

COMFAR III *Expert*
COMFAR III *Business Planner*

for Windows

REFERENCE MANUAL

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION





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INDUSTRIAL DEVELOPMENT ORGANIZATION
VIENNA, 2003



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COMFAR III Expert
COMFAR III Business Planner
for Windows
Reference Manual
2003-05-01

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The manual may be used for COMFAR III Expert as well as COMFAR III Business Planner. Since COMFAR III Business Planner does not facilitate a module for Economic analysis, the respective chapters covering the use of this module are not applicable for COMFAR III Business Planner. Later, the Reference Manual will always refer to COMFAR III Expert.

COMFAR III Expert has been developed by UNIDO using the PRESENTER development tool. The compiled version of the COMFAR III Expert software package contains parts of the PRESENTER software (library) required to run COMFAR III Expert on graphical user interfaces. This embedded software is the property of HCL Technologies Ltd., and it may be used only to run the COMFAR III Expert package under the conditions defined in the COMFAR license agreement. UNIDO affirms that it has the right to embed the HCL Technologies Ltd. software in COMFAR III Expert.

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ACKNOWLEDGEMENT

In 1983 the first generation of the Computer Model for Feasibility Analysis and Reporting (COMFAR), a computation tool for financial analysis of investments, was released. Since then, this UNIDO software has been developed further, to also support the economic appraisal of projects. During these years valuable comments and recommendations for improvement of the model have been received from users around the world, from lecturers and from seminar participants. The tenor of suggestions was to make COMFAR more flexible and to allow the user to define the scope or depth of project analysis. The new generation of COMFAR (replacing COMFAR 2.1) has been developed to satisfy the requirements of an even wider group of users and to make use of the latest state-of-the-art of PC applications.

The economic appraisal module has been redesigned by Ingrid Innerhofer and Richard Noestaller. Based on their draft, a revised, more pragmatic economic appraisal model has been developed. The browser structures for non-industrial projects were prepared by Pierre Fabre. From David Sussman we received valuable comments on the design of the financial and economic model. The model was programmed by informatics experts of the Investment and Technology Promotion Division of UNIDO, Feasibility Studies Branch. In their work they were assisted by Christian Bernscherer, who programmed the calculation modules.

The manuscript of the entire COMFAR *III Expert Reference Manual* has been prepared by David Sussman. He designed the structure of the *Manual* in close cooperation with the software engineers of the Feasibility Studies Branch, and he drafted the text for the various chapters based on the systems analysis while the programming work was ongoing. Mr. Sussman also designed and prepared the cases in a companion volume, COMFAR *III Expert Tutorial Manual* (referred to hereinafter as the *Tutorial Manual*). Birgit Niessner assisted in program testing and editing of the *Reference Manual*, which was typeset by Ursula Koenig. All these contributions and inputs, having greatly facilitated the design and preparation of the COMFAR *III Expert* package, are herewith gratefully acknowledged.

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To find a reference, use the alphabetical index at the end of the *Reference Manual*. If you are working on the computer, use the **Help** feature [?] of COMFAR III *Expert*.

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Part one

Part one

**About COMFAR *III* Expert
and the *Reference Manual***

I. ABOUT COMFAR *III Expert*

A. PURPOSE OF THE PROGRAM

The Computer Model for Feasibility Analysis and Reporting (COMFAR *III Expert*) is intended as an aid in the analysis of investment projects. The main module of the program accepts financial and economic data, produces financial and economic statements and graphical displays and calculates measures of performance. Supplementary modules assist in the analytical process. Cost-benefit and value-added methods of economic analysis developed by UNIDO are included in the program and the methods of major international development institutions are accommodated.

The program is applicable for the analysis of investment in new projects and expansion or rehabilitation of existing enterprises as, e.g., in the case of reprivatization projects. For joint ventures, the financial perspective of each partner or class of shareholder can be developed. Analyses can be performed under a variety of assumptions concerning inflation, currency revaluation and price escalations.

B. GENERAL DESCRIPTION OF THE MODEL

The program communicates with the user through a graphical user interface (GUI) to facilitate data entry. Data are entered into pre-defined annotated windows selected from a browser, a special window that graphically depicts the structure of project data. Another browser permits the user to select, calculate and display or print numerical or graphical reports.

COMFAR *III Expert* provides flexibility with regard to the structure of project data. The system presents standard input data structures depending upon the type of project and the level of analysis which can be expanded beyond the minimum structure at the discretion of the user within practical limits. The planning horizon can be expanded to up to 10 years of construction and up to 50 years of production (operational phase). During the construction and startup phases, the user may specify, with some restrictions, planning units from a minimum of one month to a maximum of one year. A variety of standardized reports for display or print in the form of numerical data or graphical output can be selected. The formats of financial reports conform generally to the schedules in the UNIDO *Industrial Feasibility Studies Manual**. Non-standard reports can be generated by exporting data to an external program.

* *Manual for the Preparation of Industrial Feasibility Studies*, newly revised and expanded edition, UNIDO, Vienna (1991).

1. Financial and economic analysis module

The *financial and economic analysis module*, which is the main module, accepts data concerning the description and definition of the project. For financial (commercial) analysis, data concerning investment and operating costs, capital structure, project financing and taxation are entered. Inflation and price escalation data can be included. Cost items can be assigned to standard or user-defined cost centres for analysis of the project's cost structure. Analysis of product profitability is also possible by allocating indirect costs among products, although it is recommended to allocate costs to products via cost centres. For joint-venture projects the level of equity participation by the partners and the distribution of profits are defined. Financial reports can be generated for each joint-venture partner.

The model facilitates the analysis of expansion and rehabilitation projects by permitting the entry of data concerning the assets of an existing enterprise in the form of starting balances. Assistance in the selection of items in the financial analysis requiring adjustments for economic analysis is provided by a module that ranks items by significance. Items can also be assigned for adjustment directly. Selected items form a data structure in the economic section of the browser. Adjustment factors relating economic prices to market prices for the selected items are defined by the user.

Financial calculations in *COMFAR III Expert* are performed essentially in accordance with the methods described in the *Industrial Feasibility Studies Manual*, and the standard financial reports follow the schedules of that *Manual*, to which this *Reference Manual* frequently refers.

Cost-benefit calculations are generally based upon the *Guide to Practical Project Appraisal*.^{*} However, the system is readily adaptable to the methods expounded in publications of other international organizations such as those of the Organization for Economic Cooperation and Development (OECD) and the World Bank.^{**}

The value-added methodology generally follows that of the *Manual for Evaluation of Industrial Projects* (United Nations Publication, Sales No. E.80.II.B.2), but is modified to include the decomposition of intermediate inputs suggested by Chervell and le Gall, writing on the effects method^{***}.

* Guide to Practical Project Appraisal; Social Benefit Cost Analysis in Developing Countries, UNIDO, 1986 (UNIDO Publication Sales No. E.78.II.B.3, reprinted in 1988, 1991 and 1993).

** I.M.D. Little and J.A. Mirlees, *Project Appraisal and Planning for Developing Countries*, OECD, 1982; Lyn Squire and H.G. van der Tak, *Economic Analysis of Projects*, World Bank, 1984.

*** Marc Chervel and Michel le Gall, *Manual of Economic Evaluation of Projects* (Paris, Ministère de la Coopération et du Développement, Paris, 1989).

2. Sensitivity module

One way to assess the impact that changes of project parameter have on the financial and economic feasibility of a project is to enter the alternative assumptions using the *Financial data input* (chapter VII) of *COMFAR III Expert*. In this case the new project data files should be saved (command **Save as**) using different filenames.

Another way is to use the *Sensitivity module* of *COMFAR III Expert*, which serves to analyze the impacts of parameter variations for critical variables without going into the data input system.

For further information refer to chapter XIII, *The sensitivity feature*.

3. On-line help features

A context-sensitive help is available at any point in the program to guide the user through program execution. While the *Reference Manual* is intended to tutor the user on how to use the application, the on-line help is intended to recall application procedures.

The on-line help (figure 1), accessible from the menu bar at the top of any window, offers a number of options.

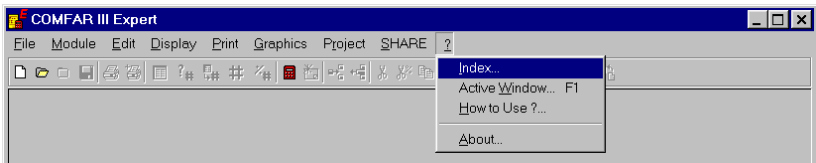


Figure 1: Help menu

The **Index** option contains in alphabetical order a list of tasks (**How to**) and a list of commands. Active are the Microsoft Windows options of the HELP window (menu bar) with File, Edit, Bookmark, Help, as well as the standard functions: Contents, Search, Back, History and Glossary. **[F1]** activates the Help for Help function (Windows Help). If **Glossary** is chosen, a box appears with a listing of keywords in alphabetical order. Choosing a **How to** task (underlined tasks) displays detailed information on that task.

The **Active Window** option provides the user with information on the currently active window and its contents (items). Underlined keywords, if selected, provide additional information. Active options are the same as for the Index above. This context-sensitive help on a currently active window can also be obtained directly by pressing **[F1]**.

The **Search** option allows the user to select words from a given list or to enter words to be reached.

The **How to use?** option connects with the Help for Help - function of the GUI (Windows).

To access the on-line help module

Choose **?** in the menu bar.

4. Hardware requirements

Hardware requirements are described in a companion volume, the *COMFAR III Expert Technical Manual*.

II. HOW TO USE THIS MANUAL

NATURE OF THE REFERENCE MANUAL

This *Manual* is one of a set of three volumes provided with the software package. Intended as a reference manual for COMFAR *III Expert*, it explains how all the functions of the system are executed, including data entry, calculations and display/printing of results. It also explains in detail how the auxiliary programs (*Sensitivity*) are executed. To seek help on a topic refer to the *Contents*, which lists major subdivisions of the text, and also the *Index* at the end of the text. COMFAR *III Expert* also includes an on-line help option covering most program functions (see chapter V.H).

Depending upon the user's prior experience, it is recommended to review sections of this *Manual* concerning general topics, such as chapter IV, *Graphical user interface*, and chapter V, *COMFAR III Expert Menus and Menu Items*, which describe the internal command structure, prior to using the program. In chapter VII, *Financial data input* and chapter VIII, *Data input for economic analysis*, a number of functions and procedures common to most data entry windows are described prior to the discussion of specific data input procedures.

COMPANION VOLUMES

Information concerning hardware requirements, peripheral interfaces, installation of COMFAR *III Expert* and other technical details are contained in the *COMFAR III Expert Technical Manual*. The *Tutorial Manual* contains detailed procedures for executing three complete cases from initial financial and economic data, one very simple, one relatively straightforward (it is the case contained in the *Industrial Feasibility Studies Manual*) and the third of greater complexity. Virtually all of the COMFAR functions are included within the three cases.

SINGLE TREATMENT OF EACH TOPIC

To avoid unnecessary repetition, within the limits of practicality, a single description of each function and procedure is provided. Where a procedure or function is repeated, reference is made to the section of the text containing the original description.

TEXT CONVENTIONS

Conventions have been adopted in the text to avoid ambiguity and to readily identify references to other documents or sections of the text. References to other parts of this *Manual* usually give the number of the chapter and, if necessary, the sub-chapter and/or section, e.g., chapter IV.B.1. References to other documents cite the author, publisher and date and are given in a footnote.

TERMS WITH SPECIFIC MEANING

The term *expand* is used in conjunction with an increase in the level of detail of the data structure; the term *extend* is used in connection with the display of the structure.

Cost items are *assigned* to cost centers but *allocated* to products.

Inflation refers to the increase in prices in a particular currency, usually reported in terms of a price index. *Escalation* refers to relative price changes for a particular commodity.

Data generally refers to numeric information. However, the term is also used in some cases where both alphabetic and numeric information are combined. Its meaning should be clear from the context. Strictly alphabetic information is *text*. To distinguish between the two types of information, the term *data* is generally (but not exclusively) reserved for quantitative numeric information; *text* refers to descriptive alphanumeric information.

Names of keys to be pressed on the keyboard are enclosed in brackets with the name in bold print and capitalized, e.g. [ENTER]. A plus sign (+) between two keyboard key names indicates that the two keys are pressed simultaneously.

III. GETTING STARTED

This section describes how to start COMFAR *III Expert* after it has been installed. For installation instructions refer to the *Technical Manual*.

COMFAR *III Expert* operates in the graphical environment MS Windows.

Most of the operating procedures for the graphical user interface (GUI) are described for a mouse, but in some cases the keyboard equivalent is also described. Refer to the GUI manual for other keyboard equivalents where necessary. For users unfamiliar with the GUI, it may be necessary to review chapter IV or the GUI supplier's manual.

The following describes the use of COMFAR *III Expert* under Windows.

To start the program

- Turn on the computer. Windows is started.
The COMFAR III Setup program automatically creates a Shortcut.
- If the COMFAR *III* Shortcut appears on the screen, double-click it.
- If the COMFAR *III* Shortcut does not appear on the screen, select **S**tart, choose **P**rograms, choose the **COMFAR *III* folder** and click the **COMFAR *III* program** to be started.

The COMFAR IDENTIFICATION WINDOW is displayed (figure 2) in which the serial number of the licensee appears. Please provide this number when requesting assistance from UNIDO.

Start COMFAR by clicking the **OK** pushbutton in the IDENTIFICATION WINDOW with the mouse.



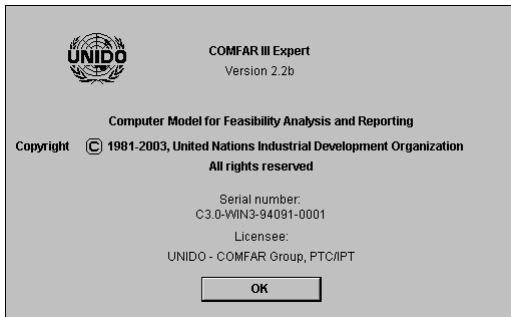


Figure 2: COMFAR identification window

The MAIN COMFAR window (figure 3) is displayed. It contains a menu bar, browser and browser overview panels.

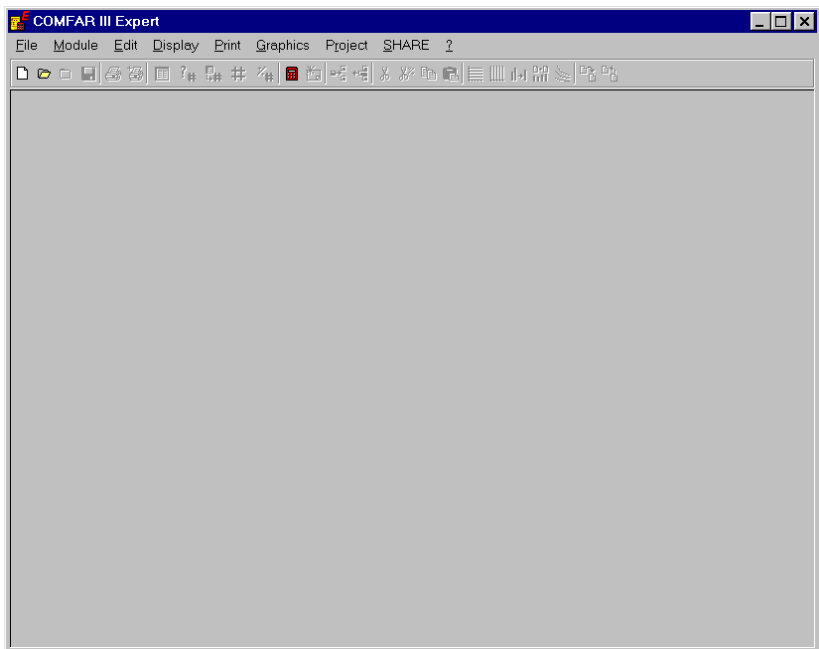


Figure 3: Main window with menu bar and browser

How to proceed with program operations is described in chapter V.

THE DIALOGUE LANGUAGE *

A dialogue language for the user interface can be selected, if alternative languages are installed, using the **Languages** feature of the DISPLAY MENU (see chapter V.D). The dialogue language may differ from the environment language of Windows.

Printouts can be obtained in other languages, if installed (for installation procedures see the *Technical Manual*). The printout language is selected in the PAGE SETUP MODAL WINDOW of the PRINT MENU. The standard (default) language for printing is the dialogue language.

* COMFAR III *Expert* was released in English in 1994; other languages will follow, depending on demand.

Part two

Part two

Communication with the system

IV. GRAPHICAL USER INTERFACE

The graphical user interface (GUI) is the medium of interaction between the user and COMFAR *III Expert*. Program features are executed by selecting and choosing options which are presented in graphical form. The use of a mouse, for which most of the procedures in the *Reference Manual* are described, greatly facilitates program operations in this type of environment.

The GUI devices described in this section are used in various parts of the COMFAR *III Expert* system. For one who is not familiar with MS/Windows and similar environments, this section should be reviewed prior to starting COMFAR *III Expert*. For more detailed information than that provided in this chapter, consult the reference manual for your graphical environment.

COMFAR *III Expert* accepts both numerical data and textual information concerning the project under analysis. To distinguish between the two types of information, the term *data* is generally (but not exclusively) reserved for quantitative numeric information; *text* refers to descriptive alphanumeric information.

A. MOUSE AND KEYBOARD FUNCTIONS

Some of the basic terminology and techniques used in this *Manual* are explained below. Other terms are explained as they are used in the text.

TERM	MEANING
<i>Click</i>	Quickly press and release the mouse button
<i>Drag</i>	Hold down the mouse button while the mouse is moved
<i>Point</i>	Move the mouse until the mouse pointer is on the item chosen

The terms *choose* and *select*, as used in this *Manual*, have distinctly different meanings:

Choose Choosing an item/pushbutton etc., from a menu, window or panel initiates an action of the program, e.g., **New Project** or **Save Project** from the FILE menu or **Calculator** from the EDIT menu. Choosing an icon initiates a function.

Select Selection of an item, e.g. **Vertical** or **Horizontal view** in the DISPLAY menu or **Rehabilitation project** and **Joint-venture project** in the PROJECT IDENTIFICATION window, has an impact on further actions during program execution but does not initiate the action. The selected item/radio button etc. can appear highlighted, with a dotted rectangle or both.

Methods of selecting and choosing are described primarily for the mouse. A limited number of functions are described for the keyboard.

B. GRAPHICAL USER INTERFACE COMPONENTS

1. Windows

A window is generally the full display that is seen on the monitor when operating under GUI. COMFAR windows are the means for dialog between the program and the user. They request information about the project or supply information that might be needed. They provide the tools for carrying out operations and functions and for data entry. Several types of windows are found in *COMFAR III Expert*. Most windows have common items such as a window title and menus. However, most contain other devices for executing special functions which are described in a general way in this section and more extensively in the section describing the particular operation or function.

NORMAL WINDOW

A NORMAL WINDOW (see figure 4) may be opened or closed while other normal windows are active. In its title line the normal window contains the icons described below.

The WINDOW TITLE generally shows the name of the application (window), of the document (name of the COMFAR file loaded), and the Project type. It cannot be modified.

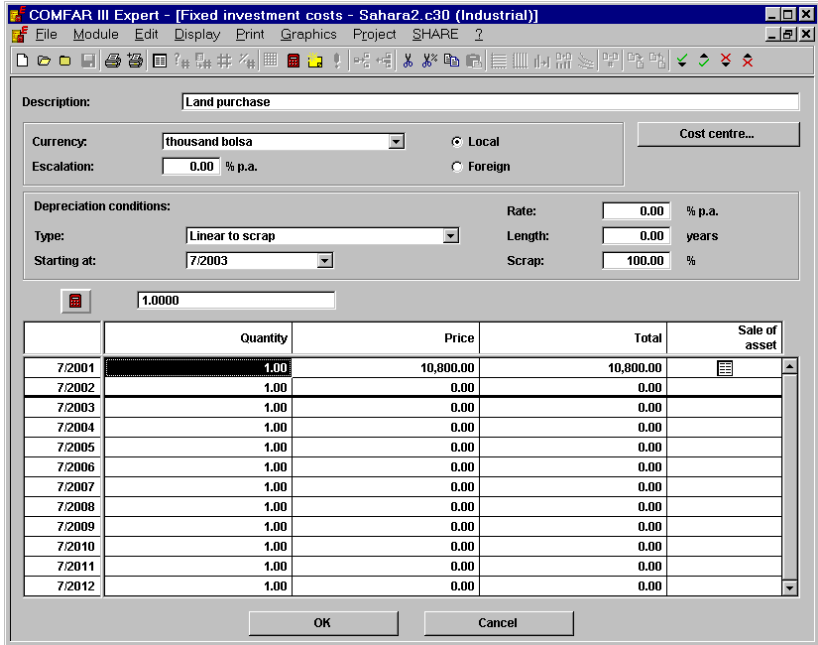


Figure 4: Normal window



The SYSTEM MENU ICON is in the upper left corner of the window. The system menu is most useful if the keyboard is used to work with the window. By using system menu commands, the window can be resized, moved, maximized, minimized or closed. (With a mouse these functions can be performed by clicking and dragging.)

The MENU BAR lists the available menus. In this case the menus represent the classifications of available menu items which are the major COMFAR commands and functions. Menus and menu items are described in the following section.



By clicking the MINIMIZE ICON with the mouse, the entire window is reduced to an icon.



The RESTORE ICON has an up-and-down arrow. Clicking this with the mouse restores the window to its previous size.



The MAXIMIZE ICON expands the window to the full screen when clicked with the mouse. This icon is then converted to the restore icon (see above).



The MOUSE CURSOR (small arrow or I-beam) appears when a mouse is installed. Its position changes as the mouse is moved.

The WINDOW BORDER is the outside edge of a window. The border can be lengthened or shortened on each side of the window using the RESIZE CURSORS.



The RESIZE CURSOR appears in the form of a double-headed arrow when the mouse cursor moves over a window border or corner. The size of the window is changed by clicking the left mouse button when the resize cursor appears, then dragging the cursor to the desired position and finally releasing the mouse button.

The *client area* usually contains one or more panels. A *panel* is a box within a window. Some windows contain several panels. For example, the FIXED INVESTMENT COSTS window (figure 4) contains a CURRENCY panel and a DEPRECIATION CONDITIONS panel.

Normal windows containing the System Menu Icon can be closed (exited) with the acceleration keys [ALT]+[F4]. This applies to both program windows and applications. The function is more fully described below.

ACCELERATED EXIT FROM A WINDOW

Normal windows containing the System Menu Icon can be closed using the acceleration keys [ALT]+[F4]. If the information in the window has changed after it was last opened, a *modal window* appears advising of the change and asking whether the changed version of the project file should be saved. Three pushbuttons are available in this modal window:

PUSHBUTTON	MEANING
YES	SAVE and then EXIT as requested
NO	DO NOT SAVE and EXIT
CANCEL	CANCEL the [ALT]+[F4] command

MODAL WINDOW

A modal window (figure 5) is a type of window that requires the user to complete entries before continuing to work in the application window from which the modal window was invoked. It is necessary to accept or cancel the selections in order to proceed with other parts of the program.

Modal windows are used in COMFAR III Expert for certain selection functions and also to display error messages. In the former case, the modal window appears when the appropriate button is selected; error messages appear when entry of inconsistent data is attempted. To deactivate the SALE OF ASSET modal window, for example, and to proceed with further data entry it is necessary to accept the entered data (**Currency**, **Date of Sale** etc.) by choosing the **OK** pushbutton or to cancel the entries with the **CANCEL** pushbutton.

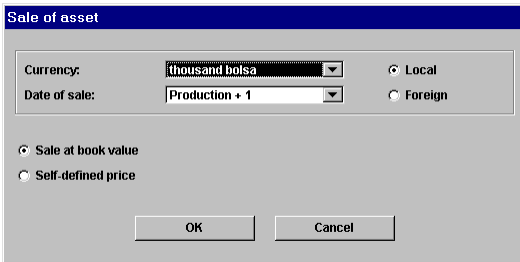


Figure 5: Modal window

WINDOW COMPONENTS

A typical working window contains various graphical components or devices which are used to facilitate data entry and commands. The PROJECT IDENTIFICATION window (see figure 6) includes several of these components: SINGLE-LINE entry field, MULTIPLE-LINE entry field with scroll bar, RADIO BUTTONS, CHECK BOXES and PUSHBUTTONS.

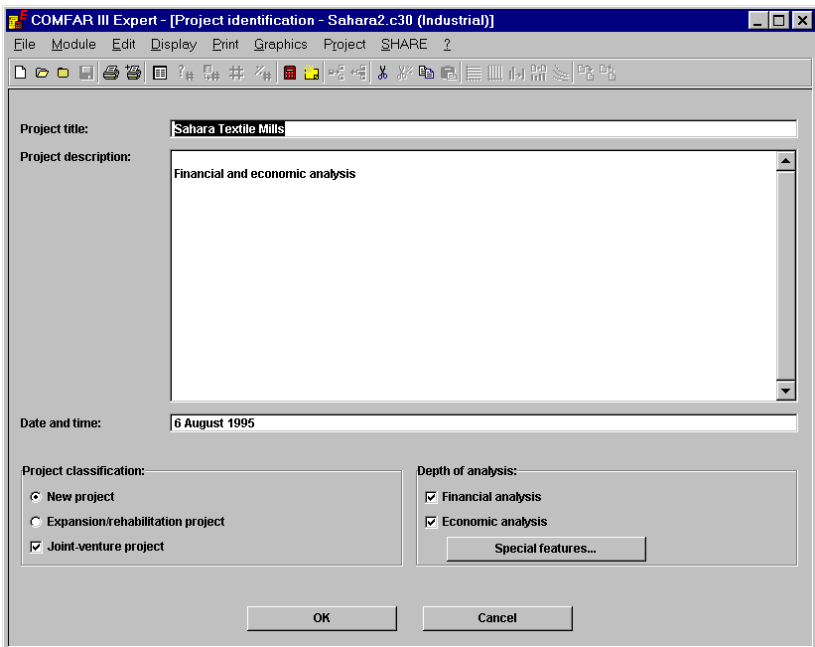


Figure 6: Project identification window

2. Menu bar

Each menu in a menu bar (figure 7) contains a category of menu items which are the commands and functions required to operate the program. Working with other types of menus is explained as needed in the text.

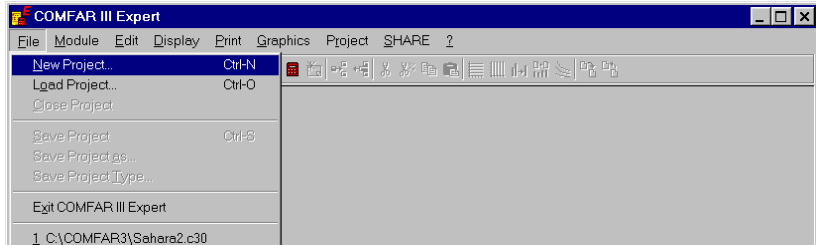


Figure 7: Menu bar

The separator in a list of menu items is used to segregate related items in the menu.

Normally only those menu items which are consistent with the current program status are active when the menu is chosen. For example, in figure 7 only the menu items **New Project**, **Load Project** and **Exit COMFAR III Expert** are active.

SELECTING AND CLOSING A MENU

A menu is selected (highlighted) and then a menu item is chosen. Choosing the menu item executes the action.

To choose a menu

WITH THE MOUSE:

- With the mouse cursor, point to the name of the menu on the menu bar and click the left mouse button. This opens the menu.

For example, if **F**ile is selected from the menu bar in the MAIN WINDOW, the FILE MENU appears as a drop-down list box as shown in figure 7 (see below for description of the drop-down list box).

WITH THE KEYBOARD:

- Press [ALT] or [F10] to select (highlight) the menu bar.
- Press [→] or [←] to move to the menu of interest.
- Press [ENTER] to open the menu. Alternatively, [ALT] can be pressed to move to the menu bar and then the underlined letter in the menu name can be typed to open the menu.

To close a menu

- Click the mouse anywhere outside the menu, or
- Press [ALT] or [F10] to cancel the menu and move back to the workspace, or
- Press [ESC] to close the menu and remain on the menu bar.

CHOOSING AN ITEM FROM A SELECTED MENU

After the menu is chosen and the drop-down list of menu items is displayed, the procedure for selecting an item from any of the menus is the same.

To choose an item from a selected menu

- Click the item or
- Move to the item to be chosen with [↑] or [↓] and then press [ENTER].

CHOOSING AN ITEM FROM THE TOOL BAR

Below the menu bar a tool bar with icons for the most important menu items is displayed.

To choose an item from the tool bar

- Click the icon representing the menu item.

3. Buttons**PUSHBUTTON****OK**

A pushbutton is chosen to carry out an action. A pushbutton with an ellipsis extension (...) in its title expands to a modal window when chosen. In the PROJECT IDENTIFICATION window the pushbuttons shown have the following functions:

PUSHBUTTON	FUNCTION
OK	Carries out the chosen functions
CANCEL	Closes the window and cancels the chosen functions

The function of the other pushbuttons in the PROJECT IDENTIFICATION window are described in chapter VII.F.

To choose a pushbutton

WITH THE MOUSE:

- Click the pushbutton with the mouse. A dotted rectangle appears around the pushbutton title and the command is executed.

WITH THE KEYBOARD:

- Press [TAB] to move to the button to be chosen. A dotted rectangle appears around the command button title.
- Press [SPACEBAR] or [ENTER].

For example, in the DEPTH OF ANALYSIS panel of the PROJECT IDENTIFICATION window, choosing the **Special features** pushbutton causes a modal window to appear concerning **Cost centres**, **Cost allocation** and **Inflation**.

RADIO BUTTON



The choices represented by a set of radio buttons are mutually exclusive; only one of the set may be selected at a time. A black dot appears in the selected button.

In the PROJECT IDENTIFICATION window (figure 6), radio buttons are used to select either a **New project** or an **Expansion/rehabilitation project**.

To select a radio button

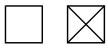
WITH THE MOUSE:

- Click the radio button for the option to be selected.

WITH THE KEYBOARD:

- Press [TAB] to move to the radio button to be selected.
- Press [ENTER] or
- Press [TAB] to move to one of the set of radio buttons.
- Use the arrow keys to move to the radio button to be selected.
- Press [ENTER].

CHECK BOX



A check box next to an option is used to select or clear the option. Check boxes are not mutually exclusive; any number can be selected simultaneously. An **X** in a check box indicates selection. Options which are not available are dimmed.

For example, in the DEPTH OF ANALYSIS panel of the PROJECT IDENTIFICATION window (figure 6), a check box is used to select **Economic analysis** (the check box for **Financial analysis** is always active).

To select or clear a check box

WITH THE MOUSE:

- Click each blank check box to be selected.
- Click a selected check box to clear it.

WITH THE KEYBOARD:

- Press [TAB] to move to the check box to be selected or cleared.
- Press the [SPACEBAR] or [ENTER] to select the box.
- Press the [SPACEBAR] or [ENTER] again to clear the check box.

ICONS AND ICONIC BUTTONS



Icons are small pictures that represent various COMFAR *III Expert* functions. These icons are found within windows and panels (a box within a window) and are chosen by clicking with the mouse or by keyboard actions. The **Graphics Icon** is used in the report system to select graphics output. Several icons are used in the browser and browser overview panel, which are used in the definition of the project structure, for extending or contracting the structure or to invoke data entry procedures (see chapter VI, *Data structures*).

The description and functions of icons are contained in the sections describing the window or panel in which they are found.

Iconic buttons are used in conjunction with a data field for the entry of numerical data into a list box (see below). In the DISCOUNTING window (see figure 8) three iconic buttons are used to facilitate data entry for the **Discounting rate** and **Number of years**.

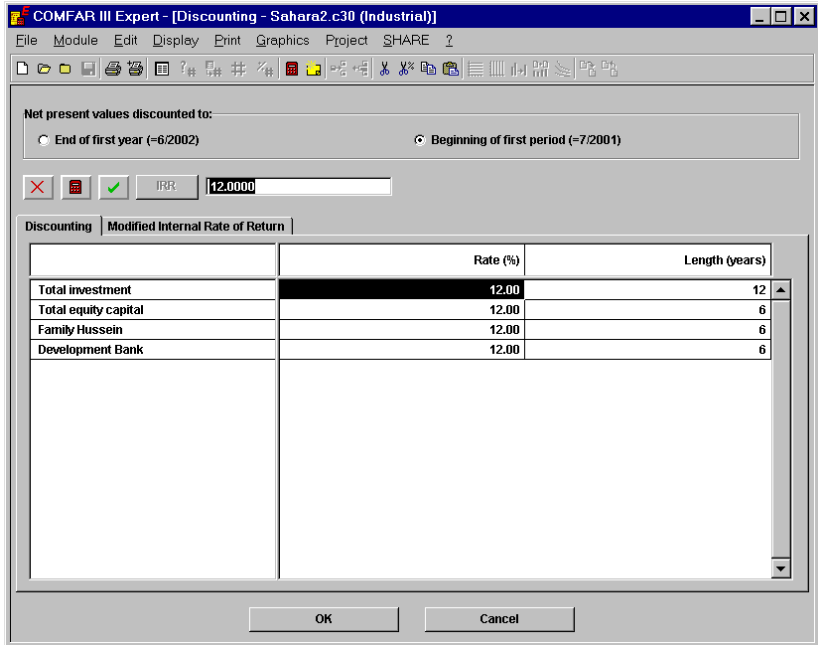


Figure 8: Iconic buttons, data field and associated list box



The **Calculator Icon** activates a calculator, which serves to calculate a value and transfers the computed value to a selected cell of a list box.



The **Cancel Icon** cancels the entries in the data field.



The **Check Icon** accepts the data as entered in the associated data field and transfers the data to the selected cell(s) of the list box.

Data is entered with the iconic buttons by first selecting a cell or group of cells in the list box, entering the data in the field and using the iconic buttons or the keyboard to accept or cancel the data in the field.

The data field is selected with the mouse cursor or with [TAB]. As the cursor (small arrow) approaches the left side of the data field it converts to a small black arrow. Clicking the mouse cursor in this area selects the field and is confirmed by an insertion point (flashing vertical line) at the beginning of the field.

Alternatively, the mouse cursor can be moved to a point within the data field. The cursor converts to a vertical **I-BEAM**. Clicking the mouse selects the field, which is confirmed by a flashing vertical line at the point of the data field.

When the data field is selected, the check and cancel iconic buttons appear in the window adjacent to the pocket calculator. The iconic buttons appear also when numerical data is typed at the keyboard.



A special cursor, the **Cross Cursor**, is used for selecting cells of the list box. When the mouse cursor enters the area of the cells in a list box it converts to a Cross Cursor.

Iconic buttons are chosen by clicking with the mouse.

To select cells in the list box

WITH THE MOUSE:

- Selecting the header for a row or column with the mouse cursor selects the entire row or column.
Selecting the upper left header with the mouse cursor selects the entire list box.
- A single cell or group of cells is selected by moving the mouse cursor to the first cell to be selected. The mouse cursor converts to a cross cursor.
- Press the left mouse button and drag the cross cursor over the cells to be selected. When the cross cursor is at the last cell to be selected, release the left mouse button.
- The selected cells are highlighted.

To enter data using the data field and iconic buttons

WITH THE MOUSE:

- Select either the complete list box, a column or a cell of the list box (see above and *List box* below).
- Type the data value in the data field to be entered into the cell(s) of the list box.
- Choose the Check Icon to accept and transfer the entered data to the list box.



The data value appearing in the field is transferred to all selected cells in the list box simultaneously.

Data is most easily entered in the list box using the keyboard. When a window with iconic buttons is invoked, the data field is automatically selected when data is typed at the keyboard. Then the data is transferred to the selected cell with either [ENTER] or one of the [↑] [↓] [←] [→] keys. Using one of the arrows transfers the data from the data field to the selected cell in the list box and moves the selection to the next cell.

To enter data using the data field

WITH THE KEYBOARD:

- When the window is invoked, the upper left cell of the list box is highlighted.
- Move to the selected cell with one of the [↑] [↓] [←] [→] keys or by moving the cross cursor to the selected cell and clicking the mouse. Multiple cells are selected by dragging the cross cursor over the cells.
- Enter the data value at the keyboard (the value appears in the data field).
- Press [ENTER] or one of the [↑] [↓] [←] [→] keys.

The value appearing in the data field is transferred to the selected cell(s). If [ENTER] is pressed the selected cell remains highlighted. If [↑] [↓] [←] or [→] is pressed, the next cell is highlighted (depending on the direction of the arrow).

- Continue entering data as described above.

Accept or cancel the data entries with the **OK** or **CANCEL** pushbutton. Control returns to the browser.

4. Fields

Information is defined by the user in a field. Fields are also used in some cases for providing information only; such fields cannot be selected and data entry is not possible.

To select a field

WITH THE MOUSE:

- Point to the field with the mouse cursor. As the cursor approaches the left side of the field it converts to a small black arrow.
- Click the mouse.

The insertion point, in the form of a blinking vertical line, appears at the left extremity of the field.

Alternatively, the mouse cursor can be placed at a point within the field, in which case it converts to an **I-BEAM**. When the mouse is clicked, the insertion point in the form of a blinking vertical line appears at the corresponding point.

ENTRY FIELD

Entry fields accept alphanumeric text. They are used for providing titles and descriptions of project items. Entry fields can be edited using the standard keyboard functions [**DELETE**], [**BACKSPACE**], [**INSERT**].

Some information is presented in fields for information only. The information cannot be selected or modified. The DESCRIPTION field in a standard FIXED INVESTMENT window (see figure 4) is an example. However, for user-defined nodes the corresponding description fields can be edited using features of the EDIT MENU.

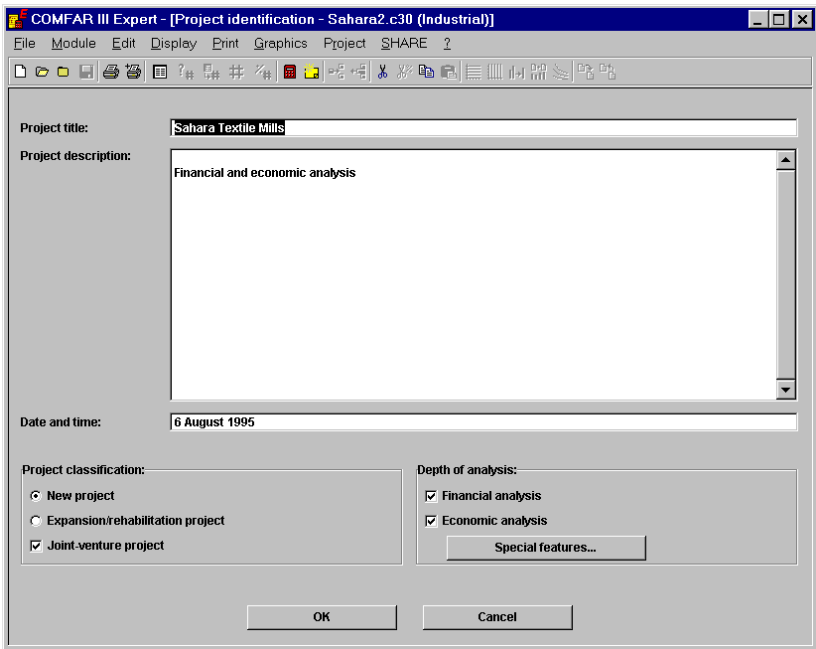


Figure 9: Project identification window

SINGLE-LINE ENTRY FIELD

The PROJECT IDENTIFICATION window, for example, contains a single-line entry field for the **Project title** (see figure 9).

To enter text in a single-line entry field

- Select the entry field with the mouse cursor or [**TAB**].
- Type the required alphanumeric information at the keyboard.

MULTIPLE-LINE ENTRY FIELD

The multiple-line entry field accepts one or more lines of alphanumeric text. In the PROJECT IDENTIFICATION window, for example, the PROJECT DESCRIPTION entry field accepts multiple lines of text.

In this type of field it is possible to enter more lines of text than appear on the screen at any one time. The field is scanned using a vertical scroll bar (see below).

Entries, acceptance and cancellation of data are similar to that of the single-line entry field.

DATA FIELD

Numerical information is either presented for information or entered in a data field. When the field is used for information only it cannot be selected (see above). The data entry format is specifically provided if other than floating point (xxxx.xx).

5. Scroll bar

A scroll bar is a device which is used for viewing information that lies outside the borders of an entry field or a list box. The DISCOUNTING window (see figure 8) shows a scroll bar with scroll arrows and a scroll box.

To scroll through information displayed in a field or box

WITH THE MOUSE:

- Drag the scroll box through all the information in the list or text.

WITH THE KEYBOARD:

- After a cell in the list box is selected, press [↑] [↓] [←] or [→] pointing in the direction of the desired scroll. [NUM LOCK] must be off.

Scrolling can be performed in several additional ways:

One line up or down Click the up or down scroll arrow.

One screen Click the scroll bar above or below the scroll box (vertical) or left or right of the scroll box (horizontal).

Continuously Hold down the mouse button while pointing to one of the scroll arrows until the information of interest comes into view.

Selected position Position the scroll box in the scroll bar to the position in the list or text desired by clicking it with the mouse

and dragging it to the selected position. For example, if the scroll box is positioned halfway on the scroll bar, the information at the midpoint of the text appears.

6. List box

A list box accepts and/or displays an array (rows and/or columns) of information, either numeric, alphabetic or a combination thereof. Several types of list boxes are used in *COMFAR III Expert*.

LIST BOX FOR ICONIC BUTTONS

A list box generally contains horizontal and vertical headers that describe its rows and columns. A vertical and/or horizontal scroll bar is added if there are more choices than can be displayed at one time.

A cell of a list box contains a data element identified by the corresponding horizontal and vertical headers.

Data is entered in a list box using the data field and iconic buttons described above. Selection of the data entry area can be accomplished in several ways.

A list box used in conjunction with iconic buttons appears in the DIS-COUNTING window, for example, to store the **Rate** and **Length** (years) (see figure 8).

To select one cell or multiple cells in a list box

- The **entire** list box is selected by clicking the upper left header cell with the mouse.
- A **row** of the list box is selected by clicking the corresponding vertical header with the mouse.
- A **column** of the list box is selected by clicking the corresponding horizontal header with the mouse.
- A **particular cell** is selected as follows:

WITH THE MOUSE:

Point to the cell and click the mouse after the mouse cursor has converted to the cross cursor when it enters a cell of the list box.

WITH THE KEYBOARD:

[↑] [↓] [←] or [→] can be used to move from a highlighted cell to any other cell in the list box to be selected.

To select a block of cells

WITH THE MOUSE:

Move the cross cursor to the cell at one of the corners of the rectangular block of cells to be selected, then press the left mouse button and drag the cursor successively through the rows and columns to be selected; when the cursor is located in the last of the cells to be selected, release the left mouse button. The selected cells are highlighted.

- Selected cells are deselected by clicking with the mouse anywhere in the list box.

The scroll bars can be used to move to an area of the list box currently not on display.

LIST BOX FOR EDIT PANEL

A list box used in conjunction with an EDIT panel (see chapter IV.B.7) contains row and column headers and generally accepts both numeric and text information. However, only a single row can be selected at one time; all of the information in the selected row is transferred to the respective fields in the EDIT panel when the **Edit** pushbutton is chosen.

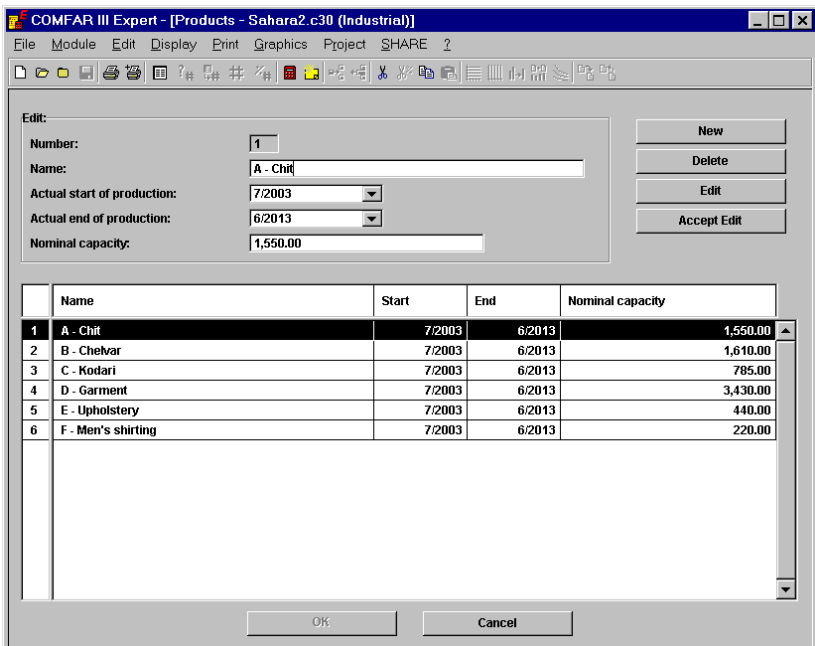


Figure 10: Products window with list box

The PRODUCTS window (see figure 10) illustrates the use of the type of list box used in conjunction with an EDIT panel.

To select a row in a list box contained in an edit panel

WITH THE MOUSE:

- Click anywhere in the row with the mouse. The row is selected.

WITH THE KEYBOARD:

- Press [TAB] sequentially until the list box is selected as indicated by highlighting of a row and a dotted border around one of the items.
- Use [↑] or [↓] to move to the row of interest.

STANDARD LIST BOX

A standard list box (figure 11) is used to select among previously defined choices. If there are more choices than can fit in the box, scroll bars are added to move quickly through the list. A list box is used, for example, in the LOAD PROJECTS window to display the files stored in the directory.

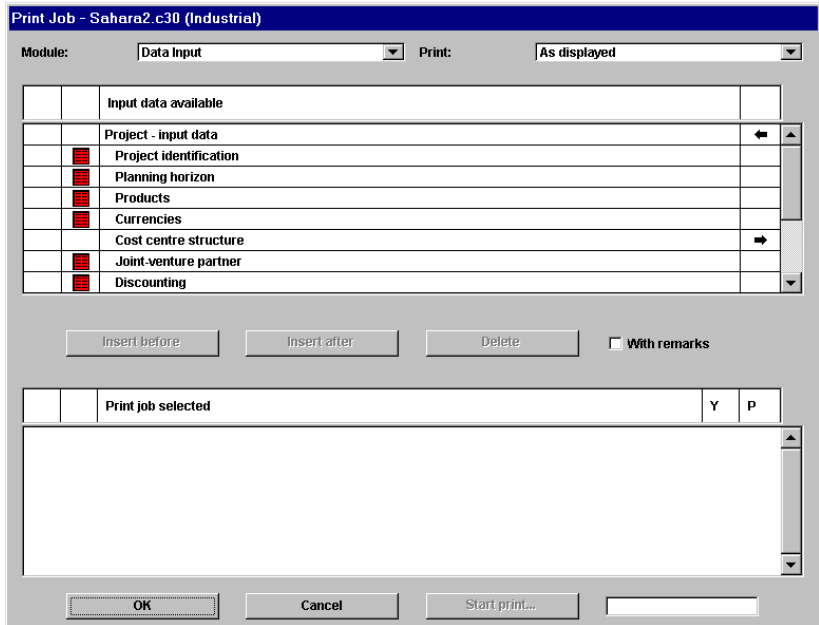


Figure 11: Standard list box

To select an item in a standard list box

WITH THE MOUSE:

- Click the scroll arrows until the item to be selected appears in the list box.
- Click the item and then choose the appropriate pushbutton or
- Double-click the item to select it and complete the command all in one step.

WITH THE KEYBOARD:

- Use [↑] [↓] [←] or [→] to scroll to the item to be selected (be sure [NUM LOCK] is off) or
- Type the first letter (for alphabetic list boxes) of the item to be selected. The first item that starts with the letter is highlighted.
- Press [ENTER].

DROP-DOWN LIST BOX

A drop-down list box is used to select among previously defined available choices. The drop-down list box appears in closed and open form.

CLOSED DROP-DOWN LIST BOX

When the drop-down list box is closed, the currently selected item in the list appears in the header. A PROMPT BOX (down arrow) appears at the right side. A closed drop-down list box is shown in the EDIT panel of the PRODUCTS window (see figure 10, "Actual start/end of production") for selecting the actual start of production.

OPEN DROP-DOWN LIST BOX

When the drop-down list box is opened by choosing the PROMPT BOX, the pre-defined list of items is displayed. The default or current selection is displayed in the header. If there are more items than can fit in the box, a scroll bar is added.

To open a drop-down list box and select an item

WITH THE MOUSE:

- Click the PROMPT BOX at the right of the box to open the box. The OPEN DROP-DOWN list box is displayed (figure 12).

- Click the up or down scroll arrow or drag the slider box to move to the desired area of the list.
- Click the item.

WITH THE KEYBOARD:

- Move to the drop-down list box with [TAB] (the header is highlighted).
- Press [ALT] + [↑] or [↓] to open the box. Be sure [NUM LOCK] is off.
- Press [↑] or [↓] to move to the item to be selected.
- Press [ALT] + [↑] or [↓] or [ENTER] to select the item.

When the item is selected the list box closes. The selected item in the list appears in the header.

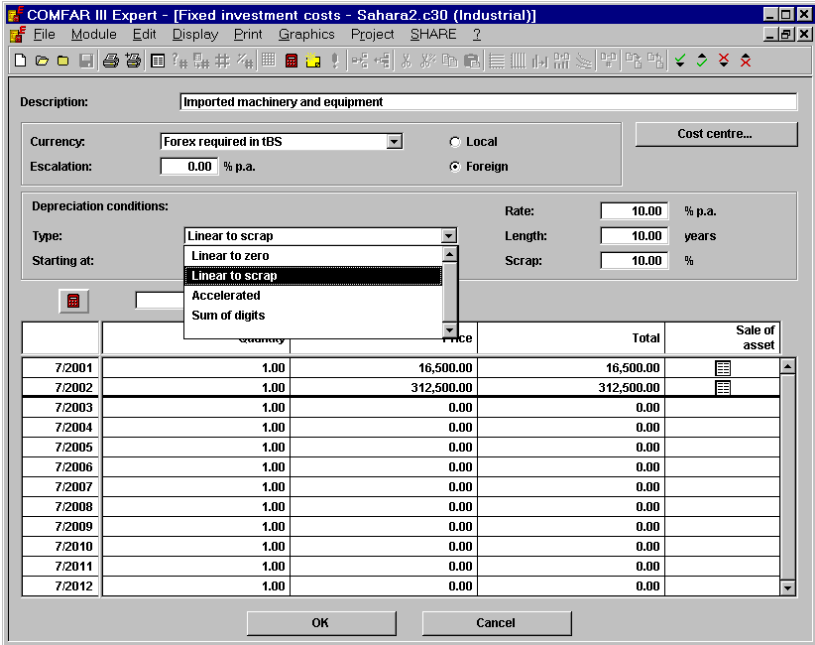


Figure 12: Open drop-down list box

7. Panels

A panel is an area of a window delineated by a border which contains a combination of related functions, text and data fields. An example is the PROJECT CLASSIFICATION panel in the PROJECT IDENTIFICATION window (see figure 9) or the EDIT panel in the PRODUCTS window (see figure 10).

EDIT PANEL

The EDIT panel in the PRODUCTS window (see figure 10) is typical of the means used for entering and editing information (data and text) in a list box. Associated pushbuttons (**New**, **Delete**, **Edit** and **Accept Edit**) facilitate entry of new data and editing previously defined data in the EDIT panel fields and list boxes. Only highlighted pushbuttons are active.

The procedures described below are generally applicable in all windows containing an EDIT panel.

To enter new information (numeric and text) in the products window list box

WITH THE MOUSE:

- Choose the **New** pushbutton.

The field descriptors in the EDIT panel are highlighted. When the EDIT panel is active, the **OK** pushbutton in its window is inactive. It is necessary to quit the EDIT panel prior to accepting the data in the entire window (see *Accept Edit* below).

- The number of the item in the list box to be defined is automatically displayed in the NUMBER display field. The number is the next sequential integer after the quantity of items previously defined in the course of project definition plus any user-defined items.
- Select the NAME entry field with the mouse cursor and type the product name as text.
- Select the NOMINAL CAPACITY entry field and type the appropriate planned capacity for the reference year.
- Use the START OF PRODUCTION DROP-DOWN LIST BOX to select the starting date of production.
- Use the END OF PRODUCTION DROP-DOWN LIST BOX to select the end date of production.
- Accept the information with the **Accept Edit** pushbutton.

The information in the EDIT panel is transferred to the list box in the row corresponding to the number.

WITH THE KEYBOARD:

- Move to the **New** pushbutton in the EDIT panel with [TAB].
- Choose the **New** pushbutton by pressing [ENTER] or [SPACEBAR] (the field descriptors in the EDIT panel are highlighted).
- Use [TAB] to traverse the fields and drop-down list boxes in the EDIT panel and enter the data for a field at the keyboard or use [↑] or [↓] for selection in a list box.
- Use [TAB] to move to the **Accept Edit** pushbutton.
- Press [ENTER] or [SPACEBAR] to accept the data.

To edit existing information

WITH THE MOUSE:

- Select a row of the list box by clicking anywhere in the row and choose the **Edit** pushbutton (or double-click the row).
The selected information appears in the EDIT panel. When the EDIT panel is active, the **OK** pushbutton in its window is inactive. It is necessary to quit the EDIT panel prior to accepting the data (with **OK**) in the entire window.
- Edit any information required as above.
- Choose the **Accept Edit** pushbutton. The information in the EDIT panel is transferred to the list box in the row corresponding to the number.

WITH THE KEYBOARD:

- Press [TAB] to move to the list box.
- Use [↑] or [↓] to move to the line in the list box to be edited.
- Press [TAB] repeatedly to move to the **Edit** pushbutton.
- Press [ENTER] or [SPACEBAR].

The information from the selected line in the list box appears in the EDIT panel.

- Use [TAB] to move sequentially to each field or drop-down list box and either enter the data or select the item.
- Use [TAB] to move to the **Accept Edit** pushbutton.
- Press [ENTER] or [SPACEBAR].

Data in the selected row of the list box is modified to conform to the edited values.

To delete existing information from the list box

WITH THE MOUSE:

- Select a row of the list box by clicking with the mouse anywhere in the row.
- Choose the **Delete** pushbutton.

The selected row is deleted. All succeeding rows are moved up one row and renumbered in the proper sequence.

WITH THE KEYBOARD:

- Press [TAB] to move to the list box.
- Use [↑] or [↓] to move to the line in the list box to be deleted.
- Press [TAB] repeatedly to move to the **Delete** pushbutton.
- Press [ENTER] or [SPACEBAR].

8. Cursors

In the GUI the mouse is represented as a pointer which takes on various shapes to achieve each of its functions. The pointer moves over the area of the window in accordance with the physical movements of the mouse.

MOUSE CURSOR



The mouse cursor is used to select a menu or menu item, an entry field or an icon or to select or choose a radio button, check box or pushbutton.

To select an entry field with the mouse cursor

- Move the cursor to the label area (left side) of the field.

The cursor changes to a small black arrow.

- Click the mouse at this point.

The field is selected, which is confirmed by a flashing vertical line at the beginning of the field.

To select or choose a menu, menu item or button with the mouse cursor

- Point to the item with the mouse cursor and click the left mouse button.

I-BEAM CURSOR



The I-beam cursor points to the position in a field to which information entered at the keyboard is transferred. When the mouse is moved within the borders of the field it changes to the I-beam cursor. The position in the field is then selected by clicking the left mouse button and information typed at the keyboard enters at the selected point.

To enter information with the I-beam cursor

- Move the mouse cursor to the selected area within the entry field.
The mouse cursor converts to an I-beam cursor.
- Click the left mouse button.
- Enter the information at the keyboard.

HOURGLASS CURSOR



The mouse cursor converts to an hourglass cursor when user interactions are temporarily suspended while system functions are performed. When these functions are completed the cursor assumes its normal aspect.

In browsers, when an icon associated with a node is selected, the mouse cursor converts to an hourglass cursor, indicating that necessary system functions are in process and that the user interface is temporarily suspended.

RESIZE CURSORS



Resize cursors expand or contract the size of a window or panel. Three forms of resize cursors are utilized.



The Left/right and Up/down cursors move the selected edge of the window left-right or up-down, respectively.



The angle cursor moves two edges at a corner simultaneously.

To resize the borders of a window or panel

WITH THE MOUSE:

- Move the mouse cursor over the border of the window.
Over one of the edges the mouse cursor converts either to the left/right or up/down cursor as appropriate. At a corner of the border the mouse cursor converts to the angle cursor.
- Press the left mouse button and drag the cursor to the desired window or panel size.
- Release the mouse button.

MOVE CURSOR



The move cursor is used in the browser overview panel to change the position of the project structure as viewed in the browser. The function of this cursor is described in chapter VI, *Data structures*.

CROSSHAIR CURSOR



The crosshair cursor is found in the graphical displays/charts (see chapter V.F). The crosshair is moved over the graph with the mouse. When the crosshair is placed at a point in a stacked bar or line graph, the corresponding coordinates (ordinate and abscissa) are displayed in the graphics window, provided **Coordinates** in the GRAPHICS menu is active. The crosshair cursor is not available in pie charts.

CROSS CURSOR



The cross cursor is used in a list box associated with iconic buttons to select cells for data entry (see *Icons and iconic buttons*).

HAND CURSOR



The hand cursor is used in the browser to move the display to a desired position. This function is described in chapter VI.

V. COMFAR III Expert MENUS AND MENU ITEMS

Menus contain the commands and other functions that are necessary to execute the program. The menu bar appears in almost all windows, including the browser and browser overview panels (figure 13), which are initially displayed when COMFAR is started (see chapter III). Items in each menu serve to facilitate the necessary operations for data entry, calculations and the preparation of reports and for other purposes, such as file management, language selection and editing. Below the menu bar a tool bar with icons for the most important menu items is displayed.

Only menu items are active which are potentially functional at any point in the execution of the program. Inactive menu items appear at low intensity in the display.

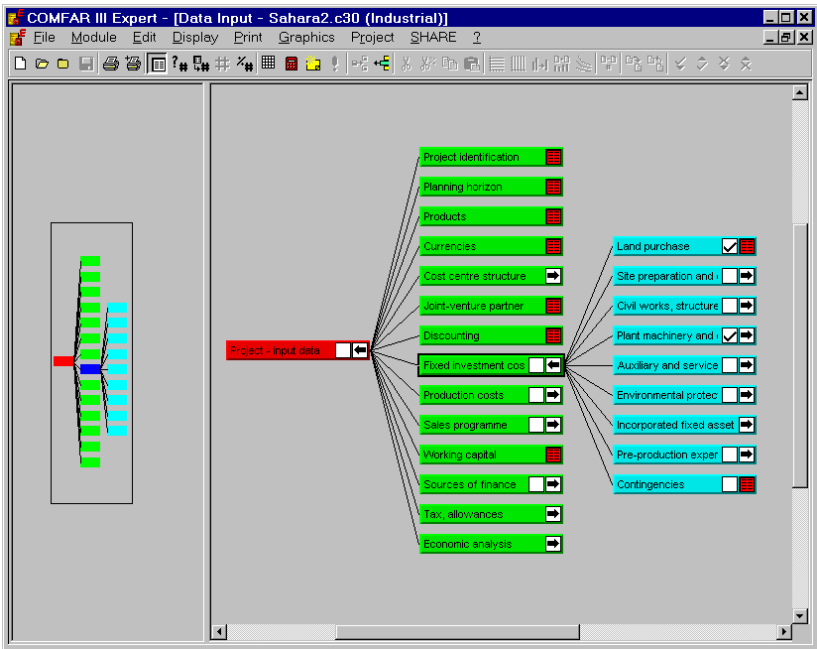


Figure 13: Main window with menu bar and browser

Each menu (FILE, MODULE etc.) contains a series of menu items that are the commands and functions which can be executed when the menu is activated. Menus and menu items are chosen either with the mouse or with the keyboard (see chapter IV.B.2). Keyboard operation involves using [ALT] and [ENTER] or [SPACEBAR].

A. FILE MENU

File items are used to initiate and to save project data. To display the FILE menu, choose **F**ile from the menu bar.

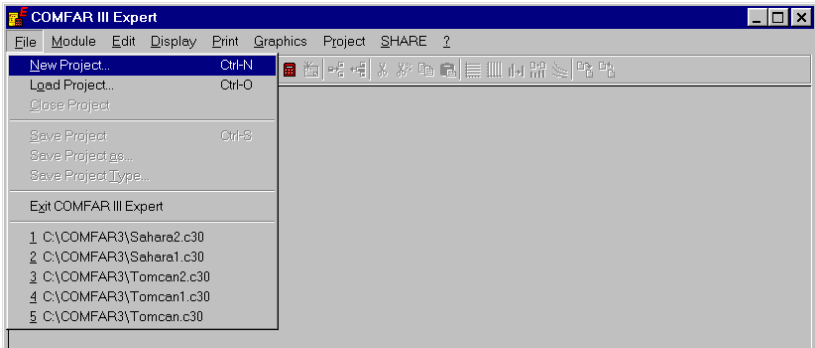


Figure 14: File menu

NEW PROJECT

A new project is one which has not been previously analyzed with COMFAR. When **New Project** is chosen from the FILE menu, only the predefined defaults (COMFAR defaults or those set by the user) are set by COMFAR. With the exception of these default settings, the user begins essentially with a blank set of windows. The nature of the project is then defined by the data and text provided via the various windows by the user.

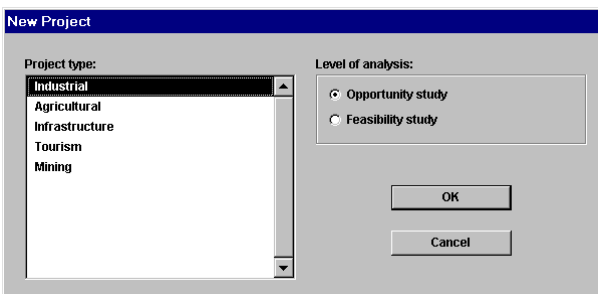


Figure 15: New project modal window

To initiate data entry for a new project

- Choose **New Project** from the FILE menu.
The NEW PROJECT modal window is displayed (figure 15).
- Select the appropriate choice from the PROJECT TYPE list box.
- Select the appropriate option button in the LEVEL OF ANALYSIS panel.
- Accept or cancel with the **OK** or **CANCEL** pushbutton.

If the selections are accepted, the browser for a new project is displayed showing the root (PROJECT - INPUT DATA) node and the first data entry node, PROJECT IDENTIFICATION (see chapter VII.F).

LOAD PROJECT

A project for which data has been previously entered and saved has a file stored in a designated directory. This project file may be retrieved by selecting **Load Project** from the FILE menu.*

To retrieve a previously saved project file

- Choose **Load Project** from the FILE menu. The LOAD PROJECT modal window is displayed (see figure 16).
- Select the drive from which the file is to be retrieved in the DRIVES drop-down list box, if different from the default drive.
- Select (by double-clicking) the directory from which the file is to be retrieved in the DIRECTORIES list box, if different from the default directory.
- Select the file format in the FILEFORMATS drop-down list box, if different from the default.

For any format the filename automatically is assigned the appropriate extension in accordance with the file formats selection.

- Select the FILENAME entry field and enter the name of the file to be retrieved.
- Alternatively, selecting a filename listed in the FILENAMES list box causes that filename to be displayed automatically in the FILENAMES entry field.
- Accept or cancel with the **OPEN** or **CANCEL** pushbutton.
- Alternatively, a file is loaded by double-clicking the filename in the FILENAMES list box.

* Up to five projects at a time may be loaded.

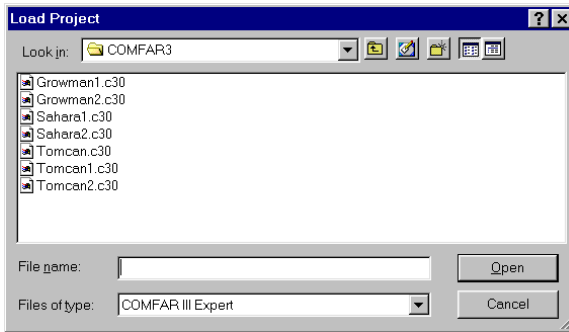


Figure 16: Load project modal window

Drives

Files can be retrieved from any drive defined in the hardware configuration. When a drive is selected the directories located in the drive are displayed in the DIRECTORIES list box.

Directories list box

If COMFAR is started, the **Default save directory** appears in the DIRECTORIES display field; however, if a file is loaded from or saved to a different directory, that directory appears instead until changed again. If the file is located in another directory, select this directory. Otherwise, skip to FILEFORMATS.

The DIRECTORIES list box contains all the directories for the active device (drive). Selecting a directory by double-clicking the directory name listed in the DIRECTORIES list box causes that directory to be displayed automatically in the DIRECTORIES field. All files for the directory selected which correspond to the selected file format are simultaneously displayed in the FILENAMES list box.

Fileformats

A file can be retrieved from any of the program formats indicated in the FILEFORMATS drop-down list box. Files saved in a format other than COMFAR III Expert are retrieved by selecting the corresponding format in the list box.

Filenames appear in the FILENAMES list box with extensions that are automatically assigned in accordance with the FILEFORMATS selection. Extensions for the different formats are as follows:

FILEFORMAT	EXTENSION
COMFAR III Expert	.C30
COMFAR III MiniExpert	.S30
COMFAR 2.1	

It is possible to retrieve financial data from files saved in the 2.1 format. Each category of data is transferred to the corresponding category of the *COMFAR III Expert* default structure.

IT IS ADVISABLE TO CAREFULLY REVIEW SUCH DATA AFTER LOADING AND TO MAKE ANY NECESSARY ADJUSTMENTS.

Filenames

To retrieve a project, the filename under which it was saved before is entered in any of the program formats indicated in the FILENAMES entry field. Alternatively, selecting a filename listed in the FILENAMES list box (see below) causes that filename to be displayed automatically in the FILENAMES entry field.

Filenames list box

Any files currently stored in the directory displayed and corresponding to the selected file format are listed in the FILENAMES list box. Selecting another directory in the DIRECTORIES list box automatically causes the filenames currently in that directory to be listed in the FILENAMES list box.

If the selections are accepted (**Open** button) the project file is loaded and the browser and browser overview panels are displayed (see chapter VI.A). When a project is loaded into the system, its name is added to the PROJECTS menu (see chapter V.G).

CLOSE PROJECT

The **Close Project** feature is used to terminate working with an active project without leaving the *COMFAR III Expert* program. If this feature is chosen from the FILE menu, the BROWSER panels are cleared and either another project can be loaded (**Load Project**), or a previously loaded project can be activated from the PROJECTS menu.

To close a project

- Choose the **Close Project** command from the FILE menu.

SAVE PROJECT

The project is saved under the same name and in the same directory. The original file is overwritten with any changes since the last execution of the **Save Project** command.

If the intention is to retain the file in its original form (prior to changes during the current session), then the **Save Project as** command should be chosen (see below), in which case either the project name or directory or the file format should be modified.

Only the input data is saved in *COMFAR III Expert*. Selected and calculated results are not saved but are retained in the computer memory so long as the file is active.

To save a project with the original filename and directory

- Choose the **Save Project** command from the FILE menu.

SAVE PROJECT AS...

This command is used to save the active project (store on a disk or diskette) with a new name, in the default directory or in a different directory*.

This feature can be used to save alternatives to the active project by changing the name or the directory (and the file format, eventually).

Only the input data is saved. Selected and calculated results are not saved but are retained in the computer memory so long as the file is active.

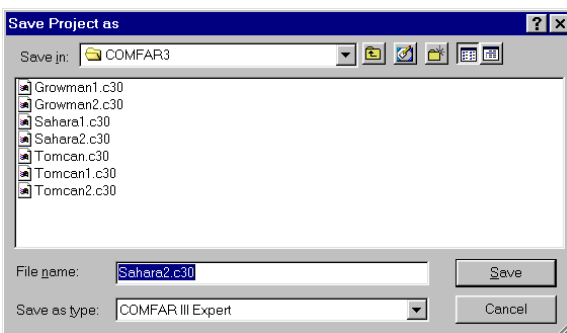


Figure 17: Save project as modal window

* If a greater number of users is interested, saving of *COMFAR III Expert* files in other formats will be made available later.

To save the active project with a new name, new directory and/or new format

- Choose the Save Project as command in the Files menu.
The Save project as modal window (figure 17) is displayed.
- Select the drive to which the file is to be saved in the Drives drop-down list box, if different from the default drive.
- Select (by double-clicking) the directory in which the file is to be saved from the Directories list box, if different from the default directory.
- Select the file format in the FILEFORMATS drop-down list box, if different from the default.
For any format the filename automatically is assigned the appropriate extension in accordance with the file formats selection.
- Select the Filenames entry field and enter the name under which the file is to be saved.
- Alternatively, selecting a filename listed in the Filenames list box causes that filename to be displayed automatically in the Filenames entry field.
- Accept or cancel with the **SAVE** or **CANCEL** pushbutton.
- Alternatively, a file is saved by double-clicking the filename in the FILENAMES list box.

Drives *

Files can be saved to any drive defined in the hardware configuration. When a drive is selected the directories located in the drive are displayed in the DIRECTORIES list box.

Directories list box

If COMFAR is started the **Default save directory** appears in the DIRECTORIES display field; however, if a file is loaded from or saved to a different directory, that directory appears instead until changed again. If the file is to be saved in another directory, select this directory. Otherwise, skip to FILEFORMATS.

* **Drives, Directories, Fileformats** and **Filenames** have been described before for the Load Project command.

The DIRECTORIES list box contains all the directories for the active device (drive). Selecting a directory by double-clicking the directory name listed in the DIRECTORIES list box causes that directory to be displayed automatically in the DIRECTORIES field. All files for the directory selected which correspond to the selected file format are simultaneously displayed in the FILENAMES list box.

Fileformats

A file can be saved in COMFAR III Expert format. Other formats will be made available later, depending on user's interest.

Filenames appear in the FILENAMES list box with extensions that are automatically assigned in accordance with the FILEFORMATS selection. Extensions for the different formats are as follows:

FILEFORMAT	EXTENSION
COMFAR III Expert	.C30

Filenames

The filename assigned to the current project is entered in the Filenames entry field. Alternatively, a filename listed in the FILENAMES list box (see below) may be selected, which is then displayed automatically in the FILENAMES entry field. By double-clicking the filename in the FILENAMES list box, the file is saved directly under this name.

Filenames list box

Any files currently stored in the directory displayed and corresponding to the selected file format are listed in the FILENAMES list box. Selecting another directory in the DIRECTORIES list box automatically causes the filenames currently in that directory to be listed in the FILENAMES list box.

If the selections are accepted (**SAVE** pushbutton) the project is saved as specified and control returns to the browser. Choosing the **CANCEL** pushbutton returns control directly to the browser (see chapter VI.A.)

SAVE PROJECT TYPE

The **Save Project Type** feature is used to save only the data structure of a project. Its purpose is to have a pre-defined structure available for other projects of the same type.

No input data is saved. For projects with multiple products, only the structure for the first defined product is saved (it is unlikely that another project has the identical product mix).

The **Save Project Type** feature functions like the **Save Project as** with the following exceptions:

- A project type is saved only in the *COMFAR III Expert* directory.
- There is only one format available in the FILEFORMATS drop-down list box (*.C3N).

To save a project type

- Choose **Save Project Type** in the FILES menu.
The SAVE PROJECT TYPE modal window is displayed (figure 18).
- Select the FILENAMES entry field.
- Enter the name of the file to be saved.
The filename automatically is assigned the extension **.C3N** to identify it as a project type.
- Alternatively, selecting a filename listed in the FILENAMES list box causes that filename to be displayed automatically in the FILENAMES entry field.
- The file is saved by choosing the **SAVE** pushbutton.
- Alternatively, a file is saved by double-clicking the filename in the FILENAMES list box.

Project type files are saved in the COMFAR directory only.

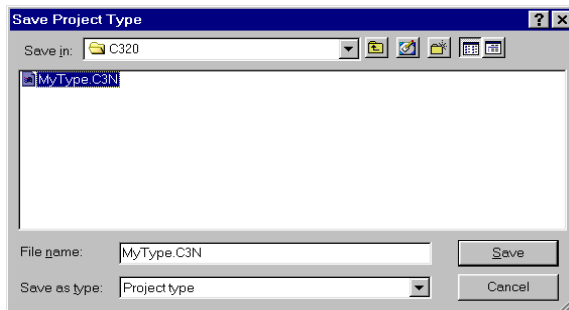


Figure 18: Save project type modal window

EXIT COMFAR III EXPERT

Invoking **Exit COMFAR III Expert** in the FILE menu terminates the COMFAR session and returns control to the PROGRAM MANAGER.

To exit COMFAR III Expert

- Choose **Exit COMFAR III Expert** in the FILE menu.

B. MODULE MENU

The **MODULE** menu (figure 19) is used to select an active COMFAR module. To display the **MODULE** menu, choose **Module** from the menu bar.

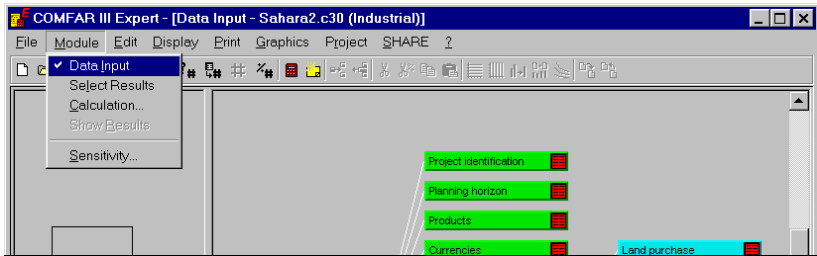


Figure 19: Module menu

DATA INPUT

Choosing **Data Input** from the **MODULE** menu causes the browser and browser overview panels to be displayed for the active project. The input data structure is displayed in the same status as that which existed at the time of the last exit from the input browser. Any further processing of data requires the use of the procedures described in part three (chapters VI, VII and VIII).

COMFAR RESULTS

Three of the menu items in the **MODULE** menu are used to produce results from the financial and economic data defined for a project. The **Select Results** feature offers the opportunity to select from among the available set of schedules (statements containing numerical results) and graphs. **Calculation** processes the input data according to the COMFAR III Expert Calculation rules and algorithms (chapters XI and XII) and stores the selected results in intermediate memory. Results are displayed and printed with the **Show Results** feature.

SELECT RESULTS

Results are the numerical and graphical reports produced by the program. The **Select Results** feature is active only when a complete project file is loaded (all input data nodes on the first level are displayed).

When **Select Results** is chosen in the **MODULE** menu, the browser and browser overview panels are displayed for selection of schedules and graphs to be calculated. A description of the features of the output browser is contained in chapter IX.

CALCULATION

The **Calculation** feature of the MODULE menu is active only together with an active **Select Results** feature. Selecting the **Calculation** feature causes the calculation of the results selected. If no results have been selected before (**Select Results** feature) only a pre-defined set of schedules and graphs is calculated. A description of the procedures for using the **Calculation** feature is contained in chapter IX.

SHOW RESULTS

Show Results is chosen from the MODULE menu to display or print the selected numerical and graphical results. This feature is active only after the **Calculation** feature has been successfully executed.

When chosen, a browser and overview panel similar to that of **Select Results** is displayed. A description of the procedures for using the **Show Results** feature is contained in chapter X.

AUXILIARY MODULES

- Sensitivity

The options are described in part four.

C. EDIT MENU

The EDIT menu (figure 20) is comprised of menu items which are used to modify existing data and text. Information can be copied, appended or deleted. It is also used to assign items contained in the financial structure of the project, as displayed in the financial section of the browser, to the economic analysis section of the browser.

To display the EDIT menu, choose **E**dit from the menu bar.

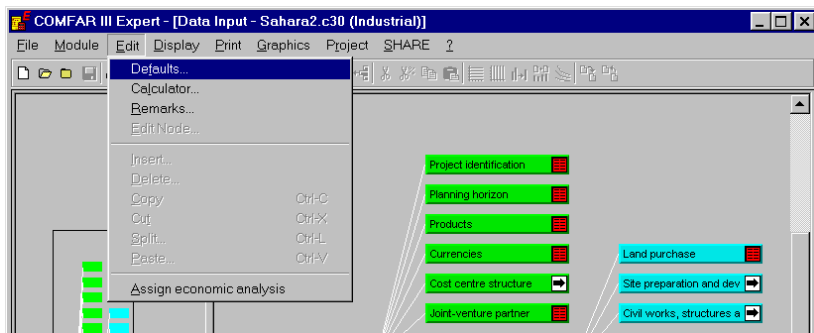


Figure 20: Edit menu

DEFAULTS

It is possible to set default values for some data and text input items as project parameters. These default values change only when set by the user to another value.

With the exception of the local currency, new items are initiated with the default parameters. These standard values are displayed automatically in the input windows in which they are contained. Local currency is used in the conversion of foreign currencies to the accounting currency (see chapter VII.C). All of the default values can be changed in the windows in which items are defined.

Default values which may be assigned are:

- Designation of initial local currency and abbreviation
- Currency in which the values of specified items are expressed
- Designation of the item as local (traded in the domestic market) or foreign (imported or exported)
- Input mode
- Depreciation type for fixed assets
- Time at which assets are sold to recover the residual value
- Minimum days coverage (for current assets and liabilities)
- Type of loan repayment plan (constant principal, annuity, profile)

- Capitalize interest during disbursement/grace period (yes, partly or no)
- Default cost allocation key
- Number format (decimal digits to be printed or displayed, decimal separator, '000 separator)
- Automatic backup (time interval in minutes or zero)
- Default save directory

To display the defaults modal window (figure 21)

- Choose **Defaults** from the EDIT menu.

