International Civil Aviation Organization

WORKING PAPER

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SOUTH AMERICAN OFFICE

ICAO SPECIAL IMPLEMENTATION PROJECT (SIP)

WORKSHOP ON THE DEVELOPMENT OF BUSINESS CASE FOR THE IMPLEMENTATION OF CNS/ATM SYSTEMS

(LIMA, 10 − 14 NOVEMBER 2008)

Agenda Item 5: Hands-on exercises for the development of business case

CNS/ATM SYSTEMS IMPLEMENTATION BUSINESS CASE SOFTWARE (DFACS)

USER MANUAL

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CNS/ATM SYSTEMS IMPLEMENTATION
BUSINESS CASE SOFTWARE
(DFACS)

USER MANUAL

Version 1.0
October 2006

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I. Introduction

The CNS/ATM Database and Financial Analysis Computer System (DFACS) model is an interactive, analytical tool that enables air navigation service providers (ANSPs) and airspace users to build, evaluate and compare the economics of alternative options or scenarios for the implementation of CNS/ATM systems.

I.1 Main components

This interactive model has three main components: database, scenarios, and reports.

The **database component** helps the software users manage the reference data required for the creation and evaluation of CNS/ATM implementation scenarios. The reference data are classified into three segments, each of which corresponds to a particular menu item: geographical data, air navigation service providers data, and airspace users data.

The geographical data segment organizes data on the physical locations of air navigation equipment into a location, a State and a region. For example, all locations published in ICAO *Location Indicators* (Doc 7910) can be loaded into the database with their corresponding States. As the necessary tools to manage the geographical data are available, the users can define a region by selecting appropriate States, as required.

The air navigation service providers data segment allows users to manage equipment categories and/or functions (such as communication, navigation and surveillance), the list of conventional and new technology equipment types and associated costs (purchase, installation, average annual maintenance and inspection, communication, etc.) and the list of the conventional technology equipment currently in operation by physical location. The categories of additional costs (not equipment-related), such as labour and material, are also defined through this option.

The airspace users data segment helps users to manage the various aircraft types in operation with their average operating costs as well as the avionics types and their related costs.

Once the reference data for each of the three segments have been established, various CNS/ATM systems implementation scenarios can be built, analyzed and compared, using the **scenarios component** of the model. The scenario creation involves the definition and selection of a homogeneous air traffic management (ATM) area (region, State, or a combination of States and regions), the selection of conventional technology equipment to be covered by the scenario, the decisions concerning withdrawal of conventional equipment, and the decisions concerning the installation of new technology equipment from the perspective of the ANSPs. With respect to airspace users, the scenario includes air traffic and fleet forecasts by aircraft type, decisions concerning introduction and timing of avionics equipage, and estimates of the average rate of reduction in flight time resulting from the use of new technology. Other related costs (not equipment related) for the ANSPs such as labour costs and overheads, and similar costs for the airspace users, are also included in the scenario.

A sound business case would involve the development of a set of scenarios based upon reasonable assumptions related to the specific CNS/ATM project at hand. These scenarios would then be analyzed and compared using the business case model.

The scenario analysis option provides a series of output results in aggregate terms and in the form of tables and graphs explaining the financial implications of the selections and decisions made in the scenario. These results, generated in the **reports component**, can be saved as a report into an MS Excel file, as needed. The software has the capability of providing tables illustrating the annual costs by component or grouped by equipment, by location, by State and/or by cost type. Similarly, graphical displays of the expenditure and revenue streams illustrating the cost recovery (if any) for both the ANSPs and the airspace users are also available.

I.2 Main features

The model allows its users flexibility in the scenario-building process through the definition of a set of parameters. These include: the analysis horizon, the dates on which each component of the new system becomes operational, the extent of the transition period, the average equipment lifecycle, the period of cost recovery, etc.

Through the scenario option, the users can determine the manner in which conventional technology equipment may be withdrawn as well as the introduction of new technology equipment. The users can also create scenarios with a full new technology configuration and any other combination thereof.

The model provides the users with the traditional profitability measures. It allows them to examine the time profile of the expenditures resulting from a given implementation scenario and to compare it to the time profile of the revenues in order to determine if and when additional financing would be needed. The model is developed with the premise that ANSPs would recover their costs through the collection of user charges. The comparison of the cumulative revenues and costs streams would enable the users to determine the breakeven point at which cumulative revenues equal cumulative costs.

The average annual amount of user charges to be collected by the ANSPs during the cost-recovery period is among the output results of the model. In general, revenues from user charges are directly related to traffic levels but the average amount provides a basis to set user charges.

The output for each scenario could also provide the annual costs by State, by location and by equipment. These costs can also be grouped by cost-type such as purchase, installation, maintenance**,** operation, communication, etc.

Since the implementation of the CNS/ATM systems may lead to changes in the way air navigation services are provided, the model offers the capability of performing sensitivity analysis to determine the options, with a view to minimizing financial risks.

The model provides the option of adding data to its database from other sources and of manipulating them, as required. It is also extendable, allowing integration with other models such as a traffic forecasting module developed independently. The model's software and database are separate in the sense that, once the software is installed, the database file can be copied separately.

The model addresses the concerns of both the ANSPs and the airspace users and provides output results for both partners.

Though the model uses generic costs for all types of equipment, users can modify them to take into account factors relevant to specific equipment and/or location.

Currently, the estimate of flight-efficiency benefits to the airspace users is an input to the model rather than a built-in analysis. These benefits have to be estimated outside the model for each of the scenarios concerned. The model, however, allows for the inclusion of a module to estimate such benefits.