Defaults

Initial local currency: Local currency

Abbreviation: LC

New items will be initialized with the following parameters:

Currency: thousand bolsa Local Foreign

Input mode: Standard Foreign

Depreciation type: Linear to scrap

Sale of assets: Production + 1

Minimum days coverage: 1.00

Coefficient of turnover: 360.00

Type of repayment: Annuity

Capitalize interest: 0.00 %

Allocation key: Direct costs

Number format: 1,234.22

Automatic backup (minutes): 5

Default save directory: C:\COMFAR3

Figure 21: Defaults modal window

To set the default values for the initial local currency

- Select the INITIAL LOCAL CURRENCY entry field.
- Enter the name of the local currency.
- Select the ABBREVIATION field.
- Enter a short name (abbreviation) for the local currency (up to five characters).

To set the default values for the input currency

- Select the **Default currency** from the CURRENCY drop-down list box.
- Select either the **Local** or **Foreign** radio button to specify the origin (default for data entry) of the item.

To set the input mode (quantity/price default)

For SALES and INVESTMENT COSTS windows, either Quantity or Price may be assigned the default value 1.

- Select the required default input mode from the INPUT MODE drop-down list box. If **Standard** is selected, Price and Quantity are assigned the value 0.

If Quantity is assigned the default value 1, then all quantity fields in the SALES and INVESTMENT COSTS windows are assigned the value 1 and only the value of the Price or the Total is to be entered for the respective items. The other value (Total or Price) is calculated.

The same logic applies for Quantity and Total, if the Price is assigned the default value 1.

- For PRODUCTION COSTS windows the default value 1 is ignored.

To set the depreciation type

- Select the default depreciation type from the DEPRECIATION TYPE drop-down list box.

Depreciation types are described in chapter VII.N.

To set sale of assets

- Select the default date of sale of assets from the SALE OF ASSETS drop-down list box.

Default values for the date of sale of assets are restricted to the balance dates of (Production + 1), i.e. the year after termination of production, or (Depreciation + 1).

During data input, however, for each individual item any balance date after the date of purchase of the asset may be defined in the SALE OF ASSET MODAL window (see chapter VII.N).

To set minimum days coverage

- Select the data entry field for **Minimum days coverage**.
- Enter the corresponding default value.

The Coefficient of Turnover (Coto) is computed automatically. It is the number rotations of a working capital item (current asset or liability) per annum. The basis for calculation is 360 days.

To set type of loan repayment

- Select the default repayment type from the TYPE OF REPAYMENT drop-down list box.

Loan repayment plans are restricted to **Annuity**, **Constant principal** or **Profile** (see chapter VII.R).

To set capitalize interest

- Select the data entry field **CAPITALIZE INTEREST** and enter the default value in% if the interest on loans during the disbursement phase (and grace period) is to be capitalized.

Interest on loans may be capitalized for a defined period (see chapter XIV.L).

To set the default cost allocation key

- Select the **Allocation** key from the ALLOCATION KEY drop-down list box.

Pushing the **Reset** pushbutton initializes each indirect cost item with the selected **Allocation** key.

To set the number format

- Select the **Change** pushbutton from the NUMBER FORMAT panel, the NUMBER FORMAT modal window is displayed.
- Select the DECIMAL DIGITS field and enter the number of digits to be displayed or printed behind the decimal point as an integer.
- Select the check box for the **1000 separator** and enter the sign to be used as separator.

The number formats must be compatible, if data are to be exchanged with other programs via the clipboard.

To set the automatic backup

- Enter the minutes to elapse between automatic backup of data input.

To set a default save directory

- Enter the directory name for the default save directory.

Choose the **OK** pushbutton to accept the default values or **CANCEL** to ignore the entries, in which case the defaults are set to the original values.

CALCULATOR



The CALCULATOR modal window (figure 22) is displayed either by choosing the Calculator Icon in a DATA ENTRY window or from the menu bar. The calculated value is returned to the selected entry field or list box cell when the **OK** pushbutton is chosen. The **CANCEL** pushbutton returns control to the point where **Calculator** was invoked.

To display the calculator modal window

- Choose **Calculator** from the EDIT menu or
- Choose the Calculator Icon in any data entry window in which it appears.



Figure 22: Calculator

If no data field is selected when the calculator is activated, the **Import** and **OK** (Export) pushbuttons are inactive.

Calculator functions can be executed either by pointing with the mouse or by using the keyboard.

REMARKS

Descriptive text can be defined or retrieved for nodes of the first level only. Although the **Remarks** feature can be called from any node, the REMARKS window (figure 23) serves to enter remarks only for a group of items (fixed investment, production costs etc.) or a group of results.

When **Remarks** is chosen from the EDIT menu a modal window is displayed in which the text is entered. A drop-down list box in the REMARKS window is used to select the group of items to which the remarks are assigned. The default is the group for the node or window from which **Remarks** was invoked.

Remarks are printed only from the PRINT JOB modal window in the PRINT menu (for a description of how to print remarks, see chapter V.E, *Print menu*).

Descriptive text can be entered also in the PROJECT IDENTIFICATION window of the data structure (see chapter VII.F).

To define or retrieve descriptive text for a browser node

- Select a node in the input or output browser.
- Choose **Remarks** from the EDIT menu.
The REMARKS modal window is displayed.
- Select the group of nodes for which remarks are to be entered or edited using the REMARKS FOR drop-down list box.
- Enter new text or edit the existing text in the MULTIPLE-LINE entry field.

The remarks are accepted by choosing the **OK** pushbutton in the REMARKS modal window.

The REMARKS FOR drop-down list box shows the group associated with the node from which **Remarks** was invoked as the default value. The remarks for any available group of nodes selected in the drop-down list box is automatically displayed in the multiple-line entry field.

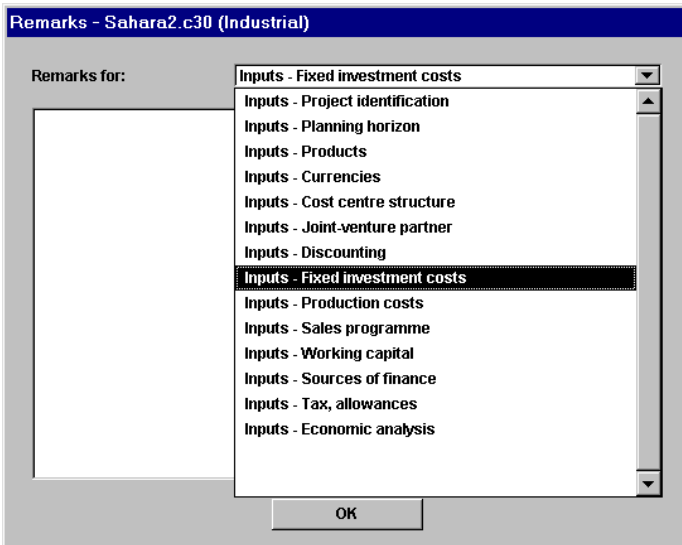


Figure 23: Remarks modal window

EDIT NODE

The name (description) of all user-created nodes in the input browser can be modified. The names of nodes contained in the standard structure at the opportunity and feasibility levels cannot be changed.

To change the name of a user-created node

- Select a user-created node in the input browser.
- Choose **Edit node** in the EDIT menu.
The EDIT NODE modal window (figure 24) is displayed.
- Select the DESCRIPTION entry field and enter the new name of the node.
- Choose **OK** to accept the new name or **CANCEL** to retain the original name and return control to the point at which **Edit node** was invoked.

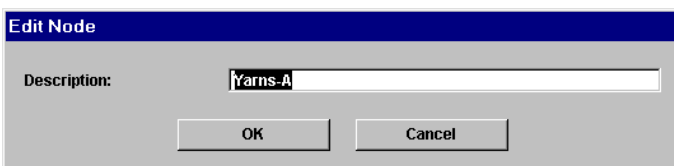


Figure 24: Edit node

INSERT (NEW SUBNODE ITEMS)

Any node beyond the standard input data structure can be expanded with up to a total of 20 subnode items. Data in the original node can be apportioned among the newly created nodes at the user's discretion. The insertion of nodes takes place at the next higher level of definition (to the right of the node selected for expansion in the browser). New nodes are numbered in sequence starting with number 1 if **According to level of feasibility study** is selected and starting with number 21, if items are **User-defined**. The description of each user-defined item contains a reference number showing its position in the browser.

The browser can have up to six levels (including the root node).

If subnodes are created, all data from the parent node is transferred by default to the first subnode.

The **Share, %** column is not active if a subnode is added to a list of previously created subnodes. The parent node has no data in this case - the original data was already transferred to the original group of created subnodes; there is no data to share.

To expand a node in the input data structure to one or more subnodes

- Select the node to be expanded in the input browser.
- Choose **Insert** in the EDIT menu.

The INSERT NEW ITEMS modal window (figure 25) is displayed with the name of the selected node in the INSERT BELOW display field.

- Select either the **According to level of feasibility study** (if active) or the **User-defined** radio button.

If the **User-defined** radio button is selected it is necessary to define the number of lines (items) to be inserted.

- Select the NUMBER OF ITEMS input data field.
- Type the number of items to be inserted.
- Press [ENTER]; the **Insert** pushbutton is activated.
- Choose the **Insert** pushbutton.

Newly created nodes are automatically assigned the name of the parent node followed by integer numbers representing the sequence. (These names can be changed in the INSERT NEW ITEMS window: Select the item to be edited; the current description appears in the input field, where it can be changed. The description of the node can also be changed by choosing **Edit** node in the EDIT menu.) The share in the first line is 100% by default.

If the radio button **According to level of feasibility study** is selected, new nodes are created according to the default structure for the particular project type (see chapter VII).

- Select a SHARE CELL in the list box.
 - Enter the share of the value contained in the selected node using the data field and iconic buttons (see above) for each newly created node (the sum is limited to 100%).
- Accept or cancel the entries by choosing **OK** or **CANCEL**.

If the entries are accepted, corresponding new nodes are created in the browser as subnodes of the selected node. If the entries are cancelled the browser appears in its original configuration.

	Description	Share (%)
21	Raw materials-1	---
22	Raw materials-2	---
23	Raw materials-3	---

Figure 25: Insert new items modal window

Any newly defined node listed in the INSERT NEW ITEMS list box below the bold line can be deleted. The **Delete** pushbutton is used to reduce the number of items to be inserted. In this case no subnode is created in the browser for the deleted item.

To delete any newly defined node from the list box

- Select in the INSERT NEW ITEMS list box the first column of the line to be deleted.
- Choose the **Delete** pushbutton.

The selected line is deleted and the names of all lines adjusted to reflect the new number of lines. The share of the deleted line (data assigned to the line) is also deleted.

DELETE

Any user-defined node can be deleted with **Delete** from the EDIT menu. Standard nodes may not be deleted. Nevertheless, it is possible to invoke the function **Delete** from any node (standard or user-defined). COMFAR offers to delete, starting from the node, from which the function was invoked, all user-defined nodes.

To delete a user-defined node from the browser

- Select a user-defined node in the input browser.
- Choose **Delete** from the EDIT menu.

The INFORMATION modal window (figure 26) is displayed.

- Choose the **YES** pushbutton to delete the indicated node, the **NO** pushbutton to keep the indicated node, the **YES TO ALL** pushbutton to delete all user-defined nodes, or the **CANCEL** pushbutton to return to the browser without deletion of the selected node.

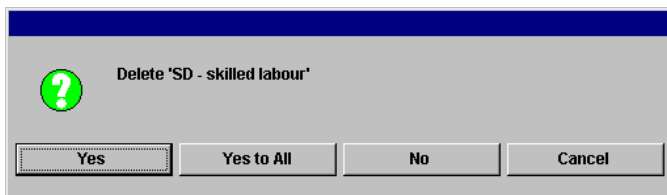


Figure 26: Information modal window

COPY, CUT, SPLIT AND PASTE

These features of the EDIT menu involve the use of the clipboard or intermediate memory in which information is stored temporarily for transfer between locations, one of which can be external to the program. All are applicable to any field in which inputs (alphanumeric or numeric) are possible.

These functions can be executed using accelerator keys which are also displayed in the EDIT menu:

FUNCTION	ACCELERATOR KEYS
Copy	[CTRL] + [C]
Cut	[CTRL] + [X]
Split	[CTRL] + [L]
Paste	[CTRL] + [V]

Copy

All or a part of the data contained in a list box or entry field can be copied using the **Copy** feature in the EDIT menu. Copied data is placed in the clipboard to be used in conjunction with the **Paste** feature to transfer the data to another location. Copied data retains its row and column structure when transferred.

The data in the copied cells is unaffected by this procedure.

To copy data from a list box or entry field

- Select the range of cells of a list box or
Select the entry field to be copied.
- Choose **Copy** from the EDIT menu.

Cut

The **Cut** feature in the EDIT menu deletes the data from the selected cells of a list box or from a selected entry field and places it on the clipboard. The original data is replaced by the default value.

To cut data from a list box or entry field

- Select the range of cells of a list box or
Select the entry field to be cut.
- Choose **Cut** from the EDIT menu.

The cut data can be transferred to another location using the **Paste** feature of the EDIT menu. Cut data retains its row and column structure when transferred to another location.

Split

The **Split** feature is used to reduce the values originally found in the cells of a list box or in an entry field by the percentage specified in the SPLIT modal window (figure 27).

The split amounts are stored on the clipboard for subsequent transfer to another location using the **Paste** feature in the EDIT menu. The values remaining after the split operation are retained in the split cells or entry fields.

The application of this feature is context-sensitive. It is not executed on portions of a data matrix for which it is inappropriate. Values such as percentage, for example, when located within a matrix containing other splittable data are not split. However, the feature is executed on a cell or matrix containing percentages only.

To split data in a list box or entry field

- Select the range of cells of a list box or
- Select the entry field to be split.
- Choose **Split** from the EDIT menu.
The SPLIT LINE modal window is displayed.
- Enter the percentage in the SPLIT entry field.
- Accept the percentage by clicking the **OK** pushbutton or cancel by clicking the **CANCEL** pushbutton.

If the percentage is accepted the appropriate selected cells are reduced in value by the specified percentage.

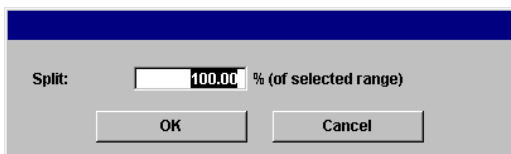


Figure 27: Split modal window

Paste

Data which has been placed in the clipboard using **Copy**, **Cut** or **Split** in the EDIT menu (or other programs) can be transferred to another location using **Paste**. Only data from the last execution of any of these three features is available to be pasted.

The upper left corner of the target (destination) cells is assumed to correspond to the upper left corner of the information in the clipboard. COMFAR checks for data type and numerical consistency. If inconsistencies exist, the transfer is carried out to the extent possible.

Two options are available: **Paste** and **Paste into selected range**

- **Paste** tries to transfer the complete clipboard regardless of the size of the target using its upper left corner as the point of reference.
- **Paste into selected range** transfers only data from the clipboard which fits into the range of target cells.

In both options the specified percentage ($> 0\%$) of the clipboard values is transferred to the target.

To paste data from the clipboard to a list box or entry field

- Select the range of cells of the target list box or target entry field to which the data is to be pasted. For the **Paste** option only the upper left cell has to be selected.
- Select **Paste** from the EDIT menu.

The PASTE modal window is displayed (figure 28).

- Select the radio button corresponding to **Paste** or to **Paste into selected range**.
- Enter the percentage of the values in the clipboard to be pasted (default value 100%).
- Choose **OK** to accept the entries or **CANCEL** to return to the browser with no change to the target matrix.

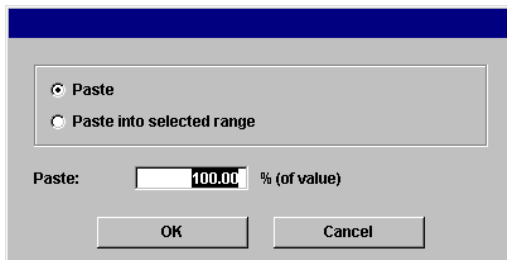


Figure 28: Paste modal window

ASSIGN ECONOMIC ANALYSIS

If **Economic analysis** (economic cost-benefit analysis) is active (see chapter VII.E), nodes in the financial data structure can be assigned to the economic section of the browser to complete the economic pricing adjustments (see chapter VIII for further discussion of these procedures). Only nodes associated with data (numerical information) can be transferred. Nodes which do not meet this criterion, such as PROJECT IDENTIFICATION, are not eligible for such a transfer.

Assign economic analysis is active only for eligible selected nodes not previously assigned. It is not active for eligible nodes without data. When new items are added to a node in the financial browser which was previously assigned to the economic browser, each new node is assigned automatically providing that data has been defined.

To assign a node from the financial browser to the economic section of the browser

- Select the node in the input browser to be transferred to the economic section.
- Choose **Assign economic analysis** from the EDIT menu.

Alternatively nodes from the financial data structure may be assigned to (or removed from) the economic section of the browser by activating (or deactivating) the Assign economic analysis icon of those nodes.

To assign a node from the financial browser to the economic section of the browser by using the icons



- Select (deselect) the **Assign economic analysis** icon on the right side of the node in the input browser to be transferred to (removed from) the economic section.



The node is transferred to the appropriate node of the economic browser.

D. DISPLAY MENU

Items in the DISPLAY menu (figure 29) determine the type of monitor presentation. A horizontal view is available for obtaining a summary report of data concerning a group of input items; the colour or grey-scale (monochrome display) for the browser can be selected; the dialogue language can be selected from among those included in the license agreement.

To display the DISPLAY menu, choose **Display** from the menu bar.

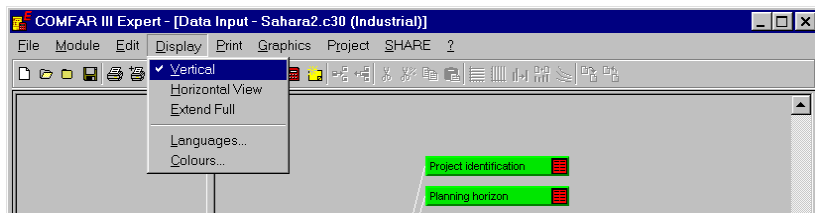


Figure 29: Display menu

VERTICAL

The **Vertical** display mode is used for data entry.

To display data entry components vertically

- Choose **Vertical** from the DISPLAY menu.

All list boxes are displayed in the vertical mode. Project periods are listed vertically and the corresponding data is entered in columns for each category. For example, in the PLANT MACHINERY window (see figure 30) the columns **Quantity**, **Price** and **Total** are used to enter the data for each project period indicated in the project periods column.

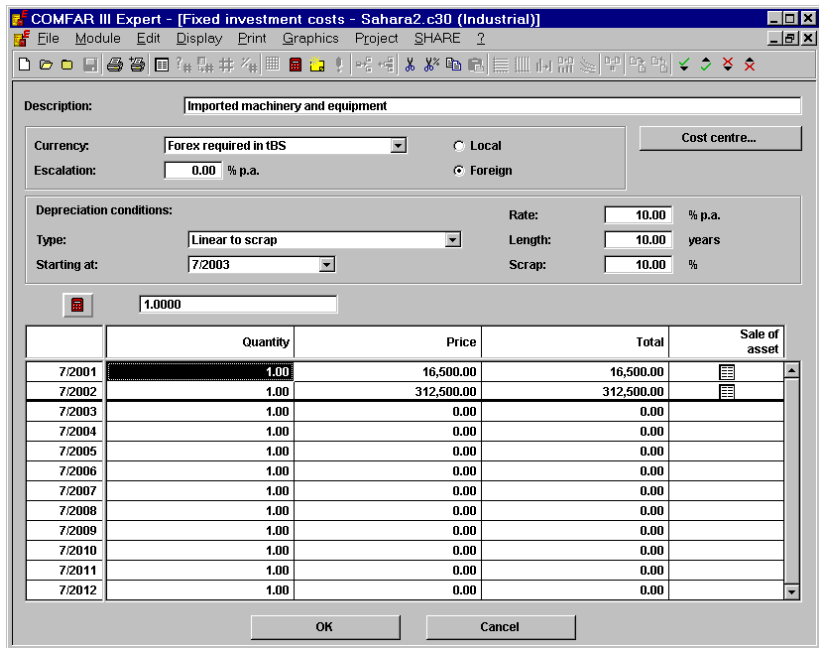


Figure 30: Vertical display - plant machinery window

HORIZONTAL

The **Horizontal** display mode allows the parallel data input into all nodes within a group of items in the input browser (e.g.: fixed investment costs).

NO DATA ENTRY IS POSSIBLE FOR CERTAIN NODES FROM THE ECONOMIC PART OF THE BROWSER.

Horizontal is available only for selected major data groups. For an industrial project, the groups for which this type of presentation is available are:

- Cost centre structure
- Fixed investment costs
- Production costs
- Sales program
- Equity, risk capital
- Long- and short-term loans
- Economic analysis – outputs (view only)
- Economic analysis – inputs (view only)
- Economic analysis - indirect effects

In the **Horizontal** display mode data are provided for item parameters and for data values in each project period. The parameters and project periods are listed horizontally and can be scanned using the scroll bars attached to the list box in the HORIZONTAL VIEW window (figure 31).

		Currency		7/2001	7/2002	7/2003	7/2004	7/2005	7/2006	7
[-]	Land purchase	IBS	Quantity	1.00	1.00	1.00	1.00	1.00	1.00	
			Price	10,800.00	0.00	0.00	0.00	0.00	0.00	
			Total	10,800.00	0.00	0.00	0.00	0.00	0.00	
			Sale of asset							
[+]	Site preparation and develop									
[-]	SD - skilled labour	IBS	Quantity	0.60	0.60	0.60	0.60	0.60	0.60	
			Price	2,500.00	0.00	0.00	0.00	0.00	0.00	
			Total	1,500.00	0.00	0.00	0.00	0.00	0.00	
			Sale of asset							
[-]	SD - fuel, foreign	IBS	Quantity	1.00	1.00	1.00	1.00	1.00	1.00	
			Price	500.00	0.00	0.00	0.00	0.00	0.00	
			Total	500.00	0.00	0.00	0.00	0.00	0.00	
			Sale of asset							
[-]	SD - spares, foreign	IBS	Quantity	0.15	0.15	0.15	0.15	0.15	0.15	
			Price	2,500.00	0.00	0.00	0.00	0.00	0.00	
			Total	375.00	0.00	0.00	0.00	0.00	0.00	
			Sale of asset							
[-]	SD - other non-traded	IBS	Quantity	0.05	0.05	0.05	0.05	0.05	0.05	

Figure 31: Horizontal display - fixed investment costs

The HORIZONTAL window is invoked from any Table Icon in an eligible group of items. The item from which the HORIZONTAL window is invoked is initially displayed as the first item in the list box (uppermost line).

To view the combined data for all items of an eligible group



- Choose **Horizontal** in the DISPLAY menu.
- Choose the Table Icon of a node for an item within an eligible group (e.g., fixed investment). The window is displayed in the horizontal mode showing parameters and periodic data for each item in the group.

EXTEND FULL (BROWSER)

The **Extend full** feature of the DISPLAY menu affects the use of the [ENTER] key and of the mouse buttons in conjunction with the browser windows.

If **Extend full** is OFF, clicking an Extend Icon on a node in the browser with the left mouse button extends the node by one level. Clicking the Extend Icon of a node with the right mouse button extends the node to all defined levels. If **Extend full** is ON, the left mouse button functions as the right mouse button, i.e. a node is extended fully by clicking its Extend Icon with the left mouse button.

If the keyboard is used to work with the browser, a node has to be selected (framed) using [↓] or [↑]. The [ENTER] key assumes the function of the left mouse button in this case.

To activate (turn on) the extend full feature

- Choose **Extend full** in the DISPLAY menu.



A Check Icon appears before **Extend full** when activated. Deactivation is accomplished by choosing **Extend full** when in the active state. In this case the check disappears.

LANGUAGES

The **Languages** feature in the DISPLAY menu is used to select the dialogue language and font mapping for languages such as Russian and Polish, which use characters other than the standard Roman set.

The language used for printed output is selected in the PRINT menu. The standard (default) language for printing is the dialogue language.

To select the dialogue language

- Choose **Languages** in the DISPLAY menu.
The LANGUAGES modal window is displayed (figure 32).
- Select one of the available languages (those included in the license agreement) using the LANGUAGE SELECTED drop-down list box.
- Select one of the available fonts using the FONT drop-down list box.

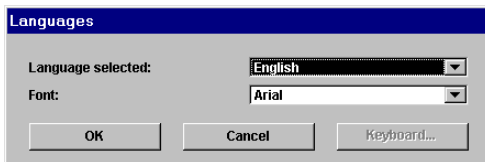


Figure 32: Languages modal window

The selected language appears as the dialogue language in windows and output displays and is also the standard language for printed output.

COLOURS

Colours in the DISPLAY menu is used to assign a colour scheme other than the default settings of the browser and browser overview panels or to change from a selected colour scheme to the default settings. For monochrome monitors the selections appears as grey scales.

To select colours for the browser and browser overview panel

- Choose **Colours** from the DISPLAY menu.
The COLOURS modal window is displayed (figure 33).
- Select the component to be changed, e.g. **Background**, by clicking anywhere in a line of the COLOURS SELECTED panel.
- Select the radio button in the COLOURS AVAILABLE panel at the left of the colour to be assigned to the component.
This above sequence is repeated for each component to be changed.
- Choose the **OK** pushbutton to accept the colour or the **CANCEL** pushbutton to cancel the colour selection.

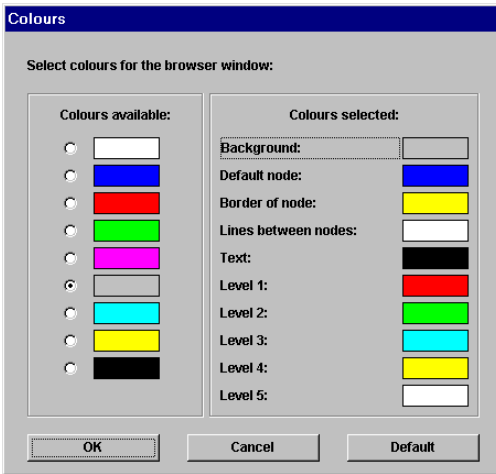


Figure 33: Colours modal window

Colours can be selected for each component of the browser and browser overview panel indicated in the COLOURS modal window. To select the default colours, choose the **Default** pushbutton at any time that the COLOURS SELECTED panel is displayed, which returns all colours to the default setting.

To return to the default colour settings for all browser components

- Choose the **Default** pushbutton in the COLOURS modal window.

E. PRINT MENU

Items in the PRINT menu (figure 34) initiate printing of selected reports and of input data, set print parameters and install printers. To display the PRINT menu, choose **P**rint from the menu bar.

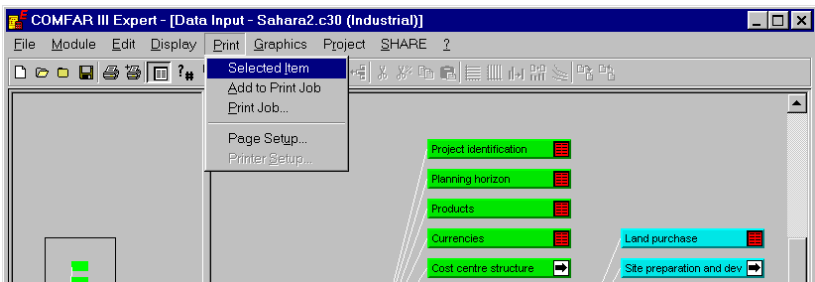


Figure 34: Print menu

SELECTED ITEM

Choosing **Selected Item** in the PRINT menu immediately initiates printing of the window which is currently on the screen. When the input browser or the select results browser is displayed, this feature prints the data of the selected (framed) node and the data of every node subordinate to the selected node.

ADD TO PRINT JOB

Choosing **Add to Print Job** in the PRINT menu places the window currently on the screen in the print queue. If a browser is displayed, the selected node (and all subordinate nodes) is added to the print job (see below).

PRINT JOB

The **Print job** feature in the PRINT menu defines the extent and sequence of printing to be performed in batch mode. Printout of input data, output (results) and data from other program modules can be specified. It is also possible to print remarks associated with any group of input data windows or a group of schedules (see chapter V.C, under *Remarks*).

To define the print job

- Choose **Print job** in the PRINT menu.

The PRINT JOB modal window is displayed (figure 35).

The MODULE drop-down list box allows to select printing of input data and of results. However, the **Results** module appears in the drop-down list box only if results have been calculated before.

- Select either **Data input** or **Results** in the MODULE drop-down list box. The **Input data available** or the **Results available** are displayed in the corresponding list box.
- The PRINT drop-down list box allows to select printing of output with sublines, without sublines or as displayed in the DATA INPUT or RESULTS windows, respectively.
- Select **With sublines**, **Without sublines** or **As displayed** in the PRINT drop-down list box.
- Select the **With remarks** check box to print descriptive text entered before for a node using the **Remarks** feature of the EDIT menu. The descriptive text is printed only the first time the associated node is printed.



Input data to be printed are selected from the INPUT DATA AVAILABLE list box for transfer to the PRINT JOB SELECTED list box; results are selected from the RESULTS AVAILABLE list box. A Check Icon appears in the first column when any item has been transferred. An icon is displayed in the second column indicating the type of output: Table Icon for data input, or a Results Icon or a Graphics Icon. For output, the Extend Icon at the right of listed items is used to display sub-items available for print. When an item is extended to sublines by clicking the Extend Icon it converts to a Compress Icon. An extended item can be compressed to the original item by clicking the Compress Icon.

Listed items may be transferred to other positions using the **Insert before** and **Insert after** pushbuttons. Selections of items or sub-items can be sequentially added to the PRINT JOB SELECTED list box which defines the extent and sequence of printing to be performed. If an item containing the Extend or Compress Icon at the right (indicating the existence of sub-items) is selected, all sub-items are automatically transferred.

Individual items are selected by clicking the corresponding line in the list box.

	Results available	
	Project - results	←
	Summary sheet	←
	Investment costs	←
	Fixed investment costs	←
	Total	←
	Structure	←
	Pre-production expenditures	→
	Working capital	→

With remarks

	Print job selected	Y	P

Figure 35: Print job

To add an item to the print job

- Select an item to be added to the print job by appropriately clicking with the mouse.
- Select the position (line) in the PRINT JOB SELECTED list box where the selected nodes are to be inserted.

If no other nodes are listed, the item is transferred to the first line of the PRINT JOB SELECTED list box. If other nodes are listed, select the one which is the basis for the insertion of the nodes to be added.

- Choose the **Insert before** or **Insert after** pushbutton.

The selected available nodes are added to the print job as specified.

If descriptive text has been entered for a node using the **Remarks** feature of the EDIT menu, the text can be printed with the node. The **With remarks** check box in the PRINT JOB modal window can be used for this purpose. This descriptive text is printed only the first time the associated node is printed.

If a printout of remarks only is required, the text should be marked in the REMARKS modal window (see chapter V.C, under *Remarks*), copied to the clipboard and pasted to any word-processing system.

To delete an item from the print job

- Click one or more items in the PRINT JOB SELECTED list box to be deleted.
- Choose the **Delete** pushbutton.

Printouts of results can be provided on a yearly basis and/or on a periodic basis when periods are defined in the planning horizon. When an item is transferred to the PRINT JOB SELECTED list box the available print options Yearly (Y) or Periodic (P) are initially indicated with the Check Icon in the Y and P columns, respectively. The Y or P option (but not both) can subsequently be deactivated by clicking with the mouse.

To deactivate one of the print options for an item if both are initially available

- Click the cell in the Y or P column corresponding to a listed item.

To initiate printing

- Choose the **Start print** pushbutton.

Printing proceeds according to the sequence of items in the PRINT JOB SELECTION list box.

The print job is defined, but printing is not initiated, when the **OK** pushbutton is chosen. Printing can subsequently be initiated by again selecting **Print job** in the PRINT menu, in which case the previously defined print job appears in the PRINT JOB window. If the **CANCEL** pushbutton is chosen, the print job returns to its original state. In either case control returns to the window from which **Print job** was invoked.

Figure 36: Page setup

PAGE SETUP

The print language and other print parameters can be defined and saved and remain in effect until changed.

To set the page setup and the print language

- Choose **Page setup** in the PRINT menu.
The PAGE SETUP modal window is displayed (figure 36).
- Select the **Language** for printed output using the PRINT LANGUAGE drop-down list box.
- Select **Point, Inch** or **MmM** from the UNITS drop-down list box.
- Select the paper **type** in the drop-down list box of the PAPER SIZE panel. The paper format is expressed in the units selected from the TYPE drop-down list box. For formats not listed, select **Other** and enter the paper dimensions (width and height fields).
- Select the LEFT, RIGHT, TOP and BOTTOM entry fields and enter the respective **Margins** in the units selected.
- Select the printing in **Portrait** or **Landscape** format in the ORIENTATION panel.
- **Page numbers** can be selected or omitted. Page numbers can be placed in the header or footer either at the left, center or right position. If pages are to be numbered, select the **Page numbers** check box. If **Page numbers** is active, it is deactivated by selecting the check box.
- The **filename** (including date and time) can be selected or omitted. The filename can be placed in the header or footer, either at the left, center or right position.
- Select (activate) the **Header** and/or **Footer** check box if a headline and/or bottom line is to be printed on each page. The horizontal position of the headline and/or bottom line can also be specified.
- If **Header** and/or **Footer** is active, select the HEADER and/or FOOTER entry field and type the text to be entered.
- Select the **Alignment (Left, Center or Right)** from the drop-down list box to define the horizontal position of the headline and/or bottom line.
- Select the corresponding check box if the user's and/or the UNIDO emblem should be printed on each page.
- Selecting **Lines** causes printing of schedules with vertical and horizontal lines; graphical charts are printed in colours or gray shades if **Colours** is selected or in b/w with patterns if deselected.
- Selecting **Calculation report** causes printing of results with a list of crucial errors (cash deficit) in the footer area.

- All printouts (columns) are resized automatically in order not to cut off text. As the size of characters printed depends on the printer, COMFAR offers the **Width correction factor**. In case text is cut off on your printer increase the factor from 5% (default) to, e.g., 15%.
- Select the **Font** and certain parameters (font size, Bold, Italic) for printed output of different components (Title, Browser level, etc.) using the FONT notebook.
Selections are accepted by choosing the **OK** pushbutton and cancelled with the **CANCEL** pushbutton.

Drafting an emblem

COMFAR III Expert allows the user to load an individual emblem, which may be printed on each page. To specify the user emblem, select the **License emblem** pushbutton in the PAGE SETUP normal window and click the **File** pushbutton to load the emblem from a file (BMP, TIFF and GIF). The user emblem is accepted with the **OK** pushbutton or cancelled with the **CANCEL** pushbutton. In either case control returns to the PAGE SETUP window.

Print parameters are in effect for all subsequent printouts until changed.

Print parameters are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton in the PAGE SETUP window.

F. GRAPHICS MENU

The items of the GRAPHICS menu (figure 37) are active only when a chart is displayed. This menu includes features which are used to define parameters for graphical displays and printout.

To display the GRAPHICS menu choose **G**raphics from the menu bar.

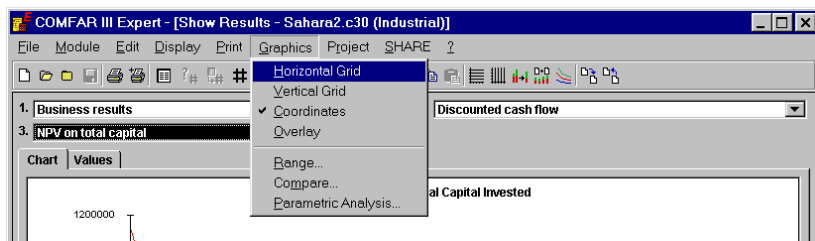


Figure 37: Graphics menu

HORIZONTAL GRID

Graphics parameters include a horizontal and a vertical grid, which may be selected (for display and printing) depending on the graph type. The **Horizontal Grid** feature is active and may be selected for all charts, except for pie charts.

VERTICAL GRID

The **Vertical Grid** feature is active and may then be selected in most of the line charts, as e.g. the break-even charts and discounted cash flows.

To activate the grid, the graphical chart must be displayed for which the grid is to be defined (figure 38).

- Select the GRAPHICS menu. If either or both of the grid options are active, select the required option: **Horizontal Grid** and/or **Vertical Grid**. A check mark appears before the selected feature.
- To remove a check mark before a selected grid, select the grid again; the check mark disappears (the feature must be active, however).

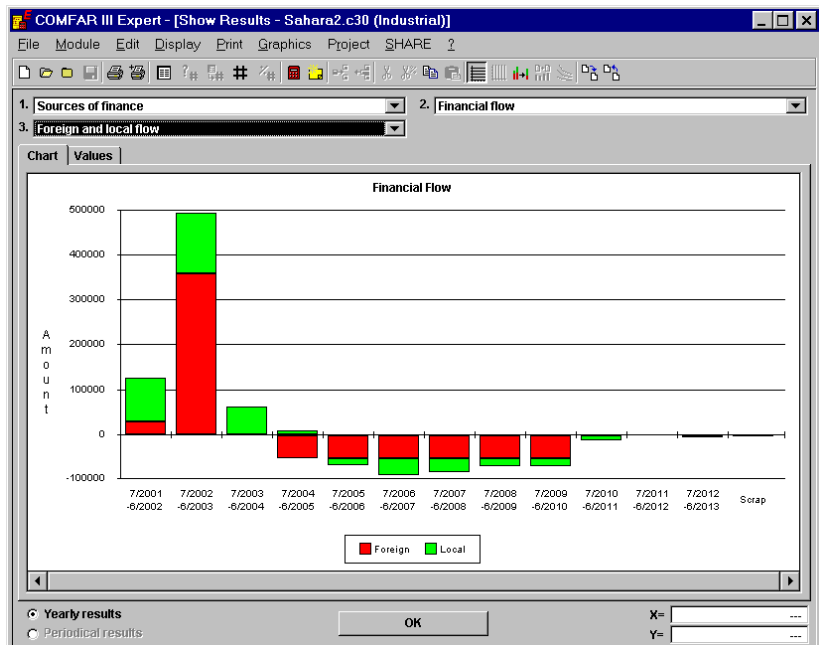


Figure 38: Graphical chart with horizontal grid

COORDINATES

Precise values of x-axis and y-axis parameters for line graphs and of points in bar graphs can be displayed in each chart or graph if **Coordinates** is selected.

When the mouse cursor moves to a position inside a graph it converts to the crosshair cursor. Simultaneously, if **Coordinates** is selected, the **x** and **y** coordinates are displayed at the bottom of the graph. The **Coordinates** feature is active by default.

To activate or deactivate the coordinates feature

- Choose **Coordinates** in the GRAPHICS menu.

If Coordinates is active already, a check appears before the item. In this case selection deactivates the feature. If no check appears, selection activates the feature.

The use of the **Coordinates** feature is illustrated in figure 39.

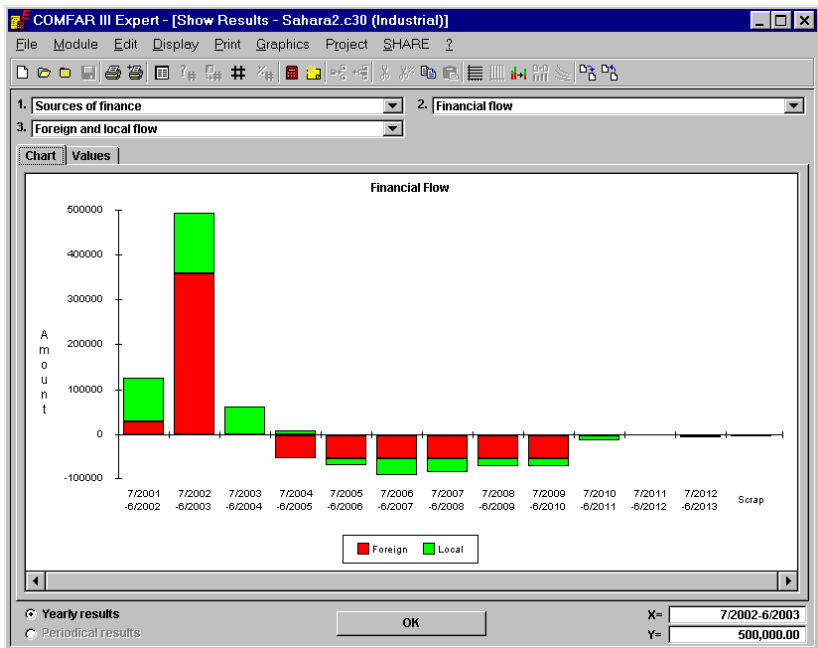


Figure 39: Graph with coordinates and corresponding x,y values

OVERLAY

In stacked bar graphs the **Overlay** feature is used to show the positive or negative consolidated values. If, for example, in one period the net financial flow of local origin is positive, say 100 units, and the net financial flow of foreign origin is negative, say -20 units, the consolidated (net) financial flow is 80 units. If **Overlay** has been selected, a line marks the consolidated values.

To put an overlay on a graph

- Choose **Overlay** in the GRAPHICS menu.

If **Overlay** is active already, a check appears before the item. In this case selection deactivates the feature. If no check appears, selection activates the feature.

RANGE

The range for the x- and y-axes of graphs and charts are automatically set by the program according to data values. However, the ranges for the x-axis can be defined by the user. The range for the y-axis is set automatically and may not be changed by the user.

To define the x-axis range for a graph or chart

- Choose **Range** in the GRAPHICS menu.

The RANGE modal window is displayed (figure 40).

- Select the FROM drop-down list box and, if applicable, the TO drop-down list box and choose appropriate range values.

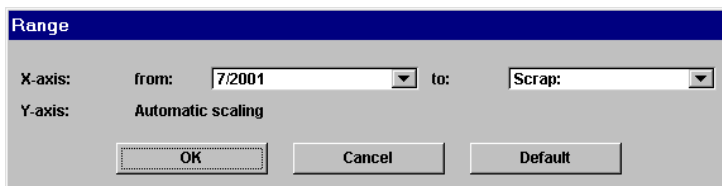


Figure 40: Range modal window (graphics)

The pushbuttons at the bottom of the RANGE modal window have the following functions:

- **OK** accepts the ranges for the selected graph or chart.
- **CANCEL** returns the range values to the original settings.
- **DEFAULT** resets the range values to the default settings for the selected graph.

COMPARE

The **Compare** feature in the GRAPHICS menu is used to compare the base project (by default the active project) with other loaded projects. The **Compare** feature is active only, when:

- A line chart (graph) is displayed, and
- More than one project has been loaded. (The names of the projects loaded are listed in the PROJECT menu.

COMFAR offers two options to compare the selected projects:

- **Absolute global range:**
This option displays or prints the respective compare chart according to the dates defined in the planning horizon windows of the selected projects. This option can **only** be activated if the planning horizons of **all** selected projects are equal or overlapping, because a respective calendar year (e.g. 1998) of the base project is compared to the same calendar year of all selected projects.
- **Relative global range:**
This option displays or prints the respective compare chart relative to the dates defined in the planning horizon windows of the selected projects. This option can always be activated because the first year of the base project is compared to the first year of all selected projects..

The following examples illustrate ¹ the two options:

	Production phase	
	Begin	End
GROWMAN1	1/1993	12/2007
SAHARA1	7/2003	6/2013
TOMCAN2	1/3	12/7
	Absolute	Relative
GROWMAN1 SAHARA1	1993-2013	Prod.-year 1-15
GROWMAN1 TOMCAN2	not possible	Prod.-year 1-15
SAHARA1 TOMCAN2	not possible	Prod.-year 1-10
GROWMAN1 SAHARA1 TOMCAN2	not possible	Prod.-year 1-15

Table 1: Compare options

Besides the global range described above COMFAR III Expert allows to define the individual range for each selected project. This option allows to

¹ The example is based on the three projects from the COMFAR III Expert Tutorial Manual

display or print for each project selected only those years which are relevant for the compare operation.

To compare selected line charts

- Load at least two projects and calculate the results.
- Display a line chart (choose the Graphics Icon for a graphics node).
- Choose **Compare** in the GRAPHICS menu.

The COMPARE modal window (figure 41) is displayed. The name and the type (e.g. Industrial) of the current base project appear in the BASE PROJECT display field.

- Select in the LOADED PROJECTS list box the project(s) to be compared with the base project by clicking into the first column. A check icon appears at the left of the project name(s) selected for comparison.
- Select the global range from the FROM and TO drop-down list box in the GLOBAL RANGE panel (subject to the projects selected COMFAR III Experts activates or deactivates the options for the global range (absolute or relative)).
- Select the individual range from the FROM and TO drop-down list box chained to the selected line of the LOADED PROJECTS list box.
- Select the COMPARE ACTIVE check box to activate the compare option.

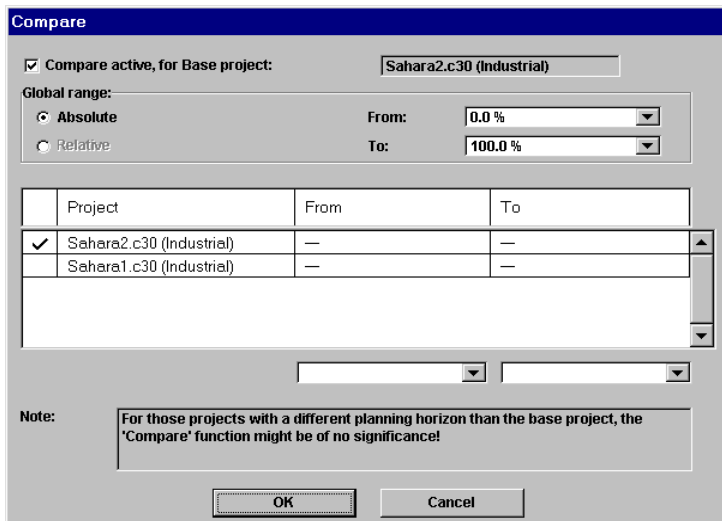


Figure 41: Compare modal window

Choosing the **OK** pushbutton accepts the compare selections. The selected project information is added to the graph. The **CANCEL** pushbutton causes the selections in the COMPARE window to be ignored and returns to the original state.

PARAMETRIC ANALYSIS

The effects of variations on project parameters can be determined using the **Parametric Analysis** feature in the GRAPHICS menu. The percentage of variation can be assigned for one of a set of project parameters. The graph then displays the nominal result and the results with the parameter variations.

Only the specified parameter is varied for this feature. Except for effects on income tax and profit distribution, no interactions with other parameters are taken into account. More rigorous sensitivity analysis is performed in the SENSITIVITY MODULE (see chapter XIII).

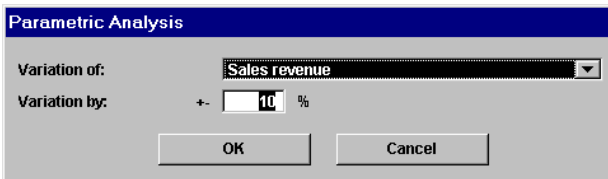


Figure 42: Parametric analysis modal window

To display the effect of a parameter variation in a graph

- Display a line chart (choose the Graphics Icon for a graphics node).
- Choose **Parametric Analysis** in the GRAPHICS menu.

The PARAMETRIC ANALYSIS modal window is displayed (figure 42).

The parameters available for variation are selected using the VARIATION OF drop-down list box. This list cannot be modified. Percentage variations for listed parameters can be specified for each parameter as follows:

- Select the parameter from the VARIATION OF drop-down list box.
- Enter in the VARIATION BY entry field the required variation (% rate).
- Choose the **OK** pushbutton to accept the parameters and to start.

After setting the variations for all selected parameters, the selections are accepted by again choosing the **OK** pushbutton.

In this case the graphs appear with results for the parameter variations included. Choosing the **CANCEL** pushbutton returns all parameter variations to the original settings.

G. PROJECT MENU

The **PROJECT** menu displays all projects currently loaded in *COMFAR III Expert*. When a project is loaded into the system, the name of the project is automatically added to the project list. A maximum of five projects can be loaded at a time. However, only one project at a time can be displayed in the browser. The check at the left of the project name indicates the project currently displayed in the browser.

To display a loaded project in the browser

- Choose **P**roject in the menu bar.

The **PROJECT** Menu is displayed indicating the active project (currently displayed in the browser) with a check at the left of the project name (figure 43).

- Choose the project to be displayed in the browser by clicking the name with the mouse.

The chosen project is then displayed in the browser.

A project is added to the **PROJECTS** menu when it is loaded.

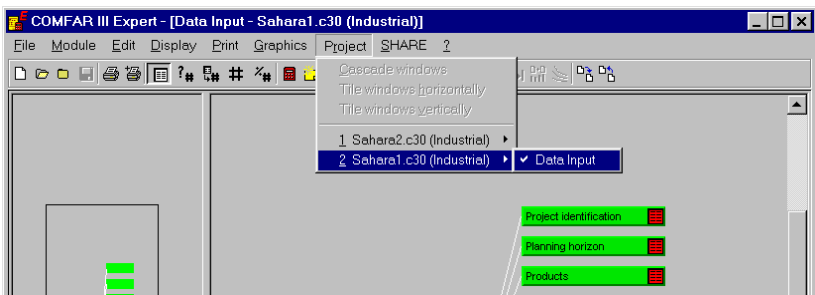


Figure 43: Project menu

H. SHARE

SHARE is the software to operate UNIDO Exchange.

COMFAR III Expert allows to exchange data with SHARE. For further information please contact UNIDO.

I. HELP MENU "?"

Context-sensitive on-line help is available at any point in the program to guide the user through program execution. While this *Reference Manual* is intended to tutor the user on how to use the application, the on-line help is intended to assist the user to recall the application procedures (see chapter I.B.6).

To display the help menu

- Choose ? from the menu bar.

J. TOOL BAR – ADDITIONAL COMMANDS

The following commands are only available in the tool bar:

- Incremental analysis (see chapter XIV)
- Next project
- Previous project
- View errors
- OK – Next window
- OK - Previous window
- Cancel – Next window
- Cancel – Previous window

To perform a function from the toolbar

- Press the respective icon from the tool bar.

Part three

Part three

The COMFAR *III Expert* model

VI. DATA STRUCTURES

A project is described by a structured array of information arranged in a **Tree**. The main stem or **Root node** represents a project. Higher levels of information are represented by successive branching.

The principle **Branches** (i.e., the first level) for a project consist of the following nodes:

- Project identification
- Planning horizon
- Products
- Currencies
- Cost centre structure (if active)
- Inflation (if active)
- Joint-venture partner (if active)
- Discounting
- Fixed investment
- Production costs
- Sales programme
- Working capital
- Sources of finance
- Taxes, allowances
- Starting balances (if expansion/rehabilitation active)
- Economic analysis (if active)

The default structure of any project is determined by the **Project type** (industrial, maritime, agricultural, infrastructure, tourism, mining) and the **Level of analysis** specified by the user (opportunity, feasibility). However, the system contains a considerable degree of flexibility to modify or to expand these structures.

A. INPUT BROWSER AND BROWSER OVERVIEW

A window containing the browser and browser overview panels is provided for design and display of the project structure. The browser window is accessed through the FILE menu as described in chapter V.A using either the **New Project** or **Load Project** features. Alternatively, the browser window is accessed from the PROJECT menu.

The browser shows the structure of the data while the browser overview panel gives a graphical illustration of the data structure in summary form.

INPUT BROWSER

When the selections from the NEW PROJECT modal window are accepted, a browser window is displayed showing only the PROJECT - INPUT DATA node and the PROJECT IDENTIFICATION node as shown in figure 44. A node represents a set of information concerning the item represented, which is displayed and/or defined in a window associated with the node. The window is displayed when the Table Icon for the node is chosen (figure 44).

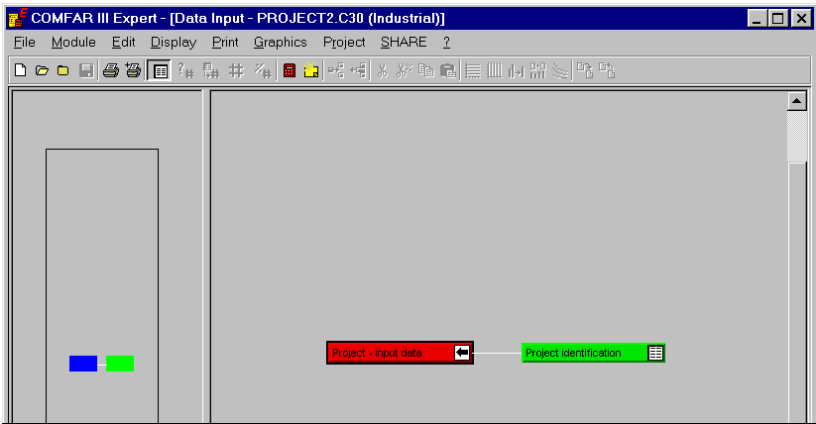


Figure 44: Browser and browser overview panels, initial display

In figure 44, the first-level nodes of a new project are shown. The data for the first five to eight nodes (depending upon the state of activation of **Cost centre structure**, **Inflation** and **Joint-venture partner**) are sequentially interdependent (Project identification - Discounting). One of these nodes appears only after data for the previous node has been accepted. After acceptance of the data in the DISCOUNTING window, all the remaining first-level nodes are displayed.

The nodes for **Cost centre structure**, **Joint-venture partner**, **Inflation**, **Starting balance** and **Economic analysis** are only displayed when the corresponding features are activated (see chapter VII.F). Joint-venture partner and economic analysis nodes are activated in the PROJECT IDENTIFICATION window. Cost centre analysis and inflation are activated from a SPECIAL FEATURES modal window invoked from the PROJECT IDENTIFICATION window.

The STARTING BALANCE node is displayed when **Expansion/rehabilitation** is activated in the PROJECT IDENTIFICATION window.

A condensed version of the structure displayed in the browser is shown in the BROWSER OVERVIEW panel (figure 45). This provides a global illustration of the project's data structure and is used to select the portion of the structure displayed in the browser.

When a project which has been previously analyzed and saved is loaded using either the **Load Project** feature of the FILE menu or **Project** in the menu bar, the previously defined structure is displayed in the browser.

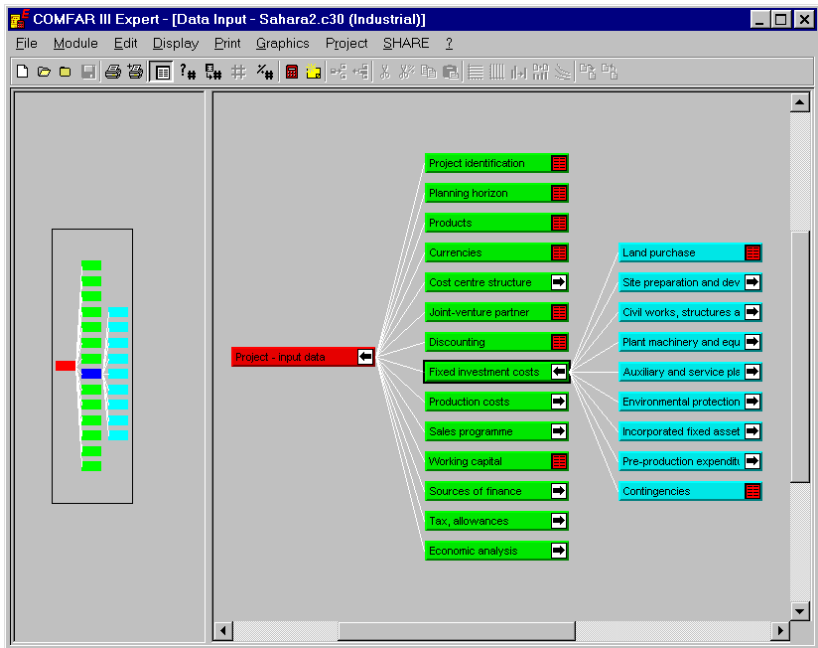


Figure 45: Browser and browser overview panel

VIEWING PORTIONS OF THE DATA STRUCTURE

A portion of the structure displayed in the BROWSER panel can be selected for view by dragging the frame of the BROWSER OVERVIEW panel to the selected area.

To view a selected portion of the structure displayed

WITH THE MOVE CURSOR:

- Move the mouse cursor to the inside of the BROWSER OVERVIEW panel frame.

The mouse cursor converts to a move cursor when it is inside the frame.

- Click and hold the left mouse button and drag the frame to the selected area.
- Release the mouse button.

The selected area appears in the BROWSER panel.

WITH THE HAND CURSOR:

- Move the mouse cursor to a position in the BROWSER panel to be relocated.
- Click and hold the left mouse button.

The mouse cursor converts to the hand cursor.

- With the left mouse button depressed, drag the mouse to reposition the structure in the browser (the structure moves in the direction of motion of the hand cursor).
- Release the mouse button.

WITH THE KEYBOARD:

- One of the browser nodes has a frame (the corresponding node in the BROWSER OVERVIEW panel is shown in a different colour); with the [←], [→], [↑] or [↓] keys this frame can be moved to other positions in the browser. If a node contains a pointer to the right/left, the next level of nodes can be opened (displayed)/closed by pressing [ENTER]. If the enflamed node shows a (data entry) Table Icon, the DATA INPUT window appears after the [ENTER] has been pressed.

BROWSER DISPLAY OPTIONS

The input browser contains three types of icons, each of which performs a different function (for a description of OUTPUT BROWSERS, see chapter IX.A. and chapter X.B). Choosing the Table Icon (click with the left mouse button) displays the DATA ENTRY window for the item. The Compress Icon reduces the extended structure to the level containing the icon. The Extend Icon extends the display of the structure to higher stages.



The left and right mouse buttons have different functions with regard to the extend and compress icons:

- Clicking Extend Icon with the left mouse button expands the data structure one stage above the node containing the icon, clicking with the right mouse button expands the structure to all higher stages (see also chapter V.D).
- Clicking the Compress Icon with the left or right mouse button compresses all current stages and reduces the expanded structure to the node containing the icon.

CONTEXT-SENSITIVE POP-UP MENU

A click with the right mouse button into the description of a node activates a context-sensitive pop-up menu to facilitate quicker and easier menu-bar functions such as: Insert, Delete, Copy, Cut, Split, Paste, etc.

SELECT AND DISPLAY A PROJECT

A new project or previously analyzed project is selected for display using menu items in the FILE MENU or the PROJECT MENU. Only one project is displayed in the browser and browser overview at one time, although up to five projects can be loaded into the system.

When a new project is initiated from **New Project** in the FILE menu (chapter V.A), the default data structure for the type and level of project is displayed. For a previously analyzed project, **Load Project** in the FILE menu is used to select a project file from a drive. Projects listed in the PROJECT menu are selected from that menu. The data structure for the project is displayed and all previously entered data are available in the various input data windows.

To initiate a new project in the browser

- Select **New Project** from the FILE menu.
- Select the **Project type** and the **Level of analysis** in the NEW PROJECT modal window.
- Accept the above selections.

To retrieve a previously analyzed project in the browser

- Select **Load Project** from the FILE menu.
- Select/specify the **drive, directory, file format and file-name** in the LOAD PROJECT modal window.
- Accept the above selections.

To activate a previously loaded project in the browser window

- Choose **Project** from the menu bar.
- Select the previously loaded project in the PROJECT menu.

For more detailed information concerning the above COMFAR functions, see chapter V.

B. STANDARD INPUT DATA STRUCTURES

Standard data structures are offered by the program for each project classification. These structures represent the organization of data for purposes of calculation and results.

Data are arranged in a hierarchical data structure organized as a *tree*. The trunk (main item), branches, sub-branches etc. are *nodes*, each of which represents an element of the project under study. The trunk node represents the project. Nodes within the successive stages of branching represent increasing levels of detail of data items.

Although data structures are nominally offered at the opportunity- and feasibility-study levels, there is virtually a continuous degree of detail that can be developed by the user starting from the least possible level of detail (the standard opportunity-study level structure).

Data structures are revealed in the BROWSER and BROWSER OVERVIEW panels, which are displayed in the data entry process. A standard (minimum) structure comprising the initial level of detail offered by the program is defined for each **Project type** (Industrial, Maritime, Agricultural, Infrastructure etc.), and for each **Level of analysis** (Opportunity, Feasibility).

None of the nodes that appear in a standard (minimum) structure can be deleted or edited. However, structures can be expanded using features of the EDIT menu. Any nodes which result from expansion can subsequently be deleted.

OPPORTUNITY-STUDY LEVEL

A similar procedure displays the standard (minimum) data structure for each of the project types offered by the program.

To create the minimum structure for opportunity level analysis

- Select **New Project** from the FILE menu.
The NEW PROJECT modal window is displayed.
- Select a **Project type** (Industrial) and **Opportunity study** in the NEW PROJECT modal window.
- Accept the selections with **OK**.

The BROWSER and BROWSER OVERVIEW panels are displayed showing only the PROJECT-DATA INPUT and the PROJECT IDENTIFICATION nodes (see figure 44 above).

- Use the move cursor to move the BROWSER OVERVIEW frame so that the PROJECT-DATA INPUT node is at the left center of the frame.
- Sequentially enter and accept data in all nodes from the PROJECT IDENTIFICATION node to the DISCOUNTING node, a total of from 5 to 8 nodes depending upon the state of **Cost centre structure, Joint-venture partner and Inflation** (see chapter VII.F).

When the DISCOUNTING node is accepted, all remaining first level nodes in the minimum structure are displayed (figure 45).

To display the extended minimum structure

- Click the Extend Icon for each first-level node; it changes into a Compress Icon and the subnodes are displayed.

Each first-level node containing an Extend or Compress Icon at the right of the node represents a data group. Such nodes can be extended to reveal the default substructure.

To fully extend the structure

- First compress the structure by clicking the Compress Icon at the root node (figure 46) and then extend fully by clicking the Extend Icon of the root node with the right mouse button (if **Extend full** in the DISPLAY menu is active, the left mouse button acts as the right mouse button - see chapter V.D).

Although the complete default structure of the industrial opportunity project is displayed in the BROWSER OVERVIEW panel, the structure is generally too large to be fully displayed in the browser panel. To view all items in the structure it may be necessary to drag the browser overview frame to various sections so that the corresponding items are displayed in the visible portion of the browser panel.

- Move the mouse cursor to the inside of the browser overview panel so that it converts to the move cursor.
- Drag the browser frame to another section of the structure displayed in the browser overview panel.

Another section of the minimum structure of an Industrial Opportunity Study is displayed. The complete structure can be reviewed by sequentially dragging the browser frame to various sections of the structure.

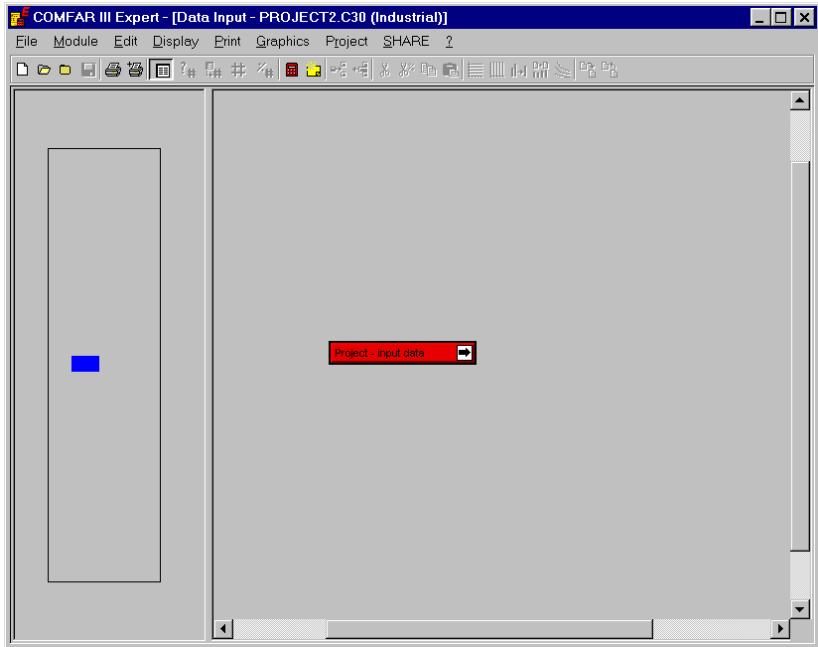


Figure 46: Browser window with minimum structure

The structures for the other standard project types offered by the program can be reviewed by executing the appropriate FILE menu and related procedures (chapters V.A and VII).

FEASIBILITY-STUDY LEVEL

As compared to the opportunity-study level, in the standard structure for project analysis on the feasibility-study level, various items are expanded further, e.g. Labour is expanded into Skilled and Unskilled Labour.

The default structure for the analysis of an industrial project (feasibility-study level) is shown in figure 47. The structures for the other standard project types offered by the program can be reviewed by executing the appropriate FILE menu and related procedures (chapters V.A and VII).

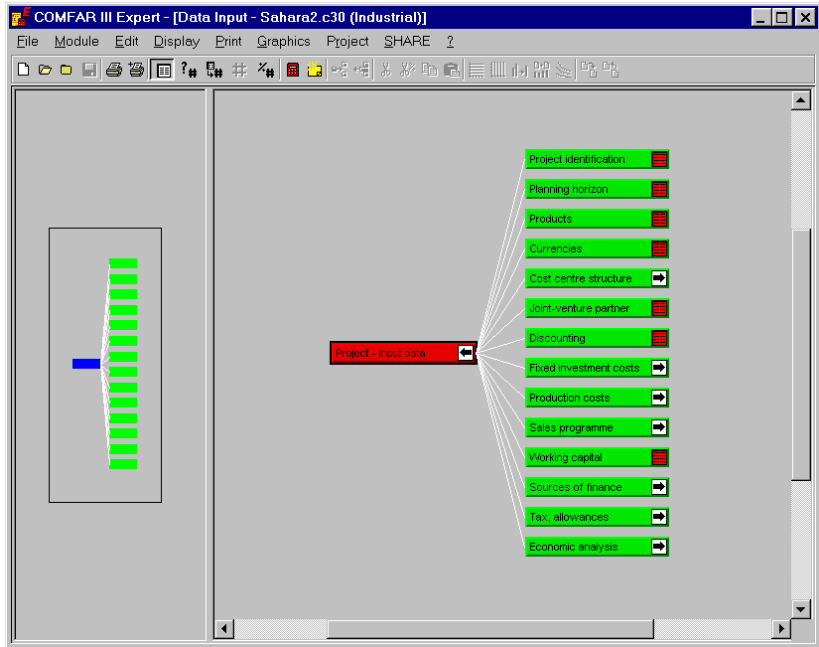


Figure 47: Standard structure of industrial project - feasibility level

The procedures for displaying the structure are the same as those described above for the opportunity-level structure.

USER-DEFINED STRUCTURES

Data structures can be expanded up to a practical limit beyond the initial level for each project type (a maximum of 20 subnodes can be defined for each node). User-created nodes can be subsequently deleted.

It is possible to expand the level of definition at any data input level, either at a node within the minimum structure or a user-defined node, using the **Insert** feature of the EDIT menu (see chapter V.C).

User-created nodes have the same data structure and window format as the parent node and are initially assigned the name of the parent node with a numerical suffix. These names can subsequently be changed using the **Edit Node** feature of the EDIT menu.

OTHER PROJECT TYPES

The structures for standard project types offered by the program other than **Industrial** can be reviewed by executing the appropriate FILE menu item and related procedures (chapters V.A and VII).

C. RESULTS AND RESULTS BROWSER

Results in the form of schedules and graphs are offered in a structural configuration which is described in the BROWSER and BROWSER OVERVIEW panels. The browser has two forms which are similar in appearance, but which perform different functions. The Select results browser is used to select schedules and graphs to be calculated for display and print afterwards. The Show results browser facilitates display and, in conjunction with features of the PRINT menu, printing of selected results.

The results (output) structure and the procedure for selecting results for display or print using the Select results browser are described in chapter IX.A.

The description and procedures for displaying and printing results using the Show results browser and other COMFAR III Expert features are described in chapter X.B.

VII. FINANCIAL DATA INPUT



Financial information (data and text) for a project is defined in windows associated with nodes displayed in the browser and browser overview panels (see chapter VI.A). Choosing the **Table Icon** for a node invokes a window into which project information is entered at the keyboard.

COMFAR presents data structures for each project type available (industrial, agricultural, infrastructural, etc.) at the opportunity and feasibility levels (see chapter VII.E, *Project definition*). The procedures described in this section are applicable for financial data input for industrial analysis; however, the procedures are similar for all of the other project types.

A. ERROR MESSAGES

Entries that clearly violate restrictions on data types or limits are detected by the system and invoke windows indicating the type of inconsistency encountered. In some cases cancellation warnings are provided when there is a chance that important data may be lost. If a project file is to be saved under a filename previously used, the system cautions that the file exists.

B. DEFAULT AND USER-DEFINED VALUES

Some project parameters are automatically assigned default values which appear when project analysis is initiated. Parameters which can be reset to user-defined values include:

- Initial local currency and abbreviation
- Currency in which values of items are expressed
- Designation as a local or foreign item
- Depreciation type for fixed assets
- Date of sale of fixed assets
- Minimum days coverage for current assets and liabilities
- Type of loan repayment plan
- Capitalized interest (yes, partly or no)
- Allocation key (when Cost allocation is active)
- Number format: Decimal digits to be displayed/printed (results only), decimal separator, '000 separator
- Input mode
- Automatic backup
- Default save directory

Procedures for resetting the default values of these parameters are described in chapter V.C, under *Defaults*.

C. DEFINITION OF COMMON FINANCIAL DATA

Entries of information which are common to most financial data entry windows include:

- Item description (name)
- Currency
- Foreign or local origin or market
- Escalation (deviation of price index from inflation rate)
- Remarks (descriptive text)
- Cost centre (cost allocation)

Other common elements found in data entry windows are used to accept or cancel information entered by the user. All entries and selections within the window are assigned when the window is accepted by choosing the **OK** pushbutton. Choosing the **CANCEL** pushbutton cancels the entries; all information reverts to the situation that prevailed before the window was invoked.

A typical window contains entry fields and selection devices for these items as in the **FIXED INVESTMENT COSTS** window shown in figure 4.

ITEM DESCRIPTION (NAME)

Each node in the data structure at the opportunity or feasibility level is assigned an item description (name). For the standard (minimum) structure these descriptions are fixed. For user-defined nodes (substructures) created with the **Insert** feature the names offered by the system can be changed using the **EDIT MENU**, as well as in the corresponding **DATA INPUT** window. Descriptions of other user-defined nodes (products, joint-venture partner) can be edited in the windows by which they were created.

To change the description of a node created with insert

- Select the node in the browser for which the description is to be changed.
- Choose **Edit Node** in the **EDIT MENU**.
- Select the description in the **EDIT NODE** modal window and enter the name of the item.
- Accept the new description with the **OK** pushbutton or cancel with the **CANCEL** pushbutton. In either case control returns to the browser.
- Alternatively, the description may be changed in the corresponding data entry window.

CURRENCY

The default currency defined with the **Default** feature of the EDIT menu appears as the default for all items. However, within the input windows the currency in which the item value is expressed can be selected from the list of pre-defined currencies (see chapter VII.I, *Currencies*).

To assign a currency to an input item other than the default currency

- Select the currency in which the value of the item is expressed using the CURRENCY drop-down list box.

FOREIGN OR LOCAL ORIGIN OR MARKET

Any input item is assigned the default **foreign** or **local** origin (market in the case of products), which can be changed in its window. If a node is expanded, the newly created nodes have the default setting.

To designate an input item as foreign or local

- Select the radio button corresponding to **Foreign** or **Local**.

ESCALATION

It is possible to define a rate of escalation for the price of every input item which is constant over the planning horizon. The rate of escalation is compounded annually at the constant rate specified. The default rate of escalation is 0%. By convention, the term *escalation* is applied to prices of items, while the term *inflation* refers to the absolute percentage increase per annum in a global price index in the currency, e.g. the Consumer Price Index.

IF ESCALATION AND INFLATION RATES ARE ENTERED, COMFAR COMPUTES THE EFFECTS OF BOTH RATES.

Escalation is best used to reflect anticipated relative price changes for an item. When both escalation and inflation features are utilized in the analysis, care should be taken to avoid double counting.

Constant price analysis is often justified even when a high rate of inflation prevails. When currency inflation is constant for all project inputs and outputs, the real rate of return on the investment generally is not significantly affected (use and production of real resources). Price escalations should be included in such analyses. Financial planning and return on equity, how-

ever, may be affected by inflation (use and reimbursement of financial resources).

The history and intermediate term projections of inflation and currency exchange controls should be taken into account in defining exchange rates and currency inflation (for further discussion, see chapter VII.I, *Currencies*, and chapter VII.K, *Inflation*).

To assign an escalation rate to the price of an input item

- Select the ESCALATION entry field.
- Enter the rate of escalation in per cent.

DIRECT/INDIRECT DATA

The distinction between direct and indirect data are maintained in this program for analysis of production costs and break-even by product. Direct data (costs or revenues) are those which are attributable to a particular product (if only one product is specified direct costs are those attributable to production). Direct data items include the sales programme and the following categories of data when defined in a window associated with a particular product:

- Production costs
- Initial stocks and starting balances for expansion/rehabilitation projects.

Working capital items are also calculated for each product using allocation of indirect costs when applicable and necessary.

There are two types of indirect data. One type is defined directly by the user when multiple products are defined. The other type is defined intrinsically by the nature of a cost item, e.g. depreciation and financial costs.

Indirect data are not readily attributable to a product and are allocated according to a selected key when **Cost allocation** is active. When **Cost centre analysis** is active, costs are allocated through the COST CENTRE ASSIGNMENT modal window for indirect items.

A separate INDIRECT COSTS node is included in the input browser when more than one product is specified for the entry of indirect production costs (those costs not directly attributable to a particular product) and initial stocks for indirect inventory items. Other indirect items are defined intrinsically from production costs and other modules. Of these items, only the first two are allocated as indirect costs:

BASIS	TYPE
Investment costs	Depreciation
Financial sources	Interest and financial fees
Allowances	Effect on taxable income
Taxes	Corporate taxes

When **Cost allocation** is active, for calculating certain items of working capital (e.g. accounts receivable, finished product inventory, work in progress) the indirect costs are allocated to products according to the selected allocation key. Production cost and break-even results, computed by product, also include the allocation of these costs. When **Cost allocation** is not active and multiple products are defined, indirect items are allocated according to direct costs when determining the cost bases for the items of working capital indicated above.

If **Cost centre analysis** is active, all production cost items (direct and indirect) can be assigned to cost centres. If a cost item is to be split between two or more cost centres it is necessary to divide its node in the browser, i.e. the data related to a node can be assigned only to one cost centre.

When more than one product is defined, the PRODUCTION COSTS node includes one subnode for the DIRECT COSTS for each defined product and one subnode for INDIRECT COSTS. The windows for entry of indirect production cost items are found in the extended structure for the INDIRECT COSTS node.

To define indirect production costs



- Choose the Extend Icon for the **Indirect costs** node in the PRODUCTION COSTS structure.

The indirect costs node is extended to the structure shown in figure 48.



- Choose the Table Icon for one of the indirect cost items.

The PRODUCTION COSTS window for indirect cost item is displayed (figure 49). For indirect costs the **Annual adjustments** radio button is selected automatically. The **Standard production costs** radio button is inactive.

- Use the data field and the iconic buttons to enter for each period any two of the values for **Quantity**, **Price** and **Total**; the third value is calculated automatically. Then specify either the variable or fixed portion (in per cent of total). The second value is calculated automatically.

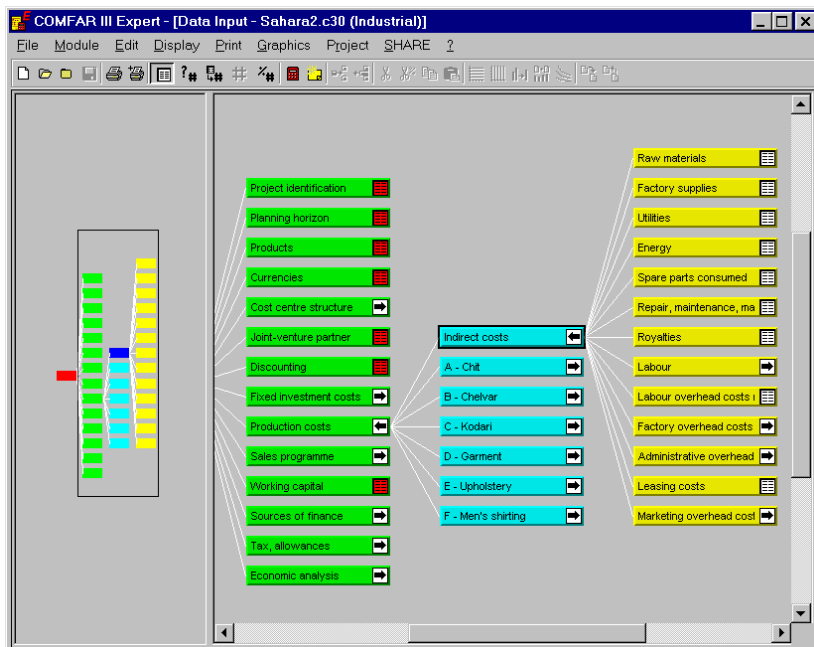


Figure 48: Indirect production cost structure

The screenshot shows the 'COMFAR III Expert - [Production costs - Sahara2.c30 (Industrial)]' window. The menu bar is the same as in Figure 48. The window contains several input fields and a table. The 'Description' field is 'Factory supplies' and the 'Product' field is 'Indirect cost item'. The 'Currency' is set to 'thousand bolsa' and 'Escalation' is '0.00 % p.a.'. The 'Annual adjustments' section has a value of '0.0000'. Below this is a table with the following data:

	Quantity	Price	Total	Var.	Fix.
7/2001	0.00	0.00	0.00		
7/2002	0.00	0.00	0.00		
7/2003	0.00	0.00	0.00	0.00	100.00
7/2004	0.00	0.00	0.00	0.00	100.00
7/2005	0.00	0.00	0.00	0.00	100.00
7/2006	0.00	0.00	0.00	0.00	100.00
7/2007	0.00	0.00	0.00	0.00	100.00
7/2008	0.00	0.00	0.00	0.00	100.00
7/2009	0.00	0.00	0.00	0.00	100.00
7/2010	0.00	0.00	0.00	0.00	100.00
7/2011	0.00	0.00	0.00	0.00	100.00
7/2012	0.00	0.00	0.00	0.00	100.00

Figure 49: Indirect cost window

The data are accepted with the **OK** pushbutton or cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

The **Cost centre** pushbutton is available only when **Cost centre analysis** has been selected (see chapter VII.F); it appears in both the **DIRECT** and **INDIRECT COST** windows. If only **Cost allocation** has been selected (chapter VII.F, under *Special features*), the **Cost allocation** pushbutton is also active in each **INDIRECT COST** window, but not in a **DIRECT COST** window because in the case of direct costs (i.e. costs defined for a product) it is the product which may be assigned to a cost centre. Choosing a pushbutton invokes a window for designating assignment to a cost centre or for choosing an allocation key.

If **Cost centre analysis** is active, products are assigned to each cost centre with the **COST CENTRE STRUCTURE** nodes created in the **INPUT BROWSER**. Both direct and indirect costs can then be assigned to cost centres.

Standard costs are defined as direct costs either for the *Nominal capacity* specified in the **PRODUCTS** window (see VII.H) or per unit of production. Consequently, indirect costs can be defined only as adjustments to periodic costs as they are not associated with any particular product (see chapter VII.O).

COST CENTRES AND COST ALLOCATION

The **COST CENTRE STRUCTURE** node extends to six cost centre groups (CCGs):

- Production
- Storage
- Environment
- Marketing
- Services
- Administration

Each of these nodes can be extended into sub-cost centre groups (SCCGs) and further into units using the **Insert** feature (see chapters V.C, *Edit menu* and VII.F, under *Special features*). Each cost item (as represented by a node) can be assigned to one cost centre only (CCG or SCCG or unit). Products are treated as profit centres, and costs are allocated to products only from those cost centres (CCG, SCCG and unit) to which products have been assigned in the **COST CENTRE DEFINITION** window (cost centre structure nodes).

In the SPECIAL FEATURES modal window of the PROJECT IDENTIFICATION node three possibilities exist with regard to the activation of Cost centre analysis and Cost allocation:

- Cost centre analysis only
- Cost allocation only
- Cost centre analysis and cost allocation

COST CENTRE ANALYSIS ONLY

If **Cost centre analysis** is activated in the SPECIAL FEATURES modal window of the PROJECT IDENTIFICATION window, all cost windows (direct and indirect) contain a **Cost centre** pushbutton. Choosing this pushbutton causes the COST CENTRE ASSIGNMENT modal window to be displayed in which the cost item from which it is invoked is assigned.

If a product is associated with more than one cost centre, the direct nodes for product items must be split into the portions to be assigned to each cost centre.

To assign a cost item to a cost centre (cost allocation inactive)

- Choose the **Cost centre** pushbutton in the DIRECT or INDIRECT COST ITEM window.

The COST CENTRE ASSIGNMENT modal window is displayed (figure 50). The Cost allocation pushbutton is inactive. The ORIGIN display field indicates the Product (for direct costs) or Indirect cost item for all indirect items from which the COST CENTRE ASSIGNMENT modal window was invoked.

- Choose one of the defined cost centres using the COST CENTRE drop-down list box.

The cost centre selection is accepted with the **OK** pushbutton or cancelled with the **CANCEL** pushbutton, in which case the original cost centre assignment is in effect. Control returns to the cost item window.

The screenshot shows a dialog box titled "Cost centre assignment". It has a blue title bar. Below the title bar, there are three input fields: "Description:" containing "Factory supplies", "Origin:" containing "Indirect cost item", and "Cost centre:" with a dropdown menu showing "Production". At the bottom of the dialog, there are three buttons: "OK", "Cancel", and "Cost allocation...".

Figure 50: Cost centre assignment window

COST ALLOCATION ONLY

When the **Cost allocation** check box in the SPECIAL FEATURES modal window is selected, the **Cost centre analysis** check box is automatically selected. The SPECIAL FEATURES modal window advises that Cost allocation should be used in conjunction with Cost centre analysis. However, the Cost centre analysis check box can be subsequently deactivated so that only Cost allocation and corresponding output (results) are available.

If only Cost allocation is active (Cost centre analysis inactive), each indirect cost item window contains a **Cost allocation** pushbutton which provides the opportunity to select one of the standard allocation keys or a user-defined allocation key. The **Cost allocation** pushbutton for a direct cost item is always inactive.

The standard allocation keys include:

- Direct cost
- Direct factory cost
- Direct material cost
- Direct labor cost
- Sales revenue
- Equally among defined products

The default allocation key for all items is **Direct cost**; however, the default may be changed in the DEFAULTS window (see chapter V.C).

To assign a cost allocation key to an indirect cost item (cost centre analysis inactive)

- Choose the **Cost allocation** pushbutton in the INDIRECT COST ITEM window.

The COST ALLOCATION modal window is displayed (figure 51).

- Choose one of the six standard allocation keys by clicking anywhere in the corresponding line of the list box and choosing the SELECT PUSHBUTTON. The selected key appears in the ALLOCATION KEY SELECTED field,
- Alternatively, for a user-defined allocation key use the EDIT panel to enter the Name of the key and the percentage of the indirect cost item to be allocated to each product (see chapter IV.B. 7).

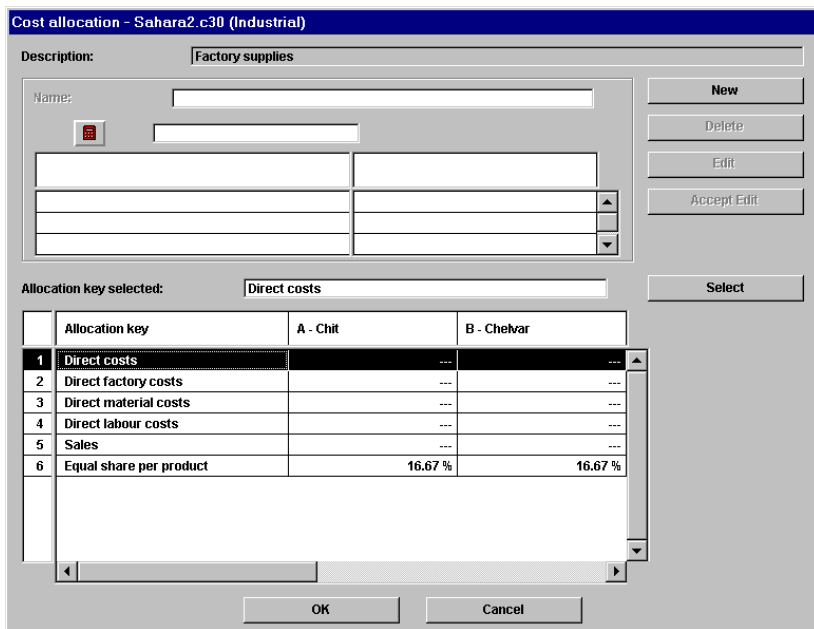


Figure 51: Cost allocation modal window

THE ACCEPT EDIT PUSHBUTTON IS ACTIVE ONLY WHEN THE TOTAL PERCENTAGE ALLOCATIONS TO ALL PRODUCTS EQUALS 100%.

The EDIT panel can be used to define up to 44 user-defined allocation keys but is not active for any of the standard keys.

Accept the allocation key with the **OK** pushbutton or cancel the allocation with the **CANCEL** pushbutton, in which case the original allocation key is reinstated. In either case, control is returned to the window from which **Cost allocation** was invoked.

COST CENTRE ANALYSIS AND COST ALLOCATION

If **Cost centre analysis** and **Cost allocation** are activated in the SPECIAL FEATURES modal window of the PRODUCT IDENTIFICATION window it is possible to assign indirect cost items (both costs defined in INDIRECT COST windows and intrinsically indirect costs, e.g. depreciation on fixed assets, and interest on loans) and direct costs (i.e. product-linked production costs) to a particular cost centre and to allocate indirect costs to products in accordance with the selected key.

INDIRECT COSTS ASSIGNED TO A COST CENTRE ARE ALLOCATED ONLY TO THOSE PRODUCTS ASSIGNED TO THE COST CENTRE.

Both cost centre results and cost allocation results are available in this case.

It is possible that a product is associated with more than one cost centre. For example, for three cost centres and four products the association may be as shown in table 2.

PRODUCT	PRODUCTION COST CENTRE		
	A	B	C
1	x	-	-
2	x	x	-
3	-	x	x
4	-	x	x

Table 2: Products and production cost centres

The data input browser for the cost centre/product assignment has the following structure shown in figure 52.

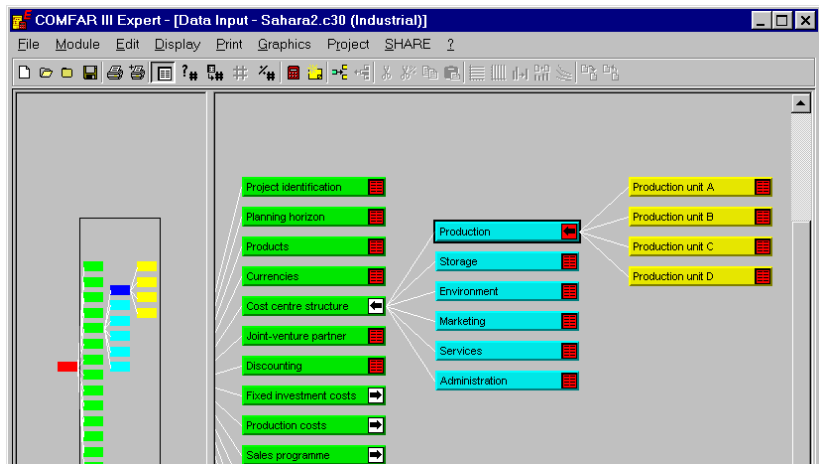


Figure 52: Cost centre/product assignments

A cost item can be assigned only to a single cost centre. If a cost item is to be assigned to more than one cost centre it is necessary to split the item in the browser using the **Insert** feature of the EDIT menu before performing the cost centre assignment.

The **Cost allocation** pushbutton in the COST CENTRE ASSIGNMENT modal window (figure 53) is only active for indirect items associated with the cost centre. The procedure for the **Cost allocation** pushbutton is identical to that described above in Cost allocation only; however, in this case the cost allocation pertains only to the products assigned to the cost centre.

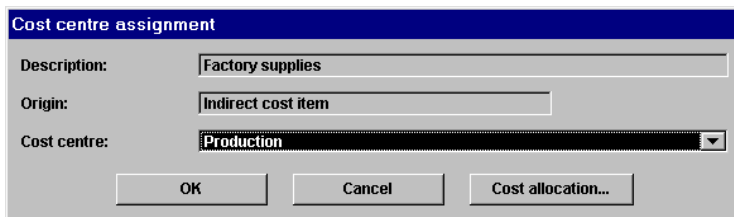


Figure 53: Cost centre assignment modal window

To assign a cost item to a cost centre and select a cost allocation key when both cost centre analysis and cost allocation are active

- Select the **Cost centre** pushbutton in any cost window.

The COST CENTRE ASSIGNMENT modal window is displayed with the **Cost allocation** pushbutton active for indirect cost items. The DESCRIPTION display field indicates the name of the item. For a direct cost item the ORIGIN display field indicates the product from which the COST CENTRE ASSIGNMENT modal window was invoked. Otherwise, the ORIGIN field displays an indirect cost item.

- Select the **Cost centre** to which the item is to be assigned using the COST CENTRE drop-down list box (it contains all defined cost centres).
- If the indirect costs assigned to the cost centre are to be allocated among its associated products choose the **Cost allocation** pushbutton in the COST CENTRE ASSIGNMENT modal window.

The COST ALLOCATION modal window is displayed (see figure 51).

- Choose one of the six standard allocation keys by clicking anywhere in the corresponding line of the list box and choosing the **Select** pushbutton (the selected key appears in the ALLOCATION KEY SELECTED field).
- Alternatively, for a user-defined allocation key use the EDIT panel to enter the **Name** of the key and the **percentage** of the indirect cost item to be allocated to each product.

The **Accept Edit** pushbutton is active only when the total percentage allocations to all products equals 100%.

The EDIT panel (chapter IV.B.7) can be used to define up to 44 user-defined allocation keys but is not active for any of the standard keys.

Accept the allocation key with the **OK** pushbutton or cancel the allocation with the **CANCEL** pushbutton, in which case the original allocation key is reinstated. In either case, control is returned to the **COST CENTRE ASSIGNMENT** modal window from which **Cost allocation** was invoked.

The cost allocation is applicable only to the products assigned to the cost centre (not necessarily all products). The default allocation key for all allocated indirect costs is Direct costs (see chapters VII.O.2 and X.C.3).

In the **COST CENTRE ASSIGNMENT** window accept the selections using the **OK** pushbutton or cancel the selections with the **CANCEL** pushbutton. In either case control is returned to the cost window.

EFFECT OF CHANGES IN PRODUCT DEFINITIONS

If products are added or deleted in the **PRODUCTS** window, changes are required in the cost centre and cost allocation definitions. This may involve the deletion of one or more cost centres, adjustments to allocation keys or the deletion of an allocation key if all associated products are deleted.

All user-defined cost centres and allocation keys are adjustable. If cost items are assigned to cost centres and/or a self-defined cost allocation key is used, when a change in the number of products occurs the system tries to adjust the assignments to the extent possible. All items for which the system cannot maintain the original assignments to cost centres and/or to cost allocation keys are reassigned to the default cost centres and to the default allocation key.

REMARKS

Descriptive text can be associated with the node representing each group of data (e.g. Fixed investment costs) using the **Remarks** feature of the **EDIT** menu (see chapter V.C).

To define or display remarks

- If a window is displayed, choose **Remarks** from the **EDIT** menu.
- Or, select the group node or one of its subnodes in the browser and then choose **Remarks** from the **EDIT** menu.

In either case the **REMARKS** modal window is displayed in which text can be entered or existing text edited.

Remarks are only printed within a print job. In the **PRINT JOB** window when the **With remarks** check box is selected the text is printed the first time the print job is executed for the selected output (see chapter V.E).

ACCEPT (OK) OR CANCEL

Information (data and/or text) entered in any window can be accepted or cancelled. Accepted information (**OK**) is stored in the project under study. Cancellation nullifies the entries in the entire window so that all information remains in the state that existed prior to activating the window.

To accept or cancel the entries in a window

- Changes in a window are accepted with **OK** and ignored with the **CANCEL** pushbutton. Choose either the **OK** (accept) or **CANCEL** pushbutton. In either case, when chosen, control is returned to the window from which the active window was invoked.

ACCELERATED EXIT FROM WINDOW



Normal windows containing the system menu icon can be closed using the acceleration keys [ALT]+[F4] (see chapter IV.B.1).

PROJECT PERIODS

In several windows it is necessary to enter data corresponding to each defined period (see chapter VII.G, *Planning Horizon*) of the construction or production phase or for the entire project. A period is defined in the first column of the list box by its beginning date. Examples of period designations and the corresponding inclusive dates are as follows:

PERIOD	INCLUSIVE DATES
1998 - 5	1 May 1998 to 31 July 1998
1998 - 8	1 August 1998 to 28 February 1999
1999 - 3	1 March 1999 to 30 November 1999
1999 -12	1 December 1999 to last day of production phase

TAXES AND DUTIES

In financial windows only sales taxes on output (products) can be defined. Export duties on output are combined with sales taxes. Sales taxes and import duties on project inputs can be included in the price underlying financial analysis (market price).

The treatment of sales taxes and duties depends on the type of tax system in effect. The financial values of inputs and outputs for value-added tax (VAT) and for ordinary sales tax are indicated in table 3.

TYPE OF TAX	VAT SYSTEM	SALES TAX SYSTEM
Output price	Net of VAT and export duties	Net of sales tax and export duties
Sales tax on output	VAT and export duties	Sales tax and export duties
Input price	Net of VAT but incl. import duties	Including sales tax and import duties

Table 3: Types of tax systems

DATA INPUT LIMITS

Data inputs beyond the ranges indicated in table 4 are not accepted.

DATA INPUT ITEM	LIMIT
Planning horizon	0≤10 years construction, 1≤50 years production, 0≤24 months startup phase
Products	1≤20
Currencies	1 local, 0≤19 foreign
Joint-venture partners	20
Fixed investment Production costs Sales programme Cost centre structure Sources of finance Indirect effects (economic analysis)	The data structure for all of these items is limited to 5 levels beyond the root (project) node. Up to 20 subnodes are permitted at each level beyond the default structure.
Allocation keys	Up to 50 including the 6 pre-defined keys

Table 4: Data input limits

D. PROJECT STATUS

COMFAR III Expert can be applied to a new project or to a project previously analyzed for which data has been saved. Work on a new project is initiated with the **New Project** feature, and updating an existing project with **Load Project** in the FILE menu. For a new project a modal window is displayed in which the **Type of project** and the **Level of analysis** are defined as described in the following section. A previously analyzed (and saved) project is selected from an available projects list in a modal window, identified by a filename, directory and file format.

Procedures for executing the steps necessary to proceed with the analysis of new and previously analyzed projects are described more fully in chapter V.A.

E. PROJECT DEFINITION

A project is defined by a **Type** and a **Level of analysis** in the NEW PROJECT modal window which is invoked with **New Project** in the FILE menu as described in chapter V.A.

PROJECT TYPE

The choice of the project type determines the default (minimum) structure provided by the system for entry of the data and displayed in the INPUT BROWSER and BROWSER OVERVIEW panel (see chapter VI.A).

LEVEL OF ANALYSIS

The **Level of analysis** feature serves to determine the initial configuration of the structure of input items. The **Feasibility study** level offers a detailed structure; the **Opportunity study** level offers a more aggregated (minimal) structure. However, COMFAR III Expert offers a virtual continuum of structural designs above the minimum (see chapter VI.B and chapter V.C, under *Insert*).

When the type and level of analysis are accepted in the NEW PROJECT modal window, the BROWSER and BROWSER OVERVIEW panel is displayed with the data structure corresponding to the project definition. The input browser with an existing project's defined structure is displayed when the filename, directory and file format are accepted in the LOAD PROJECT modal window.

F. PROJECT IDENTIFICATION



A project is identified by parameters defined in the PROJECT IDENTIFICATION window (figure 54), which is displayed when the Table Icon is chosen for the PROJECT IDENTIFICATION node.

Figure 54: Project identification window

1. General project information

PROJECT TITLE

To define the project title (name of project)

- Select the PROJECT TITLE entry field.
- Enter one line of text.

PROJECT DESCRIPTION

To enter descriptive text for the new or active project

- Select the PROJECT DESCRIPTION multiple-line entry field.
- Enter lines of descriptive text. (Text can be edited as described in chapter IV.B.4, under *Entry field*.)

DATE AND TIME

This information is treated as text. It is independent of the timer in the operating system.

To enter the date and time of data entry

- Select the DATE AND TIME entry field.
- Enter the date and time in one line of text.

2. Project classification

In the PROJECT CLASSIFICATION panel the project can be designated either a new or an expansion/rehabilitation project. The project can be further classified as a joint venture.

NEW PROJECT

A **New project** starts with a data structure free of information except for default values provided by the system. Data can be entered for any or all periods in the planning horizon consisting of construction and production phases.

EXPANSION/REHABILITATION

If the **Expansion/rehabilitation** option is selected, the windows for certain project items are adjusted to permit entry of starting balances for the year prior to the first project period. A special node is created for entry of **starting balance** items for which a window does not exist and appears in the data structure below the TAX, ALLOWANCES node. This node appears automatically for a loaded (previously analyzed) expansion/rehabilitation project (see chapter VII.T).

JOINT VENTURE

The **Joint-venture project** check box is selected for a joint venture between two or more partners. A JOINT VENTURE PARTNER node is added automatically to the data structure in the browser which becomes part of the interdependent entry sequence of initial data.

The procedure for entering information concerning joint-venture partners are described in chapter VII.L.

To define the project classification

- Select either the **New project** or **Expansion/rehabilitation project** radio button (mutually exclusive).
- For a joint venture select the **Joint-venture project** check box.

3. Depth of analysis

In the DEPTH OF ANALYSIS panel the **Financial analysis** check box is permanently selected. This is the minimum level of analysis for a project. The **Economic analysis** check box can be selected as an option. **Special features** comprise other analytical options (cost centre analysis, cost allocation, inflation/price escalation, revaluation of fixed assets and inventory management) which are accessed by choosing the **Special features** push-button. The **Special features** are not mutually exclusive; any or all of these options can be selected.

FINANCIAL ANALYSIS

Measures and indices of project performance based upon market prices are presented in a set of available reports. The financial model is described in chapter X.C, *Financial schedules and graphs*, and chapter XI, *Financial calculation rules*.

ECONOMIC ANALYSIS

The economic costs and benefits of the project can be analysed with inputs and outputs converted to economic prices. COMFAR *III Expert* does not include the price conversion models; when the economic analysis option is chosen, the factors which convert market prices to *economic prices* are to be provided by the analyst.

The economic module also includes analysis of *value added* created by the project and its distribution among social groups. The *foreign exchange effect*, i.e. the impact on the balance of payments, and *employment effects* are also determined.

The economic model is described in chapter X.D, *Economic schedules and graphs* and chapter XII, *Economic calculation rules and algorithms*.

If **Economic analysis** is selected, the ECONOMIC ANALYSIS node appears in the browser with its associated data structure. A description of the economic data entry procedures is found in chapter VIII. The **Assign economic analysis** feature of the EDIT menu is activated so that it can be used for assigning items from the financial browser to the economic section of the browser.

SPECIAL FEATURES

Special features are analytical tools extending to a depth greater than the conventional financial and economic analysis and should be used only when justified.

Cost centre analysis may be particularly useful, for example, in designing the project organization. Centres which show disproportionate costs may be

subject to greater scrutiny in terms of function and operational design. When **Cost centre analysis** is selected, a special node is created in the browser for the purpose of defining the cost centre structure (see chapter VII.C, under *Cost centres and cost allocation*).

Cost allocation may be useful in attempting to define the product mix; the analyst may recommend deleting products with inordinately high cost in relation to revenues. When **Cost allocation** is selected a modal window is accessible in INDIRECT COST ITEM windows from the COST ALLOCATION pushbutton to select or define an allocation key. Production costs and **Break-even analysis** for each product are available in the results.

Inflation refers to a general increase in prices in a currency as measured by a *price index*. Some suggestions on the use of this feature are found in chapter VII.C, under *Escalation*. Constant inflation and variable inflation options are offered. When **Inflation** is selected, a special node is created in the input browser, which becomes part of the interdependent initial data sequence for defining the rate of inflation in each currency.

A special feature, **Revaluation of fixed assets**, is available for revaluing fixed assets under inflation conditions. This feature may be selected only together with the **Inflation** feature. If selected, fixed assets, with the exception of financial costs accrued, are revalued in accordance with the annual inflation rate(s) defined by the user. In this case annual depreciation charges are also adjusted accordingly, and in the balance sheet a new line, **Revaluation adjustments**, is introduced on the liabilities side of the balance sheets. The rules underlying the adjustments are described in chapter XI.B.

Escalate first year. If the price basis has changed, e.g. when a project is delayed, it may be necessary to adjust all prices for the period of delay. The escalation rate defined by the user (in % per year) should then be applied for each year of escalation. Enter the number (integer) indicating how often the annual escalation rate should be used to adjust for price increases.

Inventories of material items and their effect on working capital requirements can be determined based either upon quantity or on total value (see chapter XI.K, *Net working capital*). Finished products inventories are always calculated on the basis of quantity as described in chapter XI.L, *Sales and production programme*. A SPECIAL FEATURES drop-down list box, **Stock model**, can be used to select either the **Total value** or the **Quantity algorithm**.

Two methods of calculation are included in the program for the following reasons:

When the starting balance of an inventory item is specified with a price which differs considerably from that of the production phase, calculations

based upon total value will give misleading information concerning working capital requirements. The **Quantity** option should be selected in this case.

If the input mode **Quantity = 1** is selected, the calculation based upon units obviously will give misleading information concerning working capital requirements. The **Total value** option is then a better choice.

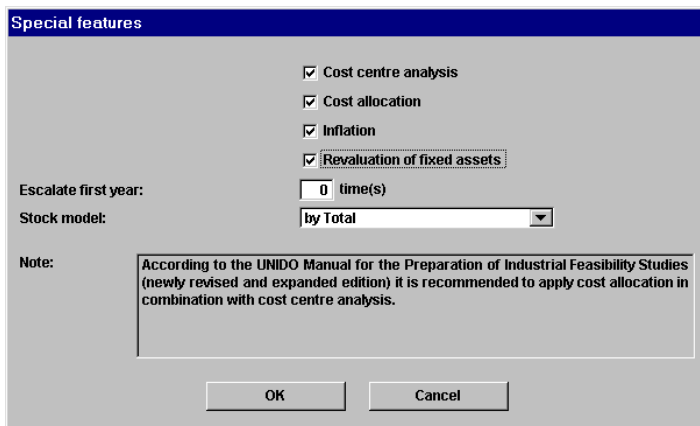


Figure 55: Special features modal window

To define the depth of analysis

- The **Financial analysis** check box is permanently selected. This is the minimum level of analysis.
- Select the **Economic analysis** check box if this type of analysis is to be performed.
- For Cost centre analysis, Cost allocation, Inflation, Revaluation of assets, Escalation (price basis) or Inventory management, select the **Special features** pushbutton.

The SPECIAL FEATURES modal window is displayed (figure 55).

- Select from the check boxes those features corresponding to the required depth of analysis (degree of detail):
 - Cost centre analysis and/or Cost allocation
 - Inflation
 - Revaluation of fixed assets
 - Escalation for the first year
 - Inventory management (by Total or by Quantity)

The corresponding Special features are enabled for the activated check boxes.

It is recommended to use cost allocation only in conjunction with cost centre analysis. Consequently, when the **Cost allocation** check box is selected without first selecting the **Cost centre analysis** check box, the latter is automatically selected. Cost centre analysis can then be deactivated by clicking the **Cost centre analysis** check box.

Data in the PROJECT IDENTIFICATION window is accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser. For a new project the PLANNING HORIZON node is displayed.

G. PLANNING HORIZON

The planning horizon encompasses the entire span of time from inception of the *construction phase* to termination of the *production phase*. For an expansion/rehabilitation project, the planning horizon also contains, in effect, a starting point for the entry of starting balances which is the day prior to the commencement of the construction phase. This does not appear in the planning horizon window, however.

The construction phase is defined as the period from start of construction to the earliest date of production. Restrictions and conditions during the construction phase are as follows:

- No production can occur
- Interest on loans can be capitalized during this period (and in addition up to the end of the loan disbursement phase, including grace periods)
- No depreciation of assets can occur
- No repayment of loans (constant principal or annuity) can start during this period; however, negative disbursements are accepted by the program (disbursement/repayment profile)

The production phase commences the day after termination of the construction phase. Investment can continue into the production phase.

Periodic planning (monthly, quarterly, semi-annually, annually or user-defined) is permitted during the construction phase and during a *startup phase* of up to two years at the beginning of the production phase.

Fixed costs associated with each product (direct fixed costs) occur only during the periods of its actual production.



The PLANNING HORIZON window (figure 57) is displayed by choosing the Table Icon for the PLANNING HORIZON node.

Figure 57: Planning horizon window

The time interval of each of the project phases (construction and production) is defined in its respective panel. The temporal structure of each phase is developed using the STRUCTURE OF PLANNING HORIZON panel.

MONTH OF BALANCE

The month of balance determines the date on which the project balance sheet is calculated: it is always the last day of the defined month of balance. Any month of the year may be chosen, although results, in general, can be presented by years or by periods as defined in the results browser (see chapter X).

The **Month of balance** is also a parameter for setting the project **End** date. The end date of the production phase is constrained to a balance date. If the production phase starts on the day after a balance date, the periods in the production phase are years; otherwise, the first period is shortened so that the project always ends on a balance date. Table 5 illustrates this.

To define the month of balance

- Select a month (last day) using the MONTH OF BALANCE drop-down list box.

MONTH OF BALANCE	BEGIN PRODUCTION	PERIODS	END PRODUCTION
12	1/1/95	5	31/12/1999
5	1/6/95	5	31/05/2000
5	1/1/95	5	31/05/1999
5	1/8/95	5	31/05/2000

Table 5: Month of balance, begin and end of production

CONSTRUCTION PHASE

Construction phase periods can be defined with the following time durations: yearly, half yearly, quarterly, monthly or user-defined. The temporal structure is developed within the STRUCTURE OF PLANNING HORIZON panel.

The time interval of the construction phase is defined in the CONSTRUCTION PHASE panel. The starting date of the construction phase and duration of the construction phase periods are defined and the end date calculated automatically.

To define the construction phase time span

- In the CONSTRUCTION PHASE panel, select the BEGIN entry field.
- Enter the month and year in which construction commences (a period is assumed to begin at the first day of the month) using the numerical format **mm/yyyy**; mm can be the number of a month from 1 to 12, yyyy can be an integer of up to four digits.
- Select the LENGTH-YEARS entry field and enter the number of years of construction as an integer; then similarly complete the entry for the MONTHS entry field (the combination of the entries defines the total length of the construction phase).

The **End** date is automatically displayed (mm/yyyy) when the length of the construction phase is registered with [TAB] or [ENTER] or by selecting another field.

It is possible to define a zero-length construction phase. This is important when analyzing the expansion or rehabilitation of an ongoing enterprise. In this case the **End** of the construction phase appears as the month before (last day) that defined as the **Begin** so that the **Production phase** commences on the same day as the zero-length construction phase.

PRODUCTION PHASE

The time span of the production phase is defined in the PRODUCTION PHASE panel. The production phase starts automatically the day after termination of the construction phase. The **Begin** date is automatically defined and displayed. A time interval of up to the first two years of the production phase can be defined as the startup phase in which periodic planning (monthly, quarterly, half-yearly, yearly or user-defined) is permitted. Beyond the first two years, only yearly periods are permitted. The temporal structure of the startup phase is developed within the STRUCTURE OF PLANNING HORIZON panel. The maximum number of production phase years is 50. The length of the production phase is defined and the end of the production phase is automatically calculated and displayed.

To define the production phase time span

- In the PRODUCTION PHASE panel, the **Begin date** is provided as information only. The date is automatically calculated as the first day of the month after termination of the construction phase.
- Select the LENGTH-PERIODS entry field and enter the number of years of production as an integer.
- Select the STARTUP PHASE entry field and enter the number of months as an integer.

The **End** date is displayed automatically (mm/yyyy) in the END field (a period is assumed to end at the last day of the month).

REFERENCE YEAR

A reference year of the production phase is specified which is used as an output parameter. The reference year can be any year in the production phase; the date is always the last day of the month of balance.

The reference year is used as the default period for break-even calculations (see chapter X.C.6, under *Break-even analysis*). The reference year should be a year of full operations.

To select the reference year

- Select the **Reference year** using the drop-down list box in the PRODUCTION PHASE panel.

STRUCTURE OF PLANNING HORIZON

The planning horizon temporal structure is defined in the STRUCTURE OF PLANNING HORIZON panel.

Yearly, half-yearly, quarterly, monthly or user-defined periods (minimum one month) can be defined sequentially within the constraints of each of the phases. The structure as defined is displayed in the PLANNING HORIZON list box.

Periods can be defined in groups by specifying the number of periods of a particular duration. The definition of these periods must conform to the length of the construction and startup phases defined above.

To define the structure of planning horizon

In the STRUCTURE OF PLANNING HORIZON panel, for each group of periods into which the construction and startup phases are to be divided:

- Select the beginning month in which the specified periods are to be inserted by clicking its number in the PLANNING HORIZON list box.
- Select the **type of period** (yearly, half-yearly etc.) using the appropriate radio button.
- If the **User-defined** radio button is selected, enter the number of months in the MONTH(S) entry field.
- Select the NUMBER OF PERIODS entry field and enter the number of periods of the specified type to be inserted in the planning horizon.
- Choose the **Insert** pushbutton (the specified periods are inserted beginning with the selected month).

This procedure is repeated until the entire planning horizon is defined. Note that **Insert** does not alter the duration of the phases but rather superimposes the specified periods on the temporal structure defined in construction phase and startup phase above.

Defined periods can be deleted only one at a time.

To delete a period

- In the PLANNING HORIZON list box select the period to be deleted.
- Choose the **Delete** pushbutton.
The deleted period is combined with the succeeding period.

Data in the PLANNING HORIZON window is accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser. For a **New project** the PRODUCTS node appears in the browser.

CHANGE OF PLANNING HORIZON

When the structure of the planning horizon is changed for an existing project, the existing data must be fitted into the new structure. The rules for executing the transfer are intended to maintain consistency of the data. The transfer is performed according to a standard function:

- Data are transferred independently for the construction and production phases
- Data from the old period is transferred to a new period on the basis of its start date relative to the new planning horizon. If the two planning horizons are aligned from the start date of each, data from an old period is transferred to the first period commencing at a date which is equal to or earlier than the relative start date of the old period. This is illustrated in figure 58.

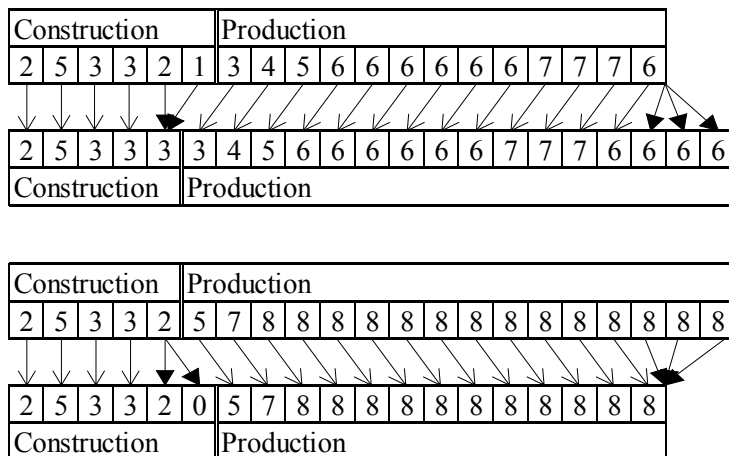


Figure 58: Change of planning horizon

- If the new construction phase is shorter than the old, all data beyond the last corresponding period of the old is transferred to the last period of the new construction phase
- If the new production phase is shorter than the old, all data beyond the last corresponding period of the old is ignored
- If the new construction phase is longer, all new periods are assigned zero data
- If the new production phase is longer, the last year of the old time horizon is duplicated in the new periods of the new planning horizon.

When the **OK** pushbutton is selected for the new planning horizon a modal window appears advising that the data will be adjusted. However, the transfer will ordinarily not be acceptable; it will probably be necessary to rearrange the periodic data. In some circumstances it would be easier to begin again.

H. PRODUCT DEFINITION

Products are defined with their production time intervals and nominal capacities using the PRODUCTS node in the browser. The default state is one product and up to 20 products can be defined. For a single product a generic name is offered which can be changed to that of the actual product.

A **Nominal capacity** should correspond to the standard production costs defined in the corresponding PRODUCTION COSTS window (when the **At nominal capacity** method of standard production cost definition is selected - see chapter VII.O, *Production costs*). Normally the nominal capacity and standard costs (at nominal capacity) are defined for the projected sales (in a full production year) rather than the projected level of production. The **variable costs** for any period are interpolated (or extrapolated) linearly based on the relation between the projected level of production and respective sales in the period and the nominal capacity. The production programme is determined from the sales projections, starting balances (for expansion/rehabilitation projects) and finished product inventory requirements as described in chapter XI.L, *Sales and production programme*.

Fixed costs associated with each product occur only during the time of production. The start of production can be the beginning date of any period of the production phase and the end of production can occur on the last day of any period of the production phase. The defaults are the beginning and end of the production phase (see chapter VII.G, *Planning horizon*).

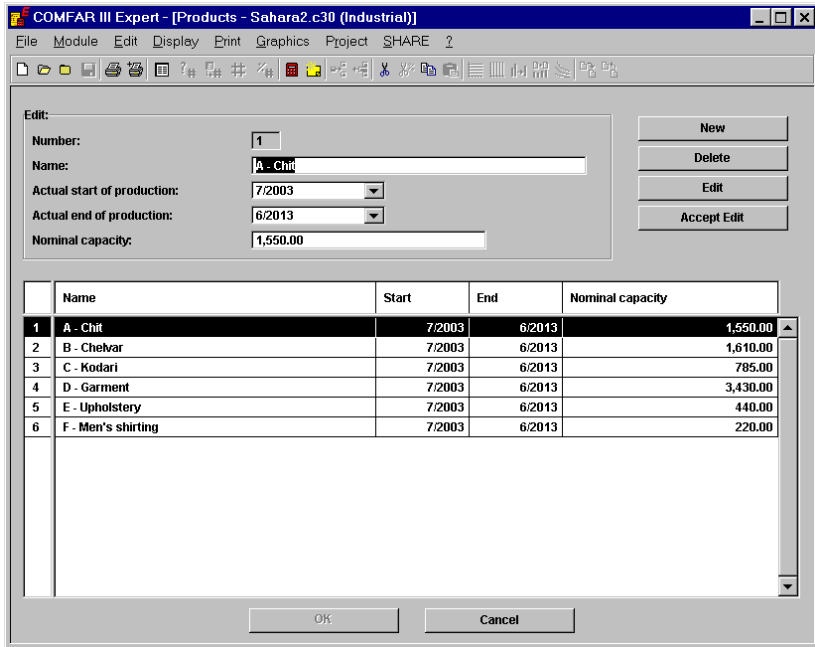


Figure 59: Products window

Direct data such as production costs and sales revenue are associated with products. The allocation of indirect costs to defined products is described under *Cost centre analysis* and *Cost allocation* (chapter VII.C).



Products are defined by selecting the Table Icon for the PRODUCTS node. The PRODUCTS window (figure 59) is displayed.

To define one or more products

- Enter the product name, the data of the actual start and actual end of production as well as the nominal capacity for each defined product using the EDIT panel and the list box (see chapter IV.B.7, under EDIT panel).

When an existing product is deleted, all associated data are also deleted including any allocations. In this case, indirect costs are reallocated to the remaining products according to the selected key (see chapter XI.G, *Cost allocation*). For user-defined allocation keys the percentages are updated using the same proportions. The effect of deleting a product when **Cost allocation** is active for a user-defined key is illustrated by the following example in table 6, in which product C is deleted:

PRODUCT	A	B	C	D
Original allocation, %	10	20	30	40
New allocation	10/70	20/70	-	40/70

Table 6: Example of cost allocation change

If the nominal capacity for a product is set to zero after data have been entered in the PRODUCTION COST window using the **At nominal capacity** option, then all cost items connected to the product are adjusted to the **Per unit of output** option (see chapter XI.J, *Production costs*).

To delete a previously defined product

- Select the product to be deleted by clicking anywhere in the line.
- Choose the **Delete** pushbutton in the EDIT panel.

When the **OK** pushbutton is chosen in the PRODUCTS window, the data structure displayed in the browser is adjusted by adding nodes for each defined product and adding product names to list boxes in all windows where necessary. The entries in the PRODUCTS window are cancelled with the **CANCEL** pushbutton. For a **New project** the CURRENCIES window appears in the browser.

I. CURRENCIES

Currencies in which the values of project inputs and outputs can be expressed are defined in the CURRENCIES window. A maximum of 20 currencies can be defined.

For financial calculations all data are converted by the system to an **accounting currency**. Exchange rates relative to the local currency are defined; rules for conversion to the accounting currency are described in chapter XI.B, *Currency exchange rates and inflation*. In the economic analysis all results are expressed in terms of a **numeraire** or **unit of account** for which the currency in which it is expressed is selected from one of the defined currencies.



To enter currency data choose the Table Icon for the CURRENCIES node in the browser. The CURRENCIES window (figure 60) is displayed.

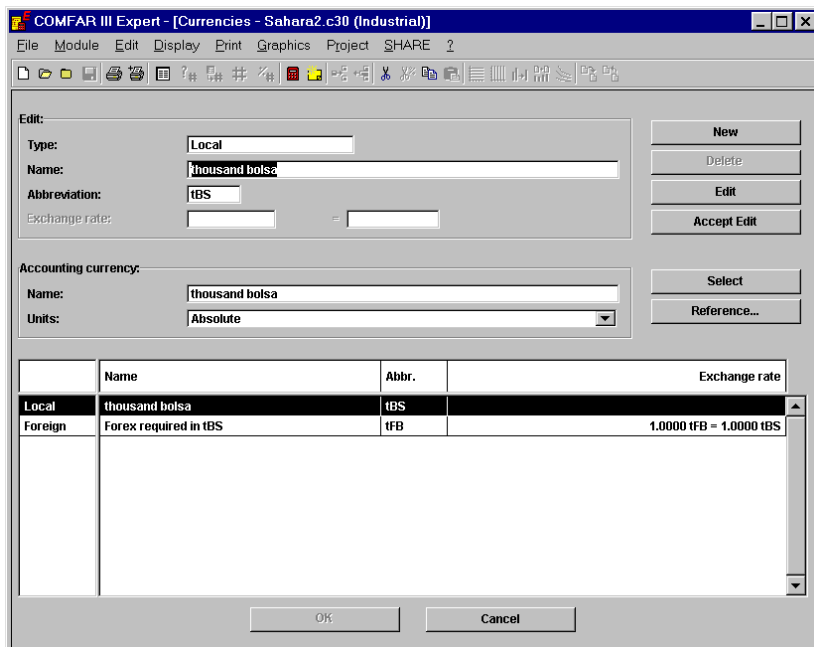


Figure 60: Currencies window

CURRENCIES FOR FINANCIAL DATA

A **local currency** is automatically defined which can be renamed but not deleted. The default for the local currency can be defined in the DEFAULTS window of the EDIT menu. The first line in the CURRENCIES list box is assigned by default to the local currency and its location in the list box cannot be changed (the name and abbreviation can be changed).

Any other currencies in which financial values of inputs and outputs are expressed are user-defined. Other currencies are automatically designated as foreign currencies. The currencies in which items are expressed are included in the **Horizontal View** feature in the DISPLAY menu (see chapter V.D).

For financial calculations, data expressed in all currencies are first converted to local currency and then to the **accounting currency** in which the results are expressed (see chapter XI.A, *General rules*).

To identify the project currencies and exchange rates

- Use the EDIT panel in conjunction with the CURRENCIES list box to enter the Name, Abbreviation (short name) and Exchange rate (relative to the local currency) for each defined currency (see chapter IV.B.7, under *Edit panel*).

Exchange rates are defined relative to the local currency. The exchange rate is expressed as the number of units of the currency relative to a specified number of units of the local currency.

To delete a currency

- Select the currency to be deleted by clicking the corresponding line in the CURRENCIES list box.
- Choose the **Delete** pushbutton.

ACCOUNTING CURRENCY

Financial results are reported in the accounting currency. Data entries expressed in the local currency or foreign currencies are converted to the accounting currency (for reports only) at the specified exchange rates. The local currency is often designated as the accounting currency.

The choices for the accounting currency unit are:

- Absolute (one unit of the Accounting currency)
- Tens ('0)
- Hundreds ('00)
- Thousands ('000)
- Ten thousands ('0 000)
- Hundred thousands ('00 000)
- Millions ('000 000)
- Ten millions ('0 000 000)
- Hundred millions ('00 000 000)
- Billions ('000 000 000)

All calculations presented in financial reports are divided by the accounting currency unit prior to display or print.

To define the accounting currency

- Select the row of the CURRENCIES list box corresponding to the currency to be assigned as the accounting currency;
- Choose the **Select** pushbutton.

The selected accounting currency is displayed in the ACCOUNTING CURRENCY NAME field.

- Select the Units for the accounting currency from one of the above choices in the drop-down list box.

REFERENCE CURRENCY

For information only, a reference currency is identified to provide the exchange rate of the accounting currency relative to a standard currency, e.g. US\$, DM or Ats. This information appears only in the SUMMARY SHEET of the results and is not used in any way in calculations.

To identify the reference currency (text only)

- Choose the **Reference currency** pushbutton.

The REFERENCE CURRENCY modal window is displayed (figure 61).

- Select the NAME entry field and enter the name of the reference currency.
- Select the EXCHANGE RATE entry field and enter the exchange rate as text, e.g., 65.00 bolsa per US\$.
- Accept the data with the **OK** pushbutton or cancel the entries with the **CANCEL** pushbutton in the REFERENCE CURRENCY modal window.

Control returns to the CURRENCIES window.

The screenshot shows a modal window titled "Reference currency". It has a light gray background and a dark blue title bar. There are two input fields: "Name:" with the text "US dollars" and "Exchange rate:" with the text "BS 65.00 per US\$". Below the fields are two buttons: "OK" and "Cancel".

Figure 61: Reference currency modal window

Accept the currencies data in the CURRENCIES window with the **OK** pushbutton or cancel the entries with the **CANCEL** pushbutton. In either case, control returns to the browser.

For a New project, if Joint venture and/or the special features Cost centre analysis and/or Inflation are selected, the corresponding nodes appear sequentially in that order in the browser. If none of these are selected the DISCOUNTING node appears in the browser.

EXCHANGE RATES

For consistency in accounting, all numerical data must be entered with the appropriate definition of exchange rates between currencies. An important consideration is that the value calculated in the accounting currency in accordance with the data entries is divided by the defined UNIT before its presentation in a report (schedule or graph).

The exchange rates relative to the local currency and the unit selected for the accounting currency are factors in deciding the order of magnitude for data entries. All calculated values are reported in the units of the accounting currency. An example is shown in table 7.

Accounting currency:			US\$ Unit: thousands
Local currency:			Ats
Exchange rate, accounting currency:			1/12 US\$ = 1 Ats
Item	Value	Currency	Exchange rate relative to local currency
1	12,000	FF	2 FF = 1 Ats
2	30,000	sfr	1 sfr = 8.00 Ats

Table 7: Sample exchange rates

The values expressed in accounting currency (US\$ thousands) are determined as follows:

$$12,000 \text{ FF} \times \frac{1 \text{ Ats}}{2 \text{ FF}} \times \frac{1 \text{ US\$}}{12 \text{ Ats}} \times \frac{1}{1000} = \text{US\$ } 0.5 \text{ thousands}$$

$$30,000 \text{ sfr} \times \frac{8 \text{ Ats}}{1 \text{ sfr}} \times \frac{1 \text{ US\$}}{12 \text{ Ats}} \times \frac{1}{1000} = \text{US\$ } 20.0 \text{ thousands}$$

CURRENCY UNITS

The same values, expressed in currencies designated as thousand FF (tFF) and thousand sfr (tsfr) are calculated in the accounting currency as follows:

$$12 \text{ tFF} \times \frac{1 \text{ Ats}}{0.002 \text{ tFF}} \times \frac{1 \text{ US\$}}{12 \text{ Ats}} \times \frac{1}{1000} = \text{US\$ } 0.5 \text{ thousands}$$

$$30 \text{ tsfr} \times \frac{8.00 \text{ Ats}}{0.001 \text{ tsfr}} \times \frac{1 \text{ US\$}}{12 \text{ Ats}} \times \frac{1}{1000} = \text{US\$ } 20.0 \text{ thousands}$$

In this example the values and exchange rates are adjusted as shown in table 8.

Item	Value	Currency	Exchange rate relative to local currency
1	12	1,000 FF	0.002 tFF = 1.00 Ats
2	30	1,000 sfr	0.001 tsfr = 8.00 Ats

Table 8: Sample currency units

J. COST CENTRE STRUCTURE

The COST CENTRE STRUCTURE node appears in the input browser only when the **Cost centre analysis** pushbutton is selected in the SPECIAL FEATURES modal window of the PROJECT IDENTIFICATION window.



The six standard cost centres (CCGs) which appear automatically when the Extend Icon for the COST CENTRE STRUCTURE node is chosen are shown in figure 62. The standard cost centres cannot be deleted or edited.

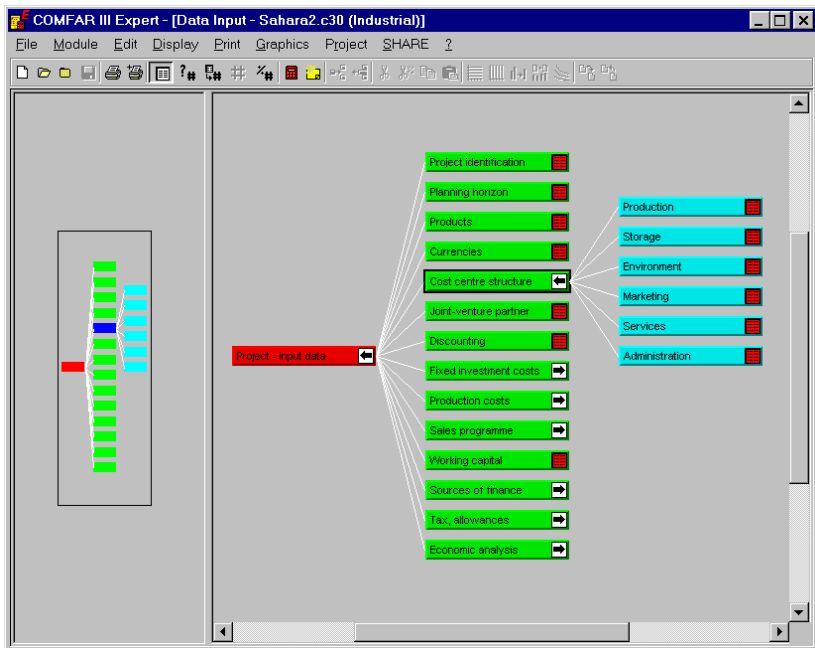


Figure 62: Cost centre structure

The cost centre structure can be extended up to four stages, including the minimal structure, using the **Insert** feature of the EDIT menu.

Products are automatically assigned to each CCG, and may be assigned to cost centre subgroups (CCSGs) and units. A product can be assigned to more than one cost centre, in which case its direct costs may not necessarily all be assigned to the same cost centre (a cost item can be assigned to only one cost centre). If **Cost allocation** is active, indirect costs assigned to a cost centre are allocated among the assigned products only, as described in chapter VII.C, *Cost centres and cost allocation*.



To assign a product to a user-defined cost centre

- Select the Table Icon for a node representing one of the user-defined cost centres (CCSGs or Units).

The COST CENTRE DEFINITION modal window is displayed (figure 63).

Products are assigned to the cost centre by selecting any of the defined products in the PRODUCTS AVAILABLE list box and transferring them to the PRODUCTS INVOLVED list box. (By default, all of the defined products appear in the PRODUCTS INVOLVED list box of the next lower level; products deleted on the higher level may be selected again on a lower level of the cost centre system).

- Select one of the products in the PRODUCTS AVAILABLE list box.
- Choose the **Select** pushbutton.

The selected product is transferred to the PRODUCTS INVOLVED list box.

To delete a product previously assigned to a cost centre

- Select the product to be deleted in the PRODUCTS INVOLVED list box.
- Choose the **Delete** pushbutton.

The description field for standard cost centres is a display field only; the existence and names of these cost centres cannot be modified. For user-defined cost centres the name of the cost centre can be modified directly or with the **Edit Node** feature of the EDIT menu (see chapter V.C).

The cost centre definitions are accepted with the **OK** pushbutton in the COST CENTRE DEFINITION window and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

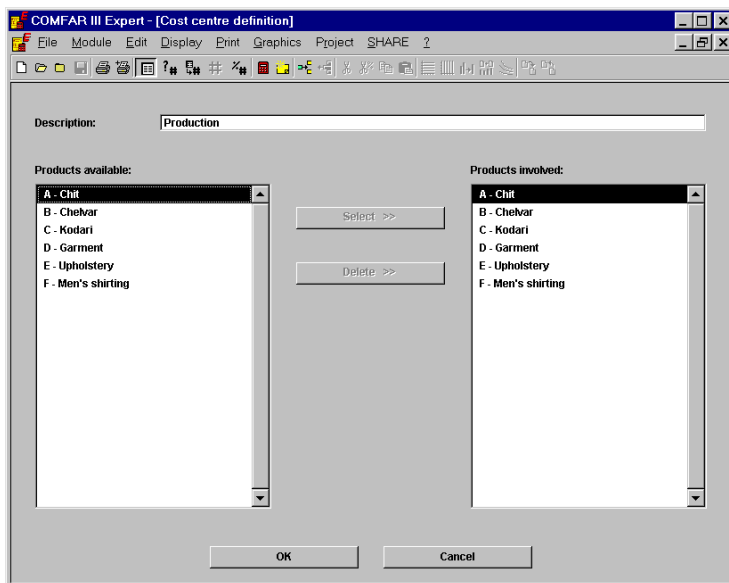


Figure 63: Cost centre definition modal window

If **Joint venture** and/or **Inflation** are selected for a new project the corresponding nodes appear sequentially in that order in the browser. If none of these is selected, the DISCOUNTING node appears in the browser.

K. INFLATION

The INFLATION node appears in the input browser only when the INFLATION check box is selected in SPECIAL FEATURES modal window (figure 55) of the PROJECT IDENTIFICATION window.

Inflation refers to the general increases in prices as measured in a particular currency. A measure of inflation is the Consumer Price Index (CPI) or the Manufacturer's Unit Value Index (MUV).

If analysis is performed at *current prices*, the inflation in each currency should be defined. However, care should be taken in defining the exchange rate relative to the local currency so that the effect of relative inflation of the two currencies is not double-counted. In the model, the exchange rate of each currency is adjusted in accordance with inflation, assuming that devaluation (revaluation) of a currency follows the relative inflation (deflation) between the two currencies (see chapter XI.B).

An anticipated change in the price of an input or output of the project relative to the general price trend should be defined as *escalation* in a FIXED INVESTMENT or a PRODUCTION COSTS window.



Inflation data is entered in the INFLATION window (figure 64) which is displayed by selecting the Table Icon for its node in the input browser.

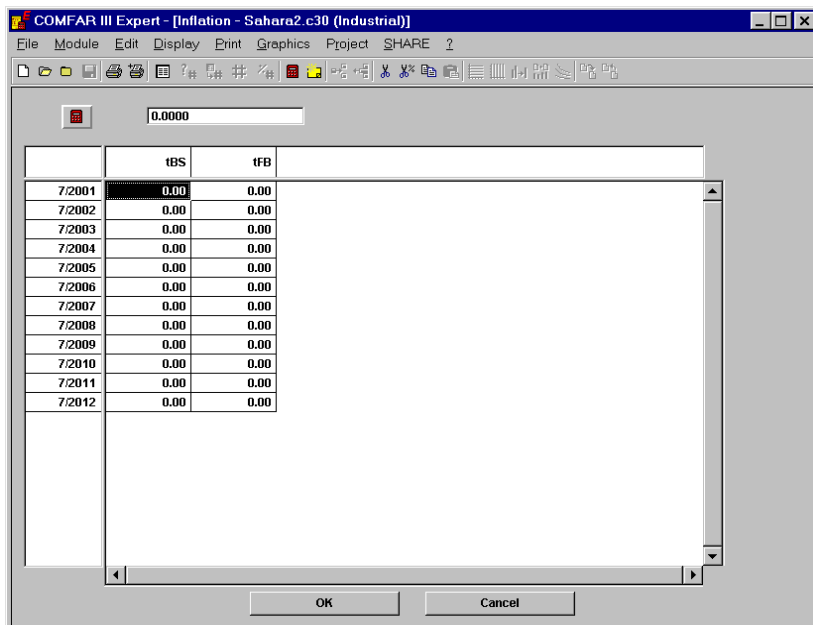


Figure 64: Inflation window

In the INFLATION window a column is assigned for each defined currency. The first column is always assigned automatically to the local currency.

The *inflation rate* can be specified for each defined currency and for each project year ending at the defined balance date by entering the value (in per cent) of inflation. All prices defined in that currency are then inflated for each year by the annual percentage, in effect compounding the inflation rate (see chapter XI.B). For a partial year (which can occur in this case only at the beginning of the planning horizon) the inflation rate should take into consideration the length of the period. No automatic adjustment for a period shorter than one year is included in the model.

To specify inflation for the defined currencies

- Use the iconic buttons and data field to insert the **inflation rates** in the list box for each defined currency (see chapter IV.B.3). The default value for all these rates is zero.
- Accept the specified rates with the **OK** pushbutton or cancel the selections with the **CANCEL** pushbutton. In either case control is returned to the browser.

If **Joint-venture project** is selected in the PRODUCT IDENTIFICATION window for a new project, the JOINT-VENTURE PARTNER node appears in the browser. Otherwise, the DISCOUNTING node appears.

L. JOINT VENTURE PARTNERS

If **Joint-venture project** is selected in the PROJECT IDENTIFICATION window, the JOINT-VENTURE PARTNER node is added to the data structure in the browser. At least two partners must be defined in the JOINT-VENTURE PARTNER window (figure 65), which is displayed by selecting the Table Icon for the corresponding node. The default condition (if **Joint-venture project** is selected) is two local partners.

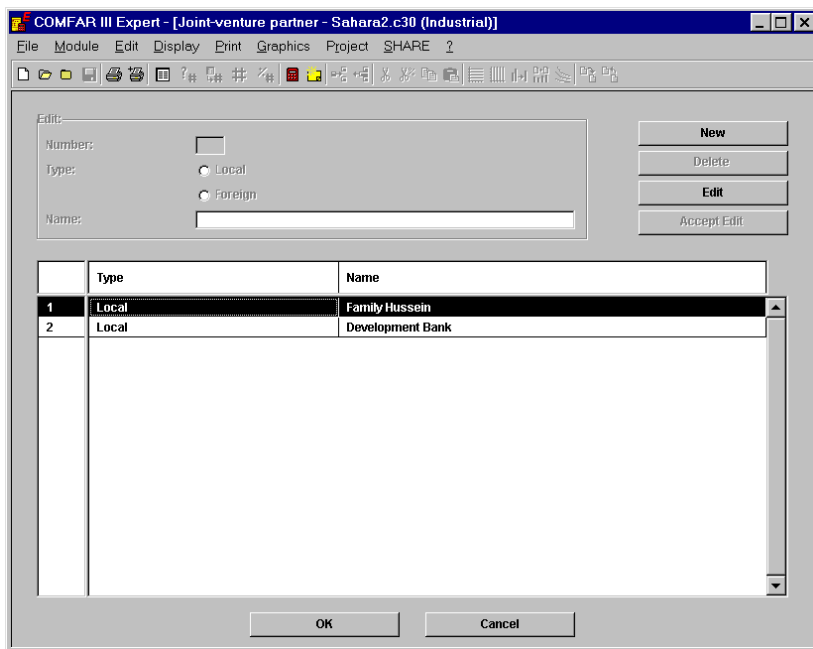


Figure 65: Joint-venture partner window

To define joint-venture partners

- Use the EDIT panel to enter the **Type** (local/foreign) and **Name** of each partner in the list box. The Type is selected with the corresponding radio button and the Name entered in the NAME field (see chapter IV.B.7, under *Edit panel*).

The definitions are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. Control returns to the browser. The discounting node appears for a new project.

To delete a previously defined joint venture partner

- Select the row corresponding to the joint venture partner to be deleted in the list box.
- Choose the **Delete** pushbutton.

M. DISCOUNTING

The time value of money is taken into account in determining the present value (discounted) or future value (compounded) of amounts (flow of funds or resources) occurring at different point in time.

Performance indicators involving discounting and/or compounding include the *Net Present Value* (NPV), *Short NPV* (reduced time span), *Dynamic Payback* period, *Internal Rate of Return* (IRR) and *Modified IRR* (see chapter XI.D. and E, as well as chapter X.C.6, under *Discounted cash flow*).



The DISCOUNTING window (figure 66) is displayed by selecting the Table Icon for the DISCOUNTING node. The list box in this window has two forms, **Discounting** for entering discounting rates for the Net Present Value (NPV) and **Modified Internal Rate of Return** (MIRR) for defining the reinvestment and borrowing rates for the MIRR.

COMFAR III Expert - [Discounting - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Net present values discounted to:

End of first year (-6/2002) Beginning of first period (-7/2001)

IRR: 12.0000

Discounting Modified Internal Rate of Return

	Rate (%)	Length (years)
Total investment	12.00	12
Total equity capital	12.00	6
Family Hussein	12.00	6
Development Bank	12.00	6

OK Cancel

Figure 66: Discounting window

To select the discounting or modified IRR list box

- Select either the **Discounting** or the **Modified IRR** tab of the notebook.

The corresponding list box is displayed in the DISCOUNTING window (figure 66).

NET PRESENT VALUE (NPV) AND SHORT NPV

The *discount rate* for the calculation of the NPV with respect to the total investment and for each class of equity capital is defined. The discount rate is generally based upon the opportunity cost of capital as a challenge (or hurdle) rate for the project. The basis for the rate with respect to total investment may be the expected weighted average return for the sources of capital. In principle, a project is acceptable if the NPV is non-negative at a discount rate that represents the best of alternative opportunities. The rate for each class of share capital may be based upon the specific opportunity cost of capital for each class of shares.

A Short NPV can be determined on the basis of the time horizon for each class of shareholder. The NPV is determined for the number of years specified. The *dynamic payback* is the year that the cumulative NPV turns positive. The **Length (years)** cell in the first line of the list box is inactive because the calculation of Short NPV is not relevant for the total investment.

To define the rate (%) and the length (years) for the short NPV

- Select the DISCOUNTING list box as above.
- Select the **Rate** cell in the first row in the list box and use the iconic buttons in conjunction with the data field to enter the **Rate (%)** for calculation of NPV of the total investment (see chapter IV.B.3, under *Icons and iconic buttons*). The **Length (years)** cell in this row is inactive.
- Select a cell corresponding to an equity class and enter the **Rate (%)** and the **Length** using the iconic buttons and data field.

MODIFIED INTERNAL RATE OF RETURN (MIRR)

A *reinvestment rate* and a *borrowing rate* are defined for the total investment and for each class of shares. The reinvestment rate is used to simulate the reinvestment of all surplus funds generated by the project with a compounded return based upon a realistic assessment of investment opportunities expected to prevail over the life of the project. The borrowing rate is used to simulate borrowing of funds at a realistic rate to cover deficits.

To define the reinvestment rate and borrowing rate for MIRR

- Select the **Modified IRR** radio button in the DISCOUNTING window.
The MODIFIED IRR list box is displayed (figure 67).
- Select the first row of the list box and use the iconic buttons and data field to enter the **Reinvestment rate** and **Borrowing rate** for the total investment in per cent (see chapter IV.B.3, under *Icons and iconic buttons*).
- Select a row corresponding to an equity class and enter the **Reinvestment rate** and the **Borrowing rate** in percent using the iconic buttons and data field.
- In case no rates are defined by the user, the system assumes for the MIRR computations that funds are reinvested and borrowed at the IRR of the project. Selecting the **IRR** pushbutton causes the system to set the IRR rates (total investment and equity) as the default.

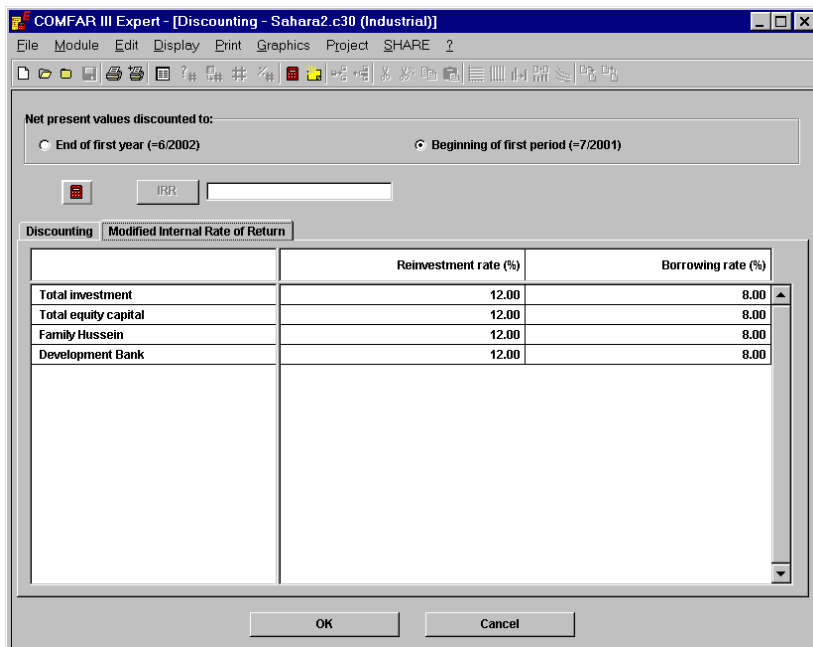


Figure 67: Discounting window with modified IRR list box

DISCOUNTING REFERENCE DATE

The defined discount rate for each class of capital is used to determine the NPV at a specified point in time (discounting reference date) which is restricted either to the end of the first year or the beginning of the first project period.

To define the reference date for discounting and compounding

- Select the radio button in the DISCOUNTING REFERENCE DATE panel corresponding to the reference date for discounting.

The selections in the DISCOUNTING window are accepted with the **OK** push-button or cancelled with the **CANCEL** pushbutton. Control returns to the browser.

N. FIXED INVESTMENT COSTS

The default structure of the Fixed investment costs differs according to the Project Type (industrial, maritime, agricultural, infrastructural etc.) and the Level of Analysis (opportunity, feasibility). However, the input data required is essentially the same for each item of Fixed investment costs.

To display the window for a typical fixed investment costs item

- If not already done, extend the FIXED INVESTMENT COSTS node in the input browser by clicking the Extend Icon with the left mouse button.

The FIXED INVESTMENT COSTS node is extended one level. Nodes representing items for which data can be entered contain the Table Icon. Nodes containing the Extend Icon can be extended further by clicking with the left (one level) or right (all levels) mouse button.

- Select the Table Icon for a Fixed investment costs item, e.g., Land purchase (figure 68).



The screenshot shows the 'COMFAR III Expert - [Fixed investment costs - Sahara2.c30 (Industrial)]' window. The 'Description' field contains 'Land purchase'. The 'Currency' is set to 'thousand bolsas', 'Escalation' is '0.00 % p.a.', and 'Depreciation conditions' are set to 'Linear to scrap' starting at '7/2003' with a 'Rate' of '0.00 % p.a.', 'Length' of '0.00 years', and 'Scrap' of '100.00 %'. A value of '1.0000' is entered in a field below the depreciation conditions. The table below shows 12 depreciation periods (7/2001 to 7/2012) with a quantity of 1.00, a price of 10,800.00 for the first period, and a total of 10,800.00.

	Quantity	Price	Total	Sale of asset
7/2001	1.00	10,800.00	10,800.00	
7/2002	1.00	0.00	0.00	
7/2003	1.00	0.00	0.00	
7/2004	1.00	0.00	0.00	
7/2005	1.00	0.00	0.00	
7/2006	1.00	0.00	0.00	
7/2007	1.00	0.00	0.00	
7/2008	1.00	0.00	0.00	
7/2009	1.00	0.00	0.00	
7/2010	1.00	0.00	0.00	
7/2011	1.00	0.00	0.00	
7/2012	1.00	0.00	0.00	

Figure 68: Fixed investment costs item

In addition to the general definitions described before (see chapter VII.C), other required and optional data can be defined for fixed investment items.

DEPRECIATION

Depreciation is a means of spreading the cost of an asset over a time-span approximating its useful life or as specified by the taxing authorities.

The start of depreciation is defined by the **Starting at** date which is limited to the first day of any production period during the time-span between the beginning and the end of the production phase and after the period of acquisition of the asset.

Depreciation commences at the **Starting at** date for any assets acquired prior to this date. The value of the asset to be depreciated is the defined value in each period converted to local currency at the current rate of exchange between the currency in which the value of the asset is expressed and the local currency. Depreciation commences at the start of the production year following the date of acquisition for additional assets of this type acquired after the **Starting at** date.

Four methods or types of depreciation are available as described in table 9 (for detailed calculation rules see chapter XI.H).

TYPE OF DEPRECIATION	DEPRECIATION PER ANNUM
Linear to zero	A defined percentage of the original asset value.
Linear to scrap	A defined percentage of the difference between the original book value and the specified scrap (salvage) value.
Accelerated	A defined percentage of the difference between the book value at the end of the prior year and the specified salvage value. Depreciation switches automatically to Linear to scrap in the year that the annual Linear to scrap depreciation is greater than or equal to the Accelerated depreciation calculated for that year.
Sum of digits	The proportion of the original asset value depreciated each year (j) is determined by the ratio $\frac{n - j + 1}{\sum j}$ where n = number of periods, e.g. 5, j = year (1, .., n), e.g. 1(st) ($\sum j = 1 + 2 + 3 + 4 + 5 = 15$)

Table 9: Depreciation methods

Partial depreciation is calculated when the balance date is defined such that the first year of production is a partial year. This occurs if the first production year starts other than on a day following the balance date. The partial depreciation is calculated according to the number of months in the partial year (see chapter XI. H).

In any full or partial year comprised of more than one period, the depreciation is charged at the balance date.

Depreciation terminates in all methods when the **book value** of an asset reaches the defined scrap value or when the asset is sold. The asset can be sold at any balance date after its acquisition and up to the end of the project (see *Sale of asset*, below).

To define the depreciation conditions

- Select the type of depreciation from the TYPE drop-down list box in the DEPRECIATION CONDITIONS panel.
- Select the date for start of depreciation from the STARTING AT drop-down list box.
- Select the RATE field and enter the **Rate of depreciation** in % per annum (not active for sum of digits method).
- Select the LENGTH field and enter the **Number of years** of depreciation.
- Select the SCRAP field line and enter the percent scrap value.

Depreciation allowances for the total fixed investment can be specified for each production period in the ALLOWANCES window under the TAX, ALLOWANCES node.

These adjustments are added to the depreciation calculated by the system and reduce the book value of the fixed assets commensurately so that the net income statement and balance sheet are affected.

COSTS OF ASSETS

The asset cost can be defined for each period in the planning horizon.

The Input Mode is defined in the **Defaults** feature of the EDIT menu (see chapter V). Options are **Standard** (0), **Price = 1** or **Quantity = 1**. In any case, when any two values of Price, Quantity and Total are defined, the third is automatically calculated according to the relation

$$\text{Total} = \text{Quantity} \times \text{Price}$$

In the COSTS list box, two of the three values are defined for each project period over the entire planning horizon, including costs of asset replacements and starting balance in the case of an expansion/rehabilitation project. If the input mode is other than Standard, it is necessary to enter only one value.

Investment defined during the construction phase is treated as initial investment (see the *Industrial Feasibility Studies Manual*). The total value of all assets of a particular type acquired prior to the production phase are depreciated jointly commencing in a period no earlier than the first period of the production phase.

To enter cost data for a fixed investment item

- Use the iconic buttons and data field to define two of the three values Quantity, Price and Total for each period in which the type of asset is acquired (see chapter IV.B.3 and IV.B.4).

SALE OF ASSET

The icon in the column **Sale of asset** provides the means to define the timing and value of the asset liquidation. This pushbutton is active only when a cell in any column for an item is selected in the list box for a period in which an asset acquisition is defined.

Any excess of sales price over book value is treated as *extraordinary income* and any deficit in sales price relative to book value is treated as *extraordinary loss* in the net income statement. The recovery of book value

(or the sale price in the latter case) is treated as return of capital (see chapter XI.I).

To define the sale of an asset

- Choose the icon in the column **Sale of asset**.

The SALE OF ASSET modal window is displayed (figure 69).

Figure 69: Sale of asset modal window

The value of the sale can be expressed in terms of any of the defined currencies.

To define the currency in which the value of the sale is expressed

- Select the Currency in the drop-down list box.

The value of the asset sold is returned in the year specified as the default value in the DEFAULTS window of the EDIT menu (Production + 1, Depreciation + 1) or any other specified balance date after purchase, starting from the next balance date until the balance date for the year after termination of production. All of these possible dates are displayed in the DATE OF SALE drop-down list box.

To define the date of sale of an asset

- Select the year of sale using the DATE OF SALE drop-down list box.

The sale of an asset can take place in the local or foreign market which has an impact on the balance of payments and the economic benefits for the project.

To define the market in which the asset is sold

- Select the **Local** or **Foreign** radio button.

The asset sale can be at book value or at a self-defined price.

To define the asset liquidation price

- Select either the **Sale at book value** or **Self-defined price** radio button.
- If the **Self-defined price** radio button is selected, a field is displayed for entering the sale value. Enter the liquidation value of the asset in terms of the selected currency in the SELF-DEFINED PRICE field.

STARTING BALANCE

If **Expansion/rehabilitation** has been selected in the PROJECT IDENTIFICATION window, the window for a fixed investment cost item is automatically adjusted to include a line for starting balance of assets which is effective on the day before the first day of the project. The effective date of investment for starting balances is the first day of the construction phase.

Starting balances are defined using the same procedures as for the other investment cost data (see above).

COST CENTRE ANALYSIS AND COST ALLOCATION

If **Cost centre analysis** or **Cost allocation** is active, a fixed investment cost item can be assigned to a Cost centre and/or can be allocated to products using the **Cost centre** or **Cost allocation** pushbutton (see chapter VII.C).

The investment data is accepted with the **OK** pushbutton or cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

CONTINGENCIES

A separate node for contingencies is contained within the FIXED INVESTMENT COSTS STRUCTURE for both opportunity and feasibility levels. The assumption is that regardless of the degree of refinement of the study some allowance is necessary for physical and price uncertainties. Normally the degree of uncertainty, and consequently the allowance for contingencies, decreases as a project advances toward the final planning stage. Allowances for contingencies are discussed in the *Industrial Feasibility Studies Manual*.

O. PRODUCTION COSTS

The default structure of the PRODUCTION COSTS node differs according to the **Project type** (industrial, maritime, agricultural, infrastructure etc.) and the **Level of analysis** (opportunity, feasibility). If more than one product is defined, nodes are provided for direct costs for each product and a separate node is added for indirect costs.

Production costs should be specified for all periods in the production phase for all defined products, even in periods when no sales are forecast. This is necessary because the valuation of finished products inventory, based essentially upon current cost of products sold in this model, is generally required in all project periods (the relation between the sales and production programme and finished products inventory requirements is described in chapter XI.L).

The procedure below describes the entry for any type of production cost.

To display the window for a typical direct production cost item (an item associated with a particular product)



- If not already done, click the Extend Icon for the PRODUCTION COSTS node with the left mouse button.

A node for each defined product and, if more than one product is defined, a node for indirect costs are displayed in the browser; each contains the Extend Icon.



- Choose the Extend Icon for a Product node.

The PRODUCT node is extended one level to reveal the cost items nodes with their associated Table Icons (figure 70).

- Choose the Table Icon for a cost item.

A PRODUCTION COSTS window for a direct cost item is displayed (figure 71).

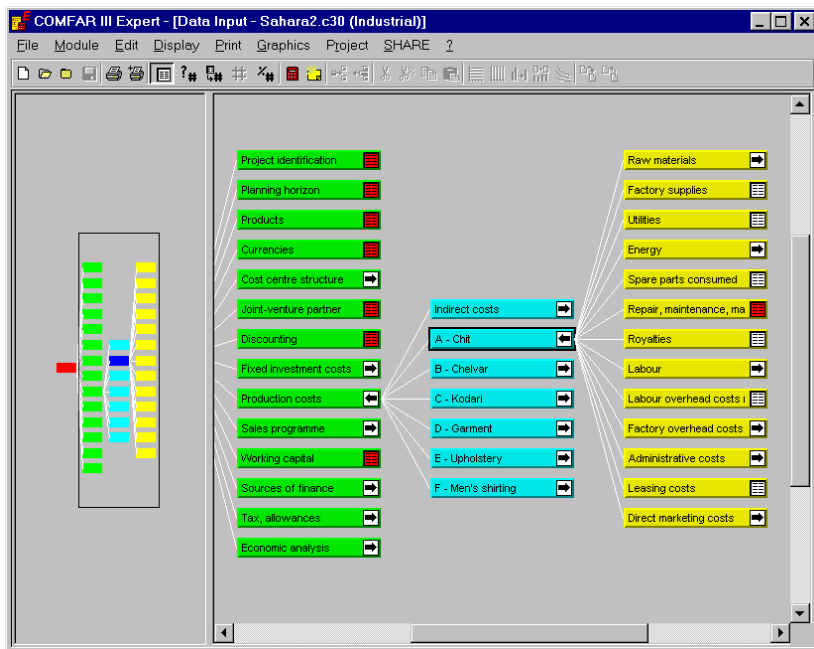


Figure 70: Structure of production costs

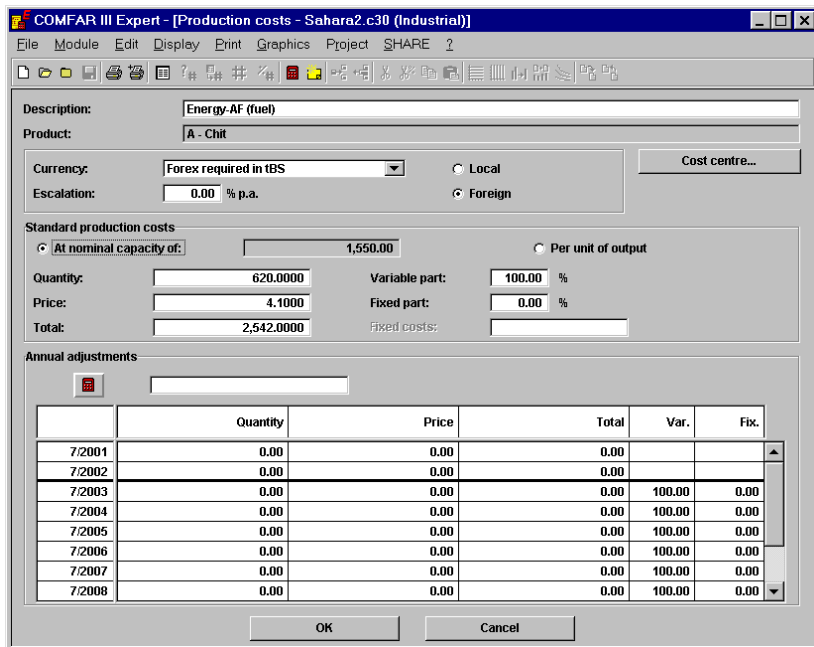


Figure 71: Production costs window (direct cost item)

1. Production cost options

Production costs are defined in terms of *Standard costs* and *Adjustments*. Calculations of production costs based upon standard production cost data, and annual adjustments data are aggregated, i.e. the total production cost for the item is the sum of the costs calculated from each type of entry.

Two alternative methods are available for defining standard costs: **At nominal capacity** (nominal capacity must be defined in the PRODUCTS window) and **Per unit of output**. Adjustments are intended primarily to account for non-linearities in the cost projections for an item. Indirect costs (not associated with a product) can be entered only as adjustments and not as standard production costs. *Standard production costs* and *adjustments* are combined by adding the quantities and applying the weighted average price (see chapter XI.K).

Standard production costs should be defined for the nominal capacity specified for each product defined in the PRODUCTS window which normally corresponds to planned sales rather than planned production. In the SALES PROGRAMME window, the level of sales in each production period is defined; production levels are determined on the basis of the sales and changes in inventory of finished goods (see chapter XI.L).

For each product and for any production period, the variable cost part of standard production costs at planned (reference) capacity is linearly interpolated (or extrapolated) based upon the relation between the defined level of sales (and the respective production) and the nominal capacity defined in the PRODUCTS window. When costs are specified per unit of output, the *unit costs* are considered completely variable. *Fixed costs* appear in each period defined by the **Actual start** and the **Actual end** of production for a product in the PRODUCTS window (see chapter VII.H).

2. Entry of production cost data

STANDARD COSTS (DIRECT COST DATA)

Direct costs for a particular product can be defined either **At nominal capacity** or **Per unit of output**.

To select a direct cost data option

- Select either of the **At nominal capacity** or the **Per unit of output** radio button in the STANDARD PRODUCTION COSTS panel.

AT NOMINAL CAPACITY

If **At nominal capacity** of is selected, the nominal capacity specified in the PRODUCTS window is displayed in the AT NOMINAL CAPACITY OF field. The option is available (active) only if a non-zero nominal capacity is defined in the PRODUCTS window for the related product.

To define the costs at nominal capacity it is necessary to specify the values for **Quantity** and **Price** or **Total**; the total must represent the value for the nominal capacity. The proportions of fixed and variable costs are defined by entering the percentage of either the **Variable part** or the **Fixed part**; when one is entered the other is automatically calculated (the sum is 100%).

Variable costs for a particular period are then determined linearly based upon the percentage sales and the respective production, with respect to the **Nominal capacity** for a product and the variable part of standard costs (see chapter XI.J). Calculations for the net income statements are based on **Cost of products sold** (CPS) with the exception of the computation of the book value of products in stock and the cash outflows from operations, which are calculated based on **Cost of products produced** (CPP).

To define costs at nominal capacity

- Sequentially select the QUANTITY and PRICE or TOTAL fields and enter the corresponding numerical values.
- Enter either a **Variable part** or **Fixed part** percentage (either value may be entered; the other is calculated automatically).

If after entering production cost data in a window using the **At nominal capacity** option either the nominal capacity for the product is set to zero in the PRODUCTS window or the **Per unit of output** radio button is selected, the cost definitions for such cost items associated with the product are converted to the **Per unit of output** option. The fixed costs and costs per unit are determined as follows:

$$FC = T \times PFC$$

$$UC = \frac{T \times PVC}{Q}$$

FC	Fixed cost
UC	Unit cost
T	Total cost
Q	Quantity
PFC	Percent fixed cost/100
PVC	Percent variable cost/100

If the nominal capacity in the PRODUCTS window has not been set to zero the process is reversed when the **At nominal capacity** radio button is selected.

PER UNIT OF OUTPUT

To define the costs **Per unit of output** it is necessary to specify the values for **Quantity** and **Price** or **Total**, the total unit cost represents the cost of the input item per unit of output. **Fixed costs** are defined using the FIXED COSTS field. The cost for a particular period is determined as the sum of fixed cost and the product of the total unit cost and units sold or produced in the period.

To define costs per unit of output

- Sequentially select the QUANTITY and PRICE or TOTAL fields and enter the corresponding values.
- Select the FIXED COSTS field and enter the value of fixed costs.

If a non-zero nominal capacity is defined in the PRODUCTS window for the product associated with a production cost window in which data exists for the **Per unit of output** option, when the radio button for the **At nominal capacity** option is selected the data is converted (see *At nominal capacity* above).

ANNUAL ADJUSTMENTS

All project periods in the planning horizon are included in the list box. During the construction phase the entries represent purchases of initial stocks necessary for trial runs and startup. Production phase entries are for the adjustments discussed above.

When **Expansion/rehabilitation** is selected in the SPECIAL FEATURES modal window of **Project identification**, the first row in the ANNUAL ADJUSTMENTS list box is used to define the **Starting balance** for inventories of the existing enterprise which are effective on the day before the start of the project. The effective date for these entries is the first day of the project. Initial stocks are entered in the succeeding rows that represent periods of the construction phase. Values can be entered for any or all periods of construction.

Initial stocks and/or starting balances can be specified for

- Raw materials
- Factory supplies
- Utilities
- Energy
- Spare parts

COMFAR III Expert - [Production costs - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: Yarns-B

Product: B - Chevvar

Currency: thousand bolsa Local Foreign

Escalation: 0.00 % p.a.

Standard production costs

At nominal capacity of: 1,610.00 Per unit of output

Quantity: 1,610.0000 Variable part: 100.00 %

Price: 52.0000 Fixed part: 0.00 %

Total: 83,720.0000 Fixed costs:

Annual adjustments

	Quantity	Price	Total	Var.	Fix.
7/2001	0.00	0.00	0.00		
7/2002	290.96	52.00	15,130.00		
7/2003	0.00	0.00	0.00	100.00	0.00
7/2004	0.00	0.00	0.00	100.00	0.00
7/2005	0.00	0.00	0.00	100.00	0.00
7/2006	0.00	0.00	0.00	100.00	0.00
7/2007	0.00	0.00	0.00	100.00	0.00
7/2008	0.00	0.00	0.00	100.00	0.00

OK Cancel

Figure 72: Production costs window, annual adjustments

The initial inventory of material items at the start of the production phase is comprised of the total of any defined starting balance and initial stocks (ANNUAL ADJUSTMENT list box). The COMFAR model automatically consumes the initial inventory at the earliest time required for the planned production programme (see chapter XI.K, under *Definition of initial stock*).

For each project period the **Quantity** and **Price** or **Total** are entered; the Total represents the adjustment for each period. Either the **Variable** or **Fixed** percentage of the costs is also entered (the other is automatically calculated so that the sum is 100%).

The fixed and variable percentages of the costs are used only to determine the portion of the adjustment to be added to the *Fixed costs* and *Variable costs schedules* (see chapter X.C.3); the variable part does not relate to production level as in the case of standard costs (however, it is considered in the Break-even analysis).

To define the annual adjustments

- Use the iconic buttons and data field to enter the values for **Quantity** and **Price** or **Total** for each project period, including the starting balance in the case of an Expansion/rehabilitation project, the periods for initial stocks defined for the construction phase and normal production costs for the production phase (see chapter IV.B.3, under *Icons and iconic buttons*).
- Use the iconic buttons and data field to enter the percentage **Variable** or **Fixed** (the other is calculated automatically) for each production period (cells representing periods prior to the production phase are inactive for these columns as they relate to initial stocks).

The **Cost centre** pushbutton is active in (direct) PRODUCTION COSTS windows when these functions are activated in the SPECIAL FEATURES modal window of the PROJECT IDENTIFICATION window (see chapter VII.C).

Accept the data with the **OK** pushbutton or cancel with the **CANCEL** pushbutton. In either case control returns to the browser.

INDIRECT COSTS

The INDIRECT COSTS node appears in the input browser only when more than one product is defined.

Indirect costs of production are entered as **Annual adjustments**. A separate node is provided in the PRODUCTION COST STRUCTURE in the browser for entry of indirect costs. Nodes for indirect cost items are displayed when this node is extended. Data entry is identical to the procedure in the preceding section, *Annual adjustments*. The fixed and variable percentages do not relate to the level of production in any way; they are used only to determine the amounts of the adjustments to be added to the *Fixed costs* and *Variable costs schedules* (however, they are considered in the Break-even analysis).

If **Cost allocation** is not active, indirect costs are not allocated; results are available only for direct costs for each product.

The **Cost centre** pushbutton appears in the PRODUCTION COSTS window for indirect cost items when **Cost centre analysis** is activated in the SPECIAL FEATURES modal window of PROJECT IDENTIFICATION. If **Cost allocation only** is activated, the **Cost allocation** pushbutton appears in the PRODUCTION COSTS window for indirect cost items (see chapter VII.C).

P. SALES AND PRODUCTION PROGRAMME

The projected sales for each period of the production phase are defined in the SALES PROGRAMME window for each product.

The production programme is calculated by the system as a function of the sales programme and changes in inventory of finished goods (see chapter X.L.L). For each product the change in finished goods inventory, calculated according to the *minimum days coverage* defined in the WORKING CAPITAL window and any defined initial stocks, is added to units sold (a decrease in finished goods inventory commensurately reduces the production programme in relation to the sales programme).

Windows for each product are accessed from the SALES PROGRAMME node in the input browser. When this node is extended a subnode appears for each defined product from which its DATA ENTRY window is invoked.

The **Insert** feature of the EDIT menu may be used to expand the level of detail of the sales among various clients or markets.

To display the sales programme window for a product

- If not already done click the Extend Icon for the SALES PROGRAMME node with the left mouse button.

The SALES PROGRAMME node is extended one stage, revealing the nodes for all defined products.

- Select the Table Icon for a product.

The SALES PROGRAMME window is displayed (Figure 73).



Either of two list boxes can be selected for data entry. The SALES PROGRAMME list box is used to define **Quantity**, **Price** and **Total**; the SALES TAX AND SUBSIDIES list box is used to define tax and subsidy conditions.

To select the list box

- Select either the **Sales programme** or the **Sales tax and subsidies** tab of the notebook.

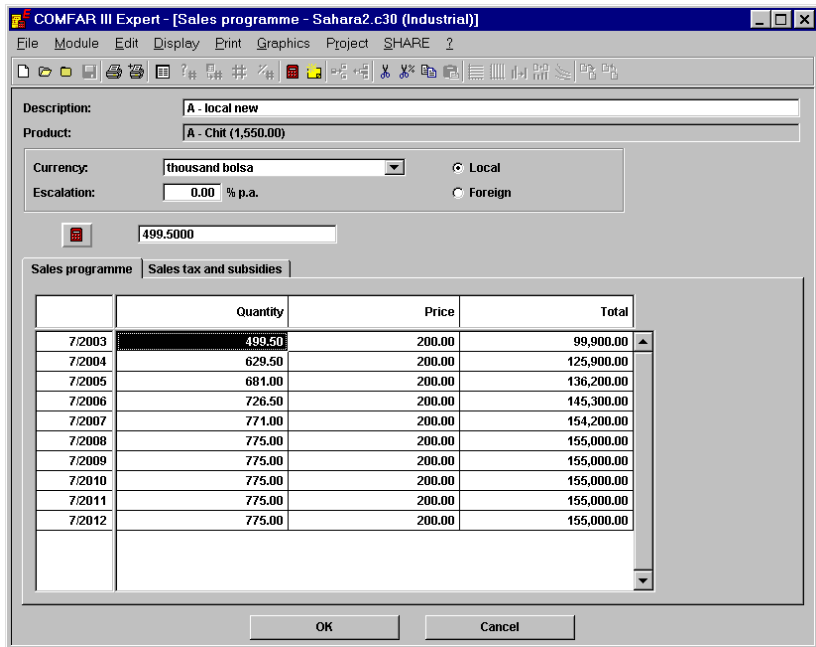


Figure 73: Sales programme window

SALES PROGRAMME DATA

If the **Sales programme** tab is selected, the SALES PROGRAMME list box is displayed as above.

To define the sales programme for a product

- Use the iconic buttons and data field to enter the values for **Quantity** and **Price** or **Total**, depending on input mode, for each production period in the SALES PROGRAMME panel (see chapter IV.B.3, under *Icons and iconic buttons*).

FOR CONSISTENCY WITH THE ALGORITHMS FOR FINANCIAL ANALYSIS IT IS NECESSARY TO ENTER THE PRICE NET OF SALES TAX.

In the financial schedules (reports) the gross sales revenue is shown, for information only, by adding the sales tax to sales revenues.

SALES TAX AND SUBSIDIES

The SALES TAX AND SUBSIDIES list box is displayed when the corresponding tab is selected (figure 74). Sales tax is specified as a percentage of the price or total sales revenue.

COMFAR III Expert - [Sales programme - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: A - local new

Product: A - Chit (1,550.00)

Currency: thousand bolsa Local Foreign

Escalation: 0.00 % p.a. Foreign

Sales programme Sales tax and subsidies

	Sales tax (%)	Subsidies (%)	Subsidies (abs)
7/2003	0.00	0.00	0.00
7/2004	0.00	0.00	0.00
7/2005	0.00	0.00	0.00
7/2006	0.00	0.00	0.00
7/2007	0.00	0.00	0.00
7/2008	0.00	0.00	0.00
7/2009	0.00	0.00	0.00
7/2010	0.00	0.00	0.00
7/2011	0.00	0.00	0.00
7/2012	0.00	0.00	0.00

OK Cancel

Figure 74: Sales tax and subsidies panel

Price subsidies are treated as part of the financial benefits for the project and thus are included in the sales revenue of the financial statements (Sales revenue = Net sales revenue + Subsidies). For economic analysis, subsidies are normally considered transfer payments and therefore not part of the economic benefits attributable to the project.

Subsidies can be specified as a percentage of the price (or net sales revenue for the product) and as an absolute amount. These values are aggregated!

To define the sales tax and subsidies for a product

- Use the iconic buttons and data field to enter the **Sales tax (%)**, **Subsidies (%)** and **Subsidies (abs)** in the corresponding columns of the SALES TAX AND SUBSIDIES panel (see chapter IV.B.3, under *Icons and iconic buttons*).

Entries are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

GROSS UNIT PRICE

The gross unit price is shown in the *Production and sales programme schedule* (chapter X.C.4) for use in the economic analysis and is defined as:

$$\text{Gross unit price} = \text{Net unit price} + \text{Sales tax}$$

Q. WORKING CAPITAL

Working capital is required to finance current assets. The requirement is diminished by a corresponding increase in current liabilities for each period in the production phase. Net working capital (NWC) at a point in time is determined by:

$$\begin{aligned} \text{NWC}_j &= \text{CA}_j - \text{CL}_j \\ \delta\text{NWC}_j &= \text{NWC}_j - \text{NWC}_{j-1} \end{aligned}$$

NWC_j	Net working capital, period j
δNWC_j	Increase/decrease in NWC, period j
CA_j	Current assets, period j
CL_j	Current liabilities, period j
$j = 1, 2, \dots, n$	Production phase periods

A working capital increase (decrease) requires financing (is a financial source). It is sometimes prudent to plan to finance some part of working capital as permanent capital (equity or long term loan).

The determination of working capital requirements involves the following elements which are defined in terms of minimum days coverage (Mdc) or coefficient of turnover (Coto):

- Material inventory (raw materials, factory supplies, utilities, energy, spare parts)
- Finished goods inventory
- Work in progress
- Accounts receivable
- Accounts payable
- Cash in hand

If either Minimum days coverage (Mdc) or the Coefficient of turnover (Coto) is entered, the other is automatically calculated according to the relation:

$$\text{Coto} = \frac{360}{\text{Mdc}}$$

Coto	Coefficient of turnover (number of rotations per period)
Mdc	Days coverage

The analyst should consider if the Mdc entries account for all the working capital requirements. Seasonal fluctuations or procurement cycles may indicate the need for additional short term financing.

The amount (quantity or total value) of working capital items required in any period is a function of the Coto, the quantity and/or financial basis and any starting balances and/or initial stocks defined. The financial bases for some working capital items (finished goods inventories, work in progress and accounts receivable) are linked to production cost items. The financial bases and calculation rules for all items of working capital are described in chapter XI.K.

Working capital requirements for material items can be calculated in terms of quantity or total value. This option is selected in the SPECIAL FEATURES modal window of the PROJECT IDENTIFICATION window. Finished goods inventories are always calculated in terms of the quantities for each period determined in the algorithm relating the sales and production programmes (see chapter XI.L). The selection of the quantity or value option can have an effect on the working capital increment/decrement, as shown by the example in table 10.

	STARTING BALANCE	INVENTORY REQUIREMENT YEAR 1
Material quantity	200	100
Material price	5	7
Value	1000	700
Change in value		$700 - 1,000 = -300$
Change in quantity		$100 - 200 = -100$
Change in quantity \times current price		$-100 \times 7 = -700$

Table 10: Sample calculation of working capital

Indirect costs are included in the financial bases for working capital components linked to production cost items. These costs are allocated according to the selected key when **Cost allocation** is active. When not active, costs are allocated by direct costs for calculating these working capital components.



To display the working capital window

- Choose the Table Icon for the WORKING CAPITAL node in the browser.
- The WORKING CAPITAL window is displayed (figure 75).

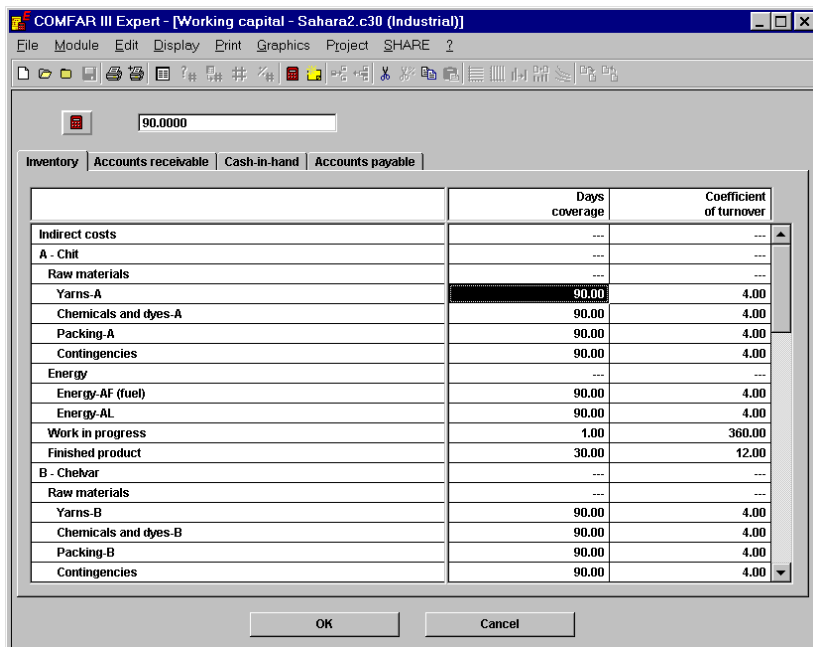


Figure 75: Working capital window

In the WORKING CAPITAL window it is possible to select any one of four list boxes to define inventory items, accounts receivable, cash-in-hand and accounts payable. Each list box is displayed when the corresponding tab of the WORKING CAPITAL ITEMS notebook is selected.

To select the appropriate list box for working capital items

- Select the tab corresponding to either **Inventory**, **Accounts receivable**, **Cash-in-hand** or **Accounts payable** in the WORKING CAPITAL ITEMS notebook.

MINIMUM DAYS OF COVERAGE

For the option selected, the list of items for which the minimum days coverage (Mdc) or turnover for the period (Coto) can be defined appears in the corresponding list box. The list contains only items for which production costs have been defined. The list box for INVENTORY is shown in the above figure. The other list boxes are similar except in regard to the items list; also, in the CASH-IN-HAND list box the items **Thereof short-term deposits**, % (percent of cash-in-hand invested in short term deposits) and **Interest rate**, % (return on short-term deposits) appear.

To define Mdc or Coto for the working capital items (inventory, accounts receivable, cash-in-hand and accounts payable)

- Use the iconic buttons and data field to enter either **Mdc** (days coverage) or **Coto** (coefficient of turnover) - (see chapter IV.B.3, *Icons and iconic buttons*). The other is calculated automatically as described above.

Entries are accepted with the **OK** pushbutton or cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

INVENTORY

If multiple products are defined, the INVENTORY list box contains **Indirect material items**, **Direct material items** associated with each product (e.g., raw materials, factory supplies) and lines for **Work in progress** and **Finished product** for each defined product. **Mdc** or **Coto** is entered for each item.

ACCOUNTS RECEIVABLE

The value of receivables is based on the cost of products sold (CPS). A separate prompt for the entry of the **Mdc** or **Coto** for each market (foreign/local) in which a product is sold is displayed in the ACCOUNTS RECEIVABLE panel. The underlying costs define the working capital increments/ decrements respectively for increases and decreases in receivables.

CASH-IN-HAND

Mdc or **Coto** is entered for foreign and local cash requirements. In addition, values are entered for the percentage of cash which is carried in short-term deposits, **Thereof short-term deposits (%)**, and the annual interest rate earned on these short term deposits, **Interest rate (%)**.

Cash-in-hand calculated for each period is reduced by the amount of the defined *securities*. This is also true in the case of an expansion/rehabilitation project where a *starting balance* of securities is declared.

ACCOUNTS PAYABLE

When multiple products are defined, the list box contains lines for indirect material items and for direct material items associated with each product. **Mdc** or **Coto** is entered for each listed item, if applicable. There are no indirect costs when a single product is defined.

INITIAL STOCKS AND STARTING BALANCES

The PRODUCTION COSTS window provides the opportunity in the ANNUAL ADJUSTMENTS panel for defining initial stocks procured during each period of the construction phase. Initial stocks can be defined for:

- Raw materials
- Factory supplies
- Utilities
- Energy
- Spare parts

In expansion/rehabilitation projects, *starting balances* can be defined for working capital items. Materials and finished goods inventories are defined in terms of quantity and price. Other working capital items are defined only in terms of value (see chapter VII.T). A stock/inventory management algorithm utilizes the initial stocks and starting balances during the production phase to reduce working capital requirements (see chapter XI.K).

R. SOURCES OF FINANCE

The SOURCES OF FINANCE node provides for the definitions of capital sources and profit distribution. The structure is fully extended by choosing the Extend Icon in the input browser with the right mouse button. Figure 76 shows a structure for a joint venture project with two partners.

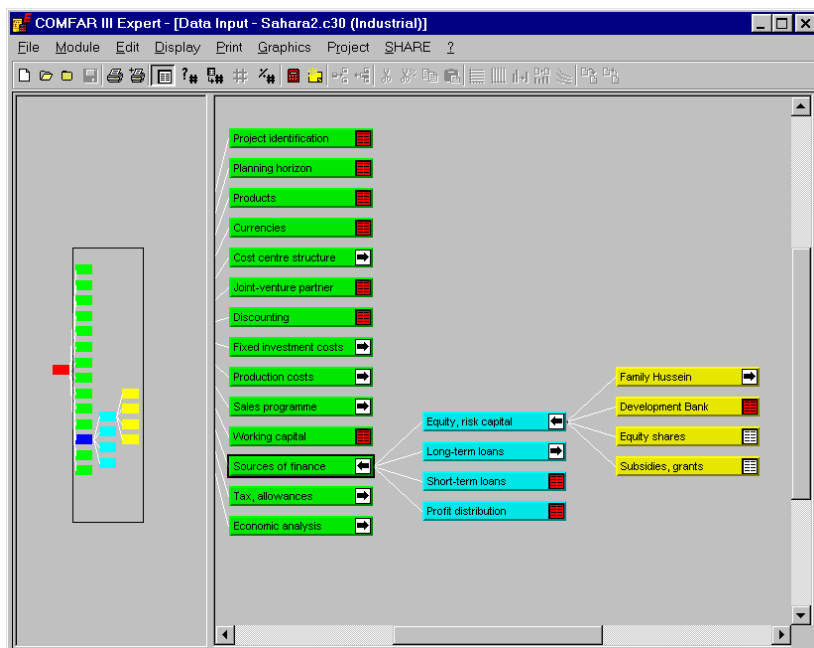


Figure 76: Structure of sources of finance

1. Equity/risk capital

Equity capital is classified as ordinary or preference capital. Preference capital is identified by the assignment of preferred dividends; any class of equity for which preferred dividends are defined is assumed to be preference capital.

For a joint venture project, equity shares can be defined for each partner and for other equity shares. The extended EQUITY/RISK CAPITAL node includes subnodes for all classes of equity, for subsidies and grants. A node is displayed for each joint venture partner (if applicable) and one node for other equity shares. These nodes can be expanded if necessary (see chapter V.C). For non-joint venture projects only one equity node is ordinarily displayed, which can be expanded at the user's discretion.

The procedure describes the entry of data for equity shares and is identical for entry of data for each defined joint venture partner.



To display the equity shares window

- Select the Table Icon for the EQUITY SHARES node.
The EQUITY SHARES window is displayed (figure 77).

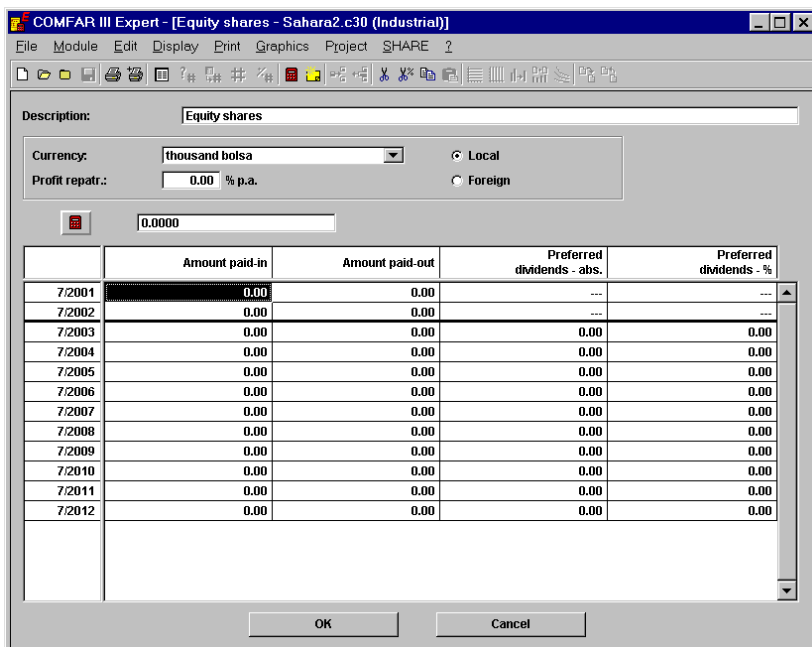


Figure 77: Equity shares window

REPATRIATION OF PROFIT

The percentage of *preferred dividends* specified in the EQUITY SHARES window which is to be repatriated is defined in the CURRENCY panel. This information is relevant to the foreign and local cash flows and in the economic analysis for determining value-added attributable to the project.

To define the percentage of profit to be repatriated

- Select the REPATRIATION OF PROFIT input field in the CURRENCY panel and enter the value in per cent.

EQUITY CAPITAL DATA

Equity capital can be paid in or paid out (refund of equity). **Amount paid in** and **Amount paid out** (capital refund) both are entered as positive values. The program does not accept negative total paid-in equity.

It is possible to define the preferred dividends to be paid to joint venture partners and other equity shares for each period in the production phase. The rules for priority distribution of profits are contained in chapter XI.Q, under *Dividends*. In general, retained earnings are first deducted from after-tax profit, preferred dividends are paid before ordinary dividends.

Preferred dividends, if any, are defined as **Preferred dividends, absolute** and **Preferred dividends, %** as a percentage of paid-in equity. The total dividend is the sum of the entries. For example, if paid-in equity capital up to and including a project period is US\$ 1,000 with **Preferred dividends, absolute** US\$ = 50 and **Preferred dividends, %** = 7, the total dividend per annum would be US\$ 120 (50 + 70).

To enter the equity capital data for a shareholder class (joint venture partner or equity shares)

- Use the iconic buttons and the entry field to enter **Amount paid in** equity, **Amount paid out** equity, **Preferred dividends, absolute** and **Preferred dividends, %** for each period in the planning horizon (see chapter IV.B.3, under *Icons and iconic buttons*).
- The entries are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

SUBSIDIES AND GRANTS

Capital subsidies may be provided to the project from single or multiple sources. Unless expanded using the **Insert** feature of the EDIT menu, a single SUBSIDIES node is displayed in the extended SOURCES OF FINANCE data structure as shown above.

Capital subsidies are treated as outright grants to the project. No dividends can be declared or other benefits or refunds defined for these amounts.



To enter the amounts of capital grants and subsidies provided to the project for each period in the planning horizon

- Select the Table Icon for the SUBSIDIES, GRANTS node in the SOURCES OF FINANCE STRUCTURE of the input browser. The SUBSIDIES, GRANTS window is displayed (figure 78).
- Use the iconic buttons and the entry field to enter the **Amount paid in** of subsidies and/or grants for each period in the planning horizon (see chapter IV.B.3, under *Icons and iconic buttons*).
The entries are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

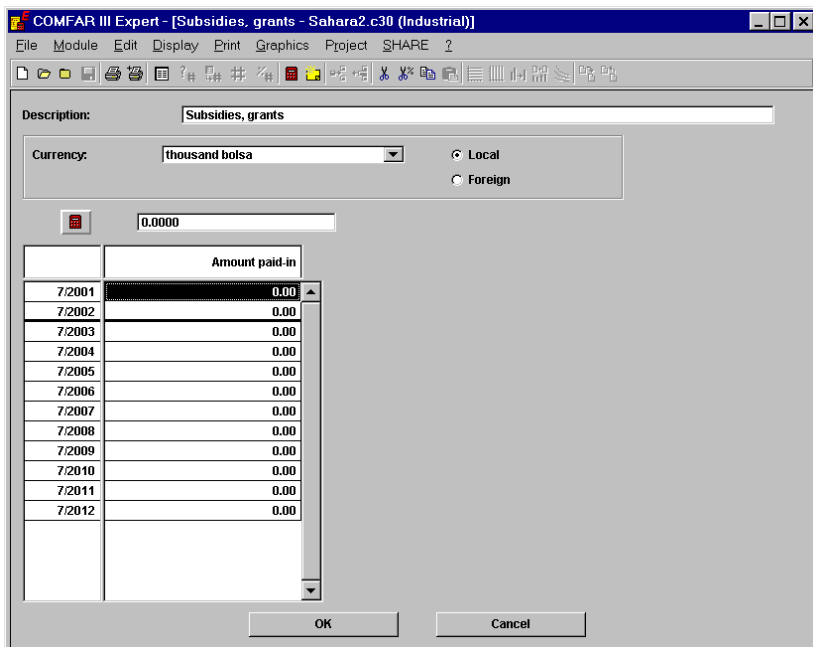


Figure 78: Subsidies, grants window

2. Long-term loans

The data structure provides for defining long-term-loans and short-term finance. The essential difference is that, of the repayment options offered for long-term loans (constant principal, annuity or profile), only the latter, which requires that both disbursements and repayments be defined, is offered for short-term finance.

Data entry procedures for long-term loans are identical for all sources (commercial banks, development finance institutions, suppliers credit etc.).

The LONG-TERM LOAN node of the SOURCES OF FINANCE data structure should be expanded to the number of nodes required if more than one loan or credit facility is to be defined.

To display the loans window for a typical credit facility

- Select the Table Icon of the LONG-TERM LOANS node.
The LOANS window is displayed (figure 79).

COMFAR III Expert - [Loans - Sahara2.c30 (Industrial)]

Description: Dev. Bank, foreign

Currency: Forex required in tBS Local Foreign Cost centre...

Total: 280,000.00

	Amount
7/2001	0.00
7/2002	280,000.00
7/2003	0.00
7/2004	0.00

Conditions Disbursements Interest Fees

Type: Constant principal

Repayment: Quarterly

Month interest paid: 30.9

Disbursements until: 30/9/2004 (dd/mm/yyyy)

First repayment: 30/9/2004 (dd/mm/yyyy)

Number of repayments: 24

Period of repayment: 5 years 9 months

Last repayment: 30/6/2010 (dd/mm/yyyy)

OK Cancel

Figure 79: Loans window - conditions panel

In the LOAN DEFINITIONS notebook four options (**Conditions**, **Disbursements**, **Interest** and **Fees**) can be selected for the entry of data which relate to various aspects of financial terms for the credit facility.

To select one of the four loan definition options

- Select the tab in the LOAN DEFINITION notebook corresponding to either **Conditions**, **Disbursements**, **Interest** or **Fees**.

The LOANS window with the corresponding LOAN DEFINITION panel is displayed (figure 79).

LOAN CONDITIONS

The **Conditions** option serves to define the terms of the loan with regard to the **Type** of loan and its **Repayment** schedule.

Type of loan

Three types of loans can be defined:

TYPE	DESCRIPTION
Constant principal	Equal payments of a capital sum (as distinguished from interest) in each of the specified repayment periods
Annuity	Equal payments (including interest) in each of the specified repayment periods: Debt at end of the disbursement phase \times Capital recovery factor (see chapter XI.M, <i>Finance</i>).
Profile	Repayments as negotiated with the lender

To define the type of loan

- Select the **Type** of loan using the TYPE drop-down list box in the CONDITIONS panel.

Repayment

Loans can be repaid either yearly, half-yearly, quarterly or monthly.

To define the number of repayments per year

- Select the **Repayment** using the REPAYMENT drop-down list box in the CONDITIONS panel.

Month interest paid

For constant principal and annuity loans the interest payable dates are defined regressively and progressively from the **First repayment** date and the **Period of repayment**. During the disbursement phase - including any period of grace - the interest payable on these dates is either capitalized or included in an interest payable account. During the repayment phase the interest is paid with the principal on all repayment dates. For these types of loans the MONTH INTEREST PAID drop-down list box is inactive, but the month displayed in this field conforms to the month of first repayment.

The month can be selected only for a profile loan, for which interest is paid or payable only in the defined month. Interest is paid in each year that the loan is outstanding and not necessarily coincident with any disbursement or repayment.

To define the month in which interest is paid (profile loan only)

- Select the **Month** (last day of month) in which interest is paid using the MONTH INTEREST PAID drop-down list box in the CONDITIONS panel.

The following features of the CONDITIONS panel are applicable only to **Annuity** and **Constant principal** loans. They are inactive for **Profile** loans.

Disbursement phase

The DISBURSEMENT UNTIL display field provides the date of last possible disbursement. Disbursements can be defined for any date up to and including the end of the disbursement phase. Only those project periods falling into this time-span are displayed in the AMOUNTS list box. It is not possible to define a disbursement at a date not within the disbursement phase.

For annuity and constant principal loans the **Disbursement until** date is automatically defined by the **First repayment** date (see below) and the **Repayment**. The **Disbursement until** date for annuity loans is one repayment period (yearly, half-yearly, quarterly or monthly as defined in the REPAYMENT drop-down list box) prior to the first repayment date. As an example, suppose the following data entries for an annuity loan:

Repayment	Quarterly
First repayment	31.7.1999

The termination of the disbursement phase shown in the DISBURSEMENT UNTIL display field is 30.4.1999 (30 April 1999), the last date on which disbursements of the loan are acceptable and the date which determines the last of the periods automatically displayed in the AMOUNTS list box .

First repayment

For constant principal and annuity loans all repayments of principal are keyed to the date of the first repayment. Payments of principal subsequent to the first occur in increments of time defined by the repayment period. For profile loans the repayments (negative values) and dates are specified in the DISBURSEMENTS panel using the EDIT panel and DISBURSEMENT list box (see below).

The default date for the first repayment is one repayment period after the last defined disbursement or after the start of the production phase, whichever is later. Repayments can only be specified for the last day of a month.

To define the first repayment date

- Select the **First repayment** field in the CONDITIONS panel and enter the date (dd/mm/yyyy).

Number of repayments

A **Number of repayments** is specified for constant principal and annuity loans. Repayments are automatically programmed starting from the first repayment at time intervals defined in **Repayment**. The amount of each repayment is also determined from the number of repayments.

To define the number of repayments

- Select the NUMBER OF REPAYMENTS entry field and enter the number (integer).

Repayment period

The PERIOD OF REPAYMENT and LAST REPAYMENT display fields provide information calculated from the above data. The period of repayment is determined by (Number of repayments times Repayment). The last repayment is calculated as the first repayment date plus the period of repayment.

The AMOUNTS list box is for information only. This data is compiled from data entered using the loan definition option **Disbursements** (see below).

DISBURSEMENTS

The **Disbursements** option is selected for the entry of loan disbursements. For profile loans repayments must also be defined.

The AMOUNTS list box contains a row for each period in the planning horizon for which disbursements, and repayments in the case of profile loans, are acceptable. These periods are limited by the conditions that define the disbursement phase (see *Loan conditions*, above). If **Expansion/reha-**

bilitation is activated in the SPECIAL FEATURES modal window of PROJECT IDENTIFICATION window, the planning horizon provides for the entry of the **Starting balance**.

Loan disbursements are entered using the EDIT panel and the AMOUNTS list box.

To define disbursements for all types of loans and repayments for profile loans

- Select the **Disbursements** tab in the window for a particular loan.

The EDIT panel and DISBURSEMENTS list box are displayed in the LOANS window (figure 80).

- For all types of loans, enter the **date** (dd/mm/yyyy) and **amount** of each disbursement using the EDIT panel and DISBURSEMENTS list box (see chapter IV.B.7, under *Edit panel*). For profile loans enter repayments as negative values.

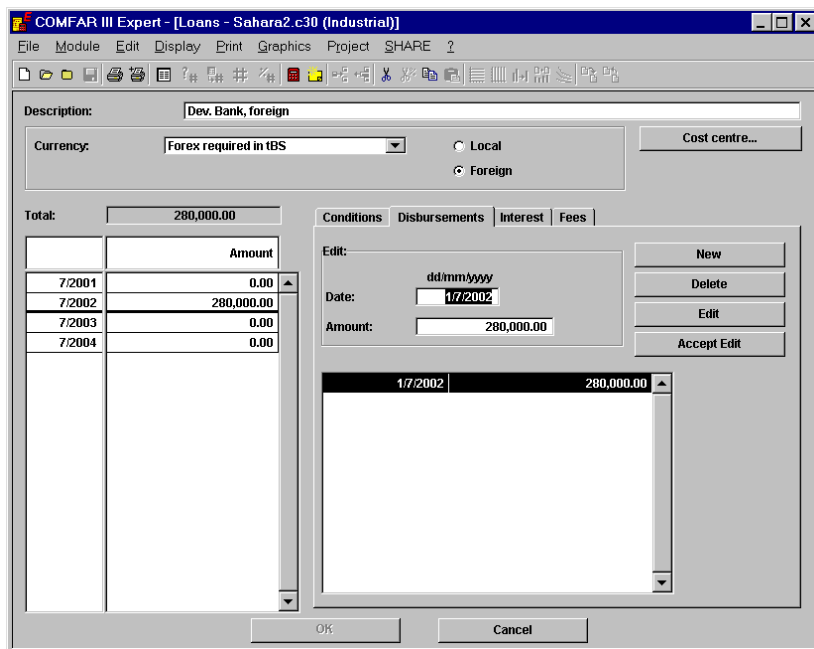


Figure 80: Loans window - edit panel and disbursements list box

For a **New** entry in the DISBURSEMENTS list box the beginning date of the period corresponding to a selected cell in the AMOUNTS list box is auto-

matically displayed in the DATE field of the EDIT panel. This date can subsequently be changed by entering the date of choice.

Disbursement dates are accepted up to and including the **Disbursement until** date defined in the CONDITIONS panel (see above).

When the **Accept edit** pushbutton is chosen, the amounts from the DISBURSEMENTS list box appear immediately in the AMOUNTS list box in aggregated form; if more than one flow occurs in a project period the algebraic sum is displayed in the AMOUNTS list box.

The algebraic sum of all disbursements appears automatically in the TOTAL display field. For profile loans the value displayed includes both disbursements and repayments; if the total is non-zero the amount repaid does not equal the amount disbursed.

INTEREST

The annual rate of interest for each loan is specified in the LOANS window. The rate can be defined for a period starting at any date in the planning horizon and remains in effect until the next rate defined at a subsequent date.

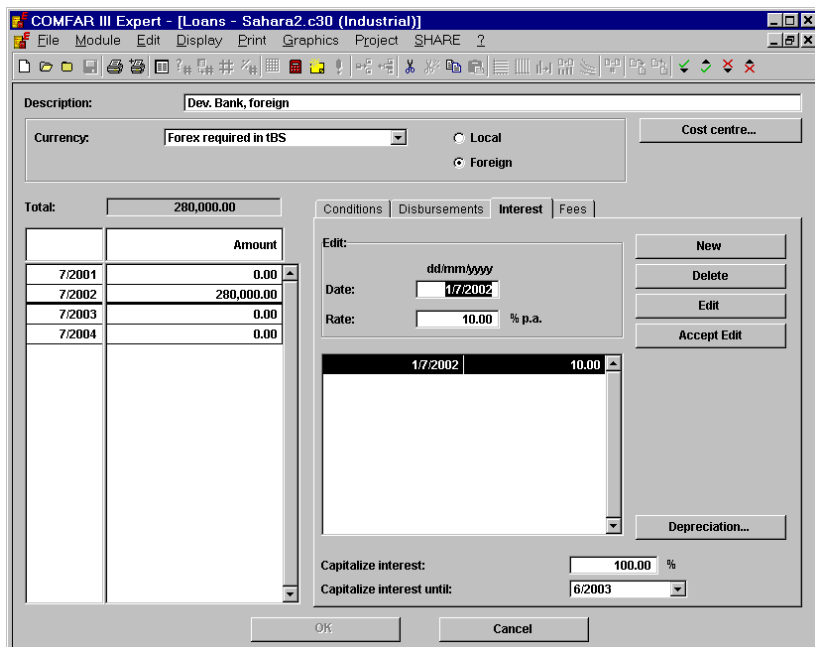


Figure 81: Loans window - edit panel and interest rate list box

To define the interest rates for a loan

- Select the **Interest** tab in the LOANS window.
The EDIT panel and INTEREST RATE list box appear in the LOANS window (Figure 81).

To define effective dates and rates of interest for a loan

- Enter the **Date** (effective date) using format dd/mm/yyyy, and the **Interest rate** in percent per annum using the EDIT panel and INTEREST RATE list box (see chapter IV.B.7, *Edit panel*).
- For a **New** entry in the INTEREST RATE list box the beginning date of the period corresponding to a selected AMOUNT cell in the AMOUNTS list box is automatically displayed in the DATE field of the EDIT panel. This date can subsequently be changed by entering the date of choice.

An interest rate is effective from the specified date until either the next specified date or the end of the project.

Interest is calculated on the basis of an annual rate (12 months of 30 days each). The rules for interest calculation for each type of loan are described in chapter XI.M.

Capitalize interest

The percentage of interest specified in the entry field **Capitalize interest**, is added to the balance of the loan. The remaining part of the calculated interest (difference to 100%) is paid. The **Capitalize interest until** drop-down list box is used to select the last date on which interest is capitalized. All dates on which interest is payable (due) up to the last one prior to the first repayment date are offered in the list. The first repayment date can occur at any time in the production phase. Therefore, it is possible that the available dates will include dates in the production phase.

The capitalized interest is included in the financial statements as follows:

Cash flow for financial planning. The value in the line **Financial cost** is increased in each period by the amount of the capitalized interest (this line also includes interest paid and fees), while the corresponding increase of the loan balance is reflected in the **Inflow of funds** line. The pre-production expenditures is net of interest paid or capitalized.

Balance sheet. Interest capitalized in any period up to and including the specified last date described above is included in the **Pre-production expenditures** line. All interest and fees up to the end of the construction phase are also included in this line.

Capitalized interest is not included as part of the investment (cash outflow) for the calculation of the NPV and the IRR on total investment. In the corresponding schedule the values in the line **Pre-production expenditures** are net of interest and fees paid or capitalized.

When yearly display or print of a schedule is selected and more than one interest payable date occurs during the year, the aggregated amount of interest paid or capitalized is shown.

To capitalize interest

- Select the **CAPITALIZE INTEREST** entry field and enter the percentage of interest to be capitalized. Select a date from the drop-down list box **CAPITALIZE INTEREST UNTIL**.

Depreciation of interest

Depreciation conditions can be specified for interest capitalized for each loan. The procedure is similar to the depreciation of assets. Depreciation can start during the production phase only and not earlier than in the month following the **Capitalize interest until** date defined in the **LOANS** window. In each case depreciation is calculated from the beginning of the period selected from the corresponding drop-down list box.

To depreciate capitalized interest

- Choose the **Depreciation** pushbutton in the **Loans** window
The **DEPRECIATION** modal window is displayed.
- Select the depreciation **Type** in the corresponding drop-down list box.
- Select the **Starting at date** in the corresponding list box.
- Select the **RATE** entry field and enter the value in % per annum.
- Select the **LENGTH** entry field and enter the value in years.
(The **scrap** entry field is inactive).

Choose the **OK** pushbutton to accept the selection or the **CANCEL** pushbutton to retain the original data. Control returns to the **LOANS** window.

FEES

Fees can be defined for each loan. The bases for the fees are as shown in table 11.

TYPE OF FEE	BASIS	PAYMENT
Agency	Each positive disbursement	At each disbursement
Guarantee	Total amount of loan up to the time of a disbursement or payment (including the current disbursement and excluding the current repayment); fee is calculated p.a.	Together with interest
Commitment	Balance of loan not disbursed; fee is calculated p.a.	Together with interest
Other	Total amount of loan	At first disbursement

Table 11: Types of fees

To define fees for a loan

- Select the **Fees** tab in the LOANS window.

The FEES panel is displayed in the LOANS window (figure 82).

Each of the applicable commissions and fees is entered as a percentage of the basis indicated above. For foreign exchange loans the currency for fees can be selected as either local currency or the currency specified for the loan. This feature is inactive for local loans.

- Select the entry field corresponding to the fee and enter the percentage of the basis.
- For a foreign currency loan, designate the fee as either **Foreign** or **Local** by selecting the corresponding radio button in the FEES PAID subpanel of the FEES panel.

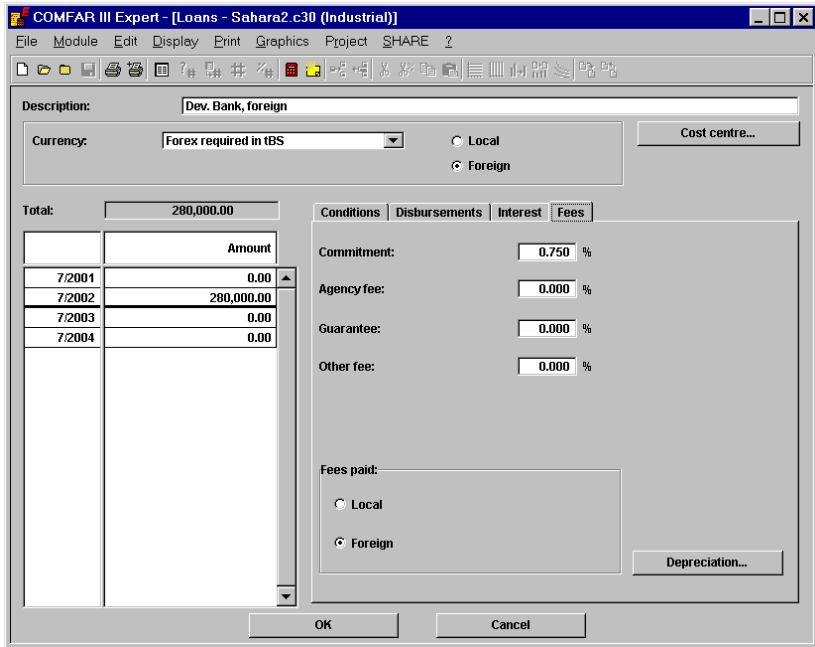


Figure 82: Loans window - fees panel

The loans selections are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton.

Depreciation of fees

It is assumed that all fees are paid when due (they cannot be capitalized). The financial treatment of fees is described in *Capitalize interest* above. Fees are depreciated in a manner similar to the depreciation of capitalized interest. The FEES panel contains a **Depreciation** pushbutton which invokes the DEPRECIATION modal window when chosen. The earliest date offered in the STARTING AT drop-down list box is the first period of the production phase.

3. Short-term loans



Data entry for short-term loans is identical to that for long-term loans.

4. Profit distribution

The after-tax profit generated by the project may be either retained by the project (**Retained profit**) or distributed in the form of dividends to shareholders in accordance with the rules for dividend distribution (chapter XI.Q). Retained profit is first deducted from after-tax profit to determine the amount available for distribution as dividends. **Preferred dividends**, as defined in the EQUITY SHARES window of the SOURCES OF FINANCE structure, on preferred shares are paid first (chapter VII.R.1, under *Equity capital data*). The balance, i.e. the **Remaining profit**, is available for distribution to ordinary shareholders.

The following parameters are defined in the PROFIT DISTRIBUTION window:

- Per cent of ordinary dividends exported by each shareholder class
- Per cent profit retained in each production period
- Per cent distributed profit (100 less profit retained)
- Per cent of Remaining profit distributed to each shareholder class in each production period
- Per cent of Net worth distributed to each shareholder class after last production period



To define the profit distribution to shareholders

- Select the Table Icon for the PROFIT DISTRIBUTION node. The PROFIT DISTRIBUTION window is displayed (figure 83).
- Select the **Repatriation of profit** cell for each shareholder class and enter the corresponding percentage. Select the **Retained profit (in %)** or the **Profit distributed (in %)** cell and enter the percentage of profits to be retained (not available for distribution) or distributed for each production period.

When the percentage of either retained profits or profit distribution is entered, the percentage of the other is automatically calculated so that the total is 100%.

Preferred dividends and **Remaining profit distributed** are provided for information only. The values are calculated according to the rules described above and cannot be changed.

If joint venture partners have been defined (chapter VII.L), each partner may be assigned a portion of the profit remaining for distribution after preferred dividends are paid. In this case enter the percentage share of each partner for each production period.

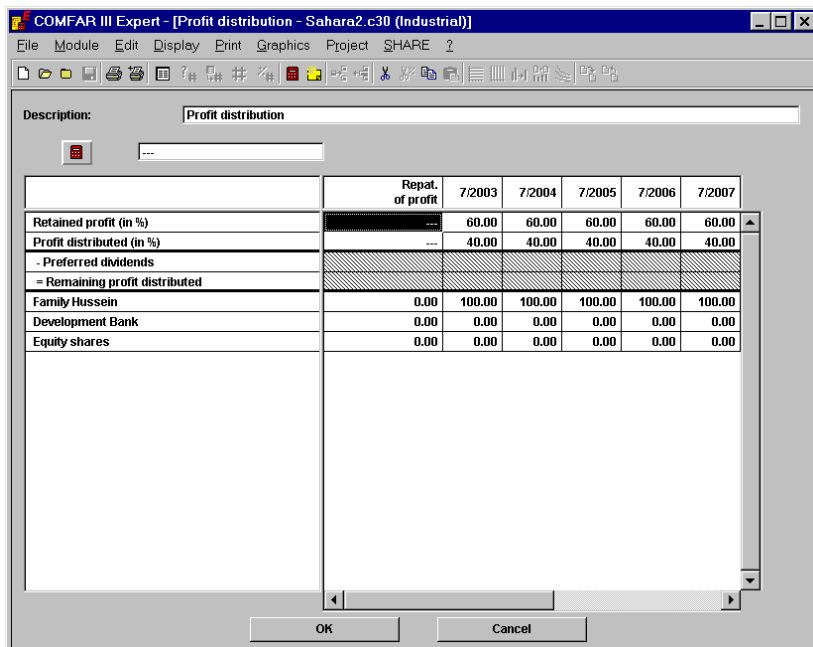


Figure 83: Profit distribution window

The total of the percentages for all classes of shareholders in each project period automatically sums to 100%. Adjustments are displayed immediately upon data entry in any REMAINING PROFIT DISTRIBUTED cell for a shareholder class. If only one shareholder class is defined, the cells for defining the percentage of **Remaining profit distributed** are inactive (default values are 100%).

S. INCOME TAX AND ALLOWANCES

Taxes are defined in terms of tax rates, tax conditions and allowances. The extension of the TAX, ALLOWANCES node in the input browser displays three subnodes, INCOME (CORPORATE) TAX, ALLOWANCES and DEPRECIATION ADJUSTMENTS.

To display the data structure for the taxes, allowances and adjustments node

- Choose the Extend Icon for the TAX, ALLOWANCES node in the input browser.



The TAX, ALLOWANCES structure (figure 84) is displayed, which cannot be altered in any way and is restricted to a single node for each of the above items.

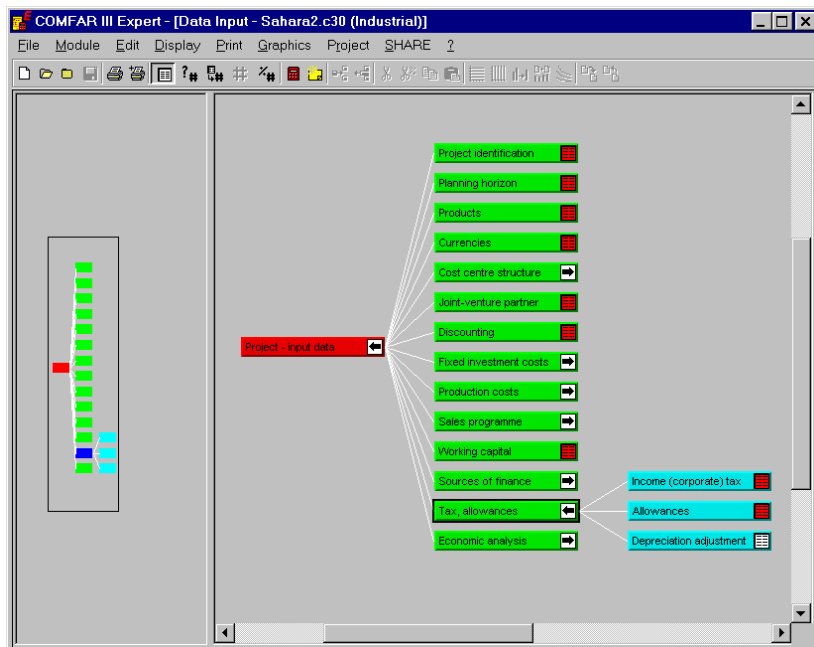


Figure 84: Tax, allowances structure

INCOME (CORPORATE) TAX

Income taxes are treated as indirect data. They are neither assigned to any particular product nor is it possible to allocate income taxes among products. Taxes are considered only as a **Local item** (the **Foreign** radio button is inactive). The values can be expressed in any of the defined currencies.



The INCOME (CORPORATE) TAX window (figure 85) is displayed when the Table Icon for the corresponding node is selected in the TAX, ALLOWANCE structure.

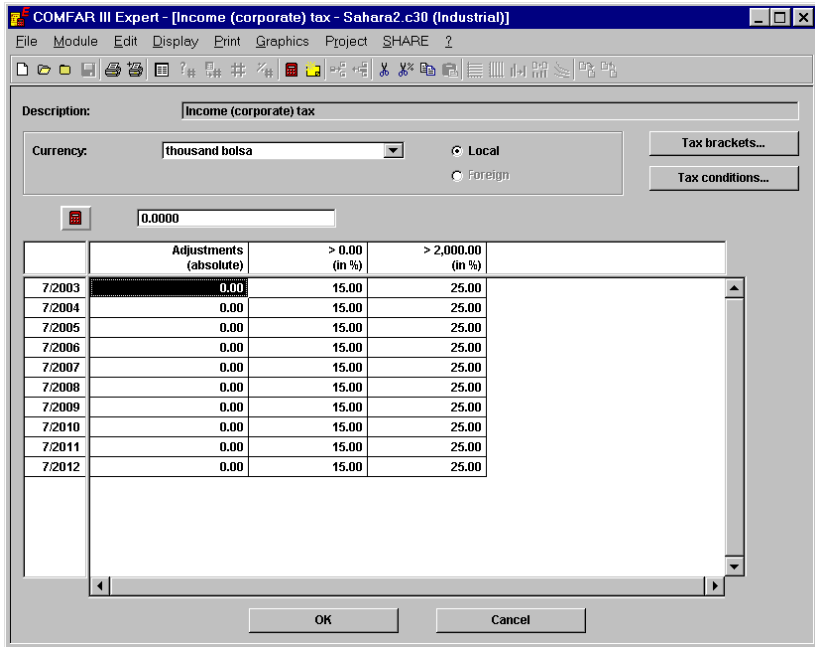


Figure 85: Income (corporate) tax window

Income taxes are defined in terms of an annual rate levied on taxable profit and adjustments. Values derived from the two definitions are aggregated.

ADJUSTMENTS

Income tax adjustments can be defined for each period of the production phase in terms of absolute value. *Tax adjustments*, positive or negative, are defined directly in the INCOME (CORPORATE) TAX window.

To define income (corporate) tax adjustments

- Use the iconic buttons and data field to enter values for **Adjustment** (absolute) for any applicable periods of the production phase (see chapter IV.B.3, *Icons and iconic buttons*).

INCOME TAX RATES

Tax rates can be defined for each production period and for each tax bracket (see below). A column appears in the list box of the INCOME (CORPORATE) TAX window for each defined *tax bracket* with a header that provides the lower limit of the bracket.

To define tax rates for each bracket and for each period of the production phase

- Use the iconic buttons and data field to enter values of the tax rate in percent for each tax bracket and for each production period (see chapter IV.B.3, *Icons and iconic buttons*).

TAX BRACKETS

Tax brackets for progressive (or regressive) systems are defined by the lower limit of the bracket (see chapter XI.P, *Income (corporate) tax*) in the TAX BRACKETS list box. Each tax bracket is assigned a tax rate which is applied only to that part of profit exceeding its lower limit and up to, but not including, the lower limit of the succeeding bracket.

Tax brackets are defined in the TAX BRACKETS modal window which is displayed with the **Tax brackets** pushbutton.

To define the tax brackets

- Choose the **Tax brackets** pushbutton in the TAXES window.
The TAX BRACKETS modal window is displayed (figure 86).
- Use the EDIT panel and the LOWER LIMIT list box to enter the lower limit for each tax bracket (see chapter IV.B.7, under *Edit panel*).

The tax bracket selections are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the INCOME (CORPORATE) TAX window. When the tax bracket **Lower limits** are accepted, a column for each bracket appears in the TAXES list box starting from the second column (the first is for entry of **Annual adjustments**).

The 'Tax brackets' modal window contains the following elements:

- Title:** Tax brackets
- Number:** 2
- Lower limit:** 2,000.00
- Table:**

	Lower limit
1	0.00
2	2,000.00
- Buttons:** New, Delete, Edit, Accept Edit, OK, Cancel

Figure 86: Tax brackets modal window

TAX CONDITIONS

The conditions **Tax holidays** and **Losses carried forward** are specified using the TAX CONDITIONS modal window activated from the INCOME (CORPORATE) TAX window.

Tax holiday

Tax holidays is the number of years from commencement of production in which the project is exempt from income tax.

Losses carried forward

Losses carried forward specifies the number of years after the project experiences an operating loss in which the taxable income is reduced up to the amount of the loss. Losses cancel profits as early as possible with any excess carried forward to subsequent years.

The 'Tax conditions' modal window contains the following elements:

- Title:** Tax conditions
- Tax holidays:** 4 years, until: 6/2007
- Losses carried forward:** 2 years
- Buttons:** OK, Cancel

Figure 87: Tax conditions modal window

To define the tax conditions

- Choose the **Tax conditions** pushbutton.
The TAX CONDITIONS modal window is displayed (figure 87).
- Use the TAX HOLIDAYS drop-down list box to select the date at which **Tax holidays** terminate. The available dates are the balance dates in the production phase. The selected date is automatically displayed in the corresponding entry field.
Alternatively, select the YEARS field and enter the number of years. The corresponding date is then displayed in the window of the drop-down list box.
- Select the LOSSES CARRIED FORWARD field and enter the number of years.

The selections are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the INCOME (CORPORATE) TAX window.

The data in the INCOME (CORPORATE) TAX window is accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. Control returns to the browser.

ALLOWANCES

Two types of income tax allowances can be defined. The **Investment allowance** is deducted from the gross profit from operations and, consequently, has the effect of reducing taxes. The **Depreciation allowance** reduces both taxable income and the book value of fixed assets (see chapter XI.R, *Allowances*). Allowances can be expressed in any of the defined currencies but are always treated as a **Local** item (the **Foreign** radio button is inactive).



To define allowances

- Select the Table Icon for the ALLOWANCES node in the TAXES, ALLOWANCES data structure of the input browser. The TAX, ALLOWANCES window with the ALLOWANCES list box is displayed (figure 88).
- Use the iconic buttons and data field to enter the absolute values of **Investment allowance** and **Depreciation allowance** for each period of the production phase in the ALLOWANCES list box (see chapter IV.B.3, under *Icons and iconic buttons*). The values are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

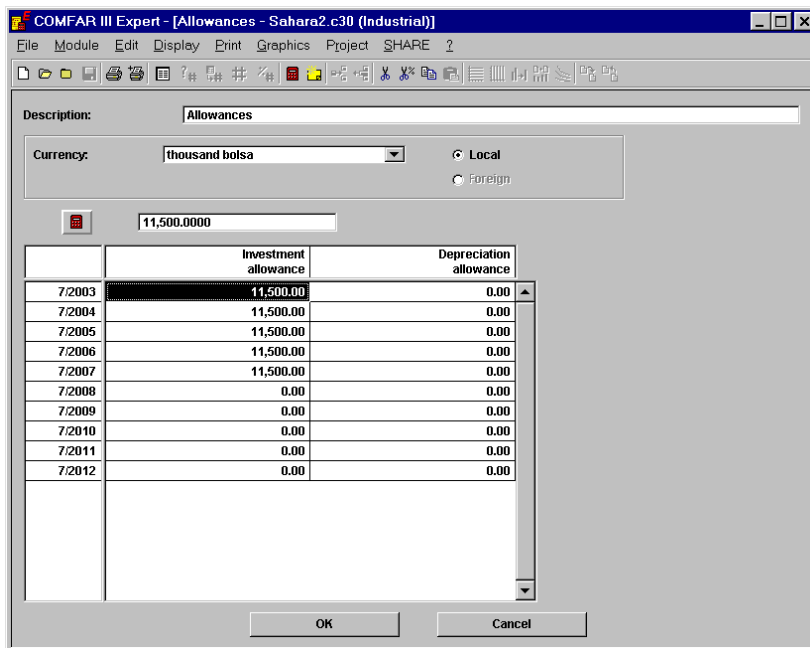


Figure 88: Allowances window

DEPRECIATION ADJUSTMENTS

Depreciation adjustments (positive or negative) can be specified for each period of the production phase. These adjustments are added algebraically to the total depreciation determined on the basis of depreciation conditions defined for each asset. They are treated as indirect data (not associated with any particular product).

Adjustments have the effect of modifying the taxable income by the amount of the adjustment and also the book value of fixed assets in the balance sheet.

Depreciation adjustments are considered a local item as the effect is on taxes which are paid in local currency. The **Foreign** and **Local** radio buttons are inactive. The values can be expressed in any of the defined currencies. Adjustments can be defined separately for local assets and for foreign assets.

COMFAR III Expert - [Depreciation adjustment - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: Depreciation adjustment

Currency: thousand bolsa Local Foreign Cost centre...

0.0000

	Local	Foreign
72003	0.00	0.00
72004	0.00	0.00
72005	0.00	0.00
72006	0.00	0.00
72007	0.00	0.00
72008	0.00	0.00
72009	0.00	0.00
72010	0.00	0.00
72011	0.00	0.00
72012	0.00	0.00

OK Cancel

Figure 89: Depreciation adjustments window



To define depreciation adjustments

- Select the Table Icon for the DEPRECIATION ADJUSTMENT node in the TAXES, ALLOWANCES data structure of the browser.

The DEPRECIATION ALLOWANCES window is displayed (figure 89).

- Use the iconic buttons and data field to enter the absolute values of depreciation adjustments in local and foreign currencies for each period of the production phase in the ADJUSTMENTS list box (see chapter IV.B.3, under *Icons and iconic buttons*).

The values are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

T. EXPANSION/REHABILITATION

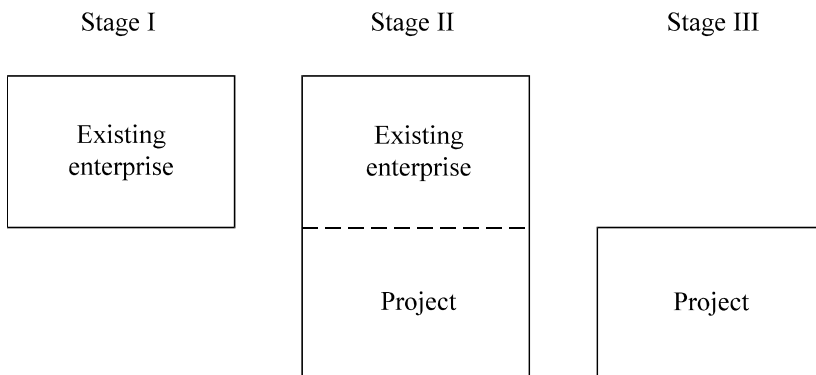
Analysis of projects involving expansion, rehabilitation or modernization of existing enterprises is initiated by selecting the EXPANSION/REHABILITATION check box in the PROJECT IDENTIFICATION WINDOW of financial data input. Such projects are best analyzed by projecting future outcomes from at least three different viewpoints:

- The existing enterprise without new investment
- The existing enterprise including the project
- The project in isolation

Each of these perspectives provides information concerning the efficiency of the proposed investment. The first provides a picture of the future if nothing is done. The second shows the result of the expanded or rehabilitated enterprise in its entirety. The last provides only the projected results of the project or the incremental investment.

All of these views are useful for appraising the investment opportunity. It is important to understand what is likely to happen if nothing is done. The projected performance of the newly configured enterprise, including the surviving components of the old enterprise plus the project, provides an indication to investors of their return on the existing assets (at their opportunity cost) and the new investment combined. The analysis of the project in isolation provides the expected return on the new investment, but cannot be totally divorced from its place within the context of an existing enterprise.

A sequential scheme for performing the analysis is shown below:



Existing assets can be valued at their opportunity cost. This might correspond to their separate or combined value in the market. However, the combination of assets may be worth more than the separate parts. An alternative is to value the assets according to the present value of the earnings stream that could be generated in the best of alternative uses.

In the second stage of analysis, data for the project is added to the data for the existing enterprise. This combination of data is then processed to determine the projected results for the expanded or rehabilitated enterprise.

Finally, in the third stage, data for the existing enterprise is removed from the second-stage analysis. Only the project data remains. In this way the incremental effect is isolated (incremental investment, financing, revenues, costs etc.) so that the projected results for the project alone are available.

If the EXPANSION/REHABILITATION check box is selected in the PROJECT IDENTIFICATION window, the windows for certain project items are adjusted to permit entry of starting balances for the year prior to the first project period. These items include

- Fixed assets
- Materials and supplies
- Long-term debt
- Equity capital

A special STARTING BALANCE node is created for entry of starting balance items for which a window does not exist. This node is added to the data structure in the input browser at the first level after the TAXES, ALLOWANCES node (see chapter VI.A) or appears in the browser when a previously saved **Expansion/rehabilitation** project is loaded.

Starting balances affect both the financial and economic analyses. Financial results are affected by the collection of receivables, payment of obligations, depreciation of assets and the determination of working capital require-

ments. This information is used also in the analysis of the foreign exchange effect as the consumption, liquidation or payment of any of these starting balance assets or liabilities is calculated in terms of foreign or local exchange as specified.

It is necessary that user-defined initial balances are actually balanced in the accounting sense. *COMFAR III Expert* does not check the individual entries to assure that an initial accounting balance is achieved; however, depending upon whether a positive or negative adjustment is necessary, the value of either *reserves and retained profit* (positive adjustment) or *accumulated losses* (negative adjustment) is modified by the program as necessary. In fact the starting balance for both of these items is zero.

1. Starting balances, current assets and liabilities

Starting balances for the following items listed in table 12 are entered in the STARTING BALANCES window.

	FOREIGN CURRENCY COMPONENT
Work in progress	available
Finished products inventory	available
Other assets	
Accounts receivable	available
Cash-in-hand	available
Short-term deposits	not available
Cash surplus	available
Liabilities	
Accounts payable	available

Table 12: Starting balances

All items (except those entered in days) are defined in terms of **Local currency**. The local currency is displayed in the INPUT CURRENCY field and cannot be changed. The effective date of all starting balance entries is the day before project commencement (first day in the planning horizon).

A **Foreign currency** component can be selected from the defined foreign currencies for use in the calculations of economic costs and benefits only. This feature is available for the items as indicated in table 12. Although the STARTING BALANCE window cannot be transferred to the economic browser, the monetary composition of these items affects the flow of foreign exchange (balance of payments effect) as assets are consumed and liabilities paid. The costs and benefits of the project are also affected as the foreign exchange is converted to the *numeraire* at the shadow rate of foreign exchange (see chapter XI.I and chapter XII.B).

The relation between the sales and production programme and the inventory requirements in each period is affected by the starting balances of finished product inventories. The cancellation of receivables and payables is defined in the STARTING BALANCES window so that working capital calculations during the production phase are unaffected by these amounts (see chapter XI.I).

To enter the starting balances for the above items when expansion/rehabilitation is selected

- Choose the Table Icon for the STARTING BALANCE node.
The STARTING BALANCE window is displayed (figure 90).



COMFAR III Expert - [Starting balance - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: Starting balance

Input currency (local): thousand bolsa

Finished products Work in progress Other assets Liabilities

	Local	Foreign
A - Chit	0.00	0.00
B - Chehvar	0.00	0.00
C - Kodari	0.00	0.00
D - Garment	0.00	0.00
E - Upholstery	0.00	0.00
F - Men's shirting	0.00	0.00

OK Cancel

Figure 90: Starting balance window - work in progress list box

A display field in the upper part of the window indicates that all starting balance data is entered in terms of local currency.

The window contains a notebook with four tabs corresponding to the categories of data indicated above. Selection of each tab invokes a list box containing only the data items appropriate to each category.

To define starting balances for work in progress

- Select the **Work in progress** tab.
The WORK IN PROGRESS list box is displayed in the STARTING BALANCE window (figure 90).
- Use the iconic buttons and list box to enter values of local and foreign **Work in progress** for each defined product.

To define starting balances for finished product

- Select the **Finished product** tab.
The FINISHED PRODUCT list box is displayed in the STARTING BALANCE window (figure 91).
- Use the iconic buttons and list box to enter values of starting balances in terms of **Quantity, Price and Total** as well as the **Foreign/local** part in percent for each defined product.

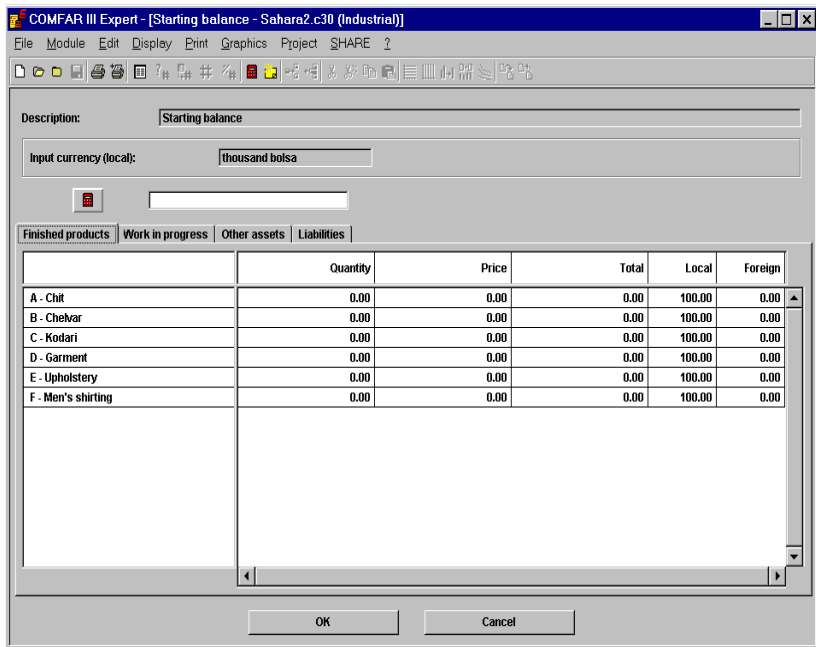


Figure 91: Starting balance window - finished product list box

To define starting balances for other assets

- Select the **Other assets** tab.

The OTHER ASSETS list box is displayed in the STARTING BALANCE window (figure 92).

- Use the iconic buttons and list box to enter local and foreign starting balances of other assets as listed above and displayed in the list box (short-term deposits can be entered only as a local item; the cells for foreign entries are inactive). The **liquidation period** for accounts receivable is defined for foreign and local **receivables** in terms of number of days.

COMFAR III Expert - [Starting balance - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: Starting balance

Input currency (local): thousand bolsas

Finished products | Work in progress | **Other assets** | Liabilities

	Local	Foreign
Accounts receivable	0.00	0.00
Liquidation period	1.00	1.00
Cash-in-hand	0.00	0.00
Short-term deposits	0.00	...
Cash surplus	0.00	0.00

OK Cancel

Figure 92: Starting balance window - other assets list box

To define starting balances for liabilities

- Select the **Liabilities** tab.
The LIABILITIES list box is displayed in the STARTING BALANCE window (figure 93).
- Use the iconic buttons and list box to enter Local and Foreign starting balances of liabilities as listed above and displayed in the list box. The **Payout period** for foreign and local **Accounts payable** is defined in terms of number of days.
The entries in the STARTING BALANCE window are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton.

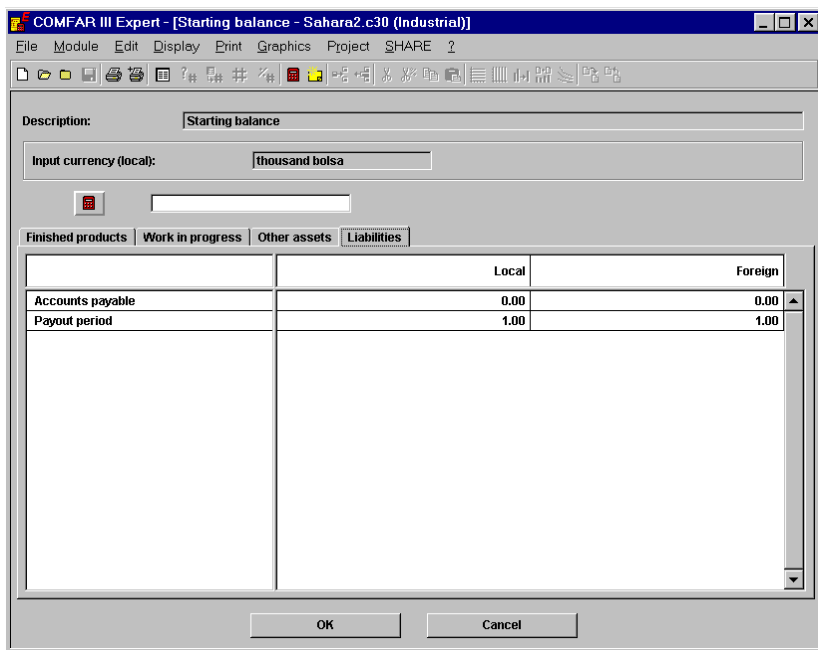


Figure 93: Starting balance window - liabilities list box

2. Starting balance, fixed assets and long-term finance

Starting balances can be defined for fixed investment items, long-term debt and equity capital (and subsidies, grants) in the respective windows in the starting periods. Material items are defined in the **Starting periods** of the respective ANNUAL ADJUSTMENTS panels.

VIII. DATA INPUT FOR ECONOMIC ANALYSIS

Economic values of project outputs and inputs (benefits and costs) are measured relative to defined economic criteria. At the fundamental stage of analysis the criterion is usually the project's contribution to national income or aggregate consumption. At more advanced stages the distributional effects on various segments of the population are taken into account. Supplementary economic performance indicators are concerned with the effect on employment, the effect on the balance of payments (foreign exchange effect) and efficiency in the use of scarce resources.

Two methods of performing economic analysis are contained in the COMFAR model: The *economic cost-benefit analysis* follows generally the approach described in the UNIDO *Guide to Practical Project Appraisal*. The *value added* approach is similar to the methodology of the *Manual for Evaluation of Industrial Project, UNIDO 1984*; however, the flexibility of the data entry structure permits the inclusion of some of the features of the *effects method* as described by Chervel and le Gall , whose work was cited in chapter I.B.1.

For the analysis of economic costs and benefits, COMFAR *III Expert* facilitates adjustment of market prices of project inputs and outputs to economic prices or shadow prices. The economic present value and rate of return are determined in a manner similar to financial analysis.

Incremental analysis is a fundamental concept in economic appraisal. The situation with the project is compared to that without the project. The difference is the effect of the project. The shadow pricing method of analysis, by taking into account the alternatives foregone in the use of inputs and the disposition of outputs, inherently includes the with and without situations. If the method of analysis does not intrinsically determine the incremental effect, then the two situations can be analysed separately. In some cases they can be analysed in separate runs of COMFAR *III Expert*. Then the **Compare** feature of the GRAPHICS menu can be used to determine the incremental effect.

A. COST-BENEFIT ANALYSIS AND VALUE ADDED

When cost-benefit analysis (economic appraisal) is performed at the level of efficiency prices which measure the effect of resources produced and consumed by a project on undifferentiated national income, the outcome should be similar, if not (ideally) identical, to an analysis using the value-added approach. The value added at the project level can be translated to national income when the contributions of all producers of goods and services in the economy are aggregated.

It is recommended to include only one of these analytical methods in any one application of the COMFAR III Expert economic appraisal features. If both approaches are to be employed they should be performed sequentially.

B. GENERAL PRICING CONSIDERATIONS

Ideally market prices would reflect economic value. However, price distortions develop where market imperfections exist and tend to assume more significance toward the extremes of centrally planned or *laissez-faire* economic systems. In economic appraisal (cost-benefit analysis) some market prices are adjusted in an attempt to eliminate the distortions.

1. Price adjustments

In COMFAR III Expert, project inputs and outputs for which the market price is to be adjusted to economic value can be placed into one of three categories: traded, tradable or non-traded.

Traded items are imports and exports. **Tradables** are items which are not directly traded by the project but which either induce trade or which would be traded in the absence of restrictive trade policies. Items are **non-traded** either because the cost of production is higher than the export price but lower than the import price (including transportation costs) or for policy or physical reasons.

Traded and tradable items can be valued in terms of foreign exchange; non-traded items can be further disaggregated into traded, tradables and non-traded components (content). The non-traded in the first round of disaggregation can be further disaggregated so that, theoretically, any non-traded item can be valued in terms of foreign exchange and domestic content. In practice, disaggregation can be limited usually to two rounds.

In the final round of disaggregation, traded and tradables can be valued at their **border prices** in accordance with the selected numeraire (economic accounting unit). The COMFAR III Expert data structure permits virtually unlimited capacity for disaggregating project inputs and outputs. A feature in the ECONOMIC ANALYSIS windows for inputs provides for three levels of disaggregation for value-added analysis.

For traded and tradable items the CIF/FOB prices, as a first approximation, can be adjusted for inland transportation and handling costs or savings using the feature for economic data input.

TRADED ITEMS

Traded items are exports or imports with relevant prices at the border or port of entry (CIF for imports, FOB for exports, as a first approximation). The production or use of items by the project that leads to additional trade should also be priced at the border to the extent of the increased trade. These prices should include internal costs between port of entry and project. Inland costs decrease the value of exports and increase the price of imports.

TRADABLES

Tradables are inputs and outputs which are not traded but which either induce trade (e.g. the production of a project leads to exports by another entity) or which would be traded in the absence of restrictive trade policies. Border prices may be applicable also in cases where the item would be traded without the project. The pricing of tradables is subjective in regard to the range of assumptions that can be adopted by the analyst. Some of the possibilities are as follows:

- International markets are the most accurate gauge of value as they are most likely to reflect the efficient allocation of resources. Virtually all commodities, except those which are clearly non-traded (the domestic price is above export price but below import price), should be priced at the border. Under this assumption, differences between domestic and international prices constitute the distributional effects of the project.
- The rationale of the system of accounting prices^{*} "is that of estimating those prices which would prevail in the economy if it were to operate so as to maximize society's ends, this maximization being constrained by the available resources, and by the possibilities of the tax system."^{**} For example, if the export price of an input is higher than the domestic accounting price, the FOB price reflects the fact that it would be more advantageous to export than to use the input in the project under study.

The border price may be higher or lower than the domestic accounting price. Table 13 attempts to show the analytical consequences of assigning the border price to tradable items under the above assumption.

* The term accounting price is similar in concept to shadow price, which generally connotes derivation from a general equilibrium model.

** *Little and Mirlees, op. cit. (edition 1982), p.72.*

TRADABLE CATEGORIES	OPPORTUNITY FOREGONE	ECONOMIC VALUE OF OPPORTUNITY FOREGONE *	TRADABLE VALUE RELATIVE TO DOMESTIC ACCOUNTING PRICE	
			Higher	Lower
PROJECT OUTPUTS				
Importable	Import (substitution)	CIF	Advantage of not importing	Disadvantage of decision to produce domestically
Exportable	Export	FOB	Potential advantage of exporting	Potential disadvantage of exporting
PROJECT INPUTS				
Importable	Import	CIF	Potential disadvantage of using imported input	Potential advantage of importing input
Exportable	Export (diversion)	FOB	Disadvantage of not exporting	Advantage of not exporting

Table 13: Economic pricing of tradable items

- Trade restrictions are a reflection of government development policy. Items precluded from trade by such restrictions should be priced at the domestic accounting price (consumer willingness to pay or cost of production - see below). "...the price in the home markets .. applies in cases where government policy isolates commodities from foreign markets through import or export prohibitions or quotas." **

Whichever the adopted position, the underlying assumptions should be confirmed. For example, the international price may be distorted by dumping practices.

Importables

Items classified as importable are valued at the import price rather than the domestic market price used in the financial analysis. For an output or input that could be imported, assigning the import price to the item reflects the projected savings in foreign exchange. Although it may be economically advantageous to produce an input domestically, price distortions (such as an overvalued currency) may cause the import to appear more favorable to the investor.

The CIF price of an importable output should be adjusted by adding the net inland costs or savings (costs of transport and handling from port of entry to market, less factory to market). The additive adjustment for an importable

* CIF/FOB as approximations of the border price.

** Squire and van der Tak, op. cit., p.32.

input is the costs from port of entry to project, less domestic source to project.

Exportables

Domestically marketed items which are classified exportable are valued at the export price rather than the domestic market price used in the financial analysis.

Although the project output could be exported to economic advantage, price distortions (for example, subsidies on sales) may provide the investor a better financial return in the domestic market. For an exportable output the FOB price should be adjusted by adding the net inland costs and savings (costs of transport and handling from project to market, less project to port).

For an input which could be exported, the export price reflects the disadvantage of diverting an item with potential export earnings to the project. The inland costs from domestic source to project, less domestic source to port, should be added to the FOB price.

NON-TRADED ITEMS

Items are non-traded either because they are non-tradable, i.e. the cost of production is higher than the export price but lower than the import price (including transportation and handling costs), or for policy or for physical reasons.

Non-traded items can be valued according to the following general rules:

Inputs

When the input has significant traded content, the production costs should be decomposed in one or more rounds to traded, domestic labor and residual non-traded components. Each component is then shadow-priced accordingly.

If the effect of the use of an input to the project is on the supply (more of the input is made available to local consumers, e.g. the project), the cost of production (supply price) is the relevant price.

If the effect of the project is on the demand (the quantity of the input available to other users is reduced), then the demand price is the appropriate price.

Outputs

If less of the output is to be supplied by alternative producers, the alternative cost of displaced production is the relevant price. This assumes that the production of less efficient suppliers with presumably higher operating costs is displaced. The net benefit is the difference between the cost of the displaced producers and the project's cost.

If the effect of the project is to increase the quantity of the output available to local users, the demand price is the appropriate price.

These principles are summarized in the table 14.

EFFECT ON	INPUT	OUTPUT	PRICE BASIS
Supply	More from local producers	Less by other local producers	Producer price
Demand	Less to other local consumers	More to other local consumers	Consumer price

Table 14: Economic pricing of non-traded items

More sophisticated methodologies have been developed for estimating shadow prices, such as the input-output model with production and demand constraints.* However, COMFAR III Expert does not include a model for estimating shadow (or accounting) prices. The price adjustment factors have to be calculated elsewhere.

Value of items not transferred to the economic browser

Items which do not have a significant impact on the economic appraisal need not be transferred to the economic browser for price adjustments. For such items the economic values that are included in the cost-benefit schedule are as follows:

Outputs:	Local items:	Net sales revenue (excluding sales taxes and subsidies)
	Exported items:	Gross sales revenue (including sales taxes, excluding subsidies)
Inputs:	The financial value of the input item (including investment) which may or may not include taxes and/or subsidies depending upon how it is defined in the financial window	

* See, for example, the following semi input-output analysis: T. POWERS, ed., *Estimating Accounting Prices for Project Appraisal*, Washington D.C., Inter-American Development Bank, 1981.

C. SELECTION OF ECONOMIC ANALYSIS

Economic analysis is initiated from the PROJECT IDENTIFICATION window by selecting the **Economic analysis** check box in the DEPTH OF ANALYSIS panel. When this is done, the ECONOMIC ANALYSIS node automatically appears in the input browser with the Extend Icon.

The ECONOMIC ANALYSIS node is extended with the left mouse button to display the default data structure at the first level, which includes the nodes GLOBAL PARAMETERS, OUTPUTS, INPUTS, FOREIGN LOANS and INDIRECT EFFECTS.



To display the economic analysis data structure

- Choose the Extend Icon for the ECONOMIC ANALYSIS node in the browser using the left mouse button.

The ECONOMIC ANALYSIS data structure is displayed in the input browser at the first level (figure 94).

- Choose the Extend Icon to extend the structure to the next level for the OUTPUTS, INPUTS and/or INDIRECT EFFECTS nodes.



The corresponding data structure is displayed in the browser. The display at this point consists of the starting economic data structure which can be expanded as discussed below.

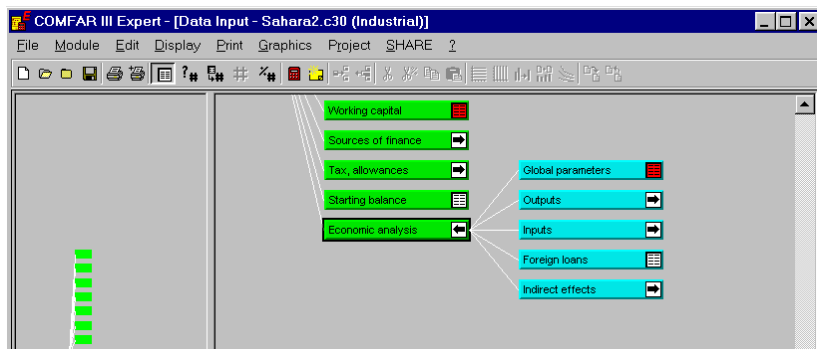


Figure 94: Economic browser

D. SELECTION OF ITEMS TO BE ADJUSTED

Data from the financial analysis is used as the basis for the economic values of project inputs and outputs. It is not necessary to define the economic price for every input and output item nor for every distortion in their prices. COMFAR III Expert provides assistance to selectively choose those items to be adjusted to economic prices.

Although it is possible to expand/split financial nodes (using EDIT menu features) it is not possible for the derived economic nodes. If it is necessary to divide the data in an economic node (e.g., into foreign and local components) which has been transferred from the financial browser, the expansion/splitting is performed at the financial node. The changes in the structure are then automatically transferred to the economic structure. Financial nodes transferred to the economic structure and subsequently deleted in the financial browser are also deleted in the economic browser.

Items are selected for inclusion in the economic structure of the browser by the following method:

1. Edit menu

The EDIT menu item **Assign economic analysis** is used to assign an item (node) in the browser to the economic structure.

To assign a financial item (node) in the input browser to the economic structure

- Select the node in the browser to be assigned to the economic structure. Subnodes containing data are automatically assigned.

Alternatively, an item may be assigned directly when the DATA ENTRY window for the item is active.

- Choose **Assign economic analysis** in the EDIT menu.

Alternatively nodes from the financial data structure may be assigned to (or removed from) the economic section of the browser by activating (or deactivating) the Assign economic analysis icon of those nodes.

To assign nodes from the financial browser to the economic section of the browser by using the icons

- Select (deselect) the **Assign economic analysis** icon on the right side of the node in the input browser to be transferred to (removed from) the economic section.



The node is transferred appropriately to the INPUT, OUTPUT or FOREIGN LOANS node of the economic structure. Foreign loans should be transferred only when available exclusively for the project.

E. GLOBAL PARAMETERS

Global parameters are those which apply to all aspects of the project. These parameters are defined in the GLOBAL PARAMETERS window.



To display the global parameters window

- Select the Table Icon for the GLOBAL PARAMETERS node in the economic section of the browser.

The GLOBAL PARAMETERS window is displayed.

Figure 95: Global parameters window

1. Numeraire (unit of account)

The numeraire is the unit of account in which all economic values are expressed. It is the standard of measurement for economic value. The relative values of all inputs and outputs and, therefore, the outcome of the analysis should not be affected by the selection.

The three available choices for the numeraire in *COMFAR III Expert* have two basic parameters: currency in which values are expressed and price system. A third parameter is the order of magnitude or unit of account (e.g. tens, hundreds or thousands). Available options for the numeraire are:

- Local currency at domestic prices
- Local currency at border prices
- Foreign currency at border prices

Financial prices are converted to economic value in a series of steps described in chapter XII. Items which are strictly financial in nature generally do not enter into these calculations (e.g. financial sources, debt service, dividends, taxes). The economic value of the project represents the aggregated costs and benefits of all applicable inputs and outputs. A summary of the procedure is as follows:

1. The **financial value** (FV) is assigned as the price in the earliest project period in which an item appears. This price is converted to local currency at the official exchange rate, when applicable.
2. An **adjusted market value** (AMV) is defined initially either as the border price for traded items or as the consumer or producer price for non-traded items.
3. An **adjustment factor** (AF) initially defines the relationship between financial value (FV) and adjusted market value (AMV):

$$AMV = FV \times AF$$

4. AMV and AF can then be adjusted at will (FV cannot be changed in the economic browser).
5. For items valued financially in terms of foreign exchange, a **foreign exchange adjustment** (FEA), which takes into account the shadow price of foreign exchange, is added to the AMV to determine the **economic value** (EV1).
6. The values of FV, AMV and EV1 for all input and output items are aggregated to determine the overall project values.
7. Indirect effects are added to EV1 (at the project level) to arrive at the **final economic value**, EV2.
8. For display and print of schedules and graphs, all values expressed in local currency are converted to the **numeraire** at the official exchange rate between the local currency and the numeraire.

To define the numeraire

- Select one of the three option buttons: **Local currency at domestic price levels**, **Local currency at border price levels** or **Foreign currency at border price level**.

The **Currency** selection is available only for the Foreign numeraire. For a Local numeraire, go to the last step.

- Select the **Currency** using the drop-down list box.
- Select the accounting **Unit** using the UNITS drop-down list box.

All values appearing in economic results (numeric and graphs) are first calculated on the basis of input data and then divided by the selected Unit.

2. Shadow exchange rates

The *official exchange rate* (OER) and the *shadow exchange rate* (SER) are defined as the ratio

$$\frac{\text{Number units foreign exchange}}{\text{Number units local exchange}}$$

The OER between two currencies may not reflect the true relative values. The SER takes into account distortions in the relative values of the currencies to arrive at a relation which represents the economic rate of exchange.

The *standard conversion factor* (SCF) is the ratio OER/SER, the *foreign currency conversion factor* (FCCF) the reciprocal value. Since the OERs have previously been defined in the CURRENCIES window of the financial browser, the SER is defined either by the SCF or by the FCCF.

To define the shadow exchange rate

- Select the STANDARD CONVERSION FACTOR or the FOREIGN CURRENCY CONVERSION FACTOR entry field and enter the corresponding value. The other value is automatically calculated.

3. Economic rate of discount

The economic rate of discount reflects the rate of decrease in values expressed in the numeraire over time. The rate defined is used for determining the *economic net present value* of outputs and inputs. A theoretical formula exists for the *consumption rate of interest* (CRI) which is suggested as the appropriate discount rate when economic values are expressed in consumption units (see the UNIDO *Guide to Practical Project Appraisal*, UNIDO, pp. 41-43):

$$\text{CRI} = ng + p$$

- n Elasticity of marginal utility of consumption with respect to change in per capita income
- g Annual growth in per capita income
- p Pure time preference

To define the economic rate of discount

- Select the ECONOMIC RATE OF DISCOUNT entry field and enter the discount rate in per cent.

The data defined in the GLOBAL PARAMETERS window is accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. Control returns to the browser.

F. GENERAL DEFINITIONS FOR OUTPUTS AND INPUTS

The ADJUSTMENT OF OUTPUTS (sales) and ADJUSTMENT OF INPUTS (costs) windows contain common features which are described in this section.

VALUES DISPLAYED IN OUTPUT AND INPUT WINDOWS IN THE ECONOMIC SECTION OF THE BROWSER ARE USUALLY EXPRESSED IN LOCAL CURRENCY, CONVERTED AT THE OFFICIAL EXCHANGE RATE DEFINED IN THE FINANCIAL INPUT DATA.

When data are changed in a financial window which has been transferred to the economic browser, the new information in the window is changed automatically in the corresponding economic window. The financial value (FV) reflects the new information, the adjusted market value (AMV) is unchanged and the adjustment factor (AF) is modified to maintain the relationship between these three variables.

DESCRIPTION

In the windows for output and input items (nodes) in the economic section of the browser, the item description (name) is presented in the DESCRIPTION display field as defined in the corresponding financial node. The description cannot be changed.

CURRENCY

With the exception of the INDIRECT EFFECTS nodes (see below), the currency in which the value of an item is expressed in the financial input browser is presented in the CURRENCY display field, as defined in the corresponding financial node, for information only.

Values in the ADJUSTMENT panel are expressed in local currency. Items displayed in the FIRST APPEARANCE panel are expressed as originally entered (see figure 96 in chapter VIII.G.2).

The **Foreign/local** designation is indicated by the active radio button. This designation cannot be changed.

If it is necessary to split an item into local and foreign components the structure can be changed in the financial browser (see chapter VIII.D). However, a percentage of **foreign currency exposure** can be specified in the input and output windows for converting the adjusted market value (AMV) to the economic value (EV1) (see *Numeraire (unit of account)* above and chapter XII).

PRICE, QUANTITY, TOTAL

Each ADJUSTMENT window contains a list box showing **Quantity**, **Price** and **Total** from the financial node for the first appearance (period) and for the reference year defined in the PLANNING HORIZON window of the financial browser. The price is displayed as entered in the FINANCIAL window. This information cannot be modified in the ECONOMIC window. For all items, the first appearance price (excluding sales tax in the case of sales prices) of any financial node is converted to the financial value (FV) for economic purposes. The *adjustment factor* (AF) is constant for all project periods.

TAXES/DUTIES INCLUDED

Other than sales taxes (see below), the percentage of indirect taxes on project inputs, such as import duties, should be entered in the TAXES/DUTIES INCLUDED entry field for input items only. For output items, indirect taxes such as export duties should be included as part of the sales tax in the financial data (the TAXES/DUTIES INCLUDED entry field does not appear in the ADJUSTMENT OF OUTPUTS window).

The entries related to sales taxes depend on the type of tax system in effect. Entries for value-added tax (VAT) and for ordinary sales tax are indicated in table 15; the first three appear in financial windows and the fourth in the economic window.

	TYPE OF TAX	
	VAT	SALES TAX
Output price (financial)	Net of VAT and export duties	Net of sales tax and export duties
Sales tax on output	VAT + export duties	Sales tax + export duties
Input price	Net of VAT but including import duties	Including sales tax and import duties
Indirect tax on input	Import duties (but excluding VAT)	Sales tax + import duties

Table 15: Entries for value-added tax and sales tax

Indirect taxes enter into calculations for both cost-benefit and value added.

Any indirect taxes defined as sales taxes in the FINANCIAL windows are included in the value of the output for both cost-benefit and value-added calculations. For value-added distribution analysis, the sales taxes (and any other indirect taxes included in this amount) are assigned to the government.

For value-added calculations the **taxes/duties included**, as specified for an intermediate input (materials and services) or for an investment item in an ADJUSTMENT OF INPUTS window of the economic browser, are first

deducted from the value of the input. The value net of taxes/duties of the intermediate input or investment item is then adjusted for the **value added included** and finally deducted from the value of project output for the calculation of value added.

TRADE CATEGORIES

Items of output can be classified as **exported** or, if **local**, as **tradable (exportable or importable)** or as **non-traded**. Inputs can be classified as **imported** or, if of **local** origin, as **tradable (exportable or importable)** or as **non-traded**. For any one item of output or input, if more than one trade category is required, the item should be split in the financial browser into the appropriate trade categories to facilitate economic adjustments.

Trade categories that can be assigned to inputs and outputs are determined by the market specified for the item as shown in table 16.

CATEGORY	MARKET	NON-TRADED	IMPORTED	IMPORTABLE	EXPORTABLE
Inputs	Foreign		X		
	Local	X		X	X
CATEGORY	MARKET	NON-TRADED	EXPORTED	EXPORTABLE	IMPORTABLE
Outputs	Foreign		X		
	Local	X		X	X

Table 16: Trade categories of inputs and outputs

ADJUSTED MARKET VALUE AND ADJUSTMENT FACTOR

In each ADJUSTMENTS window of the economic browser the adjusted market value (AMV) is initially assigned a value depending upon the trading category of the input and output and the trading price defined in the window (CIF, FOB, *consumer's willingness to pay* or *producer's cost price*). This initial AMV or the adjustment factor (AF) can then be modified by directly entering the appropriate value (in terms of local currency) in the ADJUSTED MARKET VALUE field or the AF field. The financial value (FV) is provided for information only; it cannot be changed in the ECONOMIC window. The above relationship between AMV, FV and AF is always maintained.

G. PROJECT OUTPUTS

Product sales nodes in the financial browser can be assigned to the OUTPUT node of the ECONOMIC structure in the browser using one of the methods described above (chapter VIII.D).

Adjustments for economic value are entered in the ADJUSTMENT OF OUTPUTS window which is invoked from an OUTPUT node in the economic browser.

Segments of a particular project output which are exported, exportable and non-traded should be subdivided into separate nodes in the financial browser to facilitate appropriate adjustments for each segment. The FOREIGN EXCHANGE ADJUSTMENT (FEA) for traded and tradable items is calculated on the basis of the AMV, which would usually differ for each segment.

1. Sales taxes, duties and subsidies

The treatment of project outputs with regard to *export duties* and *subsidies* differs with regard to an item's assignment to the economic browser.

If the only price distortion for an output is taxes, then the taxes should be specified in the financial browser; there is no need for further adjustment. For items not assigned to the economic browser (no adjustment) the following applies:

- Any sales taxes specified in the financial node are included and subsidies excluded in the economic calculations. Other taxes such as indirect taxes and export duties can be included if their treatment is consistent with that for sales taxes.

For project outputs, the sales taxes defined in the financial browser are automatically credited to the government for determining the distribution of value added. No indirect taxes are defined in the economic window for project output.

If an output item is assigned to the economic browser, the original FOB, CIF, consumer or producer price as specified in the ADJUSTMENT OF OUTPUTS window is the initial AMV and then can be modified at the user's discretion. The consumer price (willingness to pay for an output) is the price plus the defined sales taxes.

2. Output classification and relevant price

Economic prices are defined in the ADJUSTMENT OF OUTPUTS window for each item assigned to the economic browser.



To display an adjustment of outputs window

- Extend the OUTPUTS STRUCTURE to reveal the nodes for each output item by choosing the Extend Icon for the OUTPUT node.
- Choose the Table Icon for the one of the product nodes in the output section of the browser.

The ADJUSTMENT OF OUTPUTS window is displayed. Four configurations of this window are available, each containing a modification of the ECONOMIC VALUE panel associated with exports, exportables, importables and non-traded items.

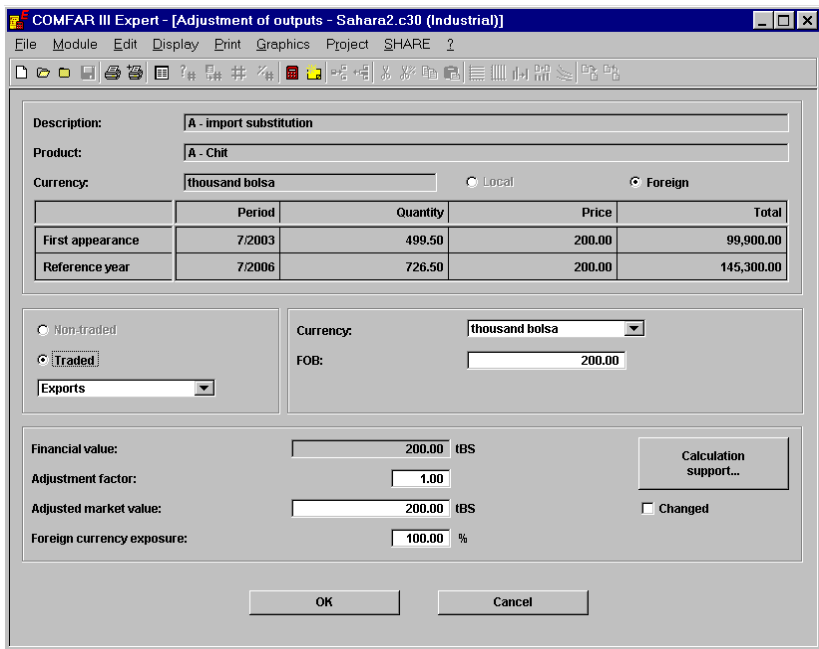


Figure 96: Adjustment of outputs window with exports panel

The DESCRIPTION, CURRENCY and QUANTITY/PRICE/TOTAL display fields are described above.

Project outputs can be classified as traded (exports), tradable (exportable, importable) or non-traded as selected by the corresponding radio button and the drop-down list box in the ADJUSTMENTS window. The value basis for

each classification differs in accordance with the impact on the national criterion (e.g. national income).

For all *tradable categories* where the CIF/FOB price is defined as the initial AMV, the currency and price are defined. However, the AMV is expressed in local currency converted from the input currency at the official exchange rate. When the tradable category is changed the information in the ECONOMIC VALUE panel is reset.

EXPORTS

Exports should be valued at the *border price*. The FOB price can be used as a first approximation, usually in the currency of the importing country. The initial AMV appearing in the ADJUSTMENTS window is the defined FOB price converted at the official exchange rate to local currency.

To define the export price and currency

- Select the **Traded** radio button in the OUTPUT CLASSIFICATION panel.
- Select **Exports** in the OUTPUT CLASSIFICATION drop-down list box.

The EXPORTS DATA panel is displayed (figure 96).

- Select the importer's currency using the CURRENCY drop-down list box.
- Select the FOB entry field and enter the export price expressed in the importer's currency.

EXPORTABLES

Exportables are valued at the border price. The FOB price can be used as a first approximation, usually in the currency of the importing country. The initial AMV appearing in the ADJUSTMENTS window is the defined FOB price converted at the official exchange rate to local currency.

The percentage of exportable output is assumed to have an indirect effect on trade. It is defined and used in calculating the *Indirect foreign exchange inflows - exportable goods* in the *Net foreign exchange effect schedule* (chapter X.D.2). For example, if the percent exportable is 40%, the FOB price is multiplied by 0.40 (40%) to determine the *foreign exchange effect*.

To define the exportables price, currency and percent exportable

- Select the **Tradable** radio button in the OUTPUT CLASSIFICATION panel.
- Select **Exportable** in the OUTPUT CLASSIFICATION drop-down list box.

The EXPORTABLES panel is displayed (figure 97).

- Select the importer's currency using the CURRENCY drop-down list box.
- Select the FOB entry field and enter the export price expressed in the importer's currency.

Select the EXPORTABLE entry field in the EXPORTABLES panel and enter the percentage of the output item which is exportable.

COMFAR III Expert - [Adjustment of outputs - Sahara2.c30 (Industrial)]

Description: B - import substitution

Product: B - Chevlar

Currency: thousand bolsa Local Foreign

	Period	Quantity	Price	Total
First appearance	7/2003	522.50	110.00	57,475.00
Reference year	7/2006	756.00	110.00	83,160.00

Non-traded
 Tradable
 Exportable

Currency: Forex required in tBS

FOB: 0.00

Exportable: 0.00 %

Financial value: 110.00 tBS

Adjustment factor: 0.00

Adjusted market value: 0.00 tBS

Foreign currency exposure: 100.00 %

Calculation support... Changed

OK Cancel

Figure 97: Adjustment of outputs window with exportable panel

IMPORTABLES

For importables the CIF price can be used as a first approximation, usually in the currency of the exporting country. The initial AMV appearing in the ADJUSTMENTS window is the defined CIF price converted at the official exchange rate to local currency.

The percentage of importable output is assumed to have an indirect effect on trade. It is defined and used in calculating the *Indirect foreign exchange inflows - importable goods* in the *Net foreign exchange effect schedule* (chapter X.D.2). For example, if the percent importable is 40%, the CIF price is multiplied by 0.40 (40%) to determine the *foreign exchange effect*.

COMFAR III Expert - [Adjustment of outputs - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: B - import substitution

Product: B - Chevlar

Currency: thousand bolsa Local Foreign

	Period	Quantity	Price	Total
First appearance	7/2003	522.50	110.00	57,475.00
Reference year	7/2006	756.00	110.00	83,160.00

Non-traded

Tradable

Importable: Importable

Currency: Forex required in tBS

CIF: 116.00

Importable: 100.00 %

Financial value: 110.00 tBS

Adjustment factor: 1.05

Adjusted market value: 116.00 tBS

Foreign currency exposure: 100.00 %

Calculation support...

OK Cancel

Figure 98: Adjustment of outputs window with importable panel

To define the importable price, currency and percent importable

- Select the **tradable** radio button in the OUTPUT CLASSIFICATION panel.
- Select **Importable** in the OUTPUT CLASSIFICATION drop-down list box.

The IMPORTABLE panel is displayed (figure 98).

- Select the displaced exporter's currency using the CURRENCY drop-down list box.

- Select the CIF entry field and enter the CIF price expressed in the displaced exporter's currency.
- Select the IMPORTABLE entry field in the IMPORTABLES panel and enter the percentage of the output item which is classified as import substitution.

NON-TRADED OUTPUT

As described above, the basis for economic value of non-traded output is the *consumer price* (willingness to pay) if the effect of the production increases the amount to consumers or the *cost of the displaced production* if the effect is on supply.

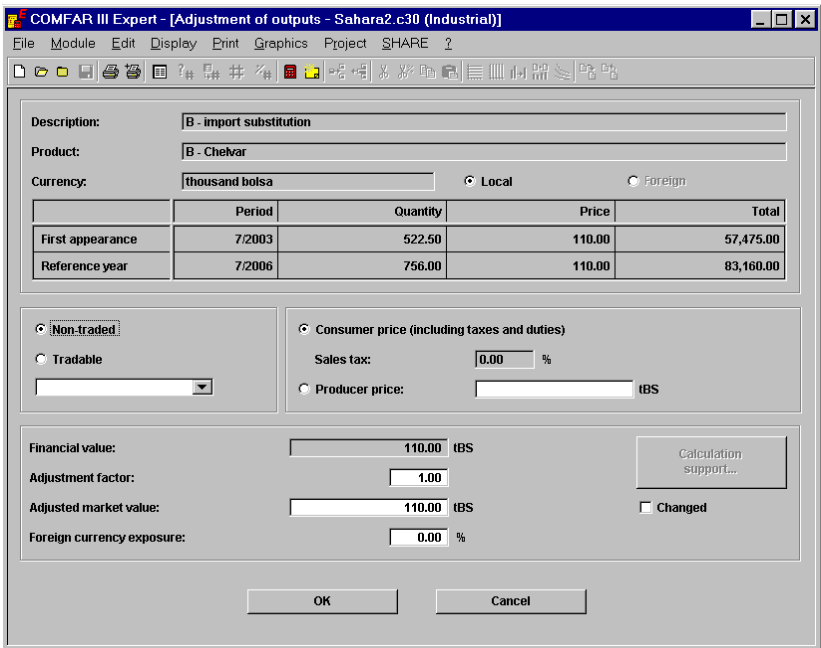


Figure 99: Adjustment of outputs window with non-traded panel

- To define the price of non-traded output**
- Select the **Non-traded** radio button in the OUTPUT CLASSIFICATION panel.
- The NON-TRADED panel is displayed (figure 99).
- If the **Consumer price (including taxes and duties)** radio button is selected the financial value in the period of first appearance is assigned as the AMV and the SALES TAX display field shows the percentage sales tax in the period of first appearance.

If the **Producer price** radio button is selected the PRODUCER PRICE entry field is activated and the price is entered in local currency.

- Select either the **Consumers price** or **Producers price** radio button.
- If the **Producers price** radio button is selected enter the producer price in the corresponding entry field. If the **Consumers price** radio button is selected, the Financial value + Sales tax is assigned automatically as the AMV.

3. Economic value

Adjustments are applied to the financial values of input and output items to define the economic values. The adjusted market value (AMV) is essentially the *economic efficiency price*. The relationship between the AMV and the FV is defined by the adjustment factor (AF). The relationship is:

$$AMV = FV \times AF$$

Subsequently (for items with foreign exchange exposure only), a foreign exchange adjustment (FEA) is combined with the AMV to arrive at the preliminary economic value (EV1). *Indirect effects*, i.e. *externalities*, are added to the aggregated preliminary economic values to determine the economic value (EV2).

The foreign exchange adjustment (FEA) is a function of the AMV, the *foreign currency exposure* (FCE) and the *standard conversion factor* (SCF) (see chapter XII.D).

The SCF is defined as the ratio:

$$\frac{\text{Official exchange rate (OER)}}{\text{Shadow exchange rate (SER)}}$$

The shadow exchange rate is defined in the GLOBAL PARAMETERS window. Only that portion of the output specified as having a foreign currency exposure is affected by the exchange rate conversion.

The adjusted market value and foreign currency exposure can be defined either directly in the ECONOMIC VALUE panel of the ADJUSTMENT OF OUTPUTS window or through the use of **Calculation support** to refine the analysis of *transportation and handling costs*.

STANDARD DATA ENTRY

To define the adjusted market value and foreign currency exposure directly in the adjustment of outputs window

- The **Financial value** (price at first appearance in any project period) is shown automatically for the output item in the corresponding display field. This value cannot be changed.
- Select either the **ADJUSTMENT FACTOR** or the **ADJUSTED MARKET VALUE** entry field and enter the corresponding value. The other value is displayed automatically according to the relation described above.

The **CHANGED** check box at the right of the **AMV** field is automatically selected to indicate that the original value of the **AMV** or **AF** has been modified.

- Select the **FOREIGN CURRENCY EXPOSURE** entry field and enter the corresponding percentage.

The selections are accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton.

The financial value in the **ADJUSTMENTS** window is automatically changed to correspond to a change in the financial browser. The **AMV** remains unchanged, but the **AF** is modified to maintain the relationship between **FV**, **AMV** and **AF**.

CALCULATION SUPPORT

Where inland costs are significant it may be useful to disaggregate a traded or tradable output into the price component, the transport and the handling costs to achieve a better determination of economic value.

The **CALCULATION SUPPORT** modal window provides the means for a more detailed analysis of economic value to include transport and handling in connection with traded and tradable output. The purpose is to determine the **AMV** and foreign currency exposure (**FCE**) when the adjustments for transportation and handling are taken into account. The **AF** is then determined as the ratio of the **AMV** to the original **FV**. The adjusted **FCE** is the ratio of the defined border price to the **AMV**, i.e. the portion of the **AMV** involving foreign exchange. In some cases the adjusted **FCE** can exceed 100% if the **AMV** exceeds the defined border price.

The rules describing how handling and transport costs enter into the determination of economic values for the various trade categories are

described in chapter XII.D.9. This feature is not available for non-traded items, for which the **Calculation support** pushbutton is disabled.

To activate calculation support

- Choose the **Calculation support** pushbutton in the ECONOMIC VALUE panel.

The CALCULATION SUPPORT modal window is displayed (figure 100).

In the VALUE ANALYSIS list box the values in the CIF/FOB column cannot be changed. The initial FV in the CIF/FOB column is taken from the border price defined in the ADJUSTMENTS window. This is automatically equal to the AMV of the border price as $AF = 1$ in this column and cannot be changed. $FCE = 100\%$ for the traded (or tradable) item and cannot be changed. The initial values in the VALUE ANALYSIS panel are taken directly from the corresponding panel in the ADJUSTMENTS window.

Exportable	FOB	- Transport	- Others
FV	0.00	0.00	0.00
AF	1.00	1.00	1.00
AMV	0.00	0.00	0.00
FCE	100.00	0.00	0.00

Financial value (FV): 110.00 tBS
 Adjustment factor (AF): 0.00
 Adjusted market value (AMV): 0.00 tBS
 Foreign currency exposure (FCE): 100.00 %

Figure 100: Calculation support modal window

All data in the VALUE ANALYSIS list box is expressed in *local currency units*. In each of the four rows (financial value, adjustment factor, adjusted market value and foreign currency exposure), data can be entered as follows:

COLUMN	ITEM
Transport	Transport costs
Other	Handling costs (including trading profit)

To define the adjusted market value and foreign currency exposure using the calculation support modal window

- Use the iconic buttons and data field to enter the values for **Transport** and **Other**. In each column enter the financial value and either the adjustment factor or the adjusted market value (the other is calculated automatically). Also enter the percentage of foreign currency exposure.

In the VALUE ANALYSIS panel the composite results of the calculations for entries in each of the three columns of the VALUE ANALYSIS list box are displayed automatically. The calculation rules are described in chapter XII.D.

The **Calculation support** results are accepted with the **OK** pushbutton in the CALCULATION SUPPORT modal window, in which case control returns to the ADJUSTMENTS window where the results are displayed in the ECONOMIC VALUE panel. If the **CANCEL** pushbutton is chosen, the original economic values remain unchanged.

H. PROJECT INPUTS: FIXED INVESTMENT AND PRODUCTION COSTS

Project input items are assigned to the INPUT node of the economic structure in the browser using the **Assign economic analysis** feature of the EDIT menu.

Inputs which can be transferred to the economic browser include all of the **Fixed investment cost** items and all **Production cost** items. Nodes for the transferred items are found in the structure of the INPUT node in the economic browser. When one or more items have been transferred from the FIXED INVESTMENT COSTS nodes or the PRODUCTION COSTS nodes in the financial browser, the corresponding nodes appear with the Extend Icon in the economic browser.



Financial items, in general, are not relevant to the economic analysis. However, any foreign currency-denominated loan can be transferred to the economic browser and should be transferred if it is available only for the project so that disbursements and debt service are included in the cost-benefit analysis (see chapter VIII.J).

Adjustments for economic value are entered in the ADJUSTMENT OF INPUTS window which is invoked from an input node in the browser.

Any input item in the economic browser can be defined in any one of the available trade categories: non-traded, traded (imported) or tradable (importable or exportable). A particular project input item with more than one trade category should be subdivided into separate nodes in the financial browser to facilitate adjustments for each part.



To display an adjustment of inputs window for a fixed investment or production cost item

- Choose the Extend Icon for the INPUTS node to extend its structure.

The structure of the Inputs node is displayed which includes nodes for FIXED INVESTMENT COSTS, PRODUCTION COSTS and PROFIT/DIVIDENDS. The first two nodes can be further extended to reveal the nodes corresponding to items transferred to the economic browser.

- Choose the Extend Icon for either the FIXED INVESTMENT COSTS or PRODUCTION COSTS node to extend its structure.

It is necessary to extend the PRODUCTION COSTS node one level further to reveal the nodes for a particular product.

- Choose the Extend Icon for a product node in the PRODUCTION COSTS structure.
- Choose the Table Icon for the one of the nodes in the INPUTS section of the browser corresponding to an investment or raw materials item.



The ADJUSTMENT OF INPUTS window is displayed (figure 101). Four configurations of this window are available, each containing a modification of the ECONOMIC VALUE panel associated with imports, importables, exportables and non-traded items.

COMFAR III Expert - [Adjustment of inputs - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: Imported machinery and equipment

Origin: Fixed investment costs

Currency: Forex required in tBS Local Foreign

	Period	Quantity	Price	Total
First appearance	7/2001	1.00	16,500.00	16,500.00
Reference year	7/2006	1.00	0.00	0.00

Taxes/duties included: 0.00 %

Value-added included: 0.00 % 0.00 % 0.00 % Rest: 100.00 %

Non-traded Traded

Currency: Forex required in tBS

Imports

CIF: 16,500.00

Financial value: 16,500.00 tBS

Adjustment factor: 1.06

Adjusted market value: 17,490.00 tBS

Foreign currency exposure: 94.34 %

Calculation support... Changed

OK Cancel

Figure 101: Adjustment of inputs window with imports panel

The procedures for the entry of economic data for fixed investments and production costs are identical. The ADJUSTMENT OF INPUTS window is used for data entry.

The DESCRIPTION, CURRENCY and QUANTITY/PRICE/TOTAL display fields are described above.

1. Taxes, import duties and subsidies

The general treatment of taxes and duties on project outputs and inputs is described above in chapter VIII.F.

The treatment of project inputs with regard to taxes, import duties and subsidies differs with regard to an item's assignment to the economic browser.

For items not assigned to the economic browser (no adjustment):

- The financial value specified in the financial browser at first appearance is used for the AMV.
- Taxes and duties which are considered to be both financial and economic costs can be included in the financial value of the input.

If an input item is assigned to the economic browser:

- The financial value of an input normally includes taxes and duties, sometimes also subsidies. To assign these taxes to the government for purposes of value-added computations and distribution, **Taxes, duties included** in the ADJUSTMENT OF INPUTS window must be selected. In case the project received subsidies/grants on inputs they should be treated as *negative tax*, and the corresponding percentage is entered in the TAXES/DUTIES INCLUDED entry field.
- The initial value of the AMV is either the CIF/FOB, consumer or producer price (depending on the trade category). The AMV or AF can subsequently be adjusted as necessary.

In the value-added analysis, indirect taxes on intermediate project inputs are treated as transfers and are excluded from project costs. They are added to the benefits accruing to the government.

To define the percent indirect taxes/duties included

- Select the TAXES/DUTIES INCLUDED entry field and enter the percentage of the financial value which consists of indirect taxes/duties (figure 101).

2. Value added included

It is possible that part of the value of a material input to the project represents incremental value added (value added WITH the project - value added WITHOUT the project). For example, the project should be credited with the value added of an input that is wholly or partly produced domestically and which is directly attributable to the project.

For project inputs it is possible to define the value added included in a maximum of three rounds of decomposition of the item. The percentage of value added included is credited to the project and is not deducted as an intermediate input. These amounts should represent the value-added content of intermediate inputs directly attributable to the project. The default values for each round are 0%. The percentage shown in the REST display field is the part of the input value deducted from the value of output in determining the value added for the project (see chapter X.D).

A schematic representation of the decomposition is shown in figure 102. If decomposition is carried out to the extreme, the item is composed of value added and imports (i.e. the rest is the imported content).

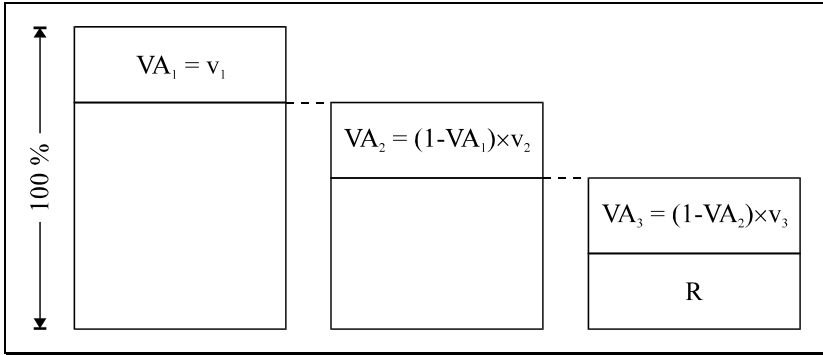


Figure 102: Decomposition of content - value added for project inputs

The value of the rest in percent is calculated as:

$$VA_1 = v_1$$

$$VA_2 = (1 - VA_1) \times v_2$$

$$VA_3 = (1 - VA_2) \times v_3$$

$$R = (1 - \sum_{i=1}^3 VA_i) \times 100$$

- VA_i Value added included at round i, %/100
- v_i Value added included in each round of disaggregation i, %/100
- R Rest, % (to be deducted as intermediate input)
- i i = 1, 2, 3

To define the percentage of the value of input to be included in each round of disaggregation

- Sequentially select the VALUE ADDED INCLUDED entry fields and enter the percentage of the value of output to be included in each round of disaggregation (figure 101).

The percentage of the input value to be excluded from value added is automatically shown in percent in the REST display field.

3. Input classification and price

Project inputs may be classified as traded (imported), tradable (importable, exportable) and non-traded. The value basis for each classification differs in accordance with the economic cost in relation to a national criterion (e.g. growth in national income).

Information in the ECONOMIC VALUE panel of the ADJUSTMENTS window is reset when the trade category is changed. The financial value is unchanged, but the AMV and AF are adjusted to conform to the values in the INPUT CLASSIFICATION panel.

IMPORTS

Imports should be valued at the border price. The CIF price can be used as a first approximation, usually in the currency of the exporting country. The initial AMV appearing in the ADJUSTMENTS window is the defined CIF price converted at the official exchange rate to local currency.

To define the import price and currency

- Select the **Traded** radio button in the INPUT CLASSIFICATION panel.
- Select **Imports** in the INPUT CLASSIFICATION drop-down list box.

The IMPORTS panel is displayed (figure 101).

- Select the exporter's currency using the CURRENCY drop-down list box.
- Select the CIF entry field and enter the import price expressed in the exporter's currency.

IMPORTABLES

The procedures for importable inputs are similar to those for output items (see chapter VIII.G.2).

EXPORTABLES

The procedures for exportable inputs are similar to those for output items (see chapter VIII.G.2).

NON-TRADED INPUT

As described above, the basis for economic value of non-traded input is the consumer price (consumer's willingness to pay) if the effect of the project is to decrease the amount available to other consumers and the cost of production if the project's input is from additional supply.

COMFAR III Expert - [Adjustment of inputs - Sahara2.c30 (Industrial)]

Description: Utilities, local
 Origin: Fixed investment costs
 Currency: thousand bolsa Local Foreign

	Period	Quantity	Price	Total
First appearance	7/2001	1.00	14,500.00	14,500.00
Reference year	7/2006	1.00	0.00	0.00

Taxes/duties included: 0.00 %
 Value-added included: 0.00 % 0.00 % 0.00 % Rest: 100.00 %

Non-traded Tradable
 Consumer price (including taxes and duties)
 Producer price: 11,600.00 tBS

Financial value: 14,500.00 tBS
 Adjustment factor: 0.80
 Adjusted market value: 11,600.00 tBS
 Foreign currency exposure: 0.00 %

Calculation support...
 Changed

OK Cancel

Figure 103: Adjustment of inputs window with non-traded panel

To define the price of non-traded output

- Select the **Non-traded** radio button in the INPUT CLASSIFICATION panel.

The NON TRADED panel is displayed. If the **Consumer price (including taxes and duties)** radio button is selected the financial value, as defined in the financial browser in the first period of appearance, is assigned initially as the AMV. If the **Producer price** radio button is selected the PRODUCER PRICE entry field is activated and the price is entered in local currency and assigned as the initial AMV.

- Select either the **Consumers price** or **Producers price** radio button.
- If the **Producers price** radio button is selected, enter the producer price in the corresponding entry field.

4. Economic value

Adjustments to the financial values of input items are similar to those for the output items (see chapter VIII.G.3).

STANDARD DATA ENTRY

The procedures for defining market value and *foreign currency exposure* directly in the ADJUSTMENT OF INPUTS window are identical to those for output items (see VIII.G.2).

CALCULATION SUPPORT

Where inland costs are significant it may be useful to disaggregate a traded or tradable input into the border price component, transport and handling costs to achieve a better determination of economic value.

The CALCULATION SUPPORT window provides the means for a more detailed analysis of the economic values of transport and handling in connection with traded and tradable inputs. This feature is not available for non-traded items, for which the **Calculation support** pushbutton is disabled.

The calculation support procedures for input items are identical to those for output items (see chapter VIII.G).

The rules describing how handling and transport costs enter into the determination of economic values for the various trade categories are described in chapter XII.

I. PROFIT/DIVIDENDS

A PROFIT/DIVIDENDS node appears as a subnode of the INPUTS node in the economic browser. Its purpose is to define the taxes levied on local and foreign dividends.

The taxes on local dividends affect the distribution of value added for the project. Taxes on foreign dividends affect both the distribution of value added and the foreign exchange flows.



To define the taxes on local and foreign dividends

- Choose the Table Icon for the PROFIT/DIVIDENDS node.
The ADDITIONAL TAX ON DIVIDENDS modal window is displayed (figure 104).
- Select the TAXES ON LOCAL DIVIDENDS DISTRIBUTED field and enter the taxes in per cent.
- Select the TAXES ON FOREIGN DIVIDENDS DISTRIBUTED field and enter the taxes in per cent.

Figure 104: Profit/dividends window

The data is accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the browser.

J. FOREIGN LOANS

Any loan defined with a foreign origin (**Foreign** radio button selected in LOANS window) can be transferred to the economic browser. A foreign loan should be transferred only if its availability is contingent upon its use in the project.

The effect of transferring the loan to the economic browser is to include the financial flows (foreign currency disbursements, principal repayments and interest) in the cost-benefit analysis. The effect is to shift the cost of the items for which the foreign currency is used to the time of repayment.

The FOREIGN LOANS node provides information on the loans which have been transferred to the browser. No data entry is possible.



To review the foreign loans transferred to the economic browser

- Choose the Table Icon for the FOREIGN LOANS node in the economic browser.

The FOREIGN LOANS window is displayed (figure 105).

Description	Total disbursement	Currency
Dev. Bank, foreign	280,000.00	tFB

Figure 105: Foreign loans window

Information provided includes the **description** or the name of the loan, the **total disbursement** and the **currency** in which the loan is expressed.

A loan can be deleted from the economic browser in the FOREIGN LOANS window.

To delete a foreign loan from the economic browser

- Select the line in the list box of the FOREIGN LOANS window corresponding to the loan to be deleted.
- Choose the **Delete** pushbutton.

When the **OK** pushbutton is chosen, control returns to the browser. All foreign loans remaining in the list in the FOREIGN LOANS window are included in the cost-benefit analysis.

K. INDIRECT EFFECTS

Indirect effects are benefits and costs attributable to the project under consideration beyond those activities identified and included in the financial analysis. These additional effects are associated either with economically related activities or with phenomena which have ecological consequences.

Economically related impacts can include changes in upstream or downstream production or other changes in economic activity arising from the existence of the project that are not already considered in the direct effects. For example, the displacement by the project of relatively inefficient producers of project outputs may already be taken into account in the shadow pricing.

Ecological costs and benefits are impacts upon the natural and social environment. Some impacts can be valued in monetary terms, for example, if tertiary waste treatment is added to the community facility to accommodate the effluent of the project. Other impacts, though non-monetary, can sometimes be monetized. For example, deleterious environmental effects can sometimes be valued in terms of increased cost of health care, among other costs. Other impacts, e.g. aesthetic, can be considered only qualitatively.

A discussion of the assessment of ecological impacts is contained in the *Industrial Feasibility Studies Manual*, chap. V.

Absolute values of the indirect monetary and non-monetary costs and benefits are defined with the following four sub nodes of the INDIRECT EFFECTS node in the economic browser:

- Costs, monetary
- Benefits, monetary
- Demerits (non-monetary costs)
- Merits (non-monetary benefits)

It is possible to expand any of the above nodes using the **Insert** feature of the EDIT menu.

To define indirect monetary or non-monetary costs or benefits

- Choose the Extend Icon for the INDIRECT EFFECTS node in the economic browser.

The INDIRECT EFFECTS structure is displayed.

- Select the Table Icon for one of the INDIRECT EFFECTS sub-nodes listed above.

The INDIRECT EFFECTS window is displayed (figure 106).



- Select the currency in which the indirect effect is expressed from the CURRENCY drop-down list box.
- Select the market for the indirect effect by choosing the **Local** or **Foreign** radio button.
- Select the ESCALATION field and enter the escalation in percent.
- Use the iconic buttons and data field to enter the Indirect effects values in the list box for each period in the planning horizon expressed in the selected currency (see chapter IV.B.3).

COMFAR III Expert - [Indirect effects - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description: Benefits (monetary)

Currency: thousand bolsa Local Foreign

Escalation: 15.00 % p.a.

0.0000

	Amount
7/2001	0.00
7/2002	0.00
7/2003	10,000.00
7/2004	10,000.00
7/2005	10,000.00
7/2006	10,000.00
7/2007	10,000.00
7/2008	10,000.00
7/2009	10,000.00
7/2010	10,000.00
7/2011	10,000.00
7/2012	10,000.00

OK Cancel

Figure 106: Indirect effects window

The data is accepted with the **OK** pushbutton and cancelled with the **CANCEL** pushbutton. In either case control returns to the input browser.

L. EMPLOYMENT EFFECTS

1. Direct employment within the project

Information concerning the number of individuals employed by the project are derived from the LABOUR node in the financial browser. The default structure for a feasibility study includes nodes for both skilled and unskilled labor whereas the opportunity study structure contains a default node only for labour. The feasibility level supports a more detailed analysis of employment effects.

2. Indirect employment effects

Indirect employment effects are defined in the EMPLOYMENT EFFECTS sub-node of the INDIRECT EFFECTS node in the economic browser.

The number of workers and the total wage bill for unskilled and skilled labor are defined for input-supplying and for output-using projects. Additional investment related to job creation is also defined.

For calculations of indices and ratios in the *Employment effects schedule* the indirect wage bill and indirect investment are combined with the corresponding direct values derived from the financial analysis.



To define indirect employment effects

- Choose the Extend Icon for the INDIRECT EFFECTS node in the economic browser.

The INDIRECT EFFECTS structure is displayed.

- Select the Table Icon for the EMPLOYMENT EFFECTS sub-node.

The EMPLOYMENT EFFECTS window is displayed (figure 107).

- Select the **Currency** in which the employment effects are expressed from the CURRENCY drop-down list box.
- The **Local** radio button is automatically selected as the market for the indirect employment effects and cannot be changed.
- Use the iconic buttons and data field to enter **Number of workers** and **Wage bill/Investment** for each category of labor and for additional investment for **Input-supplying projects** and for **Output-using projects** expressed in local currency (see chapter IV.B.3).

COMFAR III Expert - [Employment effects - Sahara2.c30 (Industrial)]

File Module Edit Display Print Graphics Project SHARE ?

Description:

Currency: Local Foreign

	Number of workers	Wage bill and investment
Input-supplying projects		
Unskilled labour	0.00	0.00
Skilled labour	0.00	0.00
Additional investment	---	0.00
Output-using projects		
Unskilled labour	0.00	0.00
Skilled labour	0.00	0.00
Additional investment	---	0.00

Figure 107: Employment effects window

Accept the data with the **OK** pushbutton or cancel the entries with the **CANCEL** pushbutton. In either case control returns to the input browser.

IX. SELECTION OF RESULTS AND SCOPE OF CALCULATION

Results to be displayed or printed are first selected from the set of available schedules (numerical statements) and graphs with the **Select Results** feature of the MODULE menu. The **Calculation** feature then executes the calculation rules and algorithms on the financial and economic data input to produce the selected results which are stored in intermediate memory. The **Show Results** feature of the MODULE menu and PRINT menu (see chapter X) facilitates the selection of schedules and graphs for display and print.

Results are selected and produced with a results browser which is similar in concept to the input browser. One version of this browser is used for selection and another for display and print of schedules and graphs. Unlike the input browser, none of the editing features contained in the EDIT menu are active. The browser nodes cannot be edited or expanded as each node represents a fixed set of available schedules and graphs from which the user can select only those which are to be displayed or printed.

A. SELECTING RESULTS

The **Select Results** feature in the MODULE menu is active only when a project is loaded. Choosing this feature invokes the results browser (figure 108) in the selection configuration.

To display the results browser for selecting schedules and graphs to be produced

- Choose **Select Results** in the MODULE menu.

The version of the results browser is displayed for the selection of schedules and graphs to be displayed or printed.

The RESULTS BROWSER panel shows the structure of the available reports, while the BROWSER OVERVIEW panel gives a graphical illustration of the report structure in summary form. This provides a global illustration of the results structure and is used to select the portion of the structure displayed in the browser.

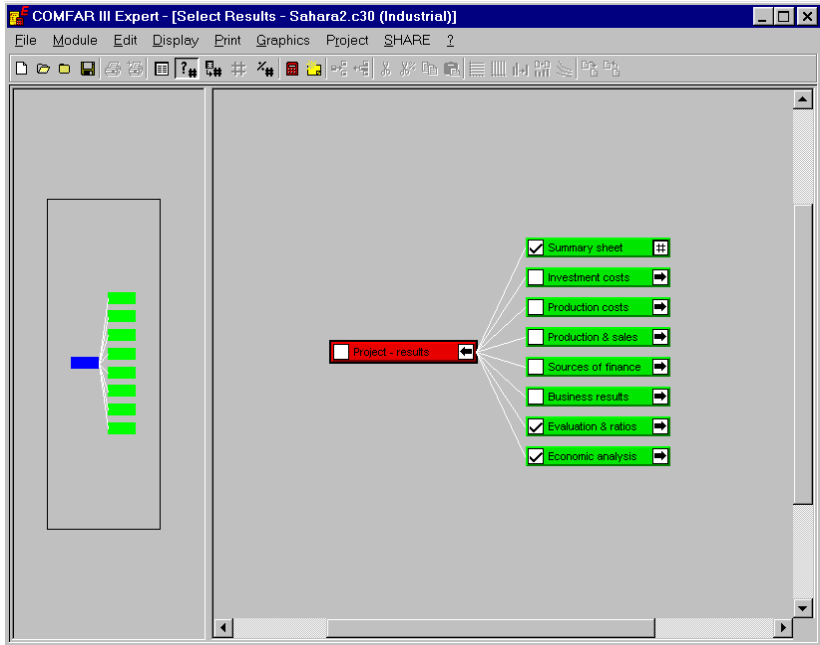


Figure 108: Results browser and overview for industrial opportunity project - manual case

1. Browser displays

The browser initially displays a root node and the first-level nodes for the **Summary sheet** and the groups of results available. Each node containing the Extend Icon at the right represents a group of available schedules and graphs. The **SUMMARY SHEET** node contains the Result Icon indicating its status as an available schedule. The structure of the nodes is identical for all levels and types of projects. The **ECONOMIC ANALYSIS** node is displayed only when this feature is selected in the **PROJECT IDENTIFICATION** window.



2. Browser operations

VIEWING PORTIONS OF THE DATA STRUCTURE

A portion of the structure displayed in the browser can be selected for view by dragging the frame of the BROWSER OVERVIEW panel to the selected area.

To view a selected portion of the structure displayed in browser panel

WITH THE MOVE CURSOR:

- Move the mouse cursor to the inside of the BROWSER OVERVIEW panel frame.

The mouse cursor converts to the move cursor when it is inside the window.

- Click and hold the left mouse button and drag the BROWSER OVERVIEW panel frame to the selected area.
- Release the mouse button.

The selected area appears in the BROWSER panel.

WITH THE HAND CURSOR:

- Move the mouse cursor to a position in the browser to be relocated.

- Click and hold the left mouse button.

The mouse cursor converts to the hand cursor.

- With the left mouse button depressed, drag the mouse to reposition the structure in the browser (the structure moves in the direction of motion of the hand cursor).
- Release the mouse button.

WITH THE KEYBOARD:

- One of the BROWSER nodes has a frame (the corresponding node in the BROWSER OVERVIEW panel is shown in a different colour); with the [←][→][↑][↓] KEYS this frame can be moved to other positions in the browser. If a node contains a pointer to the right/left, the next level of nodes can be opened (displayed)/closed by pressing [ENTER]. If the enframed node shows a Result Icon or Graphics Icon (active only in the Show results browser), the schedule/graph appears after [ENTER] has been pressed.



BROWSER EXTENSION



The browser contains six types of icons, each of which performs a function to select or produce a schedule or graph. In the select results browser the Compress Icon, the Extend Icon as well as the Select Icon (selected or unselected) are active.

The Result Icon and the Graphics Icon are active only in the show Results browser.

The Extend Icon at the right of any node indicates that the node can be extended to reveal a higher level of detail comprising a group of nodes which represent either subgroups of the original node (containing the Extend Icon) or specific schedules and graphs available (containing the Result or the Graphics Icon). The procedure for extending any node containing the Extend Icon is identical. The following procedure applies to the BUSINESS RESULTS node and is similar for any other node containing the Extend Icon.

To extend the business results node to reveal available schedules and graphs

- Choose the Extend Icon for the BUSINESS RESULTS node with the right mouse button.

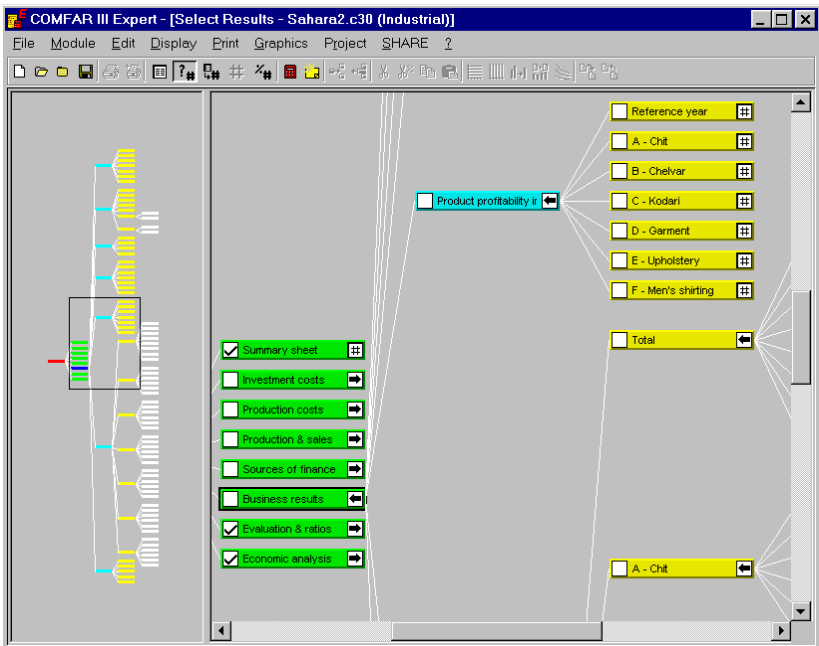
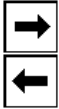


Figure 109: Business results structure fully extended

If extended with the right mouse button, the structure of the BUSINESS RESULTS node appears as shown in figure 109.



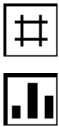
When the Extend Icon is chosen the structure is extended and the Extend Icon is converted to the Compress Icon.

The left and right mouse buttons have different functions with regard to the Extend and the Compress Icons. Clicking the Extend Icon with the left mouse button extends the results structure one stage above the node containing the icon. Clicking with the right mouse button extends the structure to all higher stages. Clicking the Compress Icon with the left or right mouse button compresses all current stages and reduces the extended structure to the node containing the icon.

SELECTING SCHEDULES AND GRAPHS



The icons (small squares) at the left of each node are used for selecting an item (schedule or graph) to be calculated and placed in intermediate memory for subsequent display or print. A blank Select Icon indicates that the node is not selected. When the blank Select Icon for a node is selected by clicking with the mouse button, a check appears indicating that the node is selected. Only selected nodes are subsequently calculated and made available for display or print. The activated Select Icon is deactivated to a blank Select Icon by clicking with the mouse button.



When the Select Icon is selected for a node containing the Extend Icon, all of its subnodes are activated. If such a node is extended fully, all nodes representing schedules (with the Result Icon at the right) and graphs (with the Graphics Icon at the right) appear with an activated Select Icon at the left. With the exception of the standard nodes, any of these nodes can subsequently be deactivated by clicking with the mouse button. If all of the schedule/graph nodes in a group are not active (one or more of the Select Icons are in the inactive state), the Select Icon for the parent node is also automatically inactivated.

To select a node in the results browser for subsequent display or print

- Choose the Select Icon at the left of the node with the mouse button.



B. CALCULATION OF SELECTED NUMERICAL RESULTS

Calculations are performed on the financial and economic data input in accordance with the rules and algorithms of the program to produce only the selected schedules and graphs. These are stored in intermediate memory for subsequent display or print. The calculated results are not saved with the project file and are only available while the project is loaded.

When **Calculation** is chosen, a modal window containing a list box is displayed which allows to accept or cancel the output selections in the select results browser. Only numerical results (schedules) are calculated; graphs are derived directly from the schedules. Calculation is initiated by choosing the **Start** pushbutton at the bottom of the window. Completion of calculation of each selection is indicated with a check in the DONE cell corresponding to the selection.

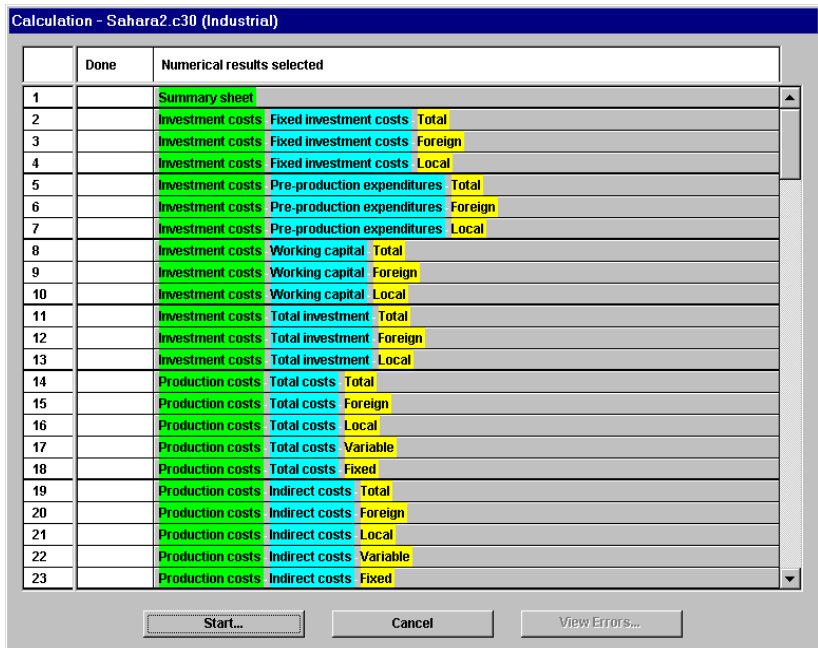


Figure 110: Calculation list box

To calculate selected numerical results (schedules)

- Choose **Calculation** in the MODULE menu.

The CALCULATION list box is displayed showing all selected schedules. Cells in the DONE column are initially blank. A check appears automatically when calculations for the corresponding schedule are complete.

- Choose the **Start** pushbutton to proceed with the calculation of the output displayed in the list, or click the **Cancel** pushbutton to return control to the browser.

When all calculations are successfully completed, control returns to the browser.

However, if COMFAR detects during the calculation any deficiency, (for example, lack of finance, no solution found for the IRR etc.) the CALCULATION REPORT modal window appears with a list of deficiencies encountered. Choose the **Start print** pushbutton to print the calculation report.

- Choose the **View errors** pushbutton to display the calculation report from the previous calculation.

Results are displayed and/or printed using the **Show Results** feature of the MODULE menu and the PRINT menu. These procedures are described in chapter X.

X. RESULTS, OUTPUT

The output of COMFAR *III Expert* consists of schedules (numerical results) and graphs produced from calculations performed on the financial and economic data. Graphical results are derived directly from the schedules with which they are associated.

The basic rules for determining the values of output in the form of numerical results and graphs are described. Descriptions of computational methods of greater technical precision, where necessary for clarification, are provided in chapters XI and XII.

In the calculation rules and algorithms it is assumed that all transactions take place on the last day of the period in which defined, with the exception of some loan disbursements and repayments (for yearly results all flows are assumed to take place on the balance date, the last day of the fiscal year). Composite numerical values, comprised of all transactions during each project period regardless of the day on which they occur, are calculated and displayed or printed in most schedules and graphs.

A. AVAILABLE RESULTS

Available results are presented in groups (e.g. fixed investment costs, production costs etc.), of which the extent and conformation are determined by:

- Level of analysis
 - Opportunity study
 - Feasibility study
- Depth of analysis
 - Financial analysis (minimum)
 - Economic analysis
 - Cost centre analysis
 - Cost allocation
- Project classification
 - New (minimum)
 - Expansion/rehabilitation
 - Joint venture
- Number of products (minimum = 1)

The schedules and graphs described in this chapter cover all of the options for an opportunity study. The results for other project configurations are similar. For each group of schedules and graphs the following information is provided in this chapter:

- The meaning or significance of the information contained in the schedules and graphs.
- The basic rules for calculating the items in each line and column of the schedules. References to the relevant sections of chapters describing financial

and economic calculation rules and algorithms in greater detail are provided when necessary.

- The line of the schedule from which each graph is derived.
- Interpretation of the results displayed in each graph.

The principle graph in a particular category is described and illustrated. Other graphs of the group can be either displayed or printed to obtain more detailed information.

B. DISPLAYING AND PRINTING RESULTS

Only those results which previously have been selected and calculated are available for display or print. The procedures for selection and calculation are described in chapter IX.

Results to be displayed or printed are selected using the **Show Results** feature of the MODULE menu. When **Show Results** is chosen, a browser is displayed which is identical in most respects to that of the **Select Results** feature; however, only nodes which have been selected and calculated are displayed in the show results browser (figure 111) and the status of the Select Icon for nodes cannot be changed or deselected.

SHOW RESULTS

Results in the form of numerical schedules and graphs are displayed using the **Show Results** feature in the MODULE menu. This feature is active only after the **Calculation** feature of the MODULE menu has been executed.

To display the results browser (figure 111)

- Choose **Show Results** in the MODULE menu.
Only the nodes that were calculated are available.

RESULTS BROWSER

Browser operations are almost identical to those described in chapter IX. The only differences relate to the state of activation of icons and to the use of the PRINT menu for producing printed output.

The status of the icons at the left of the nodes cannot be changed. An active check indicates that the results for the corresponding node are available for display/print; otherwise the corresponding result is not available for display and printing.

The icons at the right of the nodes representing available schedules and graphs are active. Choosing the Results Icon for a node produces a schedule; the Graphics Icon produces graphical output.

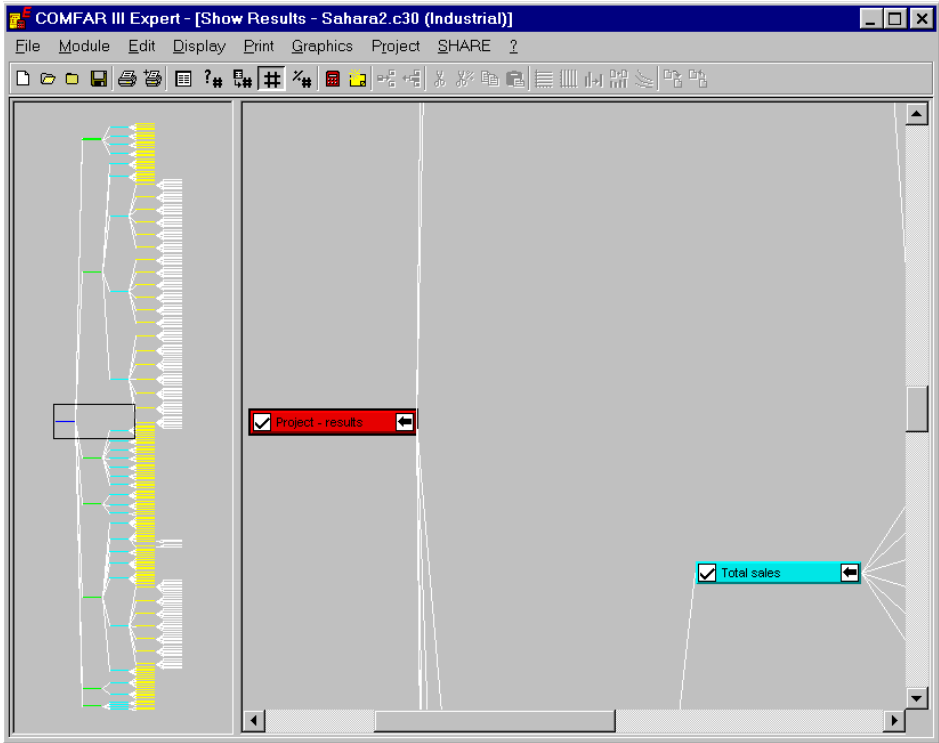


Figure 111: Results browser fully extended

DISPLAY SCHEDULES

The procedure is described for display of the *Business results - discounted cash flow - total capital invested* schedule. This node appears at the third level of the Business results structure shown in figure 111. The procedures are similar for displaying all other schedules.

To display the *business results - discounted cash flow - total capital invested* schedule (figure 112)

- Choose the Result Icon at the right of the node corresponding to the schedule to be displayed.

The *Business results - discounted cash flow - total capital invested* schedule is displayed (see also chapter X.C.6).

Results are generally available either on a yearly or periodic basis. The program allows for yearly, half-yearly, quarterly, monthly or user-defined planning periods during the construction phase and also during the first two years of the production phase.

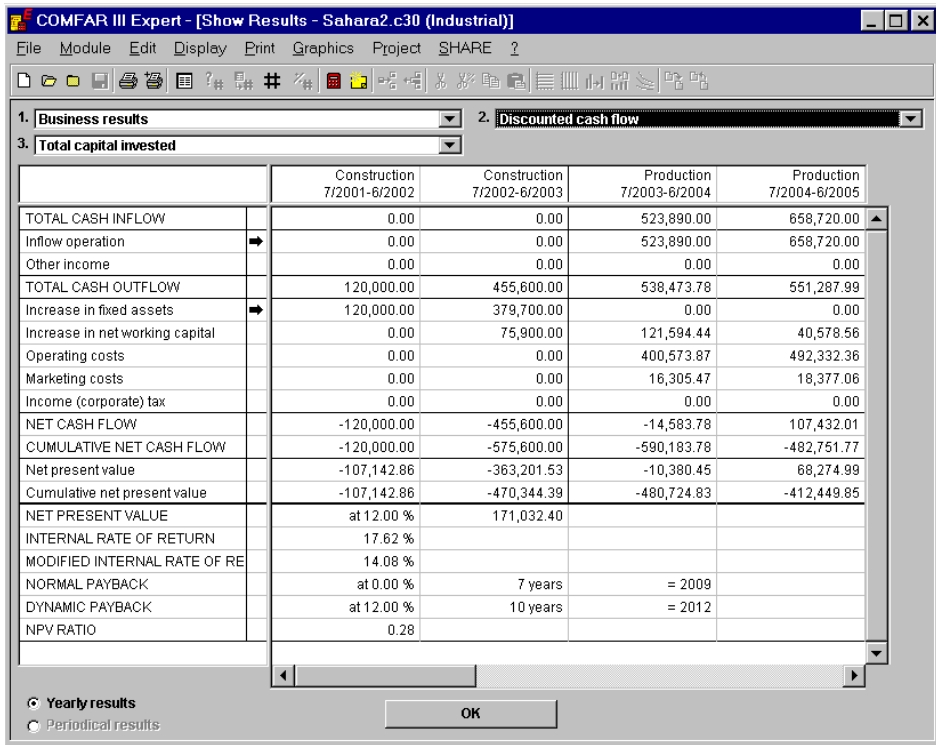


Figure 112: Business results - discounted cash flow - total capital invested schedule

When planning periods of less than a full year are defined in the PLANNING HORIZON window of financial data input, it is possible to produce results either for full years or for the defined periods. For yearly results with period planning (less than a full year) the results for all periods within the year are consolidated. Results for full years are reported for all balance dates as defined in the PLANNING HORIZON window. For a project in which a balance date falls less than a full year after start of the production phase, the first year of the production phase is shortened to terminate at a balance date.

To define the reporting periods (yearly or periodic) for a schedule

- Select the **Yearly** or **Periodical results** radio button in the SHOW RESULTS window.

The results of the selected type are displayed in the window.

The drop-down list boxes appearing at the top of the SHOW RESULTS window are used to change the selection of the schedule displayed. From left to right and top to bottom, the drop-down list boxes correspond to successively higher stages of definition of the RESULTS STRUCTURE as it appears in the browser. In the example shown in figure 112,

the leftmost drop-down list box (**Business results**) corresponds to the first stage above the parent node and the next list box to the next higher stage of definition.

To select from among the schedules in the group of the parent node of the displayed schedule

- Select **Income statement and ratios** in the second drop-down list box.

The selection in the third drop-down list box changes to the NET INCOME STATEMENT schedule.

The **Net income schedule** is now displayed in the window. It is not necessary to return control to the show results browser by choosing the **OK** pushbutton to display any one of the schedules from another major group such as *Sources of finance*. The procedure is similar for changing to other displays (tables or charts).

DISPLAY GRAPHS

The procedure for display of graphical results is similar to that for schedules.

To display a graph

- Click with the left mouse button the Graphics Icon at the right of the node in the show results browser corresponding to the graph to be displayed.
- Click with the right mouse button the Graphics Icon at the right of the node in the show results browser to activate a context-sensitive pop-up menu. This menu allows you to quickly perform parametric analysis.
- Choose the reselective tab of the notebook to switch between the display of the chart or the corresponding numerical values.

The chosen graphical result is displayed. Available features for editing a graph, comparing results for two or more projects and for performing parametric analysis are described in chapter V.F.

PRINTING

Schedules and graphs can be printed either on-line or in batch mode. The **On-line printing** feature produces a print of the active window (schedule or graph) only. The batch mode is used to produce multiple schedules and graphs. Both procedures involve the use of the show results browser and the PRINT menu.

To print the active window (schedule or graph)

- If the schedule or graph is displayed choose **Selected item** in the PRINT menu.

To print one selected item

- In the SHOW RESULTS BROWSER select the node corresponding to the schedule or graph to be printed.
- Choose **Selected item** in the PRINT menu or click with the right mouse button into the description of a node to activate the context-sensitive pop-up menu

In either case the selected schedule or graph is printed. When the printer buffer is fully loaded, normal program operations can proceed. Control returns to the position from which **Selected item** was executed.

Batch printing is described in chapter V.E, under *Add to print job* and *Print job*.

DISPLAY/PRINT OF SUBLINES

Sub-items (user-defined nodes) which are defined in the data structure for the project can be displayed or printed in some of the schedules as sublines. The sub-items display capability is indicated in the schedule with the Extend Icon adjacent to the item.

To display/print sublines of a schedule

- If sub-items (user-defined nodes) are defined for certain nodes of the browser, the Extend Icon appears in the schedule at the right of the item line. If the Extend Icon is clicked it converts to the Compress Icon and sublines are displayed/printed in the schedule. Sublines can be condensed to the original item by clicking its Compress Icon. The sublines are then no longer displayed or printed.

The sum of the sub-items is displayed in the row corresponding to the item of which each sub-item is a part.

FOREIGN/LOCAL ITEMS

Most of the results are offered in a series of schedules and graphs showing total, foreign and local components, as well as fixed and variable costs where applicable.

THE DEFINITION OF A COMPONENT AS FOREIGN OR LOCAL IS NOT LINKED TO THE CURRENCY IN WHICH ITS VALUE IS EXPRESSED BUT RATHER TO THE MARKET IN WHICH IT IS PURCHASED OR SOLD AS DEFINED IN THE INPUT WINDOW FOR THE ITEM.

RESULTS FOR SELECTED YEARS

Data may be computed for a *reference year* defined in the PLANNING HORIZON window. In the case of graphical presentation of results it is possible to select a range of years (for the break-even chart, only a single year). Where applicable, the drop-down list boxes at the top of the RANGE modal window for the graph is used to select the year(s).

To display results for selected years in a graph

- Select **Range** from the GRAPHICS menu.
- Chose a drop-down list box and select the year(s) in the list box for which results are to be displayed/printed.

C. FINANCIAL SCHEDULES AND GRAPHS

Unless otherwise indicated, all columns of the schedules represent the values per period (according to the period definitions, see chapter VII.G) expressed in the defined accounting currency unit.

As a general rule, financial data is converted to the accounting currency and unit as follows:

1. The exchange rate between the input currency and local currency is determined for the period taking into account any defined relative inflation between the two currencies (assumes devaluation follows relative inflation).
2. The value of each item except loans specified in foreign currency is determined for each period by taking into account both inflation and price escalation, if specified. This includes the value of fixed assets if both **Inflation** and **Asset revaluation** are activated in the SPECIAL FEATURES modal window.
3. All items except loans specified in foreign currency are converted to local currency at the current exchange rate of input currency to local currency.
4. Calculations are performed in local currency with the exception of debt balance and debt service on loans expressed in foreign currency, which are calculated in the input currency and then converted to local currency at the current exchange rate.
5. All items are converted from local currency to accounting currency at the *initial exchange rate* of accounting currency to local currency.
6. The value in (5) is divided by the specified unit of the accounting currency.

A more detailed description of these rules is contained in chapter XI.A.

Graphs are derived directly from the information in the schedules. The following descriptions of graphs include the line of the schedule from which the graph is derived, the meaning or significance of the information and the types of graphical presentation available.

1. Summary sheet

The Summary sheet (figure 113) displays key data in abbreviated form extracted from other schedules.

Data for the summary sheet is derived from the following sources:

Exchange rate Defines the relation between the reference currency and the accounting currency; taken from the CURRENCY INPUT window

Total investment costs From the *total investment costs schedule* (chapter X.C.2)

Total sources of funds From the *total financial flow schedule* (chapter X.C.5)

Income and costs of operations From the *net income statement schedule* and the *total annual costs of products schedule**. All data are shown for three years: the first year of production, a user-defined reference year and the last year of production (chapter X.C.3 and C.4)

Ratios From *cash flow schedules*, the *net income statement* and the *projected balance sheet* (chapter X.C.6)

1. Summary sheet

Project title: Sahara Textile Mills
 Project description: Financial and economic analysis
 Date and time: 6 August 1995
 Project classification: New project
 Joint-venture project
 Construction phase: 7/2001 - 6/2003
 Length: 2 years
 Production phase: 7/2003 - 6/2013
 Length: 10 periods
 Accounting currency: thousand bolso (tBS)
 Units: Absolute
 Local currency: thousand bolso (tBS)
 Exchange rate: 1.0000 tBS = 1.0000 tBS

	Total construction	Total production	Total investment
Total fixed investment costs	494,000.00	0.00	494,000.00
Total pre-production expenditures	47,578.86	0.00	47,578.86
Pre-production expenditures (net of interest)	5,700.00	0.00	5,700.00
Interest	41,878.86	0.00	41,878.86
Increase in net working capital	75,900.00	225,520.65	301,420.65
TOTAL INVESTMENT COSTS	617,478.86	225,520.65	842,999.50

Yearly results
 Periodical results

OK

Figure 113: Summary sheet

* See chapter X.C.3, *Production costs*

2. Investment costs

The investment is comprised of the assets substantially dedicated to the project over the planning horizon expressed in terms of their financial values (fixed investment, pre-production expenditures and working capital). It comprises the cost of the project and is compared with the net benefits from planned operations to assess the investment project.

FIXED INVESTMENT COSTS

Fixed investments are the physical resources required for constructing and equipping the project. If the technological life of an asset is shorter than the planning horizon, replacement of the asset should be included in the investment plan.

Schedules: Total, foreign/local fixed investment costs

(Schedules X-1/1 and X-1/2) *

Calculation rules:

LINES OF SCHEDULES	
Investment item	<i>According to data entries: land purchase, ..., incorporated fixed assets, contingencies</i>
Total fixed investment	<i>Sum of assets acquired in each period of planning horizon</i>
Foreign share, %	<i>Percentage of total investment of foreign origin; appears only in the Total investment costs schedule</i>
Share of total, %	<i>Percentage of total which is of foreign and local origin, respectively; appears only in foreign and local costs schedules</i>
COLUMNS OF SCHEDULES	
Total construction	<i>The sum of the fixed investment during the construction phase</i>
Total production	<i>The sum of fixed investment during the production phase</i>
Period columns	<i>Results for each period of the project</i>

Chart: Structure of fixed investment costs

Y-axis: *Total fixed investment*
 X-axis: *Years*
 Graph type: *Stacked bars (foreign/local)*
 Source schedule: *Total fixed investment costs*
 Source line: *Total fixed investment*

* The schedule numbers refer to the corresponding schedule in the *Industrial Feasibility Studies Manual*.

Meaning: The value of resources committed substantially for the project life or for the technological life of the resource (whichever is shorter) for each period in the planning horizon, divided into its foreign and local content, is provided. The proportion of foreign content of fixed assets reflects the requirement for foreign currency equity or debt and the effect of the project on the country's balance of payments, and it may relate to the degree of dependency on foreign technology.

PRE-PRODUCTION EXPENDITURES

Pre-production expenditures represent the cost of assets (essentially intangible) acquired or generated prior to commercial production (e.g. preparatory studies, capital-issue expenditures, startup and commissioning expenditures).

Schedules: Total, foreign/local pre-production expenditures

(Schedules X-2/1 and X-2/2)

Calculation rules:

LINES OF SCHEDULES	
Pre-production expenditures	<i>These lines represent the pre-production expenditures if sub-items have been defined in the data input</i>
Pre-production expenditures (net of interest)	<i>The sum of the sub-items defined above</i>
Interest (paid/accrued)	<i>Interest payable and capitalized during the disbursement phase and period of grace (see chapter XI.M)</i>
Total pre-production expenditures	<i>The sum of pre-production expenditures and interest paid/accrued</i>
Foreign share, %	<i>The proportion of the total pre-production expenditures of foreign origin; shown only in the total cost schedule</i>
Share of total, %	<i>Shown only in foreign and local schedules; the proportion of total pre-production expenditures of foreign or local origin respectively</i>
COLUMNS OF SCHEDULES	
Total construction	<i>The sum of pre-production expenditures during the construction phase</i>
Total production	<i>The sum of pre-production expenditures during the production phase</i>
Period columns	<i>Results for each period of the project</i>

Chart: Structure of pre-production expenditures

Y-axis:	<i>Total pre-production expenditures</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local)</i>
Source schedule:	<i>Total pre-production expenditures</i>
Source line:	<i>Total pre-production expenditures</i>

Meaning: The value of organizational, commissioning and start-up expenditures for each period of the planning horizon which are necessary for production are presented in terms of their foreign and local content. These expenditures can generally be depreciated or amortized. The proportion of foreign content of pre-production expenditures reflects the requirement for foreign currency equity or debt and the effect of the project on the country's balance of payments, and it may relate to the degree of dependency on foreign technology.

WORKING CAPITAL

Working capital is used to finance current assets, net of current liabilities, necessary for project operations. It may be prudent to plan to finance a portion of the working capital as part of the initial capital outlay. An increase in working capital is a use of funds (requires financing) and a decrease, a source of funds.

Schedules: Total, foreign/local working capital requirements

(Schedules X-4/1 and X-4/2)

Calculation rules:

LINES OF SCHEDULES	
Total inventory	Σ raw materials.....finished products
Raw materials Factory supplies Utilities Energy Spare parts consumed Work in progress Finished products	<i>Requirements for each subline in accordance with calculation bases (see chapter XI.K)</i>
Accounts receivable	Σ accounts receivable for each defined product
Subline of accounts receivable for each defined product	<i>Requirements for each subline in accordance with calculation bases (see chapter XI.K)</i>
Cash-in-hand	<i>Requirement in accordance with calculation basis (see chapter XI.K)</i>
CURRENT ASSETS	Σ total inventory, accounts receivable, cash-in-hand
CURRENT LIABILITIES	<i>Empty</i>

Accounts payable	Σ accounts payable for each defined product and indirect costs
Subline of accounts payable for each defined product and for indirect costs	Requirements for each subline in accordance with calculation bases (see chapter XI.K)
TOTAL NWC REQUIREMENTS	Current assets less current liabilities
INCREASE IN NWC	$NWC_j - NWC_{j-1}, j = 1, 2, \dots, n$ periods
Foreign share, %	Percentage of total NWC of foreign origin; appears only in the total NWC schedule
Share of total, %	Percentage of total NWC requirement of foreign or local origin respectively. Appears only in foreign and local NWC schedules
COLUMNS OF SCHEDULES	
Coefficient of turnover	Appears only if an Mdc is defined for the item (see chapter XI.K)
Period columns	Results for each project period

In case sub-items (user-defined nodes) were introduced with data entry, sublines are available in the corresponding schedules. Schedule lines for which sublines exist show an Extend Icon. The working capital schedule may contain the following sublines (representing user-defined nodes):

Sublines in the Working capital schedule (extension options)

(a) First user-defined level

Sublines exist only if more than one product has been defined or, in case of one product only, if production cost items have been expanded (e.g. raw material A and raw material B)

Sublines may be found for:

- Raw material in stock
- Factory supplies in stock
- Utilities in stock
- Energy in stock
- Spare parts in stock
- Accounts payable

If more than one product was defined, sublines appear also for:

- Work-in-progress
- Finished products
- Accounts receivable

(b) Second and third user-defined levels

Sublines exist for each product and sub-item originally defined

Chart: Structure of working capital requirements

Y-axis:	<i>Total net working capital requirements</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local)</i>
Source schedule:	<i>Total net working capital requirements</i>
Source line:	<i>Total net working capital requirements</i>

Meaning: Current assets net of current liabilities, adjusted for initial stocks of materials and supplies and divided into foreign and local content, are presented for each project period. These amounts of working capital require financing from internal and/or external sources. The proportion of foreign content reflects the requirement for foreign currency equity or debt and the effect of the project on the country's balance of payments, and it may relate to the degree of dependency on foreign technology and sources of supply.

TOTAL INVESTMENT

Total investment is the sum of fixed investments, pre-production expenditures and net working capital requirements from the previous three schedules. It represents the total value of the resources dedicated to the project over the planning horizon.

Schedules: Total, foreign/local total investment

(Schedules X-6/1 and X-6/2)

Calculation rules:

LINES OF SCHEDULES	
Total fixed investment	<i>From Schedule X-1/1, total fixed investment cost</i>
Total pre-production expenditure	<i>From Schedule X-2/1, total pre-production expenditures</i>
Net of interest	<i>From Schedule X-2/1</i>
Interest accrued	<i>From Schedule X-2/1</i>
Increase in net working capital	<i>The change in working capital from Schedule X-4/1; an increment is a use of funds, a decrement a source of funds</i>
Total investment cost	<i>Sum of total fixed investment, total pre-production expenditures less interest accrued or capitalized, and increase in total net working capital</i>
Foreign share, %	<i>Only in the total investment schedule (X-6/1); the percentage of the total investment of foreign origin</i>
Share of total, %	<i>Only in the foreign/local investment schedules (X-6/2); the percentage of the total investment of foreign/local origin</i>

COLUMNS OF SCHEDULES	
Total construction	<i>Sum of investments during the construction phase</i>
Total production	<i>Sum of investments during the production phase</i>
Period columns	<i>Results for each period of the project</i>

Chart: Structure of total investment

Y-axis:	<i>Total investment cost</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local)</i>
Source schedule:	<i>Total investment costs</i>
Source line:	<i>Total investment costs</i>

Meaning: The total of fixed investment, pre-production expenditures and net working capital requirements (based upon specified days coverage requirements) represents the value of permanent capital resources dedicated to the project in each period of the planning horizon. Short-term capital resources may not be included. The proportion of foreign content reflects the requirement for foreign currency equity or debt and the effect of the project on the country's balance of payments, and it may relate to the degree of dependency on foreign technology and sources of supply.

3. Production costs

All production cost schedules and graphs show the cost of production and marketing occurring in each period (cost accounting). These cost figures usually differ from costs accounted for in the *Net income statements* because in the latter costs of products in stock (not sold) are to be excluded for the computation of the net income per period. The *cost of products produced* (CPP) is also used in calculations of some working capital items.

The *cost of products sold* (CPS), as shown in all *Business results schedules* (e.g. in the *Net income statement*), represents the value of goods and services applicable to the production of project outputs sold in each period and is determined as the sum of *standard production costs* and *annual adjustments* applied to the quantities of products defined in the SALES PROGRAMME window for each period (see chapter XI.J).

Production costs related to changes in inventory of finished goods are included as part of the working capital requirements.

Two groups of schedules and graphs are available for analysis of production costs, the first for *profit centres* (products) and the second for *cost centres* (if **Cost centre** is active). When multiple products are defined, the group of profit centre schedules and graphs include the subgroups *total costs*, *indirect costs*, *direct costs* (for each product) and *cost allocation* when this feature is active. The *cost centre group* includes schedules and graphs for each defined cost centre.

TOTAL COSTS OF PRODUCTS

Schedules: Total, foreign/local, variable/fixed costs of product(s)

(Schedules X-3/1, X-3/2 and X-3/3 total direct and indirect costs)

Calculation rules:

LINES OF SCHEDULES	
Capacity utilization (%)	<i>Percentage of reference capacity if only one product; otherwise empty</i>
Raw materials, ..., Factory overheads	<i>Cost of item for products produced in each production period; sum of standard costs and adjustments (see chapter XI.J)</i>
FACTORY COSTS	<i>Σ raw materials, ..., factory overheads</i>
Administrative overhead	<i>From production cost input data; direct + indirect administrative overheads</i>
OPERATING COST	<i>Factory costs + administrative overheads</i>
Depreciation	<i>Total depreciation of all assets (see chapter VII.N)</i>
Financial costs	<i>Interest + fees + leasing costs</i>
Interest	<i>See chapter XI.M, Financial calculation rules, Finance</i>
Leasing costs	<i>From production costs input data</i>
TOTAL PRODUCTION COSTS	<i>Operating cost + depreciation + financial cost</i>
Direct marketing costs	<i>From production costs input data</i>
Marketing overhead costs	<i>From production costs input data</i>
COSTS OF PRODUCTS	<i>Total production costs + direct marketing costs + marketing overhead costs</i>
Foreign share, %	<i>Percentage of CPP (cost of products produced) of foreign origin (not in foreign or local cost schedules)</i>
Variable share, %	<i>Percentage of CPP which is variable (not in variable or fixed cost schedules)</i>
Share of total, %	<i>Percentage of CPP which is either variable/fixed or foreign/local (not in total annual cost schedule)</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each production period</i>

If only one product is defined, the schedule can be extended to include the sub-items by clicking the Extend Icon at the right of the item.

If more than one product is defined, only the line **financial costs** can be extended as shown above. Otherwise, no extension is possible in these schedules. Only the sums of

the items for all defined products and for indirect costs are displayed/printed. The values for sub-items related to each product can be obtained in the schedules for each product when more than one product is defined. Indirect sub-item values can be in the *Indirect costs schedules*.

Chart: Structure of total costs, total of product(s)

Y-axis:	<i>Costs of products (cost accounting)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (variable/fixed; foreign/local)</i>
Source schedule:	<i>Total costs of products</i>
Source line:	<i>Costs of products</i>

Meaning: The relation of fixed to variable costs is an indicator of profitability risk. High fixed costs tend to reduce the margin of safety with regard to projected sales. The proportion of foreign production costs is a measure of the dependency of the project on foreign sources of supply. Anticipated productivity improvement may be reflected in a reduction of the ratio production costs/revenues over time.

DIRECT COSTS (BY PRODUCT/PROFIT CENTRE)

Direct costs are those costs that are attributable to a particular product as defined in the windows corresponding to PRODUCTION COSTS nodes in the input browser.

In these schedules, which are available for each of the defined products, the structure and calculation rules are similar to those for *total annual costs of product* (schedules X-3/1 to X-3/3).

ONLY DIRECT COSTS ARE INCLUDED; FOR INDIRECT COSTS ALLOCATED TO A PRODUCT, SEE COST ALLOCATION SCHEDULES AND CALCULATION RULES.

The lines for *depreciation* and *financial costs* (interests, fees) and any other items which are indirect by definition are left blank. The description below of the *Direct costs by product schedule* includes only those lines which either differ in content from the schedules for *Total annual costs of product* or which require additional explanation. Schedules can be displayed/printed for *total*, *foreign/local* and *variable/fixed costs*.

Schedules: Direct total, foreign/local, variable/fixed costs of product(s)

(Schedules X-3/1, X-3/2 and X-3/3 direct costs by product)

Calculation rules:

LINES OF SCHEDULES	
Capacity utilization (%)	<i>Percentage of reference capacity (each product)</i>
Raw materials, ..., factory overheads	<i>Direct cost of item for products produced in each production period; sum of direct standard costs and adjustments (see chapter XI.J)</i>

FACTORY COSTS	Σ Raw materials, ..., factory overheads
Administrative costs	Direct administrative costs for the product
OPERATING COSTS	Direct factory cost + direct administrative costs
Depreciation	Empty; indirect costs by definition
Financial costs	This line may contain leasing costs directly attributable to a product
Interest	Empty; interests are indirect costs by definition
Leasing costs	From production costs input data
TOTAL PRODUCTION COSTS	Total of all direct costs defined in a window corresponding to a product node except direct marketing costs
Direct marketing costs	Direct marketing costs defined in window for a product node
COSTS OF PRODUCTS	Total production costs for the product (direct only, including defined factory overheads and administration) + direct marketing costs
Foreign share, %	Percentage of direct cost of product of foreign origin (not in foreign or local cost schedules)
Variable share, %	Percentage of direct costs of product which is variable (not in variable or fixed cost schedules)
Share of total, %	Percentage of direct costs of product which is either variable/fixed or foreign/local (not in total direct production cost schedule)
COLUMNS OF SCHEDULES	
Period columns	Results for each production period

Chart: Structure of direct costs by products

Y-axis: Direct costs of product
X-axis: Years
Graph type: Stacked bars (variable/fixed; foreign/local)
Source schedule: Direct costs of product
Source line: Costs of products

Meaning: The distribution of direct costs among the various products (profit centres) allows to assess and optimize the production and sales programme.

INDIRECT COSTS

Indirect costs are those not directly attributable or not attributed to a particular product. They derive from two sources, those defined in the INDIRECT COSTS node of the PRODUCTION COSTS data structure (only when more than one product is defined) and those that are inherently indirect costs such as depreciation and interest.

In these schedules the structure and calculation rules are similar those for **Total costs of product** (schedules X-3/1 to X-3/3). Only indirect costs are included. Lines which contain only direct costs by definition are left blank. The description below of the schedule of indirect costs includes only those lines which either differ in content from the schedules for *total annual costs of product* or which require additional explanation. Schedules can be displayed/printed for **total, foreign/local and variable/fixed costs**.

Schedules: Indirect total, foreign/local, variable/fixed costs

(Schedules X-3/1, X-3/2 and X-3/3 indirect costs)

Calculation rules:

LINES OF SCHEDULES	
Capacity utilization	<i>Empty</i>
OPERATING COSTS	<i>Factory costs (net of direct costs) + indirect administrative overhead costs</i>
TOTAL PRODUCTION COSTS	<i>Operating costs (net of direct costs) + depreciation + financial costs (interests, fees) + indirect leasing costs</i>
Marketing overhead costs	<i>Defined in indirect costs node of the production cost structure</i>
COSTS OF PRODUCTS	<i>Total production costs (net of direct costs) + marketing overhead costs</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each production period</i>

Chart: Structure of indirect costs of products

Y-axis:	<i>Indirect costs of product</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (variable/fixed; foreign/local)</i>
Source schedule:	<i>Indirect costs</i>
Source line:	<i>Costs of products</i>

Meaning: The analysis of the composition of indirect costs can be particularly useful in the analysis of an expansion/rehabilitation project where existing operational data are available to corroborate, or to compare with, the planned cost distribution.

COST ALLOCATION

If **Cost allocation** is activated in the SPECIAL FEATURES modal window of PROJECT IDENTIFICATION and more than one product is defined, schedules and graphs are available for each defined product.

In these schedules the structure and calculation rules are identical to those for *total annual costs of product* (schedules X-3/1 to X-3/3) except that the cost items include the sum of any *direct costs* defined for each product and an allocation of *indirect costs* in accordance with the allocation key selected for each item.

Schedules can be displayed/printed for *total, foreign/local* and *variable/fixed costs*.

Schedules: Total, foreign/local, variable/fixed costs by product

(Schedules X-3/1, X-3/2 and X-3/3 direct and indirect costs by product)

Lines of schedules and columns of schedules:

See the line and column descriptions for TOTAL COSTS OF PRODUCT.

Chart: Structure of allocated costs, by product

Y-axis:	<i>Costs of product</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (variable/fixed; foreign/local)</i>
Source schedule:	<i>Costs by product</i>
Source line:	<i>Costs of product</i>

Meaning: The total cost of production for each defined product, including allocated indirect costs, can be useful in decisions regarding product mix. Such decisions should take into account the effect of re-allocating indirect costs to other products when one of them is removed from the production plan. The foreign/local proportions indicate the product's dependency on foreign sources of supply. The relation of fixed to variable costs is an indicator of profitability risk. High fixed costs tend to reduce the margin of safety with regard to projected sales. Anticipated productivity improvement may be reflected in a reduction of the ratio production costs/revenues over time.

COST CENTRE GROUPS AND COST CENTRES

Cost centre schedules and graphs provide information concerning the distribution of costs among the various operational subdivisions of the project as defined in the COST CENTRE STRUCTURE. Direct and indirect costs are assigned to the defined cost centres. Allowances, however, are not assigned.

Two groups of cost centre schedules and graphs are available. One type of schedule provides costs for a user-defined **selected year** (or period) in the production phase; the other provides the total costs for **all years** of the production phase.

In the event that some operating cost is not assigned by the user to one of the defined cost centres, the item is automatically assigned to the standard cost centre group Production.

These schedules are displayed/printed only if **Cost centre analysis** is activated.

The six **Standard cost centres** (representing six cost centre groups if divided further) offered by COMFAR may be divided into cost centre units or into cost centre subgroups and further into units. In case two levels are defined, the following terminology is used to distinguish between the different levels:

Cost centre group (CCG):	Each of the six standard cost centres
Cost centre unit (CCU):	Each unit defined by the user within a CCG

In case three levels are defined:

Cost centre group (CCG):	Each of the six standard cost centres
Cost centre subgroup (CCSG):	Each unit defined by the user within a CCG
Cost centre unit (CCU):	Each unit defined by the user within a CCSG

A CCG comprises the CCUs or CCSGs as defined by the user within a particular CCG. (The standard cost centres are: production, storage, environment, marketing, services, administration.) Results from all of the subunits of a CCSG or a CCG are combined in the parent node (represented by a node of the input browser). Results are available for the parent and optionally for each of the subunits.

For cost centre analysis, schedules are available for a selected year and for all years of the production phase. These schedules are displayed/printed only if **Cost centre analysis** was activated in the **Data Input** module.

In a schedule line, an Extend Icon appears at the right of a CCG or CCSG if two or more subunits have been defined (figure 114). It offers the opportunity to extend in these schedules the number of result lines to display/print for such units. When the Extend Icon is clicked it converts to the Compress Icon. A line is created for each defined subunit, i.e. for a CCU or CCSG of a CCG or a CCU of a CCSG, and the values for the corresponding subunits are displayed in each column of the schedule.

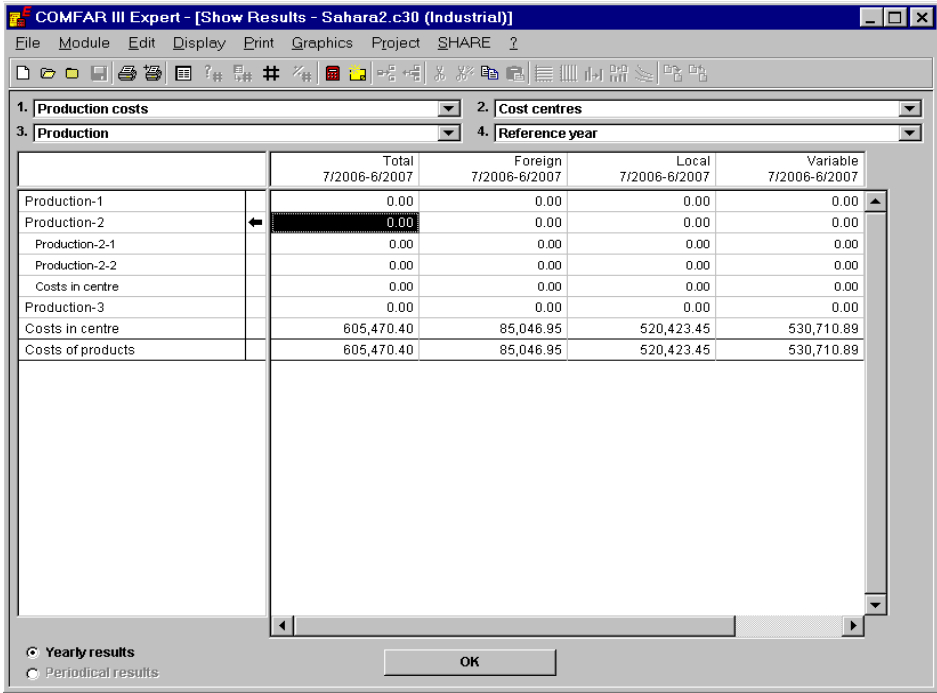


Figure 114: Use of the extend icon for subunits

Schedule: Cost centre costs for a reference year

This schedule provides the results for the *reference year* within the production phase defined in the data input module.

Calculation rules:

LINES OF SCHEDULE	
Production, ..., administration (CCGs)	<i>Sum of all cost items (direct and indirect) which have been assigned to each of the standard cost centres or cost centre groups during the selected year. No sub-lines are available for print/display</i>
COSTS OF PRODUCTS	<i>Sum of costs for the selected year for all standard cost centres or cost centre groups, e.g., production, ..., administration</i>
COLUMNS OF SCHEDULE	
Total	<i>Total costs for the selected year</i>
Foreign	<i>Foreign costs for the selected year</i>
Local	<i>Local costs for the selected year</i>
Variable	<i>Variable costs for the selected year</i>
Fixed	<i>Fixed costs for the selected year</i>

**Schedules: Cost centre costs for all years -
total, foreign/local, variable/fixed costs**

These results are presented on a yearly basis over the entire production phase. Schedules offered are *total, foreign/local* and *variable/fixed costs*.

Calculation rules:

LINES OF SCHEDULES	
Production, ..., administration	<i>Sum of cost items (direct and indirect) which have been assigned to each listed cost centre or cost centre group. No sublines are available for print/display</i>
COSTS OF PRODUCTS	<i>Sum of cost items for all cost centres or cost centre groups, e.g., production, ..., administration</i>
Foreign share, %	<i>Percentage of costs of products of foreign origin. Appears only in total and variable/fixed costs schedules</i>
Variable share, %	<i>Percentage of costs of products which are variable. Appears only in total and foreign/local schedules</i>
Share of total, %	<i>Appears in foreign/local and variable/fixed costs schedules. Percentage of costs of products which are respectively foreign, local, variable, fixed</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each production period</i>

Chart: Structure of total costs by cost centres

Y-axis:	<i>Costs of products</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (production, ..., administration)</i>
Source schedule:	<i>Total cost centre costs for all years</i>
Source line:	<i>Production, ..., administration</i>

Meaning: The distribution of costs among the various operational subdivisions is useful for organizational design of a new project and can be particularly useful in the analysis of an expansion/rehabilitation project where existing operational data are available to corroborate, or to compare with, the planned cost distribution.

Schedule: Costs by cost centre for a reference year

These schedules provide the results for the reference year within the production phase defined in the data input module.

Calculation rules:

LINES OF SCHEDULE	
Cost centre group structure	<i>Sum of all cost items (direct and indirect) which have been assigned to each cost centre unit of the group during the selected year. Costs assigned directly to a cost centre group are included in a separate line</i>
COSTS OF PRODUCTS	<i>Sum of costs for the selected year for all cost centre units of the group plus costs assigned directly to a cost centre group.</i>
COLUMNS OF SCHEDULE	
Total	<i>Total costs for the selected year</i>
Foreign	<i>Foreign costs for the selected year</i>
Local	<i>Local costs for the selected year</i>
Variable	<i>Variable costs for the selected year</i>
Fixed	<i>Fixed costs for the selected year</i>

**Schedules: Costs by standard cost centre for all years -
total, foreign/local, variable/fixed costs**

These results are presented on a yearly basis over the entire production phase. Schedules offered are total, foreign/local and variable/fixed.

Calculation rules:

LINES OF SCHEDULES	
Cost centre group structure	<i>Sum of all cost items (direct and indirect) which have been assigned to each cost centre unit of the group. Costs assigned directly to a cost centre group are included in a separate line</i>
COSTS OF PRODUCTS	<i>Sum of costs for all cost centre units of the group plus costs assigned directly to a cost centre group</i>
Foreign share, %	<i>Percentage of production costs of foreign origin; appears only in total and variable/fixed schedules</i>
Variable share, %	<i>Percentage of production costs which are variable; appears only in total and foreign/local schedules</i>
Share of total, %	<i>Percentage of annual costs (foreign/local, variable/fixed) of CCG; appears only in foreign/local and variable/fixed schedules</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each production period</i>

Chart: Structure of total costs by standard cost centres - foreign/local, variable/fixed costs by centre

The graph presents the composition of costs by cost centres within each group for each year of the production phase.

Y-axis:	<i>Costs of products</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (variable/fixed; foreign/local)</i>
Source schedule:	<i>Cost by standard cost centre for all years</i>
Source line:	<i>Costs of product</i>

Meaning: The distribution of costs among the various operational subdivisions of the project is useful for organizational design and related resource mobilization planning for a new project and can be particularly useful in the analysis of an expansion/rehabilitation project where existing operational data are available to corroborate, or to compare with, the planned cost distribution.

4. Production and sales programme

The quantity of units projected to be sold in each year of production is defined. The sales programme is the basis for costs in each production period included in the *Net income statement*. The production programme is determined from projected sales, taking into account inventory changes of finished products (see chapter VII.P).

It is possible to display and print schedules for each defined product and also for the combination of all products.

TOTAL, FOREIGN/LOCAL SALES

This group of schedules provides the total annual sales results for all products. They are available only if more than one product is defined. Schedules are available for total and foreign/local sales.

Schedules: Total, foreign/local sales

Calculation rules:

LINES OF SCHEDULES	
GROSS SALES REVENUE	<i>Sum of gross sales revenue for each product (sales revenue + sales tax)</i>
Sales tax	<i>Sum of sales tax for each product</i>
NET SALES REVENUE	<i>Gross sales revenue less sales tax</i>
Subsidy	<i>Sum of subsidy from each product</i>
SALES REVENUE	<i>Net sales revenue + subsidy</i>
Foreign share, %	<i>Only in total sales schedule. Percentage of sales revenues for exports</i>

Share of total, %	<i>Only in foreign/local sales schedules. Percentage of sales revenue from foreign/local markets</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each production period</i>

Chart: Share of products sales, selected year(s) (two charts)

A. Pie chart

Dependent variable: *Sales revenue for product*
 Number of pies: *Number of years selected*
 Graph type: *Pie*
 Source schedule: *Production and sales programme for each product*
 Pie segments: *Percentage of sales revenue for each product*

B. Bar chart

Y-axis: *Percentage of sales revenue for each product*
 X-axis: *Years*
 Graph type: *Stacked bars*
 Source schedule: *Production and sales programme for each product*
 Source line: *Sales revenue for product*

Meaning: The proportion of revenues generated by each product is an indicator of its relative significance to the project. However, the profitability and other non-financial aspects of each product should also be considered when making product mix decisions.

Chart: Structure of total sales, local markets and exports

Y-axis: *Sales revenue*
 X-axis: *Years*
 Graph type: *Stacked bars (foreign/local)*
 Source schedule: *Production and sales programme*
 Source line: *Sales revenue*

Meaning: The sales revenue for all products over time reflects the overall (for multiple products) anticipated rate of market penetration and capture of market share. During the start-up phase an additional constraint may be production efficiency. The foreign currency share of revenues is an indicator of the effect of the project on the balance of payments.

Schedules: Annual sales by product, total, foreign/local sales

This group of schedules is available for a single product or for each product when more than one product is defined. The schedules are available for total and foreign/local sales.

Calculation rules:

LINES OF SCHEDULES	
Stock brought forward	<i>For new projects, the stock of finished products b/f from the previous period. For expansion/rehabilitation a starting balance is defined: the larger of required inventory or the amount of the unconsumed starting balance at the end of the previous period (see chapter XI.K and L).</i>
Quantity produced	<i>Quantity sold + stock carried over – stock brought forward (see chapter XI.K)</i>
Stock carried over	<i>For new projects the inventory requirement of finished goods for current period. For expansion/rehabilitation a starting balance is defined: the larger of the current period's finished products inventory requirement or the unconsumed starting balance (see chapter XI.K and L).</i>
Quantity sold	<i>As specified in the input data for each product</i>
Average gross unit price *	<i>Weighted average of unit prices (including sales taxes) for all sub-products or markets for a given product in each period</i>
GROSS SALES REVENUE	<i>Quantity sold × average gross unit price</i>
Sales tax	<i>Sales tax (%) divided by (quantity × price × 100)</i>
NET SALES REVENUE	<i>Gross sales revenue less sales tax</i>
Subsidy	<i>Quantity × price × subsidy (%) divided by 100 + subsidy in absolute terms</i>
SALES REVENUE	<i>Net sales revenue + subsidy</i>
Foreign share, %	<i>Only in total sales schedule. Percentage of sales revenues from exports</i>
Share of total, %	<i>Only in foreign/local sales schedules. Percentage of sales revenues from foreign/local markets</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each production period</i>

* Can be extended with the Extend Icon to sublines **net unit price** and **sales tax** if sales taxes are defined in data input.

Chart: Structure of total sales by product

Y-axis:	<i>Sales revenue</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local)</i>
Source schedule:	<i>Sales and production programme</i>
Source line:	<i>Sales revenue</i>

Meaning: The sales revenue for each product over time reflects the anticipated rate of market penetration and capture of market share. During the startup phase an additional constraint may be production efficiency. The proportion of foreign exchange earnings is an indicator of the effect of product sales on the balance of payments.

5. Sources of finance

Financial schedules describe the financial flows related to the acquisition of resources required to implement and operate the project. They provide a summary of all the financial disbursements (positive values) and repayments (negative values) that are either defined or calculated.

FINANCIAL FLOW

Financial flows include all disbursements and repayments relating to external sources of finance. Internally generated funds are included in the cash flow schedules.

Equity capital may include equity automatically defined by COMFAR to cover deficits during the construction phase. **Bank overdraft** may include amounts defined automatically by COMFAR to cover cumulative cash deficits during the production phase (see chapter XI.N).

Schedules: Financial flow, total, foreign/local flow

(Schedules X-7/2 and X-7/3)

Calculation rules:

LINES OF SCHEDULES	
Total equity capital	Σ <i>sublines: ordinary capital, ..., subsidies + automatic equity defined by COMFAR (see above)</i>
Ordinary capital	Σ <i>value of all ordinary capital shares defined in input data (no preferred dividends defined)</i>
Preference capital	Σ <i>value of all preference capital shares defined in input data (shares for which preferred dividends are specified)</i>
Subsidies, grants	Σ <i>value of defined capital subsidies (sources of finance - equity/risk capital - subsidies, grants)</i>
Automatic equity	<i>Increases automatically to cover cash deficits occurring during the construction phase only; disappears when deficits covered by defined sources of finance</i>

Total long-term loans	Σ value of defined loan disbursements – principal repayments
TOTAL LONG-TERM FINANCE	Σ Equity capital and long-term loans
Total short-term finance	Total short-term loans + accounts payable + automatic bank overdraft
Total short-term loans	Σ defined short-term loan disbursements – principal repayments
Accounts payable	Increment/decrement of accounts payable in each period
Automatic bank overdraft	Increases automatically to cover cumulative cash deficits occurring during the production phase only; repaid automatically from surplus cash; disappears when deficits are covered by defined sources of finance
TOTAL FINANCIAL FLOW	Total long-term finance + short-term finance
Foreign share, %	Percentage of total financial flow in foreign currency; in total flow schedule only
Share of total, %	Percentage of total financial flow in foreign/local currency; in foreign/local flow schedules only
COLUMNS OF SCHEDULES	
Total disbursement	Σ disbursements for all periods of the project
Period columns	Results for each period of project

Chart: Structure of financial flow (two charts) - total, foreign/local; equity/long-term loans and short-term finance

Y-axis:	Total financial flow
X-axis:	Years
Graph type:	Stacked bars (foreign/local flow; equity/long-term loans/short-term finance)
Source schedule:	Flow of financial resources
Source line:	Total, foreign/local financial flow; total equity capital, total long-term loans and total short-term finance

Meaning: Annual flows of financial resources are comprised of all sources external to the project. A high proportion of debt in relation to equity financing is an indicator of risk for both equity and loan capital. The variations of these proportions over time indicates the degree of financial vulnerability in each project stage. The proportion of foreign currency financing may indicate the degree of dependency on imported technology. If provided from local reserves, the allocation to this project may require authorization from the central bank.

TOTAL DEBT AND DEBT SERVICE

These schedules provide a summary of the *disbursements, repayments, debt balances, interests* and *fees* attributable to all the defined long-, medium- and short-term loans.

Sub-items can be displayed/printed only in the **other financial costs** lines for each applicable type of fee.

Schedules: Total debt service; total, foreign/local

(Schedules X-7/4 and X-7/5)

Calculation rules:

	LINES OF SCHEDULES
Total long-term loans	<i>Empty</i>
Disbursements	Σ all defined long-term loan disbursements for period
Repayments	Σ all repayments on long-term loans for period
Debt balance at end of year	<i>Disbursements less repayments up to and including period</i>
Exchange rate adjustments*	<i>Debt balance adjustment + repayment adjustment</i>
Capitalized interest**	Σ capitalized interest on long-term loans for period
Interest payable**	Σ interest payable on long-term loans for period (not capitalized)
Other financial costs**	Σ all fees payable on long-term loans for period
Total short-term loans	<i>Empty</i>
Disbursements	Σ all defined short-term loan disbursements for period
Repayments*	Σ all repayments on short-term loans for period
Debt balance at end of year	<i>Disbursements less repayments up to and including period</i>

* Repayments of principal and debt balance on loans denominated in foreign currency are affected by relative inflation/revaluation between the local and foreign currencies (see chapter XI.M.2). The sum of these impacts is included in the *Balance sheet* in either of the lines Exchange rate gains or Exchange rate losses.

Repayments: The exchange rate gain/loss in each period is the difference between the repayment at the defined and current exchange rates. The cumulative amount of these differences is one component of the exchange rate adjustment.

Debt balance: The exchange rate gain/loss is the difference between the debt balance at the defined exchange rate and the current exchange rate.

** Interest and fees (financial costs) are affected by relative inflation between the local and foreign currencies (see chapter XI.M.2). The exchange rate gain/loss is included in the Less financial costs line in the *Net income statement*. It is the difference between the financial costs at the defined exchange rate and the current exchange rate.

Exchange rate adjustment *	<i>Debt balance adjustment + repayment adjustment</i>
Capitalized interest **	<i>Σ capitalized interest on short-term loans for period</i>
Interest payable **	<i>Σ interest payable on short-term loans for period</i>
Other financial costs **	<i>Σ all fees payable on short-term loans for period</i>
TOTAL DEBT SERVICE	<i>Each line is the sum of the respective lines from long-term loans and short-term finance above</i>
COLUMNS OF SCHEDULES	
Total disbursement	<i>Total for all periods of project; empty for debt balance line</i>
Period columns	<i>Results for each period of the project</i>

**Chart: Total debt balance (two charts) -
total, foreign/local; long-term and short-term-loan**

Y-axis:	<i>Total debt</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local; long-term/short-term)</i>
Source schedule:	<i>Total debt balance</i>
Source line:	<i>Total, foreign/local; long-term and short-term loans</i>

Meaning: The structure of the total debt should correspond to the structure of the assets of the project (fixed assets financed with long-term finance - equity and long-term loans - and current assets with short-term debt). The proportion of foreign debt indicates the need for generating or otherwise securing foreign exchange to satisfy debt service requirements.

* See p. 263

** See p. 263

DEBT AND DEBT SERVICE, BY LOAN

This group of schedules provides information concerning debt service for each loan defined in the input data. The information is displayed/printed in either a foreign or local schedule depending on the origin of the loan.

Fees related to a particular loan may have an origin (foreign or local) which differs from the loan principal. For example, a foreign loan may involve payment of local fees. Both the debt service and fees (other financial costs) are shown in the section of the schedule pertaining to the loan. In the *Flow of funds schedules*, however, the local and foreign transactions are included in the appropriate schedule according to origin.

Each foreign or local loan is described by the seven lines shown in the following calculation rules table. If more than one loan is defined, additional lines are displayed/printed containing the sum of these items for all loans.

Sub-items can be displayed/printed only in the *other financial costs* lines for each applicable type of fee.

Schedules: Debt service, foreign/local loans

(Schedule X-7/6)

Calculation rules:

LINES OF SCHEDULES	
Name of loan (loan #)	<i>Empty</i>
Disbursements	<i>Disbursements defined for loan #</i>
Repayments	<i>Repayments defined for loan #</i>
Debt balance at end of period	<i>Cumulative disbursements less cumulative repayments up to and including period</i>
Exchange rate adjustments	<i>Debt balance adjustment + repayment adjustment</i>
Capitalized interest	<i>Capitalized interest on loan # for period</i>
Interest payable	<i>Interest payable on loan # for period</i>
Other financial costs	<i>Σ all fees payable on loan # for period</i>
TOTAL DEBT SERVICE	<i>Empty if only one loan is defined; a line corresponding to each of the above lines is displayed/printed if more than one loan is defined which is the sum of the respective lines for all loans</i>
COLUMNS OF SCHEDULES	
Total (disbursement)	<i>Total for respective lines; empty for debt balance</i>
Period columns	<i>Results for each period of project; inflation not applied to sources of finance</i>

6. Business results

This series of schedules describe the pro-forma financial results of the project. The schedules and graphs provide information concerning the estimated performance indicators to be measured against criteria applicable to the project.

CASH FLOW FOR FINANCIAL PLANNING

These schedules describe the sources and uses of funds for each period of the project. Negative cumulative cash balances may indicate underfinancing of the project.

Schedules: Cash flow for financial planning - total, foreign/local

(Schedules X-8/1 and X-8/2)

Calculation rules:

LINES OF SCHEDULES	
TOTAL CASH INFLOW	Σ inflow funds, ..., other income
Inflow funds	Σ total equity, ..., total short-term finance
Total equity	Total paid-in equity (equity capital + subsidies) but excluding any automatic equity generated by the system in case of cash deficit during construction phase (see chapter XI.N)
Total long-term loans	Total long-term loans disbursed: defined disbursements + capitalized interest
Total short-term finance	Total disbursement of short-term loans (from total debt service schedule) + capitalized interest + increment of accounts payable (from net working capital requirements schedule) but excluding possible automatic overdraft generated by the system in case of cash deficit (see chapter XI.N) in current liabilities.
Inflow operation	Σ sales revenue....Interest on short-term deposits
Sales revenue	Sales revenue from production and sales schedules
Interest on short-term deposits	Income from interest on short-term deposits (see chapter XI.O)
Other income	Income from sale of fixed assets (see chapter XI.I)
TOTAL CASH OUTFLOW	Σ increase in fixed assets, ..., equity capital refund
Increase in fixed assets	Σ Fixed investments and pre-production expenditures (net of interest payable)
Fixed investments	Total fixed investment; from the total investment costs schedule
Pre-production expenditures	Total pre-production expenditures - net of interest; from the total investment cost schedule

Increase in current assets	<p>Change of current assets from the total net working capital requirements schedule, defined as:</p> $CCA_j = CA_j - CA_{j-1}$ <p>CCA_j Change current assets, period j CA_j Current assets, period j j j = 1, 2, ..., n project periods</p>
Operating costs	Operating costs; from total annual costs of products schedule (CPS)
Marketing costs	Direct marketing costs + marketing overhead costs; from total annual costs of products schedule (CPS)
Corporate tax paid	Income tax paid in period (see chapter XI.P)
Financial costs	Interest payable + capitalized interest + other financial costs; from total debt service schedule
Loan repayments	Total loan repayments (from total debt service schedule) + decrement of accounts payable (from net working capital requirements schedule)
Dividends paid	Dividends paid to shareholders (see chapter XI.Q)
Equity capital refund	Refunded (paid out) equity capital; from total financial flow schedule
SURPLUS (DEFICIT)	Total cash inflow less total cash outflow
CUMULATIVE CASH BALANCE	<p>Cumulative value from SURPLUS (DEFICIT) line up to and including period:</p> $CB_j = \sum_{i=1}^j SD_i$ <p>CB_j Cumulative cash balance, period j SD_i Surplus (deficit) period i j j = 1, 2, ..., n project periods + 1</p>
Foreign surplus (deficit)	Surplus (deficit) in foreign exchange (from foreign schedule); displayed/printed only in total cash flow schedule
Local surplus (deficit)	Surplus (deficit) in local currency (from local cash flow schedule); displayed/printed only in the total cash flow schedule
Foreign cumulative cash balance	Cumulative foreign currency balance (from foreign cash flow schedule); Displayed/printed only in the total cash flow schedule
Local cumulative cash balance	Cumulative local currency balance (from local cash flow schedule); Displayed/printed only in the total cash flow schedule

Net flow of funds	<i>Inflow of funds - financial costs - loan repayment - dividends - equity capital refund</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each project period</i>

Chart: Cash flow for financial planning, periodical flow - total, foreign/local flow

Y-axis:	<i>Cash surplus/deficit</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars + lines</i>
Source schedule:	<i>Cash flow for financial planning</i>
Source line:	<i>Foreign/local surplus/deficit</i>

Meaning: The annual cash flow is the surplus or deficit resulting from all sources and uses of funds for the project. A surplus indicates the amounts available for future applications, either internal or external to the project. A deficit in any period indicates the amount that must be covered by accumulated available funds or other external sources. The foreign and local surpluses or deficits provide the same type of information which is useful both for planning the acquisition of financial resources necessary to meet project requirements and also as an indication of the quantity and type of financial resources available for internal or external applications.

Chart: Cash flow for financial planning, accumulated flow - total, foreign/local flow

Y-axis:	<i>Cash surplus/deficit</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars, accumulated inflows and outflows Line, cumulative cash balance (Overlay feature)</i>
Source schedule:	<i>Cash flow for financial planning</i>
Source line:	<i>Foreign/local cumulative cash balance</i>

Meaning: The **cumulative cash flow** is an indicator of the adequacy of the financial plan. A cumulative deficit may signal a potential liquidity problem and that additional sources of finance may be necessary. Where the local currency is not readily convertible, even in the absence of an overall cumulative deficit, a cumulative foreign deficit indicates the possibility that sources of foreign currency other than those already identified in the financial plan may be required.

Chart: Total sales and production costs - total, foreign/local items

Y-axis:	<i>Sales revenues and total costs of products produced (expenditures, depreciation and financial charges)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local)</i>
Source schedule:	<i>Sales revenues; production costs</i>
Source line:	<i>Sales revenues; production costs</i>

Meaning: The relationship between sales and production plus marketing costs indicates the efficiency with which the production resources generate revenues. It focuses on the

ability of the project to convert sales to profits after taking into account all operating expenses and can be compared with the performance of similar enterprises and industrial sectors.

Chart: Net flow of funds - total, foreign/local flow

Y-axis:	<i>Net flow of funds</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars (foreign/local), line</i>
Source schedule:	<i>Cash flow for financial planning</i>
Source line:	<i>Net flow of funds</i>

Meaning: The financial flows indicate the amount and timing of financial resources provided to the project and of financial obligations over the planning horizon. It is useful for planning financial activities: securing financial resources and meeting financial obligations. The proportion of foreign exchange flows may indicate the degree of reliance upon foreign capital or technology.

DISCOUNTED CASH FLOW - TOTAL CAPITAL INVESTED

This schedule provides information concerning performance indicators related to the total investment, i.e. how efficiently the assets dedicated to the project are applied in the project under consideration. Generally the performance indicators are measured against criteria appropriate to the particular business sector or the economy as a whole.

The essential technical difference between the information in this schedule and the *Cash flow for financial planning schedule* is that the financial flows (financial sources, debt service, dividends) are eliminated as they are not relevant to this analysis. This is essentially an analysis of the flow of real resources (as opposed to financial resources), real assets dedicated to the project and the net production of goods and services by the project.

Schedule: Discounted cash flow - total capital invested

(Schedule X-9/1)

Calculation rules:

LINES OF SCHEDULE	
TOTAL CASH INFLOW	<i>Inflow operation + other income</i>
Inflow operation	<i>Sales revenue + income from short-term deposits</i>
Sales revenue	<i>Sales revenue from production and sales programme schedule</i>
Income from short-term deposits	<i>Interest income on short-term deposits (see chapter XI.O)</i>
Other income	<i>Income from sale of assets (see chapter XI.I)</i>
TOTAL CASH OUTFLOW	<i>Σ increase in fixed assets, ..., corporate tax paid</i>

Increase in fixed assets	<i>Fixed investment + pre-production expenditures (net of interest)</i>
Fixed investment	<i>Total fixed investment from the total investment costs schedule</i>
Pre-production expenditures	<i>Pre-production expenditures, net of interest; from total investment costs schedule</i>
Increase in net working capital	<i>From the total net working capital requirements schedule</i>
Operating costs	<i>From the total annual costs of products schedule (CPS)</i>
Marketing costs	<i>Direct marketing costs + marketing overhead costs from the total annual costs of products schedule (CPS)</i>
Corporate tax paid	<i>Tax on gross profit from operations less allowances (see net income statement schedule and chapter XI.P)</i>
NET CASH FLOW	<i>Total cash inflow less total cash outflow</i>
CUMULATIVE NET CASH FLOW	<p><i>Cumulative values from the net cash flow line up to and including a period j:</i></p> $CNC_j = \sum_{i=1}^j NCF_i$ <p>CNC_j <i>Cumulative net cash flow to period j,</i> <i>j = 1, 2, ..., n</i> NCF_i <i>Net cash flow, period i</i> n <i>Number of project periods + 1 (salvage recovery period)</i></p>
Net present value	<i>Present value of the net cash flow for period (see chapter XI.E)</i>
Cumulative net present value	<p><i>Cumulative value of the net present value line up to and including period j:</i></p> $CNPV_j = \sum_{i=1}^j NPV_i$ <p>$CNPV_j$ <i>Cumulative net present value to period j,</i> <i>j=1, 2, ..., n</i> NPV_i <i>Net present value, period i</i> n <i>Number of project periods + 1 (salvage recovery period)</i></p>
NET PRESENT VALUE (NPV) AT i%	<i>Single net present value of complete project in period n; same as the cumulative net present value in period n</i>

INTERNAL RATE OF RETURN (IRR)	<i>Single value of IRR (see chapter XI.E)</i>
MODIFIED INTERNAL RATE OF RETURN (MIRR)	<i>Single value of MIRR (see chapter XI.E)</i>
NORMAL PAYBACK PERIOD	<i>Duration of normal payback period and date corresponding to first year in which the cumulative net cash flow becomes positive</i>
DYNAMIC PAYBACK PERIOD	<i>Duration of dynamic payback period and date corresponding to first year in which the cumulative net present value becomes positive</i>
NET PRESENT VALUE RATIO (NPVR)	<p><i>Ratio of NPV to the present value (PVI) of investment or NPV generated by project per unit of investment:</i></p> $NPVR = \frac{NPV}{PVI}$ $PVI = \sum_{j=1}^n PV(I_j)$ $I_j = FI_j + PPN_j + IWC_j$ <p><i>FI_j Fixed investment, period j</i> <i>PPN_j Pre-production expenditures, period j</i> <i>IWC_j Increment of net working capital, period j</i> <i>I_j Total investment, period j</i> <i>n Number of project periods + 1 (salvage recovery)</i></p>
COLUMNS OF SCHEDULE	
Period columns	<i>Results for each period of project</i>

Chart: Net present value (NPV) - total capital invested

- Y-axis: *Net present value of net cash flow - total capital invested*
- X-axis: *Discount rate*
- Graph type: *Line*
- Source schedule: *Discounted cash flow - total capital invested*
- Source line: *Net cash flow (discounted)*

Meaning: Net benefits (net value of goods and services produced) and costs (the value of the resources committed to the project) are discounted at various rates to determine the net present value of the project. A non-negative net present value at a discount rate equal to opportunity cost of the capital required to finance the project indicates that the project is acceptable from this point of view.

A discount rate for which the present values of benefits and costs are equal (i.e. the NPV = 0) is an internal rate of return (IRR), a rate at which the assets dedicated to the project generate net benefits. This rate can be compared with the return on alternative investment opportunities.

Chart: Sensitivity of the internal rate of return (IRR)

Y-axis:	<i>Sensitivity of IRR</i>
X-axis:	<i>Parameter deviation, %</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Discounted cash flow - total capital invested</i>
Source line:	<i>Net cash flow</i>

Meaning: When key parameters of the project are varied, the change in the IRR indicates the sensitivity of this performance indicator to the parameter. A parameter to which the project is sensitive shows a relatively large percentage change in IRR for a given percent change in the parameter compared with changes for other parameters. Parameters to which the project has greatest sensitivity should be investigated rigorously.

This information is only indicative as it does not include interactions with other parameters; true sensitivity to a parameter variation should be examined using the **Sensitivity** module of the MODULE menu.

Chart: Normal payback

Y-axis:	<i>Cumulative net cash flow</i>
X-axis:	<i>Year</i>
Graph type:	<i>Bar</i>
Source schedule:	<i>Discounted cash flow - total capital invested</i>
Source line:	<i>Cumulative net cash flow</i>

Meaning: The chart indicates in which period the total investment is recovered, without taking into consideration the time-value of money (undiscounted results).

Chart: Dynamic payback

Y-axis:	<i>Cumulative net present value</i>
X-axis:	<i>Year</i>
Graph type:	<i>Bar</i>
Source schedule:	<i>Discounted cash flow - total capital invested</i>
Source line:	<i>Cumulative net present value</i>

Meaning: The chart indicates in which period the total investment is recovered, taking into consideration the time-value of money (discounted results).

DISCOUNTED RETURN ON TOTAL EQUITY

This schedule provides information concerning the return on equity contributed to the project by the investors. All financial transactions are relevant to this analysis as they have a bearing on the financial leverage for the investors. For equity as a whole, dividends paid out are considered part of the cash generated by the operations of the project (dividend payments are added back to the **cash flow for financial planning** so that the project is credited with their generation). From the point of view of the investors as a group, the equity capital contributions in each project period are outflows.

Financial performance indicators should be measured against alternative investment opportunities available to the various parties involved in the decision process: investors, financial institutions, government etc.

Schedule: Discounted cash flow - total equity capital invested

(Schedule X-9/2)

Calculation rules:

LINES OF SCHEDULE	
TOTAL CASH INFLOW	<i>Cash surplus (deficit) + dividends paid + equity capital refund</i>
Cash surplus (deficit)	<i>Surplus (deficit) from the cash flow for financial planning schedule</i>
Dividends paid	<i>Dividends paid to shareholders from the cash flow for financial planning schedule</i>
Equity capital refund	<i>Paid out (refunded) equity capital from the total financial flow schedule</i>
TOTAL CASH OUTFLOW	<i>Includes only equity capital paid (net of subsidies)</i>
Equity capital paid (net of subsidies)	<i>Ordinary capital + preference capital from the total financial flow schedule</i>
NET CASH RETURN	<i>Total cash inflow less total cash outflow</i>
CUMULATIVE NET CASH RETURN	<p><i>Cumulative values from the net cash return line up to and including a period j:</i></p> $CNR_j = \sum_{i=1}^j NR_i$ <p> <i>CNR_j Cumulative net cash return to period j,</i> <i>j = 1, 2, ..., n</i> <i>NR_i Net cash return, period i</i> <i>n Number of project periods + 1 (salvage recovery)</i> </p>
Net present value	<i>Present value of the net cash return for period (see chapter XI.E)</i>
Cumulative net present value	<p><i>Cumulative value of the net present value line up to and including period j:</i></p> $CNPV_j = \sum_{i=1}^j NPV_i$ <p> <i>CNPV_j Cumulative net present value to period j,</i> <i>j=1, 2, ..., n</i> <i>NPV_i Net present value, period i</i> <i>n Number of project periods + 1 (salvage recovery)</i> </p>

NET PRESENT VALUE AT i%	<i>Single net present value (NPV) of complete project in period n; same as the cumulative NPV in period n</i>
INTERNAL RATE OF RETURN ON EQUITY	<i>Single value of IRR (see chapter XI.E)</i>
MODIFIED IRR ON EQUITY	<i>Single value of MIRR (see chapter XI.E)</i>
SHORT NPV AT i%, FOR n YEARS	<i>Single value: NPV of the net cash return for the first n years, discounted at i%. This is the short NPV</i>
NORMAL PAYBACK PERIOD	<i>Duration of normal payback period and date corresponding to first year in which the cumulative net cash return becomes positive</i>
DYNAMIC PAYBACK PERIOD	<i>Duration of dynamic payback period and date corresponding to first year in which the cumulative discounted net cash return becomes positive</i>
COLUMNS OF SCHEDULE	
Period columns	<i>Results for each project period</i>

Chart: Net present value (NPV) - total equity invested

Y-axis:	<i>Net present value</i>
X-axis:	<i>Discount rate (%)</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Discounted cash flow - total equity capital invested</i>
Source line:	<i>Net cash return</i>

Meaning: The net cash return for each project period, from the investors' point of view, is discounted at various rates to determine the net present value. The financial cost is represented by outflow of equity, and the financial benefits are comprised of the cash surpluses generated by the project in each period. The cash surplus/deficit for each project period from the *Cash flow for financial planning schedule* forms the basis for this analysis. Dividends are added back to credit the project with their generation. Net equity contribution (equity paid - equity refunds) is then subtracted as the outflow in each project period.

The project is financially acceptable if the net present value is non-negative for a discount rate equal to the opportunity cost of capital for the investors, assuming that the most advantageous of investment alternatives are considered.

DISCOUNTED RETURN ON JOINT VENTURE PARTNERS' EQUITY

Preferred and ordinary dividends specified for each joint venture partner constitute the benefits to be derived from the project. Costs are the contributions of equity. Performance indicators are displayed/printed in the schedule for each defined partner, which can be measured against applicable criteria.

Schedule: Discounted cash flow - partner (equity) capital invested

Calculation rules:

LINES OF SCHEDULES	
TOTAL CASH INFLOW	<i>Dividends paid + partner's capital refund</i>
Dividends paid	<i>Dividends paid to respective joint-venture partner (see chapters VII.L and XI.Q)</i>
Capital refund	<i>Paid-out (refunded) equity capital from the total financial flow schedule</i>
TOTAL CASH OUTFLOW	<i>Equity capital paid in by respective partner</i>
Equity capital paid	<i>Same as above</i>
NET CASH RETURN	<i>Total cash inflow less total cash outflow</i>
CUMULATIVE NET CASH RETURN	<p><i>Cumulative values from the net cash return line up to and including a period j:</i></p> $CNR_j = \sum_{i=1}^j NR_i$ <p> <i>CNR_j Cumulative net cash return to period j,</i> <i>j = 1, 2, ..., n</i> <i>NR_i Net cash return, period i</i> <i>n Number of project periods + 1 (salvage recovery)</i> </p>
Net present value	<i>Present value of the net cash return for period (see chapter XI.E)</i>
Cumulative net present value	<p><i>Cumulative value of net present value line up to and including period j:</i></p> $CNPV_j = \sum_{i=1}^j NPV_i$ <p> <i>CNPV_j Cumulative net present value to period j,</i> <i>j = 1, 2, ..., n</i> <i>NPV_i Net present value, period i</i> <i>n Number of project periods + 1 (salvage recovery period)</i> </p>
NET PRESENT VALUE AT i %	<i>Single net present value for partner/shareholder of complete project in period n; same as the cumulative net present value in period n</i>
INTERNAL RATE OF RETURN ON J.V. EQUITY	<i>Single value of the IRR for partner/shareholder (see chapter XI.E)</i>

MODIFIED IRR ON J.V. EQUITY	<i>Single value of the MIRR for partner/shareholder (see chapter XI.E)</i>
SHORT NPV AT i % FOR n YEARS	<i>Single value: shareholder/partner's net present value of Net cash return for the first n years discounted at i%. This is the short NPV</i>
NORMAL PAYBACK PERIOD	<i>Duration of normal payback period and date corresponding to first year in which the cumulative net cash return becomes positive</i>
DYNAMIC PAYBACK PERIOD	<i>Duration of dynamic payback period for shareholder/partner and date corresponding to the first year in which the cumulative discounted net cash return becomes positive</i>
COLUMNS OF SCHEDULES	
Period columns	<i>Results for each project period</i>

Chart: Net present value (net cash return) on partner capital

- Y-axis: *Net present values*
- X-axis: *Discount rate (%)*
- Graph type: *Line*
- Source schedule: *Discounted cash flow - partner capital invested*
- Source line: *Net cash return*

Meaning: From the point of view of a joint venture partner, the preferred and ordinary dividends paid in each project period are the benefits to be derived from the project. The costs are the partner's net capital contribution. The net amounts in each period are discounted at various rates and aggregated to determine the net present value (NPV). A non-negative NPV at a discount rate equal to the opportunity cost of capital for the joint venture partner indicates that the project is financially acceptable.

NET INCOME STATEMENT AND RATIOS

This schedule provides information on project profitability. Static profitability ratios are derived from this information, which is used also in the break-even analysis for each operating year of the project.

Schedule: Net income statement

(Schedule X-10)

Calculation rules:

LINES OF SCHEDULE	
Sales revenue	<i>Sales revenue from production and sales programme</i>
Less variable cost	<i>Σ material, ..., other variable cost which is equivalent to costs of products sold; from total annual costs of products, variable costs schedule, adjusted for finished products on stock</i>

Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services); from total annual costs of products, variable costs schedule, adjusted for finished products on stock</i>
Personnel (salaries and wages)	<i>Labour + labour overheads + factory overhead costs (salaries, wages) + administrative overhead costs (salaries, wages) + direct marketing costs, (salaries etc.) + marketing overhead costs (salaries etc.); from the total annual costs of products, adjusted for finished products on stock</i>
Marketing (except personnel)	<i>Direct marketing costs + marketing overhead costs less any personnel costs (salaries etc.); from the total annual costs of products, variable costs schedule, adjusted for finished products on stock</i>
Other variable costs	<i>Costs of products sold other than material, personnel (salaries, wages) and marketing; from total annual costs of products, variable costs schedule, adjusted for finished products on stock</i>
VARIABLE MARGIN	<i>Sales revenue less variable costs</i>
In % of sales revenue	$\frac{\text{Variable margin}}{\text{Sales revenue}} \times 100$
Less fixed costs	<i>Σ material, ..., other fixed cost equivalent to costs of products sold; from the total annual costs of products, fixed costs schedule, adjusted for finished products on stock</i>
Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services); from the total annual costs of products, fixed costs schedule, adjusted for finished products on stock</i>
Personnel (salaries, wages)	<i>Labour + labour overheads + factory overhead costs (salaries, wages) + administrative overhead costs (salaries, wages) + direct marketing costs (salaries etc.) + marketing overhead costs (salaries etc.) (the last four items are optional); from the total annual costs of products, fixed costs schedule, adjusted for finished products on stock</i>

Marketing (except personnel)	<i>Direct marketing costs + marketing overhead costs less costs of personnel (salaries etc.); from the total annual costs of products, fixed costs schedule, adjusted for finished products on stock</i>
Depreciation	<i>Depreciation; from the total annual costs of products, fixed costs schedule, adjusted for finished products on stock</i>
Other fixed costs	<i>Costs of products sold other than material, personnel, marketing, depreciation and financial costs; from the total annual costs of products, fixed costs schedule, adjusted for finished products on stock</i>
OPERATIONAL MARGIN	<i>Variable margin less fixed cost</i>
In % of sales revenue	$\frac{\text{Operational margin}}{\text{Sales revenue}} \times 100$
Interest on short-term deposits	<i>Interest generated; from operating funds invested in short-term deposits (see chapter XI.O)</i>
Less financial costs*	<i>Total interest payable (i.e. total interest net of capitalized interest) + other financial costs (fees); from the total debt service schedule</i>
GROSS PROFIT FROM OPERATIONS	<i>Operational margin + interest on short-term deposits less financial costs</i>
In % of sales revenue	$\frac{\text{Gross profit from operations}}{\text{Sales revenue}} \times 100$
Extraordinary income	<i>Sale of assets above book value (see chapter XI.I)</i>
Extraordinary loss	<i>Sale of assets below book value (see chapter XI.I)</i>
Less depreciation allowances	<i>Depreciation allowances (see chapters VII.S and XI.R)</i>
GROSS PROFIT	<i>Gross profit from operations + extraordinary income less extraordinary loss less depreciation allowances</i>
Less investment allowances	<i>Investment allowances (see chapter VII.S and XI.R)</i>
Deductible loss	<i>Annual losses brought forward (see chapter XI.P); this line is generated when losses may be brought forward (conditions to be defined by the user)</i>
TAXABLE PROFIT	<i>Gross profit less investment allowances less deductible loss (b/f)</i>

* Financial costs (interest and fees) on loans denominated in foreign currency are affected by relative inflation/revaluation between the local and foreign currencies (see chapter XI.M.2). The exchange rate gain/loss is included in the less financial costs line in the *Net income statement*.

Income (corporate) tax	<i>See chapter XI.P</i>
NET PROFIT	<i>Gross profit less income (corporate) tax</i>
In % of sales revenue	$\frac{\text{Net profit}}{\text{Sales revenue}} \times 100$
Dividends payable	<i>Dividends paid to shareholders (see chapter XI.Q)</i>
RETAINED PROFIT	<i>Net profit less dividends payable</i>
RATIOS	<i>Empty</i>
Net profit to equity capital = (RoE)	$\frac{\text{Net profit}}{\text{Equity capital}} \times 100$ $EC_j = \sum_{i=1}^j (\text{OEC}_i + \text{PEC}_i)$ <p> <i>EC_j Equity capital up to and including period j</i> <i>OEC_i Ordinary equity capital, production period i</i> <i>PEC_i Preference equity capital, production period i</i> <i>j j = p, p+1, ..., n production periods</i> <i>p first production year</i> <i>n number of project years</i> </p>
Net profit to net worth	$\frac{\text{Net profit}}{\text{Net worth}} \times 100$ <p><i>Net worth = total equity capital + reserves, retained profit brought forward + retained profit – accumulated losses brought forward – loss in current year</i></p>
(Net profit + interest) to investment = (RoI)	$\frac{\text{Net profit} + \text{Cost of finance}}{\text{Investment}} \times 100$ $I_j = \sum_{i=1}^j \text{TI}_i$ <p> <i>I_j Investment up to and including period j</i> <i>TI_j Total Investment, production period i</i> <i>j j = p, p+1, ..., n production periods</i> <i>p first production year</i> <i>n number of project years</i> </p>
COLUMNS OF SCHEDULE	
Period columns	<i>Results for production period</i>

Chart: Net profit to total sales ratio (%)

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Net income statement from operations</i>
Source line:	<i>Net profit in % of sales revenues</i>

Meaning: The net profit to sales ratios are indicators which can be compared with results for similar enterprises and industrial sectors and other investment opportunities. The ratio is provided for each production year, indicating the various stages of profitability. These ratios reflect the effectiveness of the transformation process from inputs (costs) to outputs (sales). As these ratios are profit-oriented (not cash-flow-oriented) they should be of particular interest to shareholders.

**Chart: Return on equity (%) -
net profit to equity and net profit to net worth ratio (%)**

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Net income statement from operations</i> <i>Projected balance sheet (equity and net worth)</i>
Source line:	<i>Net profit to equity capital (RoE), net worth</i>

Meaning: These ratios provide an indication of the return on equity capital invested. **Net worth** includes equity, retained profits and reserves. The ratios are provided for each year of production showing the various stages of profitability. As indicators of profit (as opposed to cash flow) they may be of particular interest to shareholders concerned with dividend payments.

**Chart: Return on investment (%) -
(net profit + interest) to total investment ratio**

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Net income statement from operations and projected balance sheet (total assets less current liabilities)</i>
Source line:	<i>(Net profit plus interest) to total investment (RoI)</i>

Meaning: This ratio provides the return on total investment (the value of the assets dedicated to the project). It is a measure of the efficacy of profit generation by the committed resources. Values provided for each production period indicate the various stages of profitability. The acceptability of the return on investment can be determined by comparison with the opportunity cost of the capital or with the return for similar enterprises and sectors.

DIRECT COSTING, CONTRIBUTION

For a project with multiple products, these schedules provide information concerning the distribution of costs among the various products and the contribution of each product to the overall performance of the project.

The first schedule provides information for a selected year for all products; the second provides information for each individual product.

Schedule: Direct costing, contribution for a reference year - contribution by product, total contribution

Calculation rules:

LINES OF SCHEDULE	
Sales revenue	<i>Sales revenue from production and sales programme schedule</i>
Less direct variable costs	<i>Σ material, ..., other variable cost equivalent to costs of products sold; from the direct costs, product 1...n, variable cost schedule</i>
Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services) (overhead costs optional); from the direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
Personnel (salaries, wages)	<i>Labour + labour overheads + factory overhead costs* (salaries, wages) + administrative overhead costs* (salaries, wages) + direct marketing costs* (salaries etc.), (items marked with * are optional); from direct costs, product 1..n, variable costs schedule, adjusted for finished products on stock</i>
Marketing (except personnel)	<i>Direct marketing costs (net of salaries etc.); from the direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
Other direct variable costs	<i>Costs of products sold other than material, personnel (salaries, wages) and marketing (except personnel); from the direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
VARIABLE MARGIN	<i>Sales revenue less direct variable cost</i>
In % of sales revenue	$\frac{\text{Variable margin}}{\text{Sales revenue}} \times 100$

Less direct fixed costs	<i>Σ material, ..., other fixed cost equivalent to costs of products sold; from the direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services) (overhead cost items are optional); from the Direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Personnel (salaries, wages)	<i>Labour + labour overheads + factory overhead costs* (salaries, wages) + administrative overhead costs* (salaries, wages) + direct marketing costs* (salaries etc.), (items marked with * are optional); from the Direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Marketing (except personnel)	<i>Direct marketing costs (net of salaries etc.); from the direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Other direct fixed costs	<i>Costs of products sold less material, personnel (salaries, wages) and marketing (except personnel); from direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
DIRECT CONTRIBUTION BY PRODUCT	<i>Variable margin less direct fixed costs</i>
In % of sales revenue	$\frac{\text{Direct contribution by product}}{\text{Sales revenue}} \times 100$
<i>The following three lines exist only if the cost centre analysis option has been selected:</i>	
Less cost centre overhead costs	<i>Sum of indirect costs in all cost centres which have been allocated to a product, adjusted for finished products on stock</i>
INDIRECT CONTRIBUTION BY PRODUCT	<i>Direct contribution by product less cost centre overhead costs</i>
In % of sales revenue	$\frac{\text{Indirect contribution by product}}{\text{Sales revenue}} \times 100$
<i>In all subsequent lines, only the first (total) column is used:</i>	

Less indirect costs (not allocated to a product)	<i>All indirect costs for each product which have not been allocated to a product via a cost centre, i.e. Σ material, ..., other indirect cost from indirect costs schedule less values in line less cost centre overhead costs (all costs adjusted for finished products on stock)</i>
Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services) (overhead costs are optional); from the indirect costs schedule, adjusted for finished products on stock</i>
Personnel (salaries, wages)	<i>Labour + labour overheads + factory overhead costs* (salaries, wages) + administrative overhead costs* (salaries, wages) + marketing overhead costs* (salaries etc.), (items marked with * are optional); from the indirect costs schedule, adjusted for finished products on stock</i>
Marketing (except personnel)	<i>Direct marketing costs + marketing overhead costs less salaries etc.; from the indirect costs schedule, adjusted for finished products on stock</i>
Other indirect costs	<i>Costs of products sold less material, personnel (salaries, wages) and marketing (except personnel); from the indirect costs schedule, adjusted for finished products on stock</i>
CONTRIBUTION	<i>Indirect contribution by product less indirect costs</i>
Depreciation	<i>Total depreciation for selected year; from the total annual costs of products schedule, adjusted for finished products on stock</i>
OPERATIONAL MARGIN	<i>Contribution less depreciation</i>
Interest on short-term deposits	<i>Interest generated from operating funds invested in short-term deposits (see chapter XI.O)</i>
Less financial costs	<i>Total interest payable (i.e. total interest net of capitalized interest) + other financial costs (fees); from the total debt service schedule</i>
GROSS PROFIT FROM OPERATIONS	<i>Operational margin + interest on short-term deposits less financial costs</i>
In % of sales revenue	$\frac{\text{Gross profit from operations}}{\text{Sales revenue}} \times 100$

COLUMNS OF SCHEDULE	
Total	<i>For all direct items this column provides the total for all products; for (unallocated) indirect costs only the total value is shown in this column</i>
Product 1 Product n	<i>Only totals of direct data for all products 1...n, shown in these columns</i>

Schedule: Direct costing - contribution by product, all periods

This schedule can be displayed/printed for each defined product.

Calculation rules:

LINES OF SCHEDULE	
Sales revenue	<i>Sales revenue from production and sales programme schedule</i>
Less direct variable costs	<i>Σ material, ..., other variable cost equivalent to costs of products sold; from direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services) (overhead costs are optional); from the direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
Personnel (salaries, wages)	<i>Labour + labour overheads + factory overhead costs* (salaries, wages) + administrative overhead costs* (salaries, wages) + direct marketing costs* (salaries etc.), (items marked with * are optional); from direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
Marketing (except personnel)	<i>Direct marketing costs (less salaries etc.); from the direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
Other direct variable costs	<i>Costs of products sold other than material, personnel (salaries, wages) and marketing (except personnel); from direct costs, product 1...n, variable costs schedule, adjusted for finished products on stock</i>
VARIABLE MARGIN	<i>Sales revenue less direct variable cost</i>
In % of sales revenue	$\frac{\text{Variable margin}}{\text{Sales revenue}} \times 100$

Less direct fixed costs	<i>Σ material, ..., other fixed cost equivalent to costs of products sold; from direct costs, product 1...n, fixed costs schedule,</i>
Material	<i>Raw materials + factory supplies + utilities + energy + spare parts consumed + factory overhead costs (materials and services) + administrative overhead costs (materials and services) (overhead costs are optional); from direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Personnel (salaries, wages)	<i>Labour + labour overheads + factory overhead costs* (salaries, wages) + administrative overhead costs* (salaries, wages) + direct marketing costs* (salaries etc.), (items marked with * are optional); from direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Marketing (except personnel)	<i>Direct marketing costs (less salaries etc.); from the direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
Other direct fixed costs	<i>Costs of products sold less material, personnel (salaries, wages) and marketing (except personnel); from direct costs, product 1...n, fixed costs schedule, adjusted for finished products on stock</i>
DIRECT CONTRIBUTION BY PRODUCT	<i>Variable margin less direct fixed costs</i>
In % of sales revenue	$\frac{\text{Direct contribution by product}}{\text{Sales revenue}} \times 100$
<i>The following three lines exist only if the cost centre analysis option has been selected</i>	
Less cost centre overhead costs	<i>Sum of costs in all cost centres which have been allocated to a single product</i>
INDIRECT CONTRIBUTION BY PRODUCT	<i>Direct contribution by product less cost centre overhead costs</i>
In % of sales revenue	$\frac{\text{Indirect contribution by product}}{\text{Sales revenue}} \times 100$
COLUMNS OF SCHEDULE	
Period columns	<i>Results for each period of the production phase</i>

PRODUCT PROFITABILITY INDICATORS

This group of schedules provides an analysis of the profitability of each product when cost allocations are taken into account. They are displayed/printed only when **Cost allocation** is active and more than one product is defined.

The schedules can be displayed/printed either for a selected year or for each product.

Schedule: Product profitability indicators for reference year (all products)

Calculation rules:

LINES OF SCHEDULE	
SALES REVENUE	<i>Sales revenue from production and sales programme schedule</i>
FACTORY COSTS	<i>Factory costs from cost allocations, product 1...n, schedule, adjusted for finished products on stock</i>
Margin	<i>Sales revenue less factory cost</i>
In % of sales revenue	$\frac{\text{Margin}}{\text{Sales revenue}} \times 100$
Coverage ratio	$\frac{\text{Sales revenue}}{\text{Factory cost}}$ <i>Indicates multiple of sales revenue coverage of factory cost</i>
OPERATING COSTS	<i>Operating costs from cost allocations, product 1...n schedule, adjusted for finished products on stock</i>
Margin	<i>Sales revenue less operating costs</i>
In % of sales revenue	$\frac{\text{Margin}}{\text{Sales revenue}} \times 100$
Coverage ratio	$\frac{\text{Sales revenue}}{\text{Operating costs}}$ <i>Indicates multiple of sales revenue coverage of operating costs</i>
TOTAL PRODUCTION COSTS	<i>Total production costs from cost allocations, product 1...n schedule, adjusted for finished products on stock</i>
Margin	<i>Sales revenue less total production cost</i>
In % of sales revenue	$\frac{\text{Margin}}{\text{Sales revenue}} \times 100$

Coverage ratio	$\frac{\text{Sales revenue}}{\text{Total production costs}}$ <i>Indicates multiple of sales revenue coverage of total production cost</i>
COSTS OF PRODUCT	<i>Costs of product from cost allocations, product 1...n, schedule, adjusted for finished products on stock</i>
Margin	<i>Sales revenue less costs of products</i>
In % of sales revenue	$\frac{\text{Margin}}{\text{Sales revenue}} \times 100$
Coverage ratio	$\frac{\text{Sales revenue}}{\text{Costs of products}}$ <i>Indicates multiple of sales revenue coverage of costs of products</i>
COLUMNS OF SCHEDULE	
Total	<i>Total of respective lines</i>
Product 1, ..., product n	<i>Results for each product in the selected year</i>

Schedule: Product profitability indicators by product, all years

This series of schedules provides profitability indicators for each product. The lines of these schedules are identical to those for the selected year. Results for each period of the production phase are displayed/printed in the columns.

BREAK-EVEN ANALYSIS

Break-even analysis indicates the volume of sales at which fixed costs are covered by variable margins (break-even point, or BEP). At a sales volume above (below) BEP, the difference between the variable margin and fixed costs represents profit (loss).

Schedules are available which provide break-even information for each period of the production phase for the entire project (all products) and for each product when **Cost allocation** is active.

Schedule: Break-even, total sales, all years

Calculation rules:

LINES OF SCHEDULE	
Sales revenue	<i>Sales revenue for all products; from production and sales programme schedule</i>
Variable costs	<i>Costs of products (variable); from total annual costs of products, variable costs schedule, adjusted for finished products on stock</i>

Variable margin	<i>Sales revenue less variable costs</i>
Variable margin ratio (%)	$\frac{\text{Variable margin}}{\text{Sales revenue}} \times 100$
BREAK-EVEN INCLUDING COSTS OF FINANCE	<i>Empty</i>
Fixed costs	<i>Costs of products sold less interest (sub-item of financial costs); from total annual costs of products -fixed costs schedule, adjusted for finished products on stock</i>
Financial costs	<i>Interest (sub-item of financial costs); from total annual costs of product -fixed costs schedule</i>
Break-even sales value (including costs of finance)	$\frac{\text{Fixed costs} + \text{Financial costs}}{\text{Variable margin ratio (\%)}} \times 100$
Break-even ratio, % capacity Utilization	$\frac{\text{Break - even sales value}}{\text{Sales revenue}} \times 100$
Fixed cost coverage ratio	$\frac{\text{Variable margin}}{\text{Fixed costs} + \text{Financial costs}}$ <i>This indicates the multiple by which the variable margin covers the fixed costs + financial costs</i>
BREAK-EVEN EXCLUDING COSTS OF FINANCE	<i>Empty</i>
Fixed costs	<i>Costs of products sold less interest (sub-item of financial costs); from total annual costs of products -fixed cost schedule, adjusted for finished products on stock</i>
Break-even sales value (excluding costs of finance)	$\frac{\text{Fixed costs}}{\text{Variable margin ratio (\%)}} \times 100$
Break-even ratio, % capacity Utilization	$\frac{\text{Break - even sales value}}{\text{Sales revenue}} \times 100$
Fixed cost coverage ratio	$\frac{\text{Variable margin}}{\text{Fixed costs}}$ <i>This indicates the multiple by which the variable margin covers the fixed costs</i>
COLUMNS OF SCHEDULE	
Period columns	<i>Results for each period of the production phase</i>

Chart: Break-even, total sales, selected period (two charts) - break-even including and excluding costs of finance

Y-axis:	<i>Fixed cost, variable and total costs, sales revenue</i>
X-axis:	<i>Percentage of annual sales volume</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Fixed costs (incl./excl. costs of finance), variable costs, sales revenue</i>

Meaning: At break-even the variable margin [quantity \times (price – variable cost)] covers the fixed costs. Above the break-even point the project is profitable; below break-even the project operates at a loss. The production level at break-even compared to full-scale production is a measure of risk: the closer break-even to planned production, the greater the risk.

Chart: Variable margin ratio

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Variable margin ratio</i>

Meaning: This ratio is the percentage contribution or the portion of sales revenue in excess of variable costs, available to cover fixed costs. As this ratio increases the break-even sales volume decreases. A high ratio, therefore, tends to diminish risk, but the sustainability of high margins should be investigated in relation to competition and stability and reliability of factor inputs.

Chart: Break-even ratio (two charts) - ratio including and excluding costs of finance

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Break-even ratio</i>

Meaning: The break-even ratio is the ratio of break-even sales to planned production for the period. It is the percentage of the planned production at which the variable margin covers the fixed costs. Risk increases with increasing break-even ratio; a low ratio (maximum = 1) provides a level of security against unforeseen operational difficulties.

**Chart: Fixed cost coverage ratio (two charts) -
ratio including and excluding costs of finance**

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Fixed cost coverage ratio</i>

Meaning: This ratio is an indicator of project risk. It gives the multiple by which the variable margin covers fixed costs. A high multiple offers security against project uncertainties.

BREAK-EVEN ANALYSIS OF EACH PRODUCT

These schedules are only available if **Cost allocation** is active. Fixed and variable indirect costs are allocated to each product for this analysis.

Break-even information is provided for each period of the production phase.

Schedule: Break-even analysis by product, all years

Calculation rules:

LINES OF SCHEDULE	
Sales revenue	<i>Sales revenue; from production and sales programme, product 1...n, schedule</i>
Sales volume	<i>Quantity sold from production and sales programme, product 1...n, schedule</i>
Average unit price	<i>Average unit price from production and sales programme, product 1...n, schedule</i>
Variable costs	<i>Variable part of costs of products from cost allocations, product 1...n schedule, adjusted for finished products on stock</i>
Fixed costs	<i>Fixed part of costs of products excluding interest from cost allocations, product 1...n, schedule, adjusted for finished products on stock</i>
Constant price analysis (average unit price)	
Break-even sales volume (constant price)	<i>Break-even sales value/average unit price</i>
Break-even sales value (constant price)	$\frac{\text{Fixed costs}}{\text{Variable margin ratio (\%)}} \times 100$
Break-even ratio, % capacity utilization (constant price)	<i>Break-even sales volume/sales volume</i>

Constant volume analysis (volume constant at nominal capacity for period)	
Break-even sales price (planned quantity sold of one product)	<i>(Fixed costs + variable costs)/sales value (planned quantities); at this price the product will break even at 100% of planned sales (assumes variable unit costs constant)</i>
Break-even sales value (planned quantity sold of one or more products)	<i>Value of total sales at break-even sales price (or price mix in case of more than one product)</i>
Break-even ratio (%), BE price in % of sales price	$\frac{\text{Break - even sales price}}{\text{Sales price}} \times 100$
Variable margin	<i>Sales revenue less variable cost (see break-even analysis of project, all products schedule)</i>
Variable margin ratio (%)	$\frac{\text{Variable margin}}{\text{Sales revenue}} \times 100$
Fixed costs coverage ratio	$\frac{\text{Variable margin}}{\text{Fixed costs}}$ <i>This indicates the multiple by which the variable margin covers the fixed costs</i>
COLUMNS OF SCHEDULE	
Period columns	<i>Results for each period of production phase</i>

Chart: Break-even analysis by product, selected year (period) - ratio including costs of finance

- Y-axis: *Fixed cost, variable and total costs, sales revenue*
- X-axis: *Percentage of annual sales volume*
- Graph type: *Line*
- Source schedule: *Break-even analysis*
- Source line: *Fixed costs (including costs of finance), variable costs, sales revenue*

Meaning: The break-even point for a single product is presented assuming allocation of all indirect costs according to the selected key. At break-even the variable margin [quantity × (price – variable cost)] covers the fixed costs. The production level at break-even compared to planned production for the period is a measure of risk: the closer break-even to full production, the greater the risk. As indirect costs are allocated, changes in product mix may affect the break-even analysis of a single product.

Chart: Break-even ratio by product, selected year (two charts)
A: Ratio for constant sales price (break-even sales volume)
B: Ratio for constant quantity (break-even sales price)

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Break-even ratio (including cost of finance)</i>

Meaning: This ratio is shown for each year for constant price and for constant volume. At constant price, the ratio indicates the percentage of capacity utilization necessary to break even. At constant volume, nominal capacity is assumed for each year; the ratio indicates the percentage of the defined price at which the project breaks even. In each case a low ratio ($\ll 1$) provides security against project uncertainties. Indirect costs are allocated to each product according to the selected key. Changing the product mix may affect this ratio.

Chart: Variable margin ratio by product

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Variable margin ratio (including cost of finance)</i>

Meaning: This ratio is the percentage contribution for the product, or the portion of sales revenue available to cover fixed costs (and available as profit after coverage of fixed costs). This ratio increases with decreasing break-even sales volume, so a high ratio is associated with lower risk. Indirect costs are allocated to the product according to the selected key. Changing the product mix may affect this ratio.

Chart: Fixed cost coverage ratio by product and year

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Break-even analysis</i>
Source line:	<i>Fixed cost coverage ratio (including cost of finance)</i>

Meaning: This ratio is an indicator of project risk related to a particular product. It is the multiple by which the variable margin covers fixed costs. A higher ratio offers security against uncertainties related to the product. Indirect costs are allocated to each product according to the selected key. Changing the product mix may affect this ratio.

PROJECTED BALANCE SHEET

The balance sheet is a snapshot view of the project at a point in time in which assets are equated with liabilities plus net worth. It reveals the value of assets committed to the project at a point in time and how these assets are financed by a combination of debt and equity. The **balance date** is the last day of each project period.

All the information in the balance sheet is derived from the schedules *Cash flow for financial planning*, *Net income statement*, *Total costs of products* and *Total net working capital requirements*.

For expansion/rehabilitation projects it is necessary that user-defined initial balances are actually balanced in the accounting sense. COMFAR *III Expert* does not check the individual entries to assure that an initial accounting balance is achieved; however, depending upon whether a positive or negative adjustment is necessary the value of **reserves**, **retained profit brought forward** (positive adjustment) or **accumulated losses brought forward** (negative adjustment) is modified by the program as necessary.

Schedule: Projected balance sheet

(Schedule X-11)

Calculation rules:

LINES OF SCHEDULE	
TOTAL ASSETS	<i>Total current assets + total fixed asset, net of depreciation + accumulated losses brought forward + loss in current year</i>
Total current assets	<i>Inventories of materials and supplies + work in progress + finished products in stock + accounts receivable + cash-in-hand + short-term deposits + cash surplus, finance available</i>
Inventory of materials and supplies	<i>Total inventory less work in progress less finished products; from total net working capital requirements schedule</i>
Work in progress	<i>From total net working capital requirements schedule</i>
Finished products in stock	<i>From total net working capital requirements schedule</i>
Accounts receivable	<i>From total net working capital requirements schedule</i>
Cash-in-hand	<i>From total net working capital requirements schedule; reduced by the amount of short-term deposits (see following line) and including starting balance</i>

Short-term deposits*	<i>Cash-in-hand × percentage of cash-in-hand invested in short-term deposits; from working capital window entry field (% rate is constant over planning horizon); defined for starting balance</i>
Cash surplus, finance available	<i>Cumulative cash balance + dividends paid; from cash flow for financial planning schedule</i>
Total fixed assets, net of depreciation	<i>Fixed investment + construction in progress (fixed investment of current period) + pre-production expenditures less accumulated depreciation less depreciation allowances</i>
Fixed investment	<i>Cumulative value of construction in progress carried forward one period</i>
Construction in progress	<i>Total fixed investment; from total investment costs schedule</i>
Pre-production expenditures	<i>Cumulative value of total pre-production expenditures; from total investment costs schedule</i>
Less accumulated depreciation	<i>Cumulative value of depreciation; from total annual costs of products schedule</i>
Less depreciation allowances	<i>Cumulative value of specified depreciation allowances (see chapter VII.S, allowances)</i>
Accumulated losses brought forward	<i>Absolute value of: (- accumulated losses brought forward + reserves, retained profit brought forward - loss in current year + retained profit; all values from the previous year) if negative</i>
Loss in current year	<i>Absolute value of retained profit if negative; from net income statement schedule</i>
Exchange rate losses	<i>Negative value of exchange rate adjustment; from total debt service schedule</i>
TOTAL LIABILITIES	<i>Total current liabilities + total long-term debt + total equity capital + reserves, retained profit brought forward + net profit after tax</i>
Total current liabilities	<i>Accounts payable + total short-term debt</i>
Accounts payable	<i>Accounts payable; from total net working capital schedule</i>

* In the case of significant inflation rates part of cash-in-hand can be invested in short-term deposits in order to compensate for losses. This option of COMFAR III Expert is NOT intended for long-term reinvestment of any cash surplus generated by the project. (See modified IRR for the inclusion of reinvestment and borrowing rates).

Total short-term debt	<i>Total short-term debt balance at end of year; from total debt service schedule + automatic overdraft</i>
Total long-term debt	<i>Total long-term debt balance at end-of-year; from total debt service schedule</i>
Total equity capital	<i>Ordinary capital + preference capital + subsidies</i>
Ordinary capital	<i>Cumulative value of ordinary capital; from total financial flow schedule + automatic equity</i>
Preference capital	<i>Cumulative value of preference capital; from total financial flow schedule</i>
Subsidies	<i>Cumulative value of subsidies; from total financial flow schedule</i>
Reserves, retained profit brought forward	<i>Value of: (- accumulated losses brought forward + reserves, retained profit brought forward - loss in current year + retained profit; all values from the previous year) if positive</i>
Net profit after tax	<i>Absolute value of net profit for current period if positive; from net income statement schedule</i>
Dividends payable	<i>Dividends payable; from net income statement schedule</i>
Retained profit	<i>Retained profit; from net income statement if positive</i>
Exchange rate gains	<i>Positive value of exchange rate adjustment; from total debt service schedule</i>
NET WORTH	<i>Total equity capital + reserves, retained profit brought forward + retained profit - accumulated losses brought forward less loss in current year</i>
RATIOS (%)	<i>Empty</i>
Equity to total liabilities	$\frac{\text{Total equity capital}}{\text{Total liabilities}} \times 100$
Net worth to total liabilities	$\frac{\text{Net worth}}{\text{Total liabilities}} \times 100$
Long-term debt to net worth	$\frac{\text{Total long term debt}}{\text{Net worth}}$
Current assets to current liabilities	$\frac{\text{Current assets}}{\text{Current liabilities}}$
COLUMNS OF SCHEDULE	
Period columns	<i>Results for each period of the project</i>

Chart: Equity capital to total liabilities ratio

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Projected balance sheet</i>
Source line:	<i>Total equity capital, total liabilities</i>

Meaning: This ratio is a measure of the financial leverage for the investors. Low equity/debt permits the investors to control a relatively large project compared with their committed resources. Financial risk is higher for the financial institution and the investors for low ratios of equity to debt.

Chart: Net worth to total liabilities ratio

Y-axis:	<i>Ratio (%)</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Projected balance sheet</i>
Source line:	<i>Total equity capital + reserves, retained profit b/f + retained profit (current year) – accumulated losses b/f – loss (current year); total liabilities</i>

Meaning: This ratio indicates the extent to which the outstanding debt balance is covered by project assets in the event of liquidation. Risk for financiers increases for low ratios.

Chart: Long-term debt to net worth ratio

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Projected balance sheet</i>
Source line:	<i>Total equity capital + reserves, retained profit b/f + retained profit (current year) – accumulated losses b/f – loss (current year); total long-term debt</i>

Meaning: The debt to net worth ratio is a measure of financial leverage for investors and reflects the degree of risk both for financiers of the project and for investors. For positive leverage (IRR greater than the cost of borrowing) a project with a low leverage has less risk of loss in a business recession but lower expected returns under favorable business conditions. Conversely, a highly leveraged project is more susceptible to risk of loss and can expect higher gains in the respective phases of a business cycle.

Chart: Current ratio

Y-axis: *Ratio (%)*
 X-axis: *Years*
 Graph type: *Line*
 Source schedule: *Projected balance sheet*
 Source line: *Total current assets*
 Total current liabilities

Meaning: The current assets to current liabilities ratio measures the short-term solvency or liquidity and is a rough indicator of the project's ability to meet current obligations depending on the liquidity of current assets. Security increases with higher ratios.

7. Evaluation and ratios

Two schedules are available which present operating ratios in addition to those displayed/printed in other schedules. If a ratio is non-calculable (division by zero or data not available) a zero is displayed/printed.

FINANCIAL RATIOS

Financial ratios provide insights concerning the solvency and risk associated with the project. These indicators should be compared with local standards for similar enterprises and industries. They are also useful for comparing project alternatives.

Schedule: Financial ratios (numerical)

Calculation rules:

LINES OF SCHEDULE	
LT debt to net worth ratio, DB_j/NW_j	DB_j Debt balance; from projected balance sheet NW_j Net worth; from projected balance sheet
Current ratio, CA_j/CL_j	CA_j Current assets; from projected balance sheet CL_j Current liabilities; from projected balance sheet
Cash flow to long-term debt ratio, CF_j/DB_{j-1}	CF_j Surplus (deficit); from cash flow for financial planning + repayment + interest payable + other financial costs; from sources of finance, total debt service, total long-term loans DB_{j-1} Debt balance (j-1) at the end of previous year; from sources of finance, total debt service, total long-term loans
Debtors to creditors ratio, AR_j/AP_j	AR_j Accounts receivable; from projected balance sheet AP_j Accounts payable; from projected balance sheet

Long-term debt service coverage, CF_j/DS_j	<p>CF_j Surplus (deficit); from cash flow for financial planning + repayment + interest payable + other financial costs; from sources of finance, total debt service, total long-term loans</p> <p>DS_j Debt service (j) = loan repayment (j) + interest payable (j) + other financial costs (j); from sources of finance, total debt service, total long-term loans</p>
COLUMNS OF SCHEDULE	
Period columns	Ratios for each period of the construction and production phase
The significance of these ratios for the project planning process and typical values (in brackets) are:	
Long-term debt to net worth ratio	Indicator of financial risk for both equity and loan capital. Risk increases in both cases the higher debt is in relation to equity capital. Indicates the extent to which the debt balance is covered by the total assets of the enterprise. Also indicates financial leverage. Smaller equity capital in relation to debt provides higher income per share (typical are: 67:33 - 75:25)
Current ratio	Measures liquidity or short-term solvency. Rough indicator of ability to meet current liabilities. (suggested are: 2.0 - 1.2)
Cash flow to long-term debt ratio (also referred to as cash flow to debt ratio)	Measure of the financial risk related to (long-term) loan capital
Debtors to creditors ratio	Helps to identify overtrading (too high a level of production for the cash resources available). Overtrading can be disastrous for the project
Long-term debt service coverage	Measure of ability of project to repay long-term loans and related financial costs from annual cash inflows. (usually above 1.3 to 1.5)

Chart: Long-term debt to net worth ratio

The long-term debt to net worth ratio was described earlier in this chapter under *Business results*.

Chart: Current ratio

The current ratio was also described under *Business results*.

Chart: Cash flow to long-term debt ratio

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Financial ratios</i>
Source line:	<i>Cash flow to long-term debt ratio</i>

Meaning: The cash flow to long-term debt ratio is the multiple by which the annual cash flow excluding long-term debt service covers the outstanding long-term debt balance. A high ratio offers security for the project's financiers.

Chart: Debtors to creditors ratio

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Financial ratios</i>
Source line:	<i>Debtors to creditors ratio</i>

Meaning: The ratio between debtors (receivables) and creditors (payables) helps to identify overtrading (too high a level of production for the cash resources available). Overtrading can be disastrous for the project. Lower values of this ratio increase risk for the project.

Chart: Long-term debt service coverage

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Financial ratios</i>
Source line:	<i>Long-term debt service coverage</i>

Meaning: This ratio is a measure of project's ability to repay long-term loans and related financial costs. It is the ratio of the annual cash flow excluding long-term debt service to total long-term debt service (principal, interest and fees).

EFFICIENCY RATIOS

Efficiency ratios generally reveal how well resources are applied in a project. One type of efficiency ratio measures benefit generated per unit of applied resource. Benefits can be measured in terms of sales volume, profits or cash flow, or wages generated (investment to personnel cost ratio) and resources in terms of invested capital or equity capital. Another type of ratio examines the operational efficiency (turnover of inventories).

Schedule: Efficiency ratios (numerical)

Calculation rules:

LINES OF SCHEDULE	
Output to capital, Sr_j/TI_j	<p>SR_j <i>Sales revenue; from the cash flow for financial planning schedule</i></p> <p>TI_j <i>Total cumulative investment costs; from the total investment costs schedule</i></p> <p><i>Meaning: Annual output per unit of invested capital. Useful yardstick when assessing project at an early stage (opportunity or pre-feasibility study)</i></p>
Investment to personnel cost ratio, Ti_j/PC_j	<p>TI_j <i>Total cumulative investment costs; from total investment costs schedule</i></p> <p>PC_j <i>Variable costs of personnel + fixed costs of personnel; from net income statement schedule</i></p> <p><i>Meaning: Investment per job created. Used in comparing alternative technologies. Also useful to compute investment per unit personnel cost (i.e. investment per unit wages and salaries generated by the project).</i></p>
Turnover of inventories, Tn_j/SR_j	<p>TN_j <i>Total inventory from total net working capital requirements schedule</i></p> <p>SR_j <i>Sales revenue from cash flow for financial planning schedule</i></p> <p><i>Meaning: Inventory per unit of sales. Measure of marketing capabilities of management. However, this ratio can be useful in project planning if data from similar enterprises are available. In general, low inventory per unit sales is desirable.</i></p>

<p>Net cash flow to output, NC_j/SR_j</p>	<p>NC_j <i>Net cash flow; from the discounted cash flow, total capital invested schedule</i> SR_j <i>Sales revenue; from cash flow for financial planning schedule</i> <i>Meaning: This ratio measures the efficiency of marketing to generate the annual net cash flow. It is useful for the comparison of similar projects.</i></p>
<p>COLUMNS OF SCHEDULE</p>	
<p>Period columns</p>	<p><i>Ratios for each period of the construction and production phase</i></p>

Chart: Output to capital ratio

- Y-axis: *Ratio*
- X-axis: *Years*
- Graph type: *Line*
- Source schedule: *Efficiency ratios*
- Source line: *Sales/total capital investment*

Meaning: This ratio relates annual output to invested capital. It is a useful yardstick when assessing projects at early stages (opportunity or pre-feasibility study).

Chart: Investment to personnel cost ratio

- Y-axis: *Ratio*
- X-axis: *Years*
- Graph type: *Line*
- Source schedule: *Efficiency ratios*
- Source line: *Initial investment to total personnel costs*

Meaning: This ratio indicates the amount of investment in the project which generates a unit of wages and salaries. It is essentially an economic indicator of the capital intensity and is useful in assessing alternative technologies.

Chart: Turnover of inventories

- Y-axis: *Ratio*
- X-axis: *Years*
- Graph type: *Line*
- Source schedule: *Efficiency ratios*
- Source line: *Inventory to sales*

Meaning: This measure indicates the amount of inventory per unit of sales. It is a measure of marketing management capability. It can be useful in project planning if data from similar enterprises are available. In general, low inventory per unit sales is desirable to minimize inventory investment and storage costs.

Chart: Net cash flow to total sales

Y-axis:	<i>Ratio</i>
X-axis:	<i>Years</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Efficiency ratios</i>
Source line:	<i>Net cash flow (from the discounted cash flow, total capital invested schedule)/sales</i>

Meaning: This ratio measures the efficiency of marketing to generate the annual net cash flow. It is useful for the comparison of similar projects.

D. ECONOMIC SCHEDULES AND GRAPHS

The purpose of economic analysis of a project is to determine its contribution to national objectives. The most fundamental objectives are the increase in national income and employment, as well as efforts on income distribution and the foreign exchange flow.

Two methods are presented for determining the effects of the project on a national criterion. Value added, when aggregated for all producers of goods and services in the economy, amounts to the national income. The economic appraisal (cost-benefit) method attempts to achieve a similar valuation of the project by assigning shadow prices or accounting prices to the inputs and outputs of the project if market prices do not reflect economic prices.

The results of each analysis should be similar, if not identical, when cost-benefit analysis is performed at efficiency prices (prices that would prevail if markets were in equilibrium), and in the corresponding value-added analysis - with and without the project - the incremental value-added impacts resulting from the implementation of the project are determined from one or more rounds of decomposition of inputs and outputs.

1. Value-added analysis

In the value-added schedule, all present-value (PV) calculations are performed at the economic rate of discount specified in the GLOBAL PARAMETERS window (figure 95 in chapter VIII.E) of the input browser.

DECOMPOSITION

When the production of intermediate inputs is attributable directly to the project, value-added may be contributed to the economy. Using the expansion capability of the data structure, it is possible to decompose such intermediate inputs into value-added, imports and domestic content. The domestic content from the first round of decomposition may then be further decomposed (see figure 115).

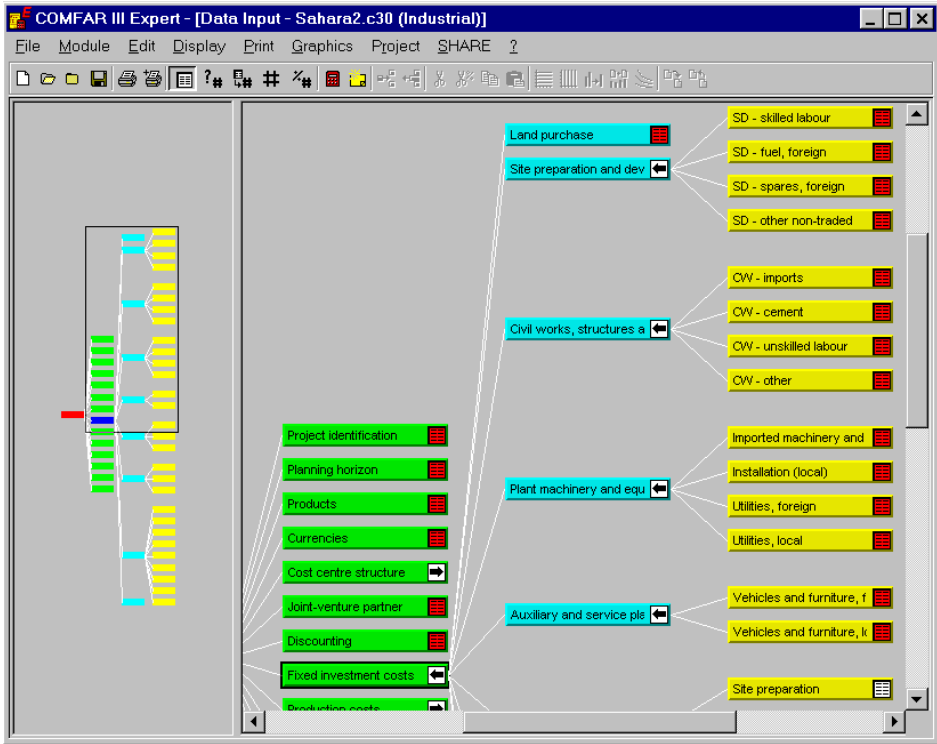


Figure 115: Value-added content of intermediate inputs

COMFAR permits specification of the included value-added for up to three rounds of decomposition of project inputs (see chapter VIII.H., figure 101, *Adjustment of inputs window*). In the value-added calculation for the project, this portion of items so identified is retained as part of the value added attributable to the project; consequently, it is not deducted from the value of output.

INDIRECT TAXES

Indirect taxes defined on project inputs are considered transfer payments. They are included in the value added and accrue to the government. Any indirect taxes are subtracted from the financial value of intermediate inputs before their inclusion in the value-added calculation. Indirect taxes on output should be included as part of sales tax. This is also included in value added distributed to the government.

VALUE-ADDED CRITERIA

Schedule: Value added

(from the Manual for Evaluation of Industrial Projects; in particular chapter II.B.3, tables)

Calculation rules*:

LINES OF SCHEDULE	
Value of output (incl. tax)	<i>Gross sales revenue; from production and sales programme schedule (incl. sales taxes) + other income; from cash flow for financial planning schedule</i>
Material input	<i>Raw materials + factory supplies + utilities + energy + spare parts + factory overhead cost (materials and services) + administrative overhead costs (materials and services); from total annual costs of products schedule, adjusted for finished products in stock; ** IT, VA</i>
GROSS DOMESTIC VALUE ADDED	<i>Value of output less material input</i>
Investment	<i>Fixed investment + pre-production expenditures net of interest; from total investment costs schedule** + increase in total inventory; from total net working capital requirements schedule; IT, VA</i>
NET DOMESTIC VALUE ADDED	<i>Gross domestic value-added less investment</i>
Repatriated payments	<i>Wages + dividends + interest payable + others</i>
Wages	<i>Labour + labour overheads + factory overhead costs, salaries/wages and social costs + administrative overheads, salaries/wages and social costs + direct marketing costs, salaries/wages + marketing overhead costs, salaries/wages; from total costs of products, foreign costs schedule, adjusted for finished products in stock; IT</i>
Dividends	<i>From cash flow for financial planning, foreign flow schedule; IT</i>

* IT Items for which indirect taxes can be defined

VA Items for which value-added included can be defined for up to three rounds of decomposition

** see chapter XII, under *Value added*

Interest payable	<i>From cash flow for financial planning, foreign flow schedule</i>
Others	<i>Costs of products – materials (indirect taxes included) – wages (indirect taxes included) – interest – depreciation; from total annual costs of products, foreign costs schedule, adjusted for finished products in stock</i>
NET NATIONAL VALUE ADDED (NNVA)	<i>Net domestic value-added less repatriated payments</i>
NNVA (domestic wages)	<i>Labour + labour overheads + factory overhead costs, salaries/wages and social costs + administrative overheads, salaries/wages and social costs + direct marketing costs, salaries/wages + marketing overhead costs, salaries/wages; from total costs of products, local costs schedule, adjusted for finished products in stock; IT</i>
Skilled labour	<i>Domestic wages less unskilled labour; IT</i>
Unskilled labour	<i>From total annual costs of products, local costs schedule, adjusted for finished products in stock; IT</i>
NNVA (dividends, interest)	<i>Dividends* + interest payable; from cash flow for financial planning, local flow schedule;</i>
NNVA (government)	<i>Corporate tax paid; from cash flow for financial planning schedule + sales tax from production and sales program schedule – subsidy on sales from production and sales program schedule – subsidies; from flow of financial resources, local flow schedule + indirect taxes (all indirect taxes on items marked with 'IT')</i>
NNVA (others)	<i>Net national value added less domestic wages less dividends, interest less government</i>
DISTRIBUTION OF VALUE-ADDED	<i>Empty</i>
NNVA (DW)/NNVA	<i>NNVA (domestic wages)/NNVA</i>
NNVA (PDI)/NNVA	<i>NNVA (dividends, interest)/NNVA</i>
NNVA (GOV)/NNVA	<i>NNVA (government)/NNVA</i>
NNVA (OTH)/NNVA	<i>NNVA (others)/NNVA</i>

* Value net of additional tax on dividends

COLUMNS OF SCHEDULE	
Present value	<i>Net present value of period columns at the economic rate of discount (discounted to end of first year as default or beginning of project)</i>
Grand total	<i>Sum of period columns for each line</i>
Period columns	<i>Shown only yearly for entire planning horizon as defined in the planning horizon window (figure 57) of input browser</i>

ABSOLUTE EFFICIENCY TEST

The absolute efficiency test gives a positive result if the value-added produced by the project is at least equal to the value of wages and salaries, i.e. if the following condition holds:

$$PV(NNVA)/PV(\text{domestic wages}) \geq 1$$

RELATIVE EFFICIENCY TEST

The relative efficiency test provides an indication of NNVA (at present value) generated by the project per unit of scarce resource. The scarce resources included in the system are investment (capital), foreign exchange, skilled labour and labour (including skilled labour).

$$\begin{aligned} & PV(NNVA)/PV(\text{investment}) \\ & PV(NNVA)/PV(\text{foreign exchange})^* \\ & PV(NNVA)/PV(\text{skilled labour}) \\ & PV(NNVA)/PV(\text{labour}) \end{aligned}$$

Chart: Structure of value added

Y-axis:	<i>Value added</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars</i>
Source schedule:	<i>Value added</i>
Source line:	<i>Net national value added, material input, investment, repatriation payment</i>

Meaning: The gross domestic value added measures the real monetary contribution of the project to the economy of the country in terms of the directly and indirectly generated value added. For national welfare, however, it is not the domestic but the net national value added that is relevant.

* From net foreign exchange flow in *Net foreign exchange effect schedule*.

Chart: Structure of net national value added

Y-axis:	<i>Net national value added</i>
X-axis:	<i>Years</i>
Graph type:	<i>Stacked bars</i>
Source schedule:	<i>Value added</i>
Source line:	<i>NNVA corresponding to domestic wages, dividends and interest, government, others</i>

Meaning: At the enterprise level the net national value added (value of output – material input – investment – repatriated payments) is a proxy for national income. The portions of NNVA distributed to wage earners, investors and the government are presented. The distribution of the remaining value added is not specified (others).

2. Net foreign exchange effect

The net foreign exchange effect traces all the inflows and outflows of foreign exchange for all items in the data entry defined as foreign in each period of the project to determine the effect on the national balance of payments.

For those items marked with IT (indirect taxes), a percentage of indirect taxes for foreign items can be specified in the input data. For such items the **included indirect taxes** represent the local currency duties included in the financial value and are, therefore, excluded from the foreign exchange flows.

Schedule: Net foreign exchange effect

(from the Manual for Evaluation of Industrial Projects; in particular chapter II.B.4, tables)

Calculation rules:

LINES OF SCHEDULE	
TOTAL FOREIGN EXCHANGE INFLOW	<i>Equity shares + loans + subsidies/grants + export of products + others</i>
Equity shares	<i>Ordinary capital inflows + preference capital; from flow of financial resources, foreign flow schedule</i>
Loans	<i>Long-term loans, inflows + short-term loans, inflows (bank overdraft and accounts payable); from flow of financial resources, foreign flow schedule</i>
Subsidies/grants	<i>Subsidies - inflows; from flow of financial resources, foreign flow schedule</i>
Exports of products	<i>Gross sales revenue; from production and sales programme, foreign sales schedule</i>
Others	<i>Other income; from cash flow for financial planning, foreign flow schedule</i>

TOTAL FOREIGN EXCHANGE OUTFLOW	<i>Investment + material input + debt service + wages + equity capital refund + profit/dividend transferred + others</i>
Investment	<i>Increase in fixed assets; from cash flow for financial planning, foreign flow schedule; IT</i>
Material input	<i>Raw materials + factory supplies + utilities + energy + spare parts + factory overhead costs (materials and services) + administrative overhead costs (materials and services); from total annual costs of products, foreign costs schedule, adjusted for finished products in stock; IT</i>
Debt service	<i>Repayment + interest</i>
Loan repayment	<i>Loan repayment; from cash flow for financial planning, foreign flow schedule</i>
Interest payable	<i>Interest payable; from cash flow for financial planning, foreign flow schedule</i>
Wages	<i>Labour + labour overheads + factory overhead costs, salaries/wages and social costs + administrative overheads, salaries/wages and social costs + direct marketing costs, salaries/wages + marketing overhead costs, salaries/wages; from total costs of products, foreign costs schedule, adjusted for finished products in stock; IT</i>
Equity capital refund	<i>Refunded (paid out) equity capital; from cash flow for financial planning, foreign flow schedule</i>
Profit/dividend transfer	<i>Dividends; from cash flow for financial planning, foreign flow schedule; IT</i>
Others	<i>Total cash outflow; from cash flow for financial planning, foreign flow schedule – investment (without IT deduction – material input (without IT deduction) – debt services – wages (without IT deduction) – dividends (without IT deduction)</i>
NET FOREIGN EXCHANGE FLOW	<i>Total foreign exchange inflow – total foreign exchange outflow</i>
Indirect foreign exchange inflows	<i>Importable outputs (savings) + exportable outputs + others</i>
Importable outputs (import substitution)	<i>Border price (CIF as approximation) of importable part of importable outputs; foreign exchange savings from producing output domestically rather than importing</i>

Exportable outputs (export diversion)	<i>Border price (FOB as approximation) of exportable part of exportable outputs; gain in foreign exchange by induced exports</i>
Others	<i>Benefits + merits</i>
Indirect foreign exchange outflows	<i>Importable inputs + exportable inputs + others</i>
Importable inputs (import substitution)	<i>Border price (CIF as approximation) of importable part of importable inputs; foreign exchange loss incurred by inducing imports</i>
Exportable inputs (export diversion)	<i>Border price (FOB as approximation) of exportable part of exportable inputs; foreign exchange sacrificed by diverting an input which otherwise would have been exported</i>
Others	<i>Costs + demerits</i>
NET FOREIGN INDIRECT EFFECTS	<i>Indirect foreign exchange inflows less indirect foreign exchange outflows</i>
NET FOREIGN EXCHANGE EFFECTS	<i>Net foreign exchange flow + net foreign exchange indirect effects</i>
COLUMNS OF SCHEDULE	
Grand total	<i>Sum of period columns for each line of schedule</i>
Present value	<i>Net present value for each line with period values discounted at the economic rate of discount</i>
Period columns	<i>Results for each project period</i>

3. Employment effects

The employment effects schedule provides indicators of employment creation for the project. It is of particular interest in countries experiencing high rates of unemployment or underemployment. This information supports the analysis regarding employment creation criteria.

Schedule: Employment effect

(from the Manual for Evaluation of Industrial Projects; in particular chapter II.B.4, tables)

Calculation rules:

LINES OF SCHEDULE	
DIRECT EMPLOYMENT WITHIN PROJECT	<i>See columns of schedule</i>
INDIRECT EMPLOYMENT	<i>Input-supplying project + output-using project</i>

Input supplying projects (suppliers upstream)	<i>See columns of schedule</i>
Output using projects (users downstream)	<i>See columns of schedule</i>
TOTAL EMPLOYMENT	<i>Direct employment within project + indirect employment created</i>
COLUMNS OF SCHEDULE	
Unskilled labour (UL)	<i>Number of unskilled jobs in reference year. Source: economic data input, indirect effects, employment effects</i>
Skilled labour (SL)	<i>Number of skilled jobs in reference year. Source: economic data input, indirect effects, employment effects</i>
Total (TL)	<i>Sum of unskilled labour and skilled labour in reference year. Source: economic data input, indirect effects, employment effects</i>
Investment (I)	<i>Total investment; Source: total investment; from summary sheet schedule</i>
Employment effect - unskilled labour	<i>Ratio $UL:I$</i>
Employment effect - skilled labour	<i>Ratio $SL:I$</i>
Employment effect - total labour	<i>Ratio $TL:I$</i>
Investment to wage ratio - unskilled labour	<i>Ratio $I:WU$, where WU is the wage bill for unskilled labour. Source: WU from unskilled labour in the total annual costs of products schedule</i>
Investment to wage ratio - skilled labour	<i>Ratio $I:WS$, where WS is the wage bill for skilled labour. Source: $WS = WT - WU$</i>
Investment to wage ratio - total labour	<i>Ratio $I:WT$; where WT is the wage bill for total labour. Source: WT from personnel in net income statement schedule</i>

4. Economic appraisal (cost-benefit analysis)

The economic costs and benefits attributable to a project over the planning horizon are determined. In the schedule and graph all values are expressed in terms of a selected economic unit of account (numeraire). The *Cost-benefit schedule* is derived from the *Discounted cash flow - total capital invested schedule*, which is based, essentially, upon the production and use of real goods and services (financial flows are not relevant).

The net present value is displayed for each line originating in the *Discounted cash flow - total capital invested schedule* and converted to economic value as described in chapter XII. The net present value is presented at several levels:

- Financial
- Adjusted market value (economic efficiency value)
- Adjusted market value + foreign exchange adjustment
- Adjusted market value + foreign exchange adjustment + indirect effects

Indirect effects are benefits and costs (merits and demerits) attributable to economic activities induced by the existence of the project under study.

The financial data sources are shown in the table describing the *Cost-benefit schedule*. Items transferred to the economic browser are converted from market price to economic value as described in chapter XII. Items not transferred to the economic browser are first converted to local currency at the shadow exchange rate (SER) and then to the numeraire at the official exchange rate of numeraire currency to local currency (OER). Such items expressed in local currency are converted directly by the OER. Some lines in the schedule may contain values which are a composite of items from the financial and economic sections of the input browser.

Schedule: Economic appraisal

Calculation rules:

LINES OF SCHEDULE	
CASH INFLOW	Σ inflow from operations, ..., indirect effects
Inflow from operations	Sales revenues + interest on short-term deposits
Sales revenues	Sales revenue; from production and sales programme schedule
Interest on short-term deposits	See chapter XI. O.
Other income	Sale of assets (see chapter XI. I)
Foreign loans	Σ disbursements of foreign loans selected for the economic browser (available only for project under study)

Indirect (external) effects	<i>Benefits (monetary) + merits (non-monetary) as defined in the corresponding indirect effects windows of the economic input browser (figure 106). All columns before IE are empty</i>
CASH OUTFLOW	<i>Σ increase in fixed assets, ..., indirect effects</i>
Increase in fixed assets	<i>Fixed investment + pre-production expenditures</i>
Fixed investment	<i>Total fixed investment; from total investment costs schedule</i>
Pre-production expenditures	<i>Total pre-production expenditures; from total investment costs schedule</i>
Increase in net working capital	<i>Increase in net working capital; from total investment costs schedule; increments of current assets and liabilities are valued at the adjusted prices of the underlying inputs and outputs</i>
Operating costs	<i>Operating costs from total annual costs of products schedule, adjusted for finished products in stock</i>
Marketing costs	<i>Direct marketing costs and marketing overhead costs from total annual costs of products schedule, adjusted for finished products in stock</i>
Foreign debt service	<i>Debt service from all foreign loans selected for the economic input browser: repayments + interest payable + other financial costs; from corresponding lines of the debt service, foreign currency loans schedule</i>
Corporate tax paid	<i>See chapter XI.P, under Income (corporate) tax</i>
Indirect effects (IE)	<i>Costs (monetary) + demerits (non-monetary) as defined in the corresponding indirect effects windows of the economic input browser (all columns before IE are empty)</i>
NET CASH FLOW	<i>Cash inflow less cash outflow</i>
IRR	<i>IRR for respective column (discount rate for which the NPV = 0)</i>
COLUMNS OF SCHEDULE	
Financial value (FV)	<i>Present value at the economic rate of discount (may be different from the discounting rate applied for financial analysis)</i>
Adjustment factor (AF)	<i>Adjusted market value divided by financial value</i>
Adjusted market value (AMV)	<i>Present value at the economic rate of discount of the adjusted market values</i>

Foreign currency exposure (FCE)	<i>Weighted average foreign currency exposure of all traded or tradable items, in percent</i>
Foreign exchange adjustment (FEA)	<i>Net present value at the economic rate of discount of the foreign exchange adjustment</i>
Economic value 1 (EV1), direct effects only	<i>Present value at the economic rate of discount of the economic values (AMV + FEA)</i>
Indirect effects (IE)	<i>Present value of the indirect effects at the economic rate of discount. For the indirect effects line the external costs and benefits, and merits/demerits, as defined in the subnodes of the indirect effects section of the economic analysis data structure, are discounted</i>
Economic value 2 (EV2), direct and indirect effects	<i>Present value at the economic rate of discount (AMV + FEA + IE)</i>

Chart: Net present values

Y-axis:	<i>Net present values: FV, AMV, EV1, EV2</i>
X-axis:	<i>Discounting rate</i>
Graph type:	<i>Line</i>
Source schedule:	<i>Economic appraisal</i>
Source line:	<i>NPV of financial value, adjusted market value, economic value excluding (EV1) and including (EV2) indirect effects</i>

Meaning: The effect of the conversion of financial values to economic values is displayed at four stages of development. The NPV of an economically acceptable project is positive (greater than zero) at the economic rate of discount.

XI. FINANCIAL CALCULATION RULES

The financial rules and algorithms describe the methods of calculating results and performance indicators. Some of the rules and algorithms pertain to the schedules, or results, offered by the program. Schedule titles and numbers correspond to those of the *Industrial Feasibility Studies Manual*, upon which they are based.

The definitions of program functions are supplementary to the more descriptive information on calculation rules contained in the discussions on schedules and graphs in chapter X and on data input (chapters VII and VIII). For a complete understanding of some of the financial calculation rules and algorithms it may be necessary, in some cases, to refer to the other chapters containing information on the function.

Unless explicitly defined otherwise, as in the case of some loan disbursements and repayments, it is assumed in all calculations that transactions (flow of funds/resources) occur on the last day of the period in which defined.

A. GENERAL RULES

In general, financial data is converted to account units at current prices according to the following procedure:

1. The exchange rate between the input currency and local currency is determined for the period taking into account any defined relative inflation between the two currencies (assumes devaluation follows relative inflation). The calculation rule is described in step 2 below.
2. The value of each item, except loans specified in foreign currency, is determined for each period by taking into account both inflation and price escalation, if specified. The calculation rules are described below (see XI.B, *Currency exchange rates and inflation*).
3. All items are converted to local currency at the current exchange rate of input currency to local currency, with the following exceptions:
 - Debt balance and debt service on ***loans expressed in foreign exchange*** are calculated in the input currency and then converted to local currency at the current exchange rate. This results in the possibility of exchange rate gains and losses (see XI.B, *Currency exchange rates and inflation*).
 - If **Inflation** and **Revaluation of fixed asset** are both active, the book value of assets (expressed in local currency) in each period is adjusted according to inflation in the local currency and depreciation is calculated on the revised value of the asset (see XI.B, *Currency exchange rates and inflation*).

$$P_{Lj} = P_{Ij} \times ER_{Lj}$$

P_{Lj}	Price in local currency L , period j
P_{Ij}	Price in input currency I , period j
ER_{Lj}	Current exchange rate, units L per unit I , period j

- Calculations are performed in local currency with the exceptions indicated above.
- All items are converted from local currency to accounting currency at the defined or initial exchange rate of accounting currency to local currency.

$$P_{Aj} = P_{Lj} \times ER_{AL0}$$

P_{Aj}	Price in accounting currency A , period j
P_{Lj}	Price in local currency L , period j
ER_{AL0}	Initial (defined) exchange rate, units A per unit L

- The value in step 5 is divided by the specified unit of the accounting currency (see chapter VII.I, *Currencies*).

B. CURRENCY EXCHANGE RATES AND INFLATION

Converting data expressed in currencies other than the accounting currency differs for analysis with and without inflation. In the conversions, three currencies are involved: the currency in which the input data is expressed (**I**), the local currency (**L**) and the accounting currency (**A**).

ANALYSIS WITHOUT INFLATION

The exchange rates remain constant during the defined planning horizon.

The exchange conversion factor ECF from **I** entries to **A** units without inflation is determined by:

$$ECF = ER_{LI} \times ER_{AL}$$

ER_{LI}	Exchange rate L to I
ER_{AL}	Exchange rate A to L
A	Accounting currency
I	Input currency
L	Local currency

$$P_A = P_I \times ECF$$

P_A	Price in accounting currency A
P_I	Price in input currency I

ANALYSIS WITH INFLATION

The exchange rate in any period of the planning horizon varies according to the inflation rates of the two currencies involved. A basic assumption of this model is that the long-term devaluation (or revaluation) of a currency follows its inflation relative to the other currency.

The inflation rate in percent (**R**) may be constant or variable. The inflation in each currency can be defined for each year in the planning horizon so that if **Inflation** is active, the exchange conversion factor can differ for each year. The factor **ECF_j** for any year **j** in the planning horizon from **I** entries to **A** units with inflation is determined as follows:

1. First, the input currency to local currency relative inflation factor **PR_j** is determined for each year **j**:

$$PR_j = \frac{1 + R_{L1}}{1 + R_{I1}} \times \frac{1 + R_{L2}}{1 + R_{I2}} \times \dots \times \frac{1 + R_{L(j-1)}}{1 + R_{I(j-1)}}$$

- L Local currency
- I Input currency
- PR_j Relative inflation factor, **L** relative to **I**, year **j**
- R_{Li} Inflation rate, currency **L** year **i**, %/100
- R_{Ii} Inflation rate, currency **I** year **i**, %/100
- j j= 2, 3, ..., n (first year not inflated)
- n Number of years in planning horizon

This product represents the inflation of the local currency relative to the input currency.

2. Using the above product for each year **j**, the current exchange rate (**ER_{LIj}**) between **L** and **I** is determined as follows:

$$ER_{LIj} = PR_j \times ER_{LI0}$$

- PR_j Relative inflation factor, **L** relative to **I**, year **j**
- ER_{LIj} Current exchange rate **L** to **I**, year **j**
- ER_{LI0} Defined exchange rate **L** to **I**
- j j = 2, 3, ..., n years

3. After converting input prices to the local currency* using the current exchange rate of **L** to **I** as in 2 above, the prices **P_{Lj}** are converted to the accounting currency **A** with the defined exchange rate **A** to **L**. Prices expressed in accounting currency are shown only in the results (schedules).

$$P_{Aj} = P_{Lj} \times ER_{AL0}$$

- P_{Aj} Current price in accounting currency, period **j**
- P_{Lj} Current price in local currency, period **j**
- ER_{AL0} Defined exchange rate **A** to **L**

* The conversion is described on next page under *C. INFLATION AND PRICE ESCALATION*; item 2.

C. INFLATION AND PRICE ESCALATION

GENERAL PRICING RULES

Price escalation (E) is the inflation in percent of a cost item relative to inflation of the currency in which its value is expressed. The price escalation should, therefore, reflect projected price changes relative to the general price index for the currency. If a currency is inflating, then the total price increase of an item expressed in that currency reflects both escalation and inflation. In any case, the rate of escalation should not duplicate the effect of currency inflation.

The current (inflated) price in local currency units for any year (period) **j** in the planning horizon is determined from the data entry in the input currency **I** as follows:

1. First, the current price in the input currency **I** is determined:

$$P_{CIj} = P_{Ej} (1 + R_1 + ((1 + E)^e - 1)) \times (1 + R_2 + E) \times \dots \times (1 + R_j + E)$$

- P_{CIj} Current (inflated) price in input currency **I**, period **j**
 e Escalator defined for first year in the DEFAULT window (see VII.F.3, under *Special features*);
 $e \geq 1$, for $e = 0$ COMFAR assumes $(1 + E)^e = 1$
 P_{Ej} Price entered in input currency **I**, period **j**
 R_j Inflation rate in year **j**, %/100
 E Defined rate of escalation, %/100
 j $j = 2, 3, \dots, n$ project years

2. The current price (P_{CIj}) is then converted to local currency **L** using the current exchange rate from **L** to **I**:

$$P_{Lj} = P_{CIj} \times ER_{Lj}$$

- P_{Lj} Current price in local currency **L**, period **j**
 P_{CIj} Current (inflated) price in input currency **I**, period **j**
 ER_{Lj} Current exchange rate **L** to **I**, period **j**

Inflation/escalation rates are specified by year terminating on a balance date. A partial year can occur at the beginning of the project. In this case it is necessary to specify the total inflation and/or escalation for the partial year only.

Prices are converted to accounting currency as shown above, *Currency exchange rates and inflation*. These values are available only in the results (schedules).

LOANS EXPRESSED IN FOREIGN CURRENCY

Loan balances and debt service for loans expressed in all currencies are first calculated in the currency in which defined. When **Inflation** is active, the model determines the current exchange rate based upon the relative inflation between the input currency **I** and the local currency **L**. The effect of this currency revaluation is threefold:

- Interest and fee payments are adjusted according to the current exchange rate between **I** and **L**.
- An exchange rate gain/loss results from the cumulative effect of repayments and disbursements designated in **I**.
- The restatement of the loan principal results in an exchange rate gain/loss.

The modified interest payments expressed in **L** are entered directly into the *Financial cash flow statement* and the *Net income statement*. The last two items are taken into account with an exchange rate gain/loss (ADJ_j) which appears in the *Balance sheet*. The gain/loss is determined after converting all loan parameters (balance, disbursements, repayments etc.) to local currency at the current exchange rate. The following equality, without ADJ_j , is established by calculating in the defined currency:

$$B_{j+1} = B_j + D_j - R_j + CI_j$$

Subsequently the loan parameters are converted to local currency at the current exchange rate and ADJ_j is determined as follows:

$$ADJ_j = B_{j+1} - (B_j + D_j - R_j + CI_j)$$

- ADJ_j Exchange rate gain (negative value) or loss (positive value)
- B_j Beginning balance, period **j**
- D_j Disbursement, period **j**
- R_j Repayment, period **j**
- CI_j Capitalized interest, period **j**

FIXED ASSETS

When **Inflation** and **Revaluation of fixed asset** are activated in the SPECIAL FEATURES modal window of **Project identification**, fixed assets are revalued according to inflation in the local currency.

1. First the inflation adjustment factor FI_j is determined for each year of the project:

$$FI_j = (1 + R_1) \times (1 + R_2) \times \dots \times (1 + R_{j-1})$$

- FI_j Inflation adjustment factor (price index), year **j**
- R_j Inflation rate, year **j**, %/100

2. The asset value in any year **j** is determined as follows:

$$V_j = V_i \times \frac{FI_j}{FI_i}$$

- V_j Asset value expressed in local currency, period **j**
 V_i Initial asset value in year **i** of acquisition expressed in local currency
 FI_j Inflation adjustment factor (price index), year **j**

Depreciation is calculated according to the selected type and conditions on the basis of the inflation-adjusted asset value for the period. The revaluation of assets in this manner results in an increase of the net worth and appears in the balance sheet as a separate line named *revaluation adjustment*.

D. DISCOUNTING, COMPOUNDING

Future (present) values are discounted (compounded) to represent present (future) values. Discounting and compounding are effectuated at the rates defined in the data entry sections. Discounted and compounded amounts are calculated assuming 360 days per year and 30 days per month. Values are discounted to the reference date (either the end of the first year or the beginning of the first project period) and compounded (in the case of the Modified IRR) to the end of the year following the last year of production.

The discounting or compounding factor $f(c/d)_m$ for any number of months **m** in the planning horizon with discount or compounding rate **dc**, %/100, is given by:

$$f(c/d)_m = (1 + dc)^{m/12}$$

- dc** Annual discounting or compounding rate, %/100
m (current date - reference date) in months = (number of days)/30

$f(c/d)_m > 1$ when **m** is positive (reference date < date)

$f(c/d)_m = 1$ when **m** or **dc** = 0

$f(c/d)_m < 1$ when **m** is negative (compounding rate)

The discounted or compounded amount for a number of months **m** is determined by:

$$A_m = \frac{A}{f(c/d)_m}$$

- A_m Discounted or compounded amount for **m** months
A Amount in month **m**
 $f(c/d)_m$ Discount/compound factor for **m** months
m **m** = 0, 1, 2, ... months of compounding or discounting

E. NET PRESENT VALUE, INTERNAL RATE OF RETURN

NET PRESENT VALUE (NPV)

The NPV is defined as the sum of the present (discounted) values of amounts in a series of periods. It is a method of aggregating amounts occurring in different periods of time in a common measuring unit, present value.

The NPV is computed as follows:

$$NPV = \sum_{j=1}^n DCF_j + DSV$$

$$DCF_j = \frac{A_j}{f(c/d)_j} \quad DSV = \frac{SV}{f(c/d)_n}$$

- DCF_j Discounted cash flow, period **j**
- DSV Discounted salvage value
- A_j Net of all positive and negative flows, period **j**
- n Number of periods in the planning horizon

The summation shown is applicable to discounting to the beginning of the first project period. When discounting to the end of the first project year, the first year amounts are not discounted:

$$DCF_j = \frac{A_j}{f(c/d)_{j-1}} \quad DSV = \frac{SV}{f(c/d)_{n-1}}$$

INTERNAL RATE OF RETURN (IRR)

The IRR is defined as the discount rate at which the NPV = 0. It can also be defined as the rate at which the investment or equity (depending upon the basis for the computation) generates net benefits.

The IRR may not be unique. The number of IRRs will be equal to the number of roots of the polynomial by which it is expressed, which result from changes in the periodic amounts from positive to negative (or the reverse). Another deficiency of the IRR is that there is an inherent assumption that all of the cash surpluses are reinvested at the IRR.

The IRR is the discount rate that satisfies the following equation:

$$NPV = 0$$

A search routine seeks the discount rate(s) for which the NPV = 0.

MODIFIED INTERNAL RATE OF RETURN (MIRR)

For the calculation of the Modified Internal Rate of Return (MIRR) an estimate of the average realistic reinvestment rate for surplus funds and a borrowing rate for deficits in effect over the planning horizon are assumed. The solution is unique.

The MIRR is determined as follows:

1. The future value **P** of all periodic surpluses is determined by summing the values of such surpluses compounded by the reinvestment rate to the year following the termination of production (year of recovery of residual value of assets).

$$P = \sum_{j=1}^n A_j^+$$

A_j^+ Net surplus value in any period compounded at the reinvestment rate

2. The present value **N** of all periodic deficits is determined by summing the values of such deficits discounted at the borrowing rate to the temporal reference point for the project.

$$N = \sum_{j=1}^n A_j^-$$

A_j^- Net deficit in any period discounted at the borrowing rate

3. The MIRR is determined by:

$$\text{MIRR} = \left(\frac{P}{N} \right)^{\frac{1}{n}} - 1$$

n Number of years in planning horizon

F. COMPOSITION OF CASH FLOWS

In the above calculations of NPV, IRR and MIRR, the rule for determining the value of the cash flow in period j , (A_j) differs according to the level of investment that is the basis for the calculation:

- Total investment
- Total equity
- Shareholder class (for joint venture projects)

The rules are defined in the most general form. Starting balances are included for an expansion/rehabilitation/privatization project; otherwise such terms are ignored.

CASH FLOW RELATED TO TOTAL CAPITAL INVESTED

$$CF_{TC} = -(FA_{SB} + CA_{SB} - CL_{SB}) + \sum_{j=1}^n NCF(TI)_j + RV_{n+1}$$

- FA_{SB} Total of fixed assets from starting balance (applicable only for day preceding start of construction phase)
- CA_{SB} Total of current assets from starting balance (applicable only for day preceding start of construction phase)
- CL_{SB} Total of current liabilities from starting balance (applicable only for day preceding start of construction phase)
- $NCF(TI)_j$ Net cash flow on total investment, period j (from *Discounted cash flow - total capital invested schedule*)
- RV_{n+1} Residual value in year after end of production phase (net of fixed assets, working capital and payment of outstanding debt)

$NCF(TI)_j$ is derived directly from the *Cash flow for financial planning schedule* by eliminating all financial transactions in each period j (equity, loan disbursements and repayments, interest and fees, dividends).

CASH FLOW RELATED TO TOTAL EQUITY INVESTED

$$CF_{TE} = -E_{SB} + \sum_{j=1}^n NCR(TE)_j + RV_{n+1}$$

- E_{SB} Starting balance equity
- $NCR(TE)_j$ Net cash return on total equity, period j (from *Discounted cash flow - total equity capital invested schedule*)
- RV_{n+1} Residual value in year after end of production phase (net of fixed assets, working capital and payment of outstanding debt)

$NCR(TE)_j$ is derived directly from the *Cash flow for financial planning schedule* by recalculating the value of NCF_j after expunging the total equity contribution and any dividends paid in each period in which such items appear (in effect, subtracting out the equity and adding back the dividends).

For expansion/rehabilitation/privatization projects the defined starting balances are used to create the initial balance for the project (day prior to start of construction

phase). A balancing amount is calculated which represents the retained profit/reserves. In some cases the user may find it appropriate to determine the values of the E_{SB} in an iterative process using the starting balance results taking into account that the net worth of the enterprise prior to commencement of the project is the sum of the defined E_{SB} and the calculated retained profit/reserves.

CASH FLOW OF SHAREHOLDER CLASS (JOINT VENTURE PARTNERS)

$$CF_{SEi} = -E_{SBi} + \sum_{j=1}^n [-ED_{ij} + ER_{ij} + PD_{ij} + OD_{ij}] + NW_i$$

E_{SBi}	Starting balance equity, shareholder class i
ED_{ij}	Equity paid-in (disbursement), class i period j
ER_{ij}	Equity reimbursement, class i period j
PD_{ij}	Preferred dividends, class i period j
OD_{ij}	Ordinary dividends, class i period j
NW_i	Net worth at end of project, shareholder class i

E_{SBi} is effective (as part of the defined starting balance) on the day prior to the start of the project.

For ongoing enterprises the defined initial equity for each shareholder class E_{SBi} should ultimately represent its ownership of a portion of the net worth at $t = 0$ (the starting balance date).

In negotiations for privatization, defining mutually acceptable values of assets and liabilities establishes the net worth, which is calculated as the balancing amount in the starting balance when all E_{SBi} are set to zero. The ownership of the net worth can then be defined by agreement between the parties and these values of E_{SBi} entered in the EQUITY windows as starting balance. These amounts do not necessarily equal the payment for shares by each partner. They may represent the opportunity cost (e.g. in the case of an existing partner).

The distribution of the net worth at the end of the project can be defined by agreement between the parties and the distribution values of NW_i entered in the PROFIT DISTRIBUTION window in the scrap period.

The starting balance should ultimately reflect the position of the enterprise after remittances for any new shares prior to the commencement of the project. For example, share proceeds may be used to reduce debt, to increase the cash position, purchase assets etc. After such adjustments any balancing amount in the starting balance is carried over into the project as retained profit/reserves or accumulated loss (negative balancing amount).

G. COST ALLOCATION

Cost allocation keys are used to allocate indirect costs when multiple products are defined (table 17). They are applicable when **Cost allocation** is active. In case **Cost center analysis** is active, the indirect costs assigned to the cost center are allocated only among the products associated with the cost center. A key can also be defined by the user in this case.

When **Cost allocation only** is active, all the allocation keys are available.

The default key in all cases depends on the default cost allocation key selected in the DEFAULTS MODAL WINDOW.

STANDARD, PRE-DEFINED ALLOCATION KEYS

All direct costs are derived from the schedule *Total costs of products* for a particular product (see chapter X). Cost allocation is calculated for the standard keys based on the cost data for each period (including the production startup periods).

ALLOCATION KEY	RULE FOR ALLOCATING INDIRECT COSTS
Direct cost	In proportion to direct costs for each product;
Direct factory cost	In proportion to direct factory cost for each product;
Direct material cost	In proportion to the total of raw materials + factory supplies for each product;
Direct labor cost	In proportion to the direct labor cost for each product;
Sales	In proportion to the sales revenue for each product;
Equally among products	Each product is allocated an equal share of indirect costs, i.e. $100/N$ is the percentage allocated to each product (N is the number of products).

Table 17: Standard keys for allocating indirect costs

USER-DEFINED KEYS

In this method the user specifies the percentage of indirect costs to be allocated to each product. User-defined keys are constant over the project planning horizon.

H. DEPRECIATION

In all methods the value of the asset depreciated is determined as the value defined in each period converted to local currency at the current rate of exchange between the currency in which the asset is denominated and the local currency. Four methods are included in the model:

- Linear to zero
- Linear to scrap
- Accelerated (declining balance)
- Sum of years digits

These methods are described in chapter VII.N.

LINEAR TO ZERO

$$SV = IBV \times \frac{SVR}{100}$$

$$M = \text{integral part of } \left[\frac{(IBV - SV) \times L}{IBV} - \frac{m_1}{12} + 1 \right]$$

$$D_1 = \frac{IBV}{L} \times \frac{m_1}{12}$$

$$D_j = \frac{IBV}{L}$$

$$RBV_1 = IBV - D_1$$

$$RBV_j = RBV_{j-1} - D_j$$

$$D_{M+1} = RBV_M - SV$$

D_j	Depreciation in year j
IBV	Initial book value
L	Total length of depreciation in years and month
m_1	Number of month in first depreciation year (may be a partial year)
RBV_j	Remaining book value at end of year j
SVR	Salvage value rate (percent of initial book value)
SV	Salvage value
j	$j = 2, \dots, M$ years

LINEAR TO SCRAP

$$SV = IBV \times \frac{SVR}{100}$$

$$M = \text{integral part of } \left[L - \frac{m_1}{12} + 1 \right]$$

$$D_1 = \frac{IBV - SV}{L} \times \frac{m_1}{12}$$

$$D_j = \frac{IBV - SV}{L}$$

$$RBV_0 = IBV$$

$$RBV_j = RBV_{j-1} - D_j$$

$$D_{M+1} = RBV_M - SV$$

- D_j Depreciation in year j ($j = 1$ is partial year)
- IBV Initial book value
- L Total length of depreciation in years and month
- m_1 Number of month in first depreciation year (may be a partial year)
- RBV_j Remaining book value at end of year j
- SVR Salvage value rate (percent of initial book value)
- SV Salvage value
- j $j = 2, \dots, M$ years

ACCELERATED DEPRECIATION

If the following condition prevails in a year of the project j , the formula for accelerated depreciation (1) is applicable; otherwise the linear to scrap formula (2) applies:

$$DA_j > \frac{RBV_{j-1} - SV}{RL_j}$$

$$RL_j = L - j - \frac{m_1}{12} + 1$$

1. Phase of accelerated depreciation:

$$DA_1 = IBV \times \frac{DR}{100} \times \frac{m_1}{12}$$

$$RBV_1 = IBV - DA_1$$

$$DA_j = RBV_{j-1} \times \frac{DR}{100}$$

$$RBV_j = RBV_{j-1} - DA_j$$

2. Phase of linear to scrap:

The calculations for the years in which this method is applicable according to the above criterion are identical to linear to scrap described above.

DA_j	Accelerated depreciation, year j
DR	Accelerated depreciation rate, %
IBV	Initial book value
L	Total length of depreciation in years and month
m_1	Number of month in first depreciation year (may be a partial year)
RBV_j	Remaining book value, end of year j
RL_j	Remaining length of depreciation
SV	Salvage value
j	$j = 2, \dots, L$ years

SUM OF YEARS DIGITS

$$L = Y + \frac{m}{12}$$

$$SODL = \frac{(Y+1) \times \left(Y + \frac{2 \times m}{12} \right)}{2}$$

Intermediate depreciation for $m = 0$:

$$D_j = \frac{L - j + 1}{SODL} \times (IBV - SV)$$

Intermediate depreciation for $m > 0$:

$$SODL_{adj} = \frac{(Y+1) \times Y}{2}$$

$$D_1 = \frac{L}{SODL} \times \frac{m}{12} \times (IBV - SV)$$

$$D_j = \frac{Y - j + 2}{SODL_{adj}} \times (IBV - D_1 - SV)$$

Depreciation for $m_1 \leq m$:

$$DS_1 = D_1 \times \frac{m_1}{m}$$

$$DS_j = D_{j-1} \times \frac{(m - m_1)}{12} + D_j \times \frac{12 - (m - m_1)}{12}$$

Depreciation for $m_1 > m$:

$$DS_1 = D_1 + D_2 \times \frac{(m_1 - m)}{12}$$

$$DS_j = D_j \times \frac{(m_1 - m)}{12} + D_{j+1} \times \frac{12 - (m_1 - m)}{12}$$

$$RBV_j = RBV_{j-1} - DS_j$$

$$RBV_0 = IBV$$

DS_j	Depreciation in year j
D_j	Intermediate depreciation in year j
IBV	Initial book value
SV	Salvage value
L	Total length of depreciation in years and months
Y	Length of depreciation in years
m	Additional length of depreciation in months
m_1	Number of month in first depreciation year (may be a partial year)
RBV_j	Remaining book value in year j , $j = 1, 2, \dots, L$
$SODL$	Sum of digit divisor (see chapter VII.L)
$SODL_{adj}$	Adjusted sum of digit divisor

I. SALE OF ASSETS, EXTRAORDINARY INCOME/LOSS

When an asset is sold, any difference between the sales price and the book value in the period sold is counted as **Other income** (or loss) in the *Net income* and *Cash flow statements*. Any value up to and including the book value is treated as return of capital. The book value of all assets at the end of the production phase is counted as return of capital automatically in the year following termination of production as the default condition (see chapter VII.N, under *Sale of asset*).

J. PRODUCTION COSTS

All production cost schedules are based upon the cost of products produced in the period, determined from the products in stock and the projected sales quantity S_j defined in the SALES PROGRAMME window for each product and for each period j . The valuations of all working capital items, with the exception of finished products and accounts receivable (based on cost of product sold), are based upon the cost of products produced (CPP), determined from the production quantity P_j derived from S_j and inventory requirements (see XI.L, *Sales and production programme*).

STANDARD PRODUCTION COSTS AT NOMINAL CAPACITY

The nominal (reference) capacity PC represents the number of units for which standard costs are defined in the PRODUCTS window for each product, normally for the maximum level of sales in any year. The fixed cost for an item is independent of S_j (or P_j) and is calculated as the defined percentage of total standard cost plus adjustments. The variable cost for an item associated with a particular product for a period j is a linear function of S_j (or P_j) plus adjustments.

$$SC_j = Q \times C_j$$

$$A_j = Q_{aj} \times C_{aj}$$

$$FC_j = f \times SC_j + f_{aj} \times A_j$$

$$VC_j = \frac{v \times SC_j \times S_j(P_j)}{PC} + v_{aj} \times A_j$$

FC_j	Fixed cost of item, period j
f	Fixed cost percentage, %/100
v	Variable cost percentage, %/100
f_{aj}	Fixed cost percentage, adjustment period j , %/100
v_{aj}	Variable cost percentage, adjustment period j , %/100
Q	Standard quantity
C_j	Standard price*
Q_{aj}	Adjustment quantity, period j
C_{aj}	Adjustment price, period j
A_j	Adjustment, period j
SC_j	Standard cost of an item*
SVC	Standard variable cost of item
VC_j	Variable cost of item, period j
$S_j(P_j)$	Sales (or production) quantity, period j
PC	Nominal capacity as defined in PRODUCTS window
j	$j = 1, 2, \dots, n$ production periods

* Although the standard price is defined for all periods, the subscript j is included to allow for inflation and/or price escalation.

The fixed and variable costs for a product are the totals of the fixed and variable costs for all cost items defined for the product. For a production period of less than one year **FC** is adjusted by the ratio $m/12$, where m is the number of months in the period (only valid for the **SC** part of the formula) .

STANDARD PRODUCTION COSTS PER UNIT OF OUTPUT

In this method the standard fixed cost for an item is defined in the data entry as an absolute value and is constant for all production years. The total fixed cost in each period is the sum of the standard fixed cost plus adjustments. The variable cost for an input item in any year **j** (**VC_j**) is a linear function of **S_j** (or **P_j**) plus adjustments:

$$VC_j = Q \times C_j \times S_j(P_j) + A_j \times v_{aj}$$

- VC_j** Variable cost for item, period **j**
- Q** Quantity per unit of output
- C_j** Price*
- S_j(P_j)** Sales (or production) quantity, period **j**
- v_{aj}** Variable cost percentage, adjustment period **j**, %/100
- A_j** Adjustment, period **j**

For a production period of less than one year, fixed costs are adjusted by the ratio $m/12$ where **m** is the number of months in the period.

$$FCT_j = FC + A_j \times f_{aj}$$

$$FCT'_j = FC \times \frac{m}{12} + A_j \times f_{aj}$$

- FCT_j** Total fixed cost, period **j**
- FCT'_j** Total fixed cost, period of less than one year
- FC** Fixed cost as defined in STANDARD COST WINDOW
- f_{aj}** Fixed cost percentage, adjustment period **j**, %/100
- A_j** Adjustment, period **j**
- m** Number of months in partial year

COST ADJUSTMENTS

Adjustments **A_j** for cost items are defined in terms of quantity (**Q_j**) and price (**C_j**) for each production period .

$$A_j = Q_j \times C_j$$

- A_j** Absolute adjustment, period **j**
- Q_j** Adjustment quantity, period **j**
- C_j** Adjustment price, period **j**
- j** $j = 1, 2, \dots, n$ production periods

K. NET WORKING CAPITAL

The value of working capital elements in each production period is based either upon the cost of products produced (CPP) or the cost of products sold (CPS). With the exception of finished product inventory, which is calculated in the algorithm relating the sales and production programmes (see below), the inventory items can be calculated in terms of units or value as selected in the SPECIAL FEATURES modal window of the PROJECT IDENTIFICATION window.

A summary of the basis for each inventory item and the applicable calculation modes are shown in table 18. The items for which starting balances (SB) and initial stock (IS) are applicable are also shown (indicated with x). More detailed descriptions of the respective calculation rules are provided below.

ITEM	BASIS	UNITS [*]	VALUE [*]	SB	IS
FIP	CPS(OC)	$(S_j/c) \times UV_j$	N/A	x	N/A
A/R	CPS(OC + MKT)	N/A	B_j/c	**	N/A
WIP	CPP(FC)	N/A	B_j/c	x	N/A
MAT	CPP(RM, FS, UT, EN, SP)	$[(P_j \times Q_j)/c] \times UV_j$	B_j/c	x	x
CIH	CPP(OC – MAT)	N/A	B_j/c	x	N/A
A/P	CPP(RM, ..., MKT)	N/A	B_j/c	**	N/A

Table 18: Working capital items, basis for calculations

FIP	Finished product
A/R	Accounts receivable
WIP	Work in progress
MAT	Materials: raw materials (RM), factory supplies (FS), utilities (UT), energy (EN) and spare parts (SP)
CIH	Cash-in-hand
A/P	Accounts payable
CPS	Cost of products sold
CPP	Cost of products produced
OC	Operating cost
MKT	Marketing costs
FC	Factory cost
RM	Raw materials
FS	Factory supplies
SP	Spare parts
c	Coefficient of turnover (see below)
UV_j	Unit value, period j (see below)

* Required amount of working capital item, period j (see algorithms for actual calculations of working capital items).

** Starting balances for these items not included in algorithm; A/R collected and A/P paid as defined in STARTING BALANCE window.

S_j	Quantity of sales, period j
P_j	Quantity produced, period j
Q_j	Number of material units per item of production
B_j	Basis, period j
SB	Starting balance
IS	Initial stock

CPS and CPP are determined by inserting the quantities S_j and P_j , respectively, for each period j in the production phase as described in chapter X.C.3, *Production costs*.

Generally the unit values are determined by dividing the basis by S_j or P_j as applicable. The unit value for starting balances of finished products is the defined price. The basis for material items includes possible adjustments in each period so that the unit value is determined as the weighted average price of standard and adjustment quantities:

$$UV = (C_j \times Q_j + C_j' \times Q_j') / (Q_j + Q_j')$$

C_j	Price of standard units
C_j'	Price of adjustment units
Q_j	Quantity, standard units
Q_j'	Quantity, adjustment units

Algorithms are included in the model for calculating working capital requirements on the basis of quantity (units) or value. In both algorithms working capital items are valued at current prices.

QUANTITY (UNITS) ALGORITHM

The algorithm for calculating working capital requirements based upon units (quantity) is applicable only to finished products inventory and material items. Finished product inventories are calculated in accordance with the algorithm described in the next section. Work-in-progress inventories, however, are not defined in terms of quantity in this model.

The quantities of initial stocks and starting balances are taken into account.

Definition of initial stock and starting balance

Initial stock can be defined for each period of the construction phase for the following production cost items:

- Raw materials
- Factory supplies
- Utilities
- Energy
- Spare parts

In general, the initial quantity of an item is the sum of the total of initial stock and the starting balance. As seen in table 17, this condition arises only for material items.

$$IQ_i = SB_i + \sum_{j=1}^p IS_{ij}$$

IQ_i	Initial quantity (initial stock + starting balance), item i
SB_i	Starting balance, item i
IS_{ij}	Initial quantity of stock, item i period j
p	Number of construction phase periods
i	$i = 1, 2, \dots, k$ items

Starting balances for the above items and for finished product inventory (see next section) are defined in terms of quantity for expansion/rehabilitation projects. The starting balance for finished product inventory is defined in the STARTING BALANCES window. Starting balances for the material items are defined in their respective PRODUCTION COST windows.

Coefficient of turnover

The coefficient of turnover is the calculated number of rotations of the working capital item in a period.

$$c = \frac{360 \times (m/12)}{Mdc} = \frac{30 \times m}{Mdc}$$

c	Coefficient of turnover
m	Length of production period, months
Mdc	Days coverage, $Mdc > 0$

Working capital requirement per period

The working capital requirement per period calculated by the system during the production phase is automatically reduced by the total initial quantity (IQ_i) of each appropriate item. The reduction takes place at the earliest possible period of the production phase.

The required stock for material item **i** (in terms of quantity) at the end of each period **j** of the production phase, RS_{ij} , is determined by:

$$RS_{ij} = \frac{S_j(P_j) \times Q_{ij}}{c_i}$$

RS_{ij}	Required stock, item i period j
$S_j(P_j)$	Sales (or production) quantity, period j
Q_{ij}	Quantity per unit of production, item i period j
c_i	Coefficient of turnover, item i (finished product, raw materials, factory supplies, utilities, energy and spare parts)
i	$i = 1, 2, \dots, k$ items
j	$j = 1, 2, \dots, n$ production periods

The quantity of an inventory item per unit of production Q_{ij} is defined in the data input in either of two modes, **at nominal capacity** or **per unit of output**. In the first mode the product $P_j \times Q_{ij}$ is provided by the input data (Q_{ij} is then determined); in the second

the quantity Q_{ij} is provided directly. The quantity may vary over periods if entries in the ANNUAL ADJUSTMENTS list box of the PRODUCTION COST window are not constant.

The increment or decrement of the quantity of a material item is determined as follows:

$$WCQ_{i0} = IQ_i$$

$$X_{ij} = WCQ_{i,j-1} - P_j \times Q_{ij}$$

$$\text{For } X_{ij} > RS_{ij}, WCQ_{ij} = X_{ij}$$

$$X_{ij} \leq RS_{ij}, WCQ_{ij} = RS_{ij}$$

- WCQ_{i0} Working capital quantity, item **i** at start of production phase
- IQ_i Initial quantity of stock, item **i**
- X_{ij} Balance of item **i** after accounting for current production, period **j**
- WCQ_{ij} Inventory requirement, item **i** at end period **j**
- P_j Production quantity, period **j** (product)
- Q_{ij} Quantity per unit of production, item **i** period **j**
- RS_{ij} Required stock, item **i** period **j** (see above)
- i** **i** = 1, 2, ..., k items
- j** **j** = 1, 2, ..., n production periods

The inventory level is the maximum of the required stock RS_{ij} and the quantity of remaining stock after taking into account current production requirements.

The incremental value of working capital for the item is determined as follows:

$$\delta WCV_{ij} = WCQ_{ij} \times C_{ij} - WCQ_{i,j-1} \times C_{i,j-1} = WCV_{ij} - WCV_{i,j-1}$$

- δWCV_{ij} Increment/decrement in working capital value, item **i** period **j**
- WCQ_{ij} Working capital quantity, item **i** period **j**
- C_{ij} Price, item **i** period **j**
- WCV_{ij} Working capital value, item **i** period **j**

TOTAL VALUE ALGORITHM

Calculation of working capital requirements based upon value is applicable to all items with the exception of finished products inventory. The value of **SB** is applicable for **WIP**, **MAT** and **CIH**. The value of **IS** is applicable only for **MAT** items (see table 18).

Definition of initial stock and starting balance

Initial stock can be defined for each period of the construction phase for the following production cost items:

- Raw materials
- Factory supplies
- Utilities
- Energy
- Spare parts

In general, the total initial value of stock of an item is the sum of the initial value of stock and the starting balance.

$$IVT_i = +SB_i + \sum_{j=1}^p IV_{ij}$$

IV_{ij}	Initial value of stock, item i period j
IVT_i	Total initial value of stock, item i
SB_i	Value of starting balance, item i
p	Number of construction phase periods
i	$i = 1, 2, \dots, k$ items

Starting balances for the above items and for finished product inventory (see next section) are defined in terms of value for expansion/rehabilitation projects. Starting balances for the material items are defined in their respective PRODUCTION COST windows.

Coefficient of turnover

The coefficient of turnover is the calculated number of rotations of the working capital item in a period.

$$c = \frac{360 \times (m/12)}{Mdc} = \frac{30 \times m}{Mdc}$$

c	Coefficient of turnover
m	Length of production period, months
Mdc	Days coverage, $Mdc > 0$

Requirement per period

The working capital requirement per period calculated by the system during the production phase is automatically reduced by the initial value of the item (IVT_i). The reduction is effectuated at the earliest possible period of the production phase.

The required value of the working capital item **i** at the end of each period **j** of the production phase, RV_{ij} , is determined by:

$$RV_{ij} = \frac{B_{ij}}{c_i}$$

RV_{ij}	Required value of stock, item i period j
B_{ij}	Basis, item i period j
c_i	Coefficient of turnover, item i
i	$i = 1, 2, \dots, k$ items
j	$j = 1, 2, \dots, n$ production periods

The increment or decrement of the value of a working capital item is determined as follows:

$$WCV_{i0} = IV_i$$

$$X_{ij} = WCV_{i,j-1} - B_{ij}$$

$$\text{For } \begin{cases} X_{ij} > RV_{ij}, & WCV_{ij} = X_{ij} \\ X_{ij} \leq RV_{ij}, & WCV_{ij} = RV_{ij} \end{cases}$$

WCV_{i0} Working capital value, item i at start of production phase

$WCV_{i0} = 0$ for A/R and A/P

IV_i Initial value, item i

X_{ij} Balance of item i after accounting for current production, item i period j

WCV_{ij} Inventory value, item i at end period j

B_{ij} Basis, item i period j

RV_{ij} Required value, item i period j (see above)

$i = 1, 2, \dots, k$ items

$j = 1, 2, \dots, n$ production periods

The incremental value of the working capital item is determined as follows:

$$\delta WCV_{ij} = WCV_{ij} - WCV_{i,j-1}$$

δWCV_{ij} Increment/decrement in working capital value, item i period j

WCV_{ij} Working capital value, item i period j

For working capital assets (liabilities) an increment is a use (source) of funds in the cash flow statement; a decrement appears as part of other income (except for a decrease of finished products in stock, which are assumed to be sold) and is a source of funds. In the above algorithm the initial stock is consumed during the earliest possible production period(s).

CHANGE IN NET WORKING CAPITAL

In each production phase period the values for each of the current asset items (**MAT**, **WIP**, **FIP**, **CIH** and **A/R**) are added to determine the total current assets and the values for all current liabilities (**A/P**) are added to determine the total current liabilities. The incremental values are determined as follows:

$$NCA_j = \sum_{i=1}^a WCV_{ij}$$

$$NCL_j = \sum_{i=1}^l WCV_{ij}$$

$$\delta NCA_j = NCA_j - NCA_{j-1}$$

$$\delta NCL_j = NCL_j - NCL_{j-1}$$

WCV_{ij}	Working capital value, item i period j
NCA_j	Net current assets, period j
NCL_j	Net current liabilities, period j
δNCA_j	Increase/decrease of current assets, period j
δNCL_j	Increase/decrease of current liabilities, period j
a	Number of current asset items
l	Number of current liability items
j	$j = 1, 2, \dots, n$ production phase periods

In the cash flow results (schedules) an increase in current assets appears as a cash outflow (investment). A decrease appears as a "negative outflow" to reflect the liquidation of the assets. An increase in current liabilities appears as a cash inflow (part of short-term finance).

ACCOUNTS RECEIVABLE

The basis for calculation of accounts receivable is **CPS (OC + MKT)** (see table 18), which may be comprised of costs of both local and foreign origin. With the exception of starting balances of receivables, an increment/decrement in foreign or local receivables results in a flow of funds based upon the structure of the underlying costs (not the market in which sold). Receivables defined as starting balance are collected at the specified point in time in the designated market.

L. SALES AND PRODUCTION PROGRAMME

A relationship exists between the sales and production programmes for each year of the production phase. Finished products inventories are included in the model which uses any defined starting balances as early as possible in the production phase. The algorithm differs depending on whether or not the default settings (beginning to end of the production phase) define the duration of production for a particular product. The following procedures apply to each product depending upon the defined production interval, which can be either the default setting (entire production phase) or user-defined.

Fixed cost are computed only for the production period defined for a product in the PRODUCTS window. However, it is possible to specify within the defined production phase years without sales, e.g. in the case of a major shut-down due to maintenance. In this case the model carries forward the finished goods in stock until sales start again. Accordingly, variable production costs are zero for a period without sales/production; however, fixed costs are charged although there is no production during such periods. (To avoid charging of fixed costs in production-free periods, use the *Annual Adjustments* as described in VII.O.2)

PRODUCTION PHASE - DEFAULT SETTING

When the beginning and end of production of an item are the same as the beginning and end of the production phase (i.e. the default settings), the production programme is determined on the basis of sales:

Sales period extending till the end of production phase

$$c = \frac{(30 \times m)}{Mdc}$$

$$RS_j = \frac{S_j}{c}$$

$$B_0 = 0 \quad \text{and} \quad B_j = C_{j-1}$$

$$C_0 = B_1 = SB$$

$$X_j = B_j - S_j$$

$$\text{For } X_j > RS_j, C_j = B_j - S_j$$

$$X_j \leq RS_j, C_j = RS_j$$

$$P_j = S_j - B_j + C_j$$

- c Coefficient of turnover
- m Number of months in period
- Mdc Days coverage, finished product
- RS_j Required stock, period **j**
- S_j Sales quantity, period **j** (from input data)
- SB Starting balance (finished products)
- B_j Stock brought forward (starting balance), period **j**
- C_j Stock carried over (ending balance), period **j**
- P_j Production quantity, period **j**

The ending finished goods inventory C_n is sold automatically in the year (n + 1).

Sales period ending before the end of the production phase

The model attempts to reduce the production in the year(s) before the last year of sales. This algorithm is valid only if the following condition holds. Otherwise, all sales quantities originate from the starting balance **SB**:

$$SB \leq \sum_{j=1}^n S_j$$

- n Number of production periods

The definition of the required stock in period **j**, RS_j , is modified as follows:

$$RS_j = \min \left(\frac{S_j}{c}, \sum_{i=j+1}^n S_i \right)$$

Either of two conditions are considered in determining P_j :

1. For any period in which $S_j < B_j$:

$$\begin{aligned} C_j &= B_j - S_j \\ P_j &= 0 \end{aligned}$$

2. For any period in which $S_j \geq B_j$:

$$\begin{aligned} C_j &= RS_j \\ P_j &= S_j + RS_j - B_j \end{aligned}$$

USER-DEFINED PRODUCTION INTERVAL

Production levels are calculated only for the periods within the specified interval of production. If sales are specified for periods not within the interval, they are calculated only to the extent available from stocks of finished goods inventory.

For any period not within the interval:

$$\begin{aligned} S_j &\leq B_j \\ C_j &= (B_j - S_j) \geq 0 \end{aligned}$$

M. FINANCE

1. Equity/risk capital

For each class of equity capital, the amount accumulated in any project period AEC_p , is the sum of the paid-in or paid-out equity in period up to and including period p :

$$AEC_p = \sum_{j=1}^p EC_j$$

AEC_p Accumulated equity capital to period p

EC_j Equity capital period j

p $p = 1, 2, \dots, n$

The total disbursement of any class of equity capital, TD , is the accumulated value up to the last project year n .

$$TD = \sum_{j=1}^n EC_j$$

n Number of project periods

The rules for distribution of dividends to various shareholder classes are described in section Q, *Dividends*.

2. Long- and medium-term loans

Every loan has a disbursement and a repayment phase. The disbursement phase precedes the repayment phase. The start of the repayment phase is defined in chapter VII.R.2.

For an expansion/rehabilitation project, the starting balance of the loan is defined in the LOAN window of the SOURCES OF FINANCE structure in the input browser. The disbursement phase may not exist for expansion/rehabilitation projects; existing loans are repaid using one of the repayment options.

With the exception of loans denominated in foreign currency, all calculations are performed in local currency. Loans denominated in foreign currency are calculated first in the foreign currency and then converted to the local currency at the current exchange rate (see chapter XI.A above). When inflation/revaluation is defined between the currency in which the loan is designated and the local currency, exchange rate gains/losses occur which have an impact on the debt service and the balance outstanding on the loan. The sum of the debt balance adjustment and the principal repayment adjustment appear in the *Balance sheet*. The adjustments to financial costs (interest, fees) appear in the *Total debt service schedule*.

DISBURSEMENT PHASE

Entry of positive amounts (disbursements) and negative amounts (repayments) are permitted during this phase. Every disbursement or repayment occurs in an amount and at a date specified in the input data.

Interest can be capitalized during the disbursement phase (including any period of grace), in which case the interest is treated as a disbursement. Both the loan balance (for the particular loan) and pre-production expenditure are increased by the amount of interest (in the *Discounted cash flow - total capital invested schedule* the interest is not included as part of the investment).

Disbursements

The total disbursement (**TDI**) is the loan principal at the end of the disbursement phase.

$$\text{TDI} = \sum_{j=1}^n (\text{DI}_j - \text{RP}_j) + \sum_{j=1}^n \text{CI}_j$$

n	Number of periods in disbursement phase
DI _j	Disbursement, period j
RP _j	Repayment, period j
CI _j	Capitalized interest, period j

The debt outstanding for loans designated in both local and foreign currency at the end of a period j of the disbursement phase (**DB_j**) is the sum of disbursements and reimbursements and capitalized interest up to the period.

$$DB_j = \sum_{i=1}^j (D_i - R_i) + \sum_{i=1}^j CI_i$$

DB_j	Debt balance of loan, period j
D_i	Disbursement, project period i
R_i	Reimbursement, project period i
CI_i	Capitalized interest, period i

The definition of the termination of the disbursement phase depends upon the type of loan as shown in table 19.

TYPE OF LOAN	TERMINATION DATE OF DISBURSEMENT PHASE
Annuity	One repayment period before <i>first repayment</i> (loans window)
Constant principal	Day before <i>first repayment</i> (loans window)
Profile	Not applicable

Table 19: Termination dates for disbursement phase

Interest during the disbursement phase

For annuity and constant principal loans the interest due or payable dates are determined regressively from the first repayment date specified in the input data according to the length of the selected repayment period (yearly, half yearly, quarterly, monthly). The date of the first repayment date is specified in the format **dd/mm/yyyy** where **dd** always represents the last day of a month, because it is assumed that the payment is made at the end of a month. Consequently, the interest payable dates also fall on the last day of a month. However, the disbursements and the effective dates for interest rates can occur on any date.

The dates on which interest is payable for profile loans are determined regressively and progressively from the **Month interest paid** specified in the LOANS window and the repayment period.

Interest is calculated on the outstanding debt DB_j , the accumulation of disbursements, repayments and capitalized interest up to a repayment interval j during the disbursement phase, the length of which is defined in the LOAN window (see above). When the interest is calculated it is either converted to a current liability account (interest payable) or capitalized.

The following method describes the calculation of interest payable at the end of a repayment interval. Sub-intervals are delimited by the occurrence of either a change in the interest rate or a change in the loan balance (disbursement/repayment), in which case the value of m below refers to the length of the sub-interval in months and d refers to the days in excess of the integral number of months, assuming 30 day months. For example, the period 15 January to 20 April is 3 months and 5 days.

Interest on loans denominated in foreign currency is first calculated in the foreign currency and then converted to local currency at the current rate of exchange between the

foreign and local currencies. The currency revaluation can involve a loss or gain for the project which is reflected in net income and in the financial flows.

$$IP_j = DB_{j-1} \times IR$$

$$IR = I_A \times \left(\frac{m}{12} + \frac{d}{360} \right)$$

IP_j	Interest payable, interval j
DB_j	Outstanding debt, end interval j
m	Integral number of months in interval
d	Number of days in excess of integral number of months
I_A	Annual interest rate, %/100
IR	Interest rate applicable for the period

REPAYMENT PHASE

The repayment phase starts the day after the termination of the disbursement phase (see above). For an annuity loan the repayment phase begins at a date determined by:

- Specified date of first repayment (**DFR**)
- Loan repayment period (**LP** in years, half years, quarters, months)

Repayments are calculated automatically for annuity and constant principal loans. For profile loans, the repayments must be specified as negative amounts in selected periods.

For annuity and constant principal loans, the date for each loan repayment DR_i for each of the repayments (numbered i) is determined by:

$$DR_i = DFR + LP \times (i - 1)$$

$$i = 1, 2, \dots, RP$$

RP	Number of repayments
DR_i	Date of repayment i
DFR	Specified date of first repayment
LP	Length of repayment period in months (year, half year, quarter, month)

When **DFR** is defined, the month interest is paid as displayed in the **LOANS** window is changed automatically to conform to the **DFR** and cannot be changed. **Month interest paid** can be selected only for a profile loan.

The following rules apply to loans denominated in local currency. For loans denominated in foreign currency, when relative inflation/revaluation is defined between the local and foreign currency, adjustments for interest payments, principal repayments and the debt balance are included in the financial schedules (see *Foreign currency loans* below).

Constant principal

For a constant principal loan the repayment phase starts at the defined date of first repayment. All principal repayments are equal.

$$R = \frac{DB_n}{RP}$$

R	Repayment amount
DB_n	Debt at end of the disbursement phase
RP	Number of repayments

Interest during the repayment phase is calculated on the basis of the ending loan balance for each period:

$$IP_j = DB_{j-1} \times IR$$

$$DB_0 = DB_n$$

$$IR = I_A \times \frac{LP}{12}$$

$$DB_j = DB_{j-1} - R$$

IP_j	Interest payable, payment period j
DB_j	Debt balance at end payment period j
DB_0	Initial debt balance, start of repayment phase
DB_n	Debt at end of the disbursement phase
IR	Applicable interest rate
I_A	Annual interest rate, %/100
LP	Length of repayment period in months (year, half year, quarter, month)
R	Repayment amount

Annuity

For an annuity loan the repayments are constant and consist of both principal and interest. The interest portion declines and the principal portion increases in time.

The periodic payment **A** is a function of the period interest rate **IR**, the number of periods **RP** and the period length **LP** in months.

$$A = DB_n \times \frac{IR \times (1 + IR)^{RP}}{(1 + IR)^{RP} - 1}$$

$$IR = I_A \times \frac{LP}{12}$$

A	Annuity payment, principal and interest
DB_n	Debt at end of disbursement phase
IR	Applicable interest rate
I_A	Annual interest rate, %/100
LP	Length of repayment period in months (year, half year, quarter, month)
RP	Number of repayment periods

For each period of the repayment phase i , the interest payable, IP_i is determined by

$$IP_i = DB_{i-1} \times IR$$

The repayment of principal R_i is the balance of the periodic payment A .

$$R_i = A - IP_i$$

The above formulas are valid only if $I \neq 0$. If $I = 0$, the calculations are based upon the constant principal formulas.

Profile

The repayment phase is not defined for a profile loan. Disbursements and repayments can occur at any point in the planning horizon. Calculation of interest is identical to that for the disbursement phase as described above.

Interest payments can be specified for any month (last day). The interest payable dates are defined regressively and progressively from the month interest is paid in accordance with the repayment interval for all periods in which a loan balance exists. Interest is paid only in the specified month and not necessarily coincident with any payment.

Foreign currency loans

Interest on loans denominated in foreign currency is first calculated in the foreign currency and then converted to local currency at the current rate of exchange between the foreign and local currencies. The currency revaluation can involve a loss or gain for the project which is reflected in net income and in the financial flows.

When inflation/revaluation exists between the local currency and the currency in which a loan is denominated, an imbalance appears in the above equations relating debt balance DB_j , disbursements D_j , repayments R_j and capitalized interest CI_j . The difference is the Exchange rate adjustment consisting of the debt balance adjustment and the cumulative repayment adjustment. This adjustment appears in the *Balance sheet* as exchange rate gain/loss and in the *Total debt service schedule* as exchange rate adjustment.

$$ADJ_j = DB_j - (DB_{j-1} + CI_j + D_j - R_j)$$

ADJ_j	Exchange rate adjustment
DB_j	Debt balance, period j
CI_j	Capitalized interest, period j
D_j	Disbursement, period j
R_j	Repayment, period j

FEES

Fees can be specified in the input data for each medium- or long-term loan. All fees are defined in terms of a percentage of the bases shown in table 20.

TYPE OF FEE	BASIS	PAYMENT
Agency	Each positive disbursement	At each disbursement
Guarantee	Total amount of loan up to the time of a disbursement or payment (including the current disbursement and excluding the current repayment); fee is calculated p.a.	Together with interest
Commitment	Balance of loan not disbursed; fee is calculated p.a.	Together with interest
Other	Total loan	At first disbursement

Table 20: Computation rules for fees

3. Short-term loans

Short-term loans are treated like profile loans, described above.

N. CASH DEFICIT

Cash deficits which occur during the construction or production phase initiate automatic responses by the system which may require further steps to rationalize the results.

1. Cash deficit during the construction phase

Local equity capital is automatically generated to cover a cash deficit in any construction period including any interest payable. The automatically generated equity is displayed/printed as shown in table 21.

SCHEDULE	DESCRIPTION
Flow of financial resources	Separate line
Balance sheet	Included in equity line but not specifically identified
Cash flow for financial planning	Not included

Table 21: Display and printing of automatically generated equity

The Automatic equity line in the *Sources of finance, financial flow schedule* (subline of equity capital) disappears when the financial deficit is resolved. It is recommended to avoid this automatic in the final version of any project file.

2. Cash deficit during the production phase

A local overdraft is automatically generated to cover any cumulative deficits in any period of the production phase. No interest is calculated on the automatically generated overdraft. Repayment is effected automatically as early as possible in the project using any surplus funds to reduce the overdraft balance.

Automatic overdraft is included as part of the separate bank overdraft line in the *Source of finance, financial flow schedule* as a subline of short-term finance. This subline disappears when the financial deficit is resolved and should not remain in the final version of the project file. In all other schedules, with the exception of the *Cash flow for financial planning schedule*, in which it does not appear, the automatic overdraft is included in short-term finance.

O. INTEREST ON SHORT-TERM DEPOSITS

A percentage of the cash-in-hand (component of working capital) during each production period can be specified for investment in short-term deposits which generate additional funds for the project (see chapter VII.Q, under *Cash-in-hand*). The amount of additional funds generated for the period is calculated as follows:

$$IOS_j = CIH_j \times s \times \frac{r \times m}{12}$$

- IOS_j Interest on short-term deposits, period **j**
 CIH_j Cash-in-hand, period **j**
 s Portion of cash-in-hand invested in short-term deposits, %/100
 r Annual rate of return on investment in short-term deposits (constant for all periods), %/100
 m Number of months in planning period **j** of production phase

The value of short-term deposits defined in the STARTING BALANCE window is combined with the short-term deposits acquired from cash-in-hand and becomes part of current assets. These short-term deposits are liquidated in the period after termination of production as part of the working capital.

P. INCOME (CORPORATE) TAX

The basis for calculation of income tax is the **taxable profit** from the *Net income statement schedule*. Tax conditions which can be specified include tax holiday and losses carried forward.

1. General tax computation rules

The income tax payable on **taxable profit** is calculated on a graduated scale according to the number of **tax brackets** defined and the tax rate applicable to each bracket. In each bracket taxes are levied on the amount which exceeds the upper limit of the next lower bracket and which is less than the maximum for the bracket. This is best shown by example (table 22).

TAX BRACKET	LOWER LIMIT	UPPER LIMIT	TAX RATE, %	TAXABLE AMOUNT	TAX	TAXABLE INCOME ABOVE UPPER LIMIT
1	0	< 1,200	15	1,200	180	7,500 - 1,200 = 6,300
2	1,200	< 2,000	25	800	200	7,500 - 2,000 = 5,500
3	2,000	< 5,000	40	3,000	1,200	7,500 - 5,000 = 2,500
4	5,000	< 10,000	60	2,500	1,500	7,500 - 10,000 = 0
5	10,000	none	75	0	0	
Taxable income for period / total tax				7,500	3,080	

Table 22: Computation of income tax in the case of tax brackets

2. Tax holiday

Taxes are payable only for years of the production phase after the number of years of tax holiday specified in the input data.

3. Losses carried forward

Any annual loss is carried forward for up to **n** years as defined in the TAX CONDITIONS window. During this period losses carried forward reduce the taxable income in any of the succeeding years. These losses reduce taxable profit in the earliest possible year until fully compensated, if possible. This is illustrated by the example in table 23.

YEAR	1	2	3	4	5	6
Taxable profit or (loss)	(200)	(80)	20	130	200	300
Loss c/f from year 1		200	200	180		
Reduction of taxable profit		0	20	130		
Loss c/f from year 2			80	80	80	
Reduction of taxable profit			0	0	80	
Taxable profit after loss carried forward	0	0	0	0	120	300

Table 23: Example of losses carried forward for three years

Q. DIVIDENDS

The preferred dividend in any production year is a function of the accumulated equity capital up to the year and the preferred dividend rate specified in the input data plus any absolute dividend specified for the year.

$$PD_j = AEC_j \times \frac{pr_j}{100} + APD_j$$

PD_j	Preferred dividend
AEC_j	Accumulated equity capital to year p
pr_j	Preferred dividend rate, %
APD_j	Absolute preferred dividend
j	$j = 1, 2, \dots, n$ project periods

Dividends are payable from after-tax profit for each period of the production phase. The order of precedence in which dividends are paid is as follows:

1. Retained profit for production year j (specified as percentage of after-tax profit) is deducted from after-tax profit (if positive) to determine the amount available for payment of dividends (dividends payable, or DP_j). If there is a loss for the period no dividends are payable.
2. Dividends on preferred shares (percentage of equity + absolute amounts) are paid to the extent available after retained profit. If profit available is insufficient to cover the preferred dividends, joint-venture shareholders are treated preferentially (see below).
3. Dividends on ordinary shares are paid according to the percentage of after-tax profit specified for the balance of profits after accounting for retained profits and preferred dividends.

For joint venture projects, dividends payable to each joint venture partner and to the other shareholders (as a class) can be displayed/printed as sublines in the *Cash flow for financial planning schedule*.

DIVIDENDS

Dividends are determined on the basis of net profit from the *Net income statement schedule* for each production year:

$$(1) \quad \text{for } NP_j > 0, \quad RP_j = NP_j \times \frac{rr_j}{100}$$

$$DP_j = NP_j - RP_j$$

$$(2) \quad \text{for } NP_j \leq 0, \quad RP_j = NP_j$$

$$DP_j = 0$$

RP_j	Retained profit, period j
NP_j	Net profit, period j

rr_j	Defined percentage net profit retained, period j
DP_j	Dividends payable, period j
j	j = 1, 2, ..., n production periods

PREFERRED DIVIDENDS

Preference in the payment of preferred dividends is given to joint venture partners. Three cases can arise:

Case 1	DP_j (above) \geq TPD_j (k + m), or
Case 2	$DP_j \geq TPD_j$ (k) but $< TPD_j$ (k + m), or
Case 3	$DP_j < TPD_j$ (k)

TPD_j (k)	Preferred dividends, k joint venture partners
TPD_j (k + m)	Preferred dividends, k joint venture partners and m shareholders

Case 1

All partners receive the full amount of preferred dividends specified.

$$PD_{ij} = AEC_{ij} \times \frac{pr_{ij}}{100} + APD_{ij}$$

$$TPD_j = \sum_{i=1}^{k+m} PD_{ij}$$

PD_{ij}	Preferred dividends, equity i period j
AEC_{ij}	Accumulated equity paid-in, equity i to period j
pr_{ij}	Preferred dividend rate, %, equity i period j
APD_{ij}	Absolute preferred dividends, equity i period j
TPD_j	Total preferred dividends period j
i	i = 1, 2, ..., k + m , k joint venture partners + m shareholders
j	j = 1, 2, ..., n production periods

Case 2

Joint venture partners receive the full amount of preferred dividends as specified. Preferred dividends for shareholders are reduced as follows:

$$\text{For } TPD_j(k) \leq DP_j < TPD_j(m+k), \quad drf_j = \frac{DP_j - TPD_j(k)}{TPD_j(m)}$$

$$PD_{ij}^* = PD_{ij} \times drf_j$$

$$TPD_j^* = \sum_{i=1}^k PD_{ij} + \sum_{i=1}^m PD_{ij}^*$$

drf_j	Dividend reduction factor, period j
$TPD_j(k)$	Total preferred dividends, k joint venture partners
$TPD_j(m)$	Total preferred dividends, m shareholders
$TPD_j(m + k)$	Total preferred dividends, m shareholders + k joint venture partners
PD_j^*	Reduced preferred dividends, equity i period j , $i = 1, 2, \dots, m$ shareholders
TPD_j^*	Total reduced preferred dividends, period j

Case 3

In this case the following rule for reduction of dividends is applied to k joint venture partners only. Shareholders receive no preferred dividends.

$$\text{For } DP_j < TPD_j(k), \quad drf_j = \frac{DP_j}{TPD_j(k)}$$

$$PD_{ij}^* = PD_{ij} \times drf_j$$

$$TPD_j^* = \sum_{i=1}^k PD_{ij}$$

drf_j	Dividend reduction factor, period j
$TPD_j(k)$	Total preferred dividends, k joint venture partners
PD_{ij}^*	Reduced preferred dividends, equity i period j , $i = 1, 2, \dots, k$ joint venture partners
TPD_j^*	Total reduced preferred dividends, period j

ORDINARY DIVIDENDS

After calculation of preferred dividends the ordinary dividends are paid on the remaining balance of distributed profit, if any, as follows:

$$\begin{aligned} \text{For } DP_j > TPD_j, \quad & TOD_j = DP_j - TPD_j \\ \text{For } DP_j \leq TPD_j, \quad & TOD_j = 0 \end{aligned}$$

TOD_j	Total ordinary dividends, period j
DP_j	Dividends payable, period j
TPD_j	Total preferred dividends, period j

Ordinary dividends are calculated as follows for all shareholders:

$$OD_{ij} = TOD_j \times \frac{ord_{ij}}{100}$$

OD_{ij}	Ordinary dividends, equity i period j
TOD_j	Total ordinary dividends, period j
ord_{ij}	Percent ordinary dividends, equity i period j
i	$i = 1, 2, \dots, k + m$, k joint venture partners + m shareholders
j	$j = 1, 2, \dots, n$ production periods

REPATRIATED DIVIDENDS

The amount of exported dividend for an equity class and production year is calculated as a percentage (profit repatriated, % specified in the EQUITY window) of the dividends payable to each type of paid-in equity capital. The balance for each type of equity capital is considered to be local dividends.

Exported dividends are included in the *Foreign cash flow schedules*.

$$ED_{ij} = D_{ij} \times \frac{\text{exr}_i}{100}$$

$$LD_{ij} = D_{ij} - ED_{ij}$$

D_{ij}	Total dividends, equity i period j
ED_{ij}	Exported dividends, equity i period j
LD_{ij}	Local dividends, equity i period j
exr_i	Export rate, equity i
i	i = 1, 2, ..., k + m , k joint venture partners + m shareholders
j	j = 1, 2, ..., n production periods

R. ALLOWANCES

Two types of allowances for reduction of taxable income can be specified, the investment allowance and the depreciation allowance. Gross profit is reduced by the **investment allowance** to determine taxable profit. No changes in asset values are involved.

The **depreciation allowance** reduces both taxable profit and the book value of fixed assets. In the *Balance sheet schedule*, total fixed assets are reduced by the depreciation allowance.

Both values are defined as absolute amounts in local currency. Each allowance can be displayed/printed in separate sublines in the *Net income statement schedule*.

XII. ECONOMIC CALCULATION RULES AND ALGORITHMS

Economic results are presented in four schedules:

- Value added - value-added criteria
- Net foreign exchange effect
- Employment effect
- Cost-benefit analysis

The basic rules for calculating the results for each of these economic criteria are described for each corresponding schedule (report) in chapter X.D. This chapter provides supplementary descriptions of the calculation procedures, rules and algorithms for these schedules and graphs.

All values contained in the above schedules designated in monetary terms are expressed in the numeraire currency defined for the economic analysis. A common unit for all of these schedules avoids confusion and permits direct comparison between the various indicators of projected performance.

A. VALUE ADDED

Value added at the project level is a proxy for national income (when capital consumption is taken into account as in the method included in this model).

1. Taxes and subsidies

The proper definition of sales taxes on inputs and outputs depends on the type of tax system in effect (see chapter VIII.F).

Any indirect taxes on output can be defined only in **Sales taxes** entries in financial windows. The *Production and sales programme schedule* (chapter X) shows the gross sales revenue, which includes sales taxes (subsequently subtracted to arrive at the revenue for the enterprise). The sales taxes are included in the government's share of value added (see below).

If indirect taxes (sales and other indirect taxes) on input items are included in the financial price, they can be isolated for value-added calculations by defining the percentage of **Taxes/dividends included** in the economic window for the item. These taxes become part of the government's share of value added.

Subsidies are not included in the value added attributable to the project.

The negative tax rate which can be entered in the **ADJUSTMENT FOR INPUT** window and which will then be treated as a subsidy on input is only considered in the *distribution of value added* (see below).

2. Gross domestic value added

The gross domestic value added (GDVA) may be expressed as follows:

$$GDVA = (O + OI) - M$$

- O Value of output (gross revenue, i.e. sales revenue + sales taxes, but not including subsidies on sales)
- OI Other income
- M Material inputs (adjusted for **Taxes/duties included** and **Value added included**, subsidies not included)

3. Net domestic value added

The net domestic value added (NDVA) may be expressed as follows:

$$NDVA = GDVA - I$$

- I Investment: fixed investment + pre-production expenditure net of interest (adjusted for **Taxes/duties included** and **Value added included**) + increase in total inventory; subsidies not included

4. Net national value added

The net national value added (NNVA) may be expressed as follows:

$$NNVA = NDVA - R$$

- R Repatriated payments: wages + profit/dividends + interest + others (see chapter X.D).

5. Distribution of value added

The distribution of value added, including the treatment of taxes and subsidies, is determined by the following model:

$$NNVA = O + T_O + OI - (M + I + R) = W + P + G + X$$

NNVA Net national value added

O Market value of output net of sales tax (indirect tax)

T_O Sales (indirect) tax on output

OI Other income

M Market value of material inputs net of indirect taxes

I Market value of investment net of indirect taxes

R Repatriated payments at OER

W Domestic wages and salaries: skilled labour + unskilled labour

P Profit/dividends/interest: dividends payable (net of indirect tax) + interest payable

G Government: corporate tax + T_O + T_M + T_I - S_O - S_I - SIN

T_M Indirect taxes on intermediate material inputs defined in economic window; these taxes are automatically included (not deducted in model) as part of NNVA and distributed to G

T_1	Indirect taxes on investment defined in economic window; these taxes are automatically included (not deducted in model) as part of NNVA and distributed to G
S_O	Subsidy on output
S_I	Subsidy on investment
SIN	Subsidy on input
X	Other value added = non-distributed NNVA , including subsidies S_O and S_I – domestic wages – profit/dividends/interest – government

T_O is a part of the **NNVA**; it is not included in **P** but added to **G**. S_O and S_I are not included in the **NNVA**. In distribution effects, subsidies are deducted from **G** and included in **X** as part of the undistributed profit.

6. Present value

The present value of **NNVA** and of project parameters used in the absolute (domestic wages) and relative (Investment, Foreign exchange, Skilled labour, Labour) efficiency tests (see chapter X.D) are calculated by:

$$PV = \sum_{j=0}^n A_j df_j$$

$$df_j = \frac{1}{(1+r)^j}$$

PV	Present value
A_j	Amount (of NNVA or other project parameter), year j
df_j	Discount factor, year j
r	Discount rate per year, %/100
j	$j = 0, 1, 2, \dots, n$

B. NET FOREIGN EXCHANGE EFFECT

The rules for calculating the flow of foreign exchange are described fully in chapter X.D. In the schedule all input and output items expressed in foreign currency are counted in the period indicated by the input data. As in the other schedules, the results are reported in the accounting currency.

The *net foreign exchange flow* includes all actual projected transactions expressed in foreign exchange for each period. To this amount, in each period are added the substitution/diversion effects and induced trade effects:

- The additional foreign exchange earnings realized from indirect exports, e.g. trade induced by the project's output.
- The additional foreign exchange savings realized by producing an output domestically rather than importing (import substitution).

- The foreign exchange earnings foregone by diverting an input that otherwise would have been exported.
- The foreign exchange loss incurred by inducing imports.

The first is a potential foreign exchange inflow. The second is the realized savings from exercising the domestic production alternative. The third is the realized loss of foreign exchange from the diversion of an input that would otherwise have been exported. The last is a potential loss in foreign exchange if the input is imported rather than supplied from domestic sources.

In the economic windows for traded and tradable inputs and outputs, the percentages **Exportable**, **Importable** or **Import substitution** are used only for determining the foreign exchange substitution or diversion effect for a tradable item in each project period. The values appearing in the *Net foreign exchange effect schedule* are determined by:

$$FE = P \times Q \times f$$

FE	Foreign exchange inflow or outflow
P	Price, foreign currency value converted to the numeraire currency at the official exchange rate
Q	Quantity of item
f	Percentage of item which is tradable (importable or exportable)

C. EMPLOYMENT EFFECTS

The rules for calculating employment effects are described in chapter X.D. Data for quantities of direct labour (employment created directly by the project) are taken from labour windows in the financial browser. The indirect labour quantities are defined in the EMPLOYMENT EFFECTS window (figure 107) of the economic browser. Investment for the project is derived from the *Summary sheet schedule* as the sum of direct Total investment and the indirect investment defined in the EMPLOYMENT EFFECTS window.

D. COST-BENEFIT ANALYSIS

Costs and benefits are the real flows of goods and services into and out of the project, valued in terms of their effect on one or more national criteria and expressed in a unit of account or numeraire. Economic values are determined for all of these items.

Some items are transferred to the economic browser and adjusted to determine economic value. Economic values for others not transferred to the economic browser are determined on the basis of the financial values defined in the financial browser.

For items not transferred to the economic browser, the economic values that are included in the *Economic schedule* are as follows:

Outputs: The gross sales revenue (including sales taxes, excluding subsidies) as defined in the financial window.

Inputs: The financial value of the input item (including investment) as defined in the financial window (investment subsidies defined in the SUBSIDIES, GRANTS window (figure 78) of the economic browser are excluded)

For economic analysis, all items expressed in foreign currencies are converted to local currency at the *shadow exchange rate* (SER). However, for the calculation of the net foreign exchange effect and for the value added, the official exchange rate is used.

The starting point for determining the economic values of project inputs and outputs transferred to the economic browser for adjustment is the financial value of the item (the Price, as indicated in the financial window for the item).

Market prices are converted to economic value in a series of steps using conversion parameters defined by the user. All conversion parameters (e.g. percent indirect tax, adjustment factor, percent foreign currency exposure) are constant for the entire project planning horizon.

All rules are valid for the unit price of one item.

To convert financial prices to economic (cost-benefit) values

- All financial prices as defined in the windows for nodes in the financial browser are first converted to the local currency specified in the CURRENCIES window of the input browser to determine the financial value (FV). The earliest appearance of the price in a project period is the basis for the conversion. For items expressed in foreign currency, the conversion is calculated by:

$$FV = \text{Price} \times \text{OER}$$

FV Financial value for economic analysis

Price Market price expressed in selected currency

OER Official exchange rate, selected foreign currency to local currency

Items initially priced in terms of local currency require no conversion.

- Border prices (FOB or CIF as first approximations) for traded and tradable items are defined in the ADJUSTMENT windows. The adjusted market value is initially calculated as:

$$AMV = \text{FOB (or CIF)} \times \text{OER}$$

AMV Adjusted market value

OER Official exchange rate, FOB or CIF, selected currency to local currency

For traded and tradable items the AMV can also be determined with more precision by using the **Calculation support** feature which takes into account internal transport and handling costs.

The border price (FOB or CIF) can be expressed in any of the defined currencies.

- The adjustment factor is initially determined from the relationship between FV and AMV.

$$AMV = AF \times FV, \text{ or}$$

$$AF = AMV/FV$$

AMF Adjusted market value

AF Adjustment factor

FV Financial value for economic analysis

- AF and AMV can be changed after the initial definition. The relation in the preceding step is automatically maintained.
- IN THE WINDOWS FOR NODES IN THE ECONOMIC SECTION OF THE BROWSER, ALL ECONOMIC VALUES ARE EXPRESSED IN LOCAL CURRENCY (with the exception of the values entered in the TRADED and TRADABLE PANELS of the adjustment windows).

The original values from the financial browser are converted at the official exchange rate of the input currency to the local currency (see above). All values in the CALCULATION SUPPORT window (figure 100) must also be expressed in local currency. Calculations of economic costs and benefits are performed in terms of local currency.

- In the **Calculation** module all economic values are converted from local currency to the selected numeraire in which the results (output) are then expressed (see chapter VIII. E).

1. Financial value and taxes

The financial value (FV) for a project output or input is the price as defined in the period of earliest appearance in the financial window. This price is exclusive of taxes and subsidies, unless such taxes and subsidies are included as part of the *price* (defined sales taxes on output, and subsidies on output and investment, are not included automatically in the *price*).

It is important to note that **Taxes/duties included** defined in the economic windows do not enter into the cost-benefit analysis, except to determine the *financial value net of tax* (NTV) for input items which are presented for information only. **Taxes/duties included** are used exclusively in the value-added distribution analysis.

2. Adjusted market value

The adjusted market value (AMV) is the economic efficiency price. It is defined in the ADJUSTMENT OF INPUTS, ADJUSTMENT OF OUTPUTS or CALCULATION SUPPORT window.

TRADED ITEMS

For traded items the CIF/FOB price, as an approximation of the border price, is assigned in the ADJUSTMENTS window and is the basis for the original AMV.

TRADABLE ITEMS

Tradable items are sold or purchased in domestic markets but would be traded internationally in the absence of restrictive trade policies (price controls, quotas, tariffs etc.). Border prices are defined as the economic value of these items in the ADJUSTMENTS window for the item after transferring the node to the economic browser.

The decision of the analyst to classify such an item as tradable or non-traded hinges on the attitude to the rationale for the market distortions. At one extreme, the distortions can be viewed as mechanisms of government development strategy, in which case the item would be treated as non-traded and priced accordingly. At the other extreme, the policies can be ignored and the border price taken as the efficiency value. However, if the item would be traded in the absence of the project, the border price is relevant and it should be classified as tradable.

In any case, the analyst should specify the assumptions upon which the pricing of tradable items is based and the project appraisal should reflect the specific decision taken for each item in regard to trading options (see chapter VIII F).

In the economic schedule, border prices are used as the basis for the economic value of items classified as tradable.

NON-TRADED ITEMS

Non-traded items are priced at the consumer or producer price. If **Consumer price** is selected in the ADJUSTMENTS window, the price in the earliest period of appearance, including sales taxes, is assigned. If **Producer price** is selected, the price is defined by the user. These values are expressed in local currency and are assigned as the initial value of AMV.

3. Foreign exchange adjustment

If an input or output item of the project has a *foreign currency exposure* defined in its economic window (exported, exportable or importable for an output; imported, importable or exportable for an input), a foreign exchange adjustment (on the total or a part of the amount) is determined when the *shadow exchange rate* (SER) of the foreign currency involved differs from the *official exchange rate* (OER).

The calculation of the foreign exchange adjustment depends on the selection of the numeraire (unit of account). The *standard conversion factor* (SCF) is the ratio OER/SER.

NUMERAIRE, LOCAL CURRENCY AT DOMESTIC PRICES

In this case items with foreign currency exposure are converted from the border price to the domestic price. The foreign exchange adjustment (FEA) is determined as follows:

$$FEA = AMV \times \frac{FCE}{100} \times \left(\frac{1}{SCF} - 1 \right)$$

FEA	Foreign exchange adjustment
AMV	Adjusted market value
FCE	Foreign currency exposure
SCF	Standard conversion factor OER/SER
OER	Official exchange rate, foreign currency to local currency
SER	Shadow exchange rate, foreign currency to local currency

Typically the local currency is overvalued and $SCF < 1$. FEA is positive for any non-zero FCE. A border price is increased to the domestic price.

NUMERAIRE, LOCAL OR FOREIGN CURRENCY AT BORDER PRICES

Items with foreign currency exposure are converted from the local price to the border price (recall that all items are first converted to the defined local currency specified in the CURRENCIES window of the input browser). The FEA in this case is determined by:

$$FEA = AMV \times \left(1 - \frac{FCE}{100} \right) \times (SCF - 1)$$

If the local currency is overvalued, $SCF < 1$ and FEA is negative. The domestic price is deflated to the border price in this case.

4. Economic value including foreign exchange adjustment

The economic value (EV1) of an item, expressed initially in local currency, is comprised of the AMV and a foreign exchange adjustment (FEA) if any part of the item's pricing involves foreign exchange ($FCE \neq 0$). EV1 includes any substitution/diversion effects included in the analysis concerning tradable items. EV1 is determined by:

$$EV1 = (AMV + FEA)$$

EV1 Economic value including foreign exchange adjustment
 AMV Adjusted market value
 FEA Foreign exchange adjustment

5. Economic value including indirect effects

The final economic value (EV2) displayed/printed in the *Economic appraisal schedule* includes the value of EV1 plus indirect or external effects. Indirect effects are defined as **Costs - monetary, Benefits - monetary, Merits - non-monetary and Demerits - non-monetary** in the economic browser in terms of local or foreign currency.

Indirect effects are shown in the **Indirect effects (IE)** line of the *Economic appraisal schedule*. The conversion to local currency is based upon the selected numeraire.

NUMERAIRE, LOCAL CURRENCY AT DOMESTIC PRICES

$$IE = IE_1 \times SER$$

IE Indirect effect
 IE₁ Indirect effect as defined in original currency
 SER Shadow exchange rate, foreign currency to local currency

No conversion is required for indirect effects defined in terms of local currency.

NUMERAIRE, LOCAL/FOREIGN CURRENCY AT BORDER PRICES

$$IE = IE_1 \times SCF$$

IE Indirect effect
 IE₁ Indirect effect as defined in original currency
 SCF Standard conversion factor, OER/SER

6. Present value

Economic quantities are converted to present value (PV) by discounting at the rate specified in the GLOBAL PARAMETERS window. For example, the PV of EV2 is determined as follows:

$$EV2 = \sum_j \sum_i [(AMV_{ij} + FEA_{ij}) + IE_j] \times df_j$$

$$df_j = \frac{1}{(1+r)^j}$$

EV2	Economic value including indirect effects
AMV _{ij}	Adjusted market value item i , year j ; <i>i</i> = 1, 2, ..., <i>m</i> items
FEA _{ij}	Foreign exchange adjustment item i , period j ; <i>i</i> = 1, 2, ..., <i>m</i> items
IE _j	Indirect effects (merits, demerits)
df _j	Discount factor year j , <i>j</i> = 1, 2, ..., <i>n</i> years
r	Discount rate per year, %/100

7. Conversion to the numeraire

All economic values displayed in the *Economic appraisal schedule* are converted from the local currency equivalent to the numeraire by:

$$EV^n = EV \times OER^*$$

EV ⁿ	Economic value expressed in the numeraire
EV	Economic value expressed in local currency
OER*	Official exchange rate, numeraire to local currency (number of numeraire currency units per number of corresponding local currency units)

8. Calculation support

Calculation support is activated from windows in the inputs and outputs sections of the ECONOMIC ANALYSIS STRUCTURE of the browser. The purpose is to assist in assigning the proper economic values to ancillary costs associated with project outputs (sales) and inputs (costs).

Two types of ancillary costs are included in the analysis: transport and others (handling, trading profit etc.). These costs are not otherwise included in the economic analysis nor are they included in the financial costs for the project.

Data entered in the CALCULATION SUPPORT modal window for an input or output item are used to calculate values of AMV, FCE and AF for the item and are transferred to the ADJUSTMENT OF INPUT or ADJUSTMENT OF OUTPUT window when accepted. Any original data in either of these types of windows is overwritten by the calculated values from the CALCULATION SUPPORT modal window.

BASIC RULES

Adjustment factor

The adjustment factor (AF) is used to convert financial values of an item and its associated transport and other costs to their respective AMVs. The AMV for the item is initially defined in the ADJUSTMENTS window. When CALCULATION SUPPORT is invoked, a window is displayed in which the FV, AF and AMV for transport and other costs can be defined.

$$AF_i = AMV_i / FV_i$$

AMV_i Adjusted market value i
 FV_i Financial value i
 AF_i Adjustment factor i
 i i = R (resource), T (transport), O (others)

In the CALCULATION SUPPORT window all items are expressed in local currency.

Adjusted market value

The adjusted market value (AMV) is obtained by multiplying the financial value appearing first in the price column of the corresponding item in the data input table with the adjustment factor:

$$AMV_i = FV_i \times AF_i$$

Foreign currency exposure

The foreign currency exposure (FCE) is the percentage of the value of an item, expressed in local currency, which involves a transaction in foreign currency. The FCE is used to determine the foreign exchange adjustment (FEA), which reflects the effect on economic value of the shadow rate of foreign exchange (SER):

$$FCE = \frac{(CIF / FOB) \pm (T + O)}{AMV}$$

FCE Foreign currency exposure for item
 CIF/FOB CIF or FOB price converted to local currency at the OER
 T Foreign currency effect, transportation
 O Foreign currency effect, other
 AMV Adjusted market value for item

SUPPORT FOR OUTPUT ITEMS (SALES)

Output, export and exportable

Internal transport and other costs from project to port, net of project-to-market costs, are economic costs that are deducted from the FOB value (see figure 116). The net values can be positive or negative.

Calculation support

Description:

Exports	FOB	- Transport	- Others
FV	120.00	10.00	5.00
AF	1.00	1.00	1.00
AMV	120.00	10.00	5.00
FCE	100.00	0.00	0.00

Financial value (FV): tBS

Adjustment factor (AF):

Adjusted market value (AMV): tBS

Foreign currency exposure (FCE): %

Figure 116: Project-to-port minus project-to-market costs

$$AMV = FOB - AMV(T) - AMV(O)$$

$$FCE = \frac{FOB - AMV(T) \times FCE(T) - AMV(O) \times FCE(O)}{AMV}$$

- AMV Adjusted market value for item
- FOB Financial price converted to local currency at OER
- AMV(T) AMV of transportation costs [(project-to-port) – (project-to-market)]
- AMV(O) AMV of other costs [(project-to-port) – (project-to-market)]
- FCE Foreign currency exposure for item
- FCE(T) Foreign currency exposure, transportation costs
- FCE(O) Foreign currency exposure, other costs

Output, importable

Internal transport and other costs from port to project, net of project-to-market costs, are economic savings that are added to CIF value (figure 117). The net values can be positive or negative:

Calculation support

Description:

Importable	CIF	+ Transport	+ Others
FV	210.00	4.20	6.30
AF	1.00	1.00	0.80
AMV	210.00	4.20	5.04
FCE	100.00	20.00	0.00

Financial value (FV): tBS

Adjustment factor (AF):

Adjusted market value (AMV): tBS

Foreign currency exposure (FCE): %

Figure 117: Port-to-market minus project-to-market

$$AMV = CIF + AMV(T) + AMV(O)$$

$$FCE = \frac{CIF + AMV(T) \times FCE(T) + AMV(O) \times FCE(O)}{AMV}$$

For explanation of signs see preceding subsection.

Output, non-traded

The AMV is defined according to the appropriate pricing rule for non-traded items (see chapter VIII.B). The financial price is converted to local currency at the OER. The foreign currency exposure (FCE) = 0. No calculation support is required.

SUPPORT FOR INPUT ITEMS

Input items, imports and importables (investments, raw materials)

Internal transport and other costs from port to project, net of (supplier-to-project costs, are economic costs that are added to the CIF (see figure 118). For importables, these items are also added to CIF since they represent costs which would be incurred if the import option were exercised. The net values can be positive or negative.

Calculation support

Description:

Imports	CIF	+ Transport	+ Others
FV	454.55	12.00	7.00
AF	1.00	1.00	1.00
AMV	454.55	12.00	7.00
FCE	100.00	0.00	0.00

Financial value (FV):	<input type="text" value="500.00"/>	tBS
Adjustment factor (AF):	<input type="text" value="0.95"/>	
Adjusted market value (AMV):	<input type="text" value="473.55"/>	tBS
Foreign currency exposure (FCE):	<input type="text" value="95.99"/>	%

Figure 118: Port-to-project minus supplier-to-project

$$AMV = CIF + AMV(T) + AMV(O)$$

$$FCE = \frac{CIF + AMV(T) \times FCE(T) + AMV(O) \times FCE(O)}{AMV}$$

- AMV Adjusted market value for item
- CIF Financial price converted to local currency at OER
- AMV(T) AMV of transportation costs [(port-to-project) – (supplier-to-project)]
- AMV(O) AMV of other costs [(port-to-project) – (supplier-to-project)]
- FCE Foreign currency exposure for item
- FCE(T) Foreign currency exposure, transportation costs
- FCE(O) Foreign currency exposure, other costs

Input items, exportable

Internal transport and other costs from supplier to port, net of supplier-to-project costs, are economic costs that are deducted from FOB (figure 119). The net values can be positive or negative.

Calculation support

Description:

Exportable	FOB	- Transport	- Others
FV	13,000.00	500.00	200.00
AF	1.00	1.00	1.00
AMV	13,000.00	500.00	200.00
FCE	100.00	0.00	0.00

Financial value (FV): tBS

Adjustment factor (AF):

Adjusted market value (AMV): tBS

Foreign currency exposure (FCE): %

Figure 119: Supplier-to-port minus supplier-to-project

$$AMV = FOB - AMV(T) - AMV(O)$$

$$FCE = \frac{FOB - AMV(T) \times FCE(T) - AMV(O) \times FCE(O)}{AMV}$$

For explanation of signs see preceding subsection.

Input items, non-traded

The AMV is defined according to the appropriate pricing rule for non-traded items (see chapter VIII.B). The foreign currency exposure (FCE) = 0. No calculation support is required.

COMPOSITE VALUES

In the CALCULATION SUPPORT modal window composite values are determined for the adjustment factor (AF), adjusted market value (AMV) and foreign currency exposure (FCE). The financial value is the price in the year of first appearance. The rules for calculating the composite values are as follows:

$$AMV_i = AF_i \times FV_i$$

$$AMV = \sum_{i=1}^3 AMV_i$$

$$AF = \frac{AMV}{FV}$$

$$FCE = \frac{\sum_{i=1}^3 [AMV_i \times FCE_i]}{AMV}$$

FV	Financial value
FV _i	Financial value, item i
AMV	Composite adjusted market value
AMV _i	Adjusted market value, item i
AF	Composite adjustment factor
FCE	Composite foreign currency exposure
FCE _i	Foreign currency exposure, item i
i	i = item, transport, other

Part four

Part four

Auxiliary programs

XIII. SENSITIVITY ANALYSIS

Sensitivity analysis is performed for a project to show how the net cash returns or the profitability of an investment change when different values are assigned to the input variables. To determine the critical variables the structure of cash flows should be analyzed first. The variables (quantities or prices or both) having the greatest impact on the financial and economic results of a project are then varied.*

Sensitivity analysis can be performed by assigning values to the critical variables corresponding to reasonably pessimistic, normal and optimistic scenarios and by computing the discounted cash flows (IRR or NPV) and any ratios etc. chosen as a yardstick for investment appraisal.

In addition to break-even analysis (see chapter X), COMFAR *III Expert* offers two features for the performance of sensitivity analysis. Together they have three functions, each of which serves a special purpose:

The **Sensitivity** feature in the MODULE menu is for the global change of input data and for changing variables to achieve a target IRR or target NPV. The **Parametric analysis** feature in the GRAPHICS menu is for varying parameters in charts.

A. THE SENSITIVITY FEATURE

With the **Sensitivity** feature, the user is able to change one set of input data at a time without going to the data input browser. The changes of original input data - quantities and prices - are to be expressed as a percentage. It is possible to define changes for each item of the FIXED INVESTMENT COSTS, PRODUCTION COSTS and SALES PROGRAMME nodes, as well as for ECONOMIC ANALYSIS - INDIRECT EFFECTS, and for all the respective sub-items. In addition it is possible to change input data to achieve a desired IRR or NPV.

SENSITIVITY

The **Sensitivity** feature in the MODULE menu serves to change input data of the current project. The feature may be activated when the Data input browser or the Select results browser or the Show results browser is displayed.

When the Data input browser is displayed, the **Sensitivity** feature in the MODULE menu is active only when the initial steps of defining the type and scope of analysis (from the PROJECT IDENTIFICATION to the DISCOUNTING node) have been made and the complete structure of the nodes originating from the PROJECT - INPUT DATA node is displayed (fixed investment costs etc.).

* More about sensitivity analysis can be found in the *Industrial Feasibility Studies Manual*.

When **Sensitivity** is selected, the SENSITIVITY window is displayed. If **Sensitivity** is activated from the Results browser, two special features are available to the user allowing the input data to be varied to obtain a desired IRR or a desired NPV*:

The SENSITIVITY window contains a panel with four radio buttons and two pushbuttons. Selecting one of the radio buttons (**Fixed investment costs**, **Production costs**, **Sales programme** or **Economic analysis - indirect effects**) causes the corresponding items and sub-items to be displayed in the list box of the window. However, **Economic analysis - indirect effects** is active only if economic analysis has already been selected (see chapter VII.F.3).

To display the sensitivity window

- Select **Sensitivity** from the MODULE MENU (figure 120).

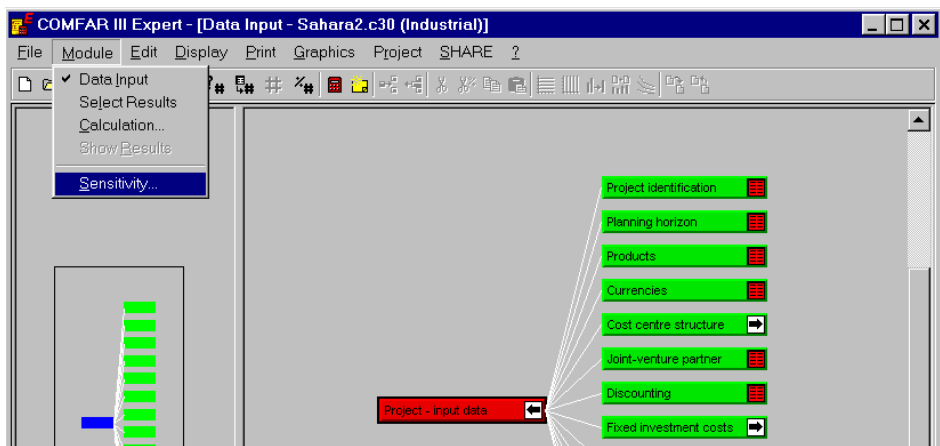


Figure 120: Module menu

1. Global change of input data

This function of the **Sensitivity** feature serves to change the values of a selected set of input variables in the currently active project. For each item (node or subnode) of **Fixed investment costs**, **Production costs** and the **Sales programme**, as well as of **Economic analysis - indirect effects**, input data may be changed.

When input data have been changed in the currently active project and if the intention is to retain the original data of the source file, the **Save as** feature has to be used to store the project.

* The **Desired IRR** and **Desired NPV** features are also active when the SENSITIVITY window is called from the Data input browser, provided the feature **Show results** is active. However, the moment any input data entry are changed, these features become inactive until the **Calculation** feature has been executed again and new results are produced.

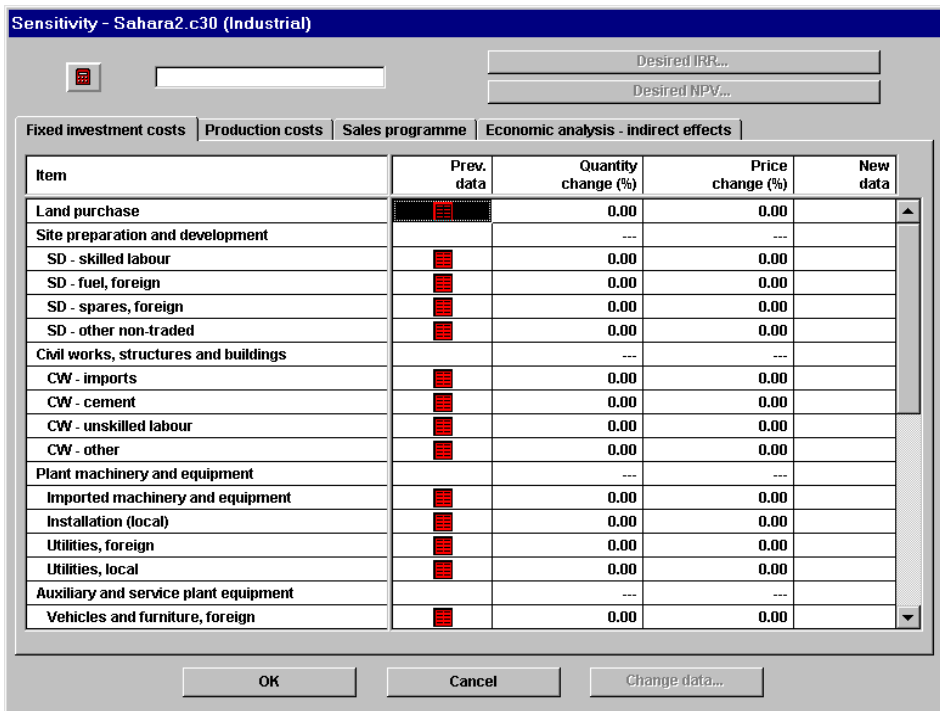


Figure 121: Sensitivity window

CHANGE DATA

Items containing data are marked with a red Table Icon, appearing in the ORIGINAL DATA column.

To display the window with input data for a selected item, the corresponding Table Icon in the ORIGINAL DATA column must be selected. No data may be entered into the tables displayed after the selection of the ORIGINAL DATA Table Icon.

If the radio buttons for **Fixed investment costs**, **Production costs** or **Sales programme** have been selected, the change in Quantity and Price can be defined for each item in **percent** of the original value. In the case of **Economic analysis - indirect effects**, only the percent change in the original value (product of $Q \times p$) can be entered. The changes defined may be different for each item but the rates are constant for the entire planning horizon.

When data are entered into the QUANTITY or PRICE column and original data exist (red Table Icon in the ORIGINAL DATA column), a red Table Icon appears in the NEW DATA column. Selecting the corresponding Table Icon in the NEW DATA column causes the display of the new data in the list box of the corresponding data input window (it is not necessary to have the **Change data** pushbutton previously selected).

The **OK**, **CANCEL** and **Change data** pushbuttons have the following functions: With **OK**, the entries made before are accepted but the original data remain unchanged. To

change the original data as defined, the **Change data** pushbutton must be selected. **CANCEL** is selected when the latest entries are to be ignored. However, the **CANCEL** function cannot be used to delete entries previously accepted with the **OK** or **Change data** pushbuttons.

It is possible to check, before executing the **Change data** feature, the new input data resulting from defined changes. Select the corresponding Table Icon in the NEW DATA column to display the new data.

The **Desired IRR** and **Desired NPV** .. pushbuttons are described in the next section, *Achieving a desired IRR or NPV*. For a description of the **Calculator** functions, please refer to chapter V.C, *Edit menu*.

To change input data

- Select either the **Fixed investment costs**, **Production costs** or **Sales programme** radio button. The **Economic analysis - indirect effects** radio button is active only if economic analysis has already been selected (see chapter VII.F.3).
- The items and sub-items corresponding to the selected radio button appear in the list box together with a red Table Icon if the item contains input data.
- Use the data entry field to enter for any item or group of items the percent rate(s) by which the original values for **Quantity** and **Price** are to be changed in the current project. Positive or negative percent rates may be entered.

To display the original data, select the Table Icon for the corresponding item in the ORIGINAL DATA column. When data are entered into the QUANTITY or PRICE column, a Table Icon appears in the NEW DATA column. Selecting the corresponding Table Icon in the NEW DATA column causes the new data to be displayed in the list box of the corresponding data input window (it is not necessary to have previously selected the **Change data** pushbutton).

- Complete the entries for the other groups (radio buttons), as applicable.
- Select the **Change data** pushbutton to execute the changes. The original data of the current project are replaced by the newly defined data.
- Alternatively, accept the entries with the **OK** pushbutton. In this case the original data remain unchanged and the entries are kept in memory.

Selecting the **CANCEL** pushbutton cancels all entries made in the list box since opening the SENSITIVITY window.

After the **Change data** command has been executed the original input data are replaced by the new data. The new project data should be saved using the **Save as** command in

the FILE menu if the intention is to retain the original data of the source file. The **Save** option should be used only when the original data are no longer needed. To see the effects of the global change of input data, the **Select Results** and **Calculation** features have to be executed.

2. Achieving a desired IRR or NPV

In addition to the global change of input data described above, the **Sensitivity** feature allows defining a desired IRR or a desired NPV (the latter for the defined discounting rate) and selecting the variables to be altered to achieve the defined target value. For each of the selected variables the maximal increase or maximal decrease in the original value is defined (in percent). COMFAR III Expert computes the IRR or NPV (as selected), changing the values in steps of one percent, starting with the first variable. The calculation is ended the moment the target value is achieved.

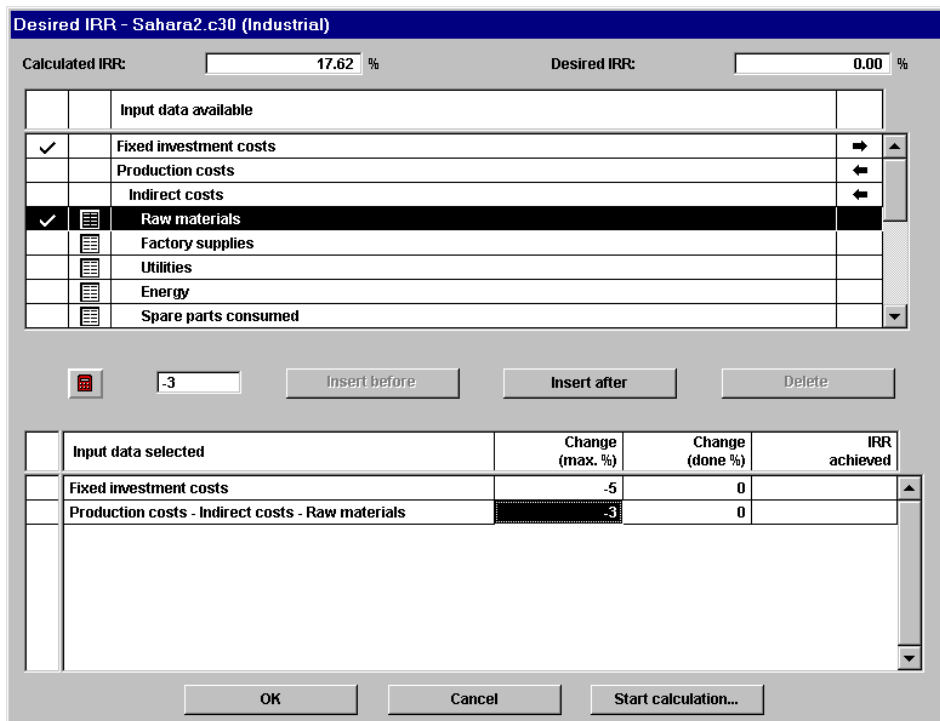


Figure 122: Sensitivity window with desired IRR list box

The **Desired IRR** and **Desired NPV** pushbuttons are active only when the **Sensitivity** feature is selected from the Results browser*.

* The **Desired IRR** and **Desired NPV** features are also active when the SENSITIVITY window is called from the Data input browser, provided the feature **Show results** is active. However, the moment any input data entry are changed, these features become inactive until the **Calculation** feature has been executed again and new results are produced.

DESIRED IRR

This function serves to alter the values of selected input variables to obtain a desired Internal Rate of Return (IRR). COMFAR III Expert changes the original values of each selected item in steps of one percent. When the maximum change defined by the user is reached, the system continues with the next item selected and so forth, until the desired IRR is achieved or the list is exhausted. The IRR achieved by changing the values of each item is also shown in the IRR ACHIEVED column.

To obtain a desired IRR

- The **Calculation** feature must have been executed before the **Sensitivity** feature is selected.
- Select the **Desired IRR** pushbutton in the SENSITIVITY window; the DESIRED IRR modal window is displayed.
- Enter the desired IRR in the corresponding entry field.
- Select in the INPUT DATA AVAILABLE list box the item which is to be altered to achieve the desired IRR. If the item (line) contains an Extend Icon, sub-items may be displayed by selecting the Extend icon.
- Select the **Insert after** pushbutton. The selected item is displayed in the INPUT DATA SELECTED list box.

In case a complete line is selected in the INPUT DATA SELECTED list box (clicking the field left of the description) and another line in the INPUT DATA AVAILABLE list box, both pushbuttons, **Insert after** and **Insert before**, are active. To insert the selected item before or after the line marked in the INPUT DATA SELECTED list box, select the corresponding pushbutton.

- Use the iconic buttons and data entry field to enter the maximal change (in percent) allowed for each selected item.
- Select the **Start calculation** pushbutton. However, this pushbutton is active only when at least one change (different from zero) has been defined.

COMFAR III Expert checks whether the increase or decrease of values of selected items has the desired effect. If this is not the case, a warning message will be displayed and the user may then choose to cancel the calculation or to continue anyway.

- An INFORMATION modal window is displayed showing the calculation time per iteration, the maximal number of iterations and the maximal total calculation time. Accept the calculation with **OK** or select **CANCEL** to exit the calculation.

After the completion of the calculations the original values are reinstalled in the project file.

DESIRED NPV

This function serves to alter the values of selected input variables in order to obtain a desired net present value (NPV). COMFAR *III Expert* changes the original values of each selected item in steps of one percent. When the maximum change defined by the user is reached, the system continues with the next item selected and so forth, until the desired NPV is achieved or the list is exhausted. The NPV achieved by changing the values of each item is also shown in the NPV ACHIEVED column.

To obtain a desired NPV

- The **Calculation** feature must have been executed before the **Sensitivity** feature is selected.
- Select the **Desired NPV** pushbutton in the SENSITIVITY window; the DESIRED NPV modal window is displayed.
- Enter the desired NPV in the corresponding entry field.
- Select the item in the INPUT DATA AVAILABLE list box which is to be altered to achieve the desired NPV. If the item (line) contains an Extend Icon, sub-items may be displayed by selecting the Extend icon.
- Select the **Insert after** pushbutton. The selected item is displayed in the INPUT DATA SELECTED list box.

In case a complete line is selected in the INPUT DATA SELECTED list box (clicking the field left of the description), and another line in the INPUT DATA AVAILABLE list box, both pushbuttons, **Insert after** and **Insert before**, are active. To insert the selected item before or after the line marked in the INPUT DATA SELECTED list box, select the corresponding pushbutton.

- Use the iconic buttons and data entry field to enter the maximal change (in percent) allowed for each selected item.
- Select the **Start calculation** pushbutton. However, this pushbutton is active only when at least one change (different from zero) has been defined.

COMFAR *III Expert* checks whether the increase or decrease in values of selected items has the desired effect. If this is not the case, a warning message will be displayed and the user may then choose to cancel the calculation or to continue anyway.

- An INFORMATION modal window is displayed showing the calculation time per iteration, the maximal number of iterations and the maximal total calculation time. Accept the calculation with **OK** or select **CANCEL** to exit the calculation.

B. DATA VARIATION IN CHARTS

With the **Parametric analysis** feature it is possible to assess for a number of charts (line charts) the effect of changing (increasing and decreasing) selected variables (input and result variables). The variation is entered in percent of the original value. In contrast to the **Sensitivity** feature, only one parameter may be varied at a time.

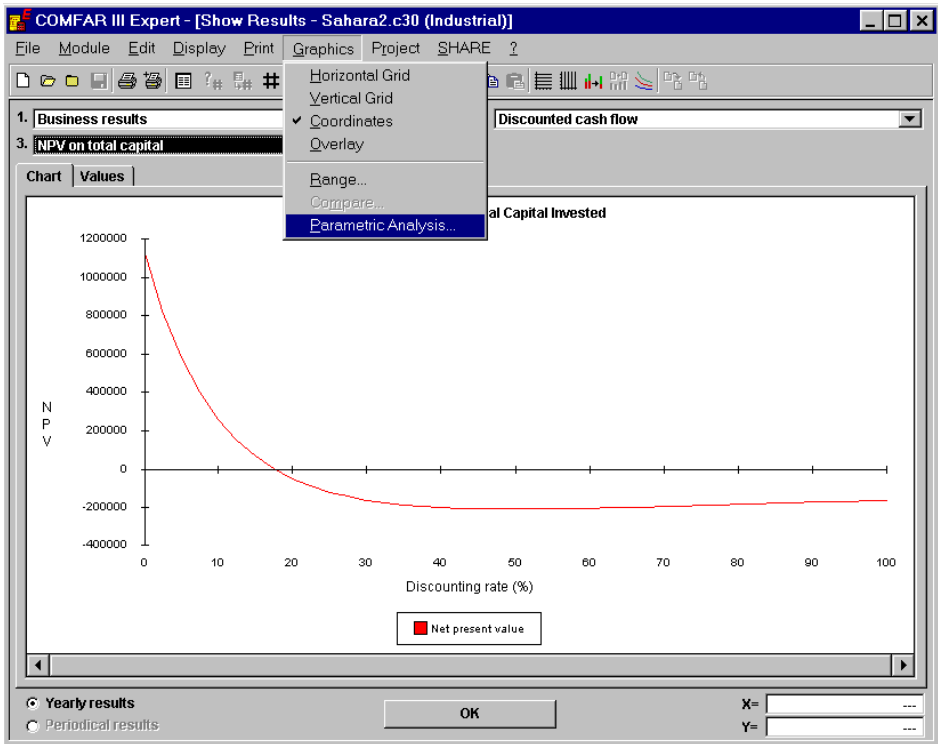


Figure 123: Selection of parametric analysis

PARAMETRIC ANALYSIS

The results of a variation are calculated including the *income tax effect**. However, the model underlying the calculations does not adjust for *cash deficits* or *cash surpluses* resulting from parameter variations, nor does it calculate any effects on *net working capital requirements* and *financing* (e.g. interest payable) that would result from parameter variations. If it is expected that these effects could be significant, the **Sensitivity** feature should be used to alter the input data accordingly.

* In the previous versions of COMFAR the income tax effect was ignored. If payment of dividends has been defined as a function of the annual net profits, COMFAR III Expert adjusts the cash flows accordingly.

Charts allowing parametric analysis

The **Parametric analysis** feature in the GRAPHICS menu may be selected when a graph (line chart) is displayed. In addition it is possible to call a chart for parametric analysis directly from the show results browser, as described below. The feature may be selected from the charts shown in table 24:

BUSINESS RESULTS	
Discounted cash flow	NPV, total capital invested NPV, total equity invested
Net income statement	Net profit to sales Net profit to equity, net profit to net worth (Net profit + interest) to investment
Break-even analysis	All charts
EVALUATION AND RATIOS	
Financial ratios	Net cash flow to long-term debt Long-term debt service coverage
Efficiency ratios	Output to capital ratio Investment to personnel costs Turnover of inventory Net cash flow to total sales ratio

Table 24: Charts allowing parametric analysis

Variables subject to parametric analysis

The variables and charts for which parametric analysis may be applied are shown in table 25.

VARIABLE	CHART
Financial costs	NPV, total equity capital invested Net profit to sales Net profit to equity; net profit to net worth Break-even charts (including finance) (Net profit + interest) to total investment Long-term debt service coverage
Fixed costs	Net profit to sales Net profit to equity; net profit to net worth (Net profit + interest) to investment Break-even charts (as appropriate)

Table 25: Variables subject to parametric analysis

Increase in fixed assets	NPV, total capital invested NPV, total equity capital invested Net cash flow to long-term debt Long-term debt service coverage
Investment costs	(Net profit + interest) to investment Output to capital ratio Investment to personnel costs
Operating costs	NPV, total capital invested NPV, total equity capital invested Net cash flow to long-term debt Long-term debt service coverage Net cash flow to total sales ratio
Personnel costs	Investment to personnel costs
Sales revenues	NPV, total capital invested NPV, total equity capital invested Net profit to sales Net profit to equity; net profit to net worth (Net profit + interest) to investment Break-even charts Net cash flow to long-term debt Long-term debt service coverage Output to capital ratio Turnover of inventory Net cash flow to total sales ratio
Variable costs	Net profit to sales Net profit to equity; net profit to net worth (Net profit + interest) to investment Break-even charts

Table 25: (continued)

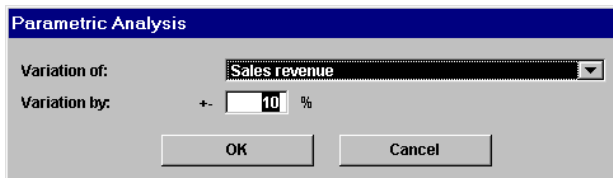


Figure 124: Parametric analysis modal window

To call parametric analysis from a chart

- Select from the Results browser the (line) chart to be analyzed (see list of charts above); alternatively, the desired chart may be selected from the drop-down list boxes displayed in a SHOW RESULTS window.
- Select **Parametric Analysis** in the GRAPHICS menu; the PARAMETRIC ANALYSIS modal window is displayed (figure 124).
- Select from the VARIATION OF drop-down list box the variable to be analyzed.
- Enter the percent rate into the VARIATION BY (\pm) entry field.
- Select the **OK** pushbutton to obtain the graphical display showing the effects of the alteration of the selected variable or **CANCEL** to return to the chart previously displayed.
- Select **Base chart** to obtain a display without parameter variations.

As mentioned before, each of the charts for parametric analysis may also be called directly from the **Show results** browser by clicking into the Graphics Icon of the corresponding RESULTS node and by dragging the cursor to the required variable displayed in the list box while the right mouse button is held down.

This short cut is very convenient when the user wants to view the charts with parametric analysis (with user-defined or default percent rates).

To call parametric analysis directly from the browser

- Extend the Show results browser until the required node (name of the chart) is displayed.
- Select with the right mouse button the Graphics Icon of the node and press the right mouse button down during the entire operation.

A list box appears with the name of the base chart on top and a list of the variables available for parametric analysis.

- Drag the mouse cursor to the variable to be analyzed and release the right mouse button once the name of the selected variable appears as inverted text.

The corresponding chart is displayed immediately, showing the variation for the percent rate defined any time before. If no rate was defined before by the user, the system assumes a value of 10% (variation \pm) as a default.

The percent rate may be changed, selecting **Parametric analysis** from the GRAPHICS menu.

- Select the **OK** pushbutton to leave the chart displayed and to return to the browser.

PRINT

To print a chart displayed, the PRINT menu is selected. The chart may be printed immediately, selecting the command: **Selected item**, or it may be added to the print job (**Add to print job**). For a detailed description of the PRINT menu and its feature, see chapter V.E.

To print a chart with parameter variations

- Select the **Selected item** feature in the PRINT menu to get a print immediately, or
- Select the **Add to print job** feature to add the chart to the print job (see chapter V.E).

XIV. INCREMENTAL ANALYSIS

Incremental analysis offers the possibility to analyze the incremental effect of two project alternatives, e.g. in case of expansion the existing enterprise including the project and the existing enterprise without new investment (see chapter VII.T. *Expansion/rehabilitation*). The analysis of the project in isolation (incremental investment) provides the expected return on the new investment, but cannot be totally divorced from its place within the context of an existing enterprise.

The **Incremental analysis** feature may be applied to the following schedules:

- Cashflow for financial planning
- Discounted Cash flow on total capital invested
- Discounted Cash flow on total equity invested
- Discounted Cash flow on joint venture capital invested

To call incremental analysis from a schedule

- Load at least two project alternatives **with the same planning horizon** and calculate the results.
- Select from the Results browser of the base project the schedule to be analyzed (see list of schedules above); alternatively, the desired schedule may be selected from the drop-down list boxes displayed in a SHOW RESULTS window.
- Select **Incremental Analysis** from the tool bar; the INCREMENTAL ANALYSIS modal window is displayed.
- Select from the 2ND PROJECT drop-down list box a project alternative.
- Select the **OK** pushbutton to obtain the schedule showing the base project, the 2nd project and the incremental effect of the 2nd project minus the base project or **CANCEL** to return to the chart previously displayed.
- Select **No incremental analysis** to obtain a display of the original schedule of the base project..

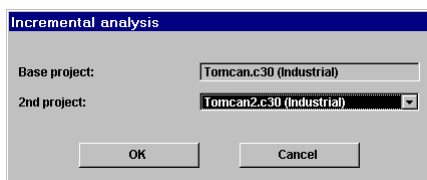


Figure 125: Incremental analysis modal window

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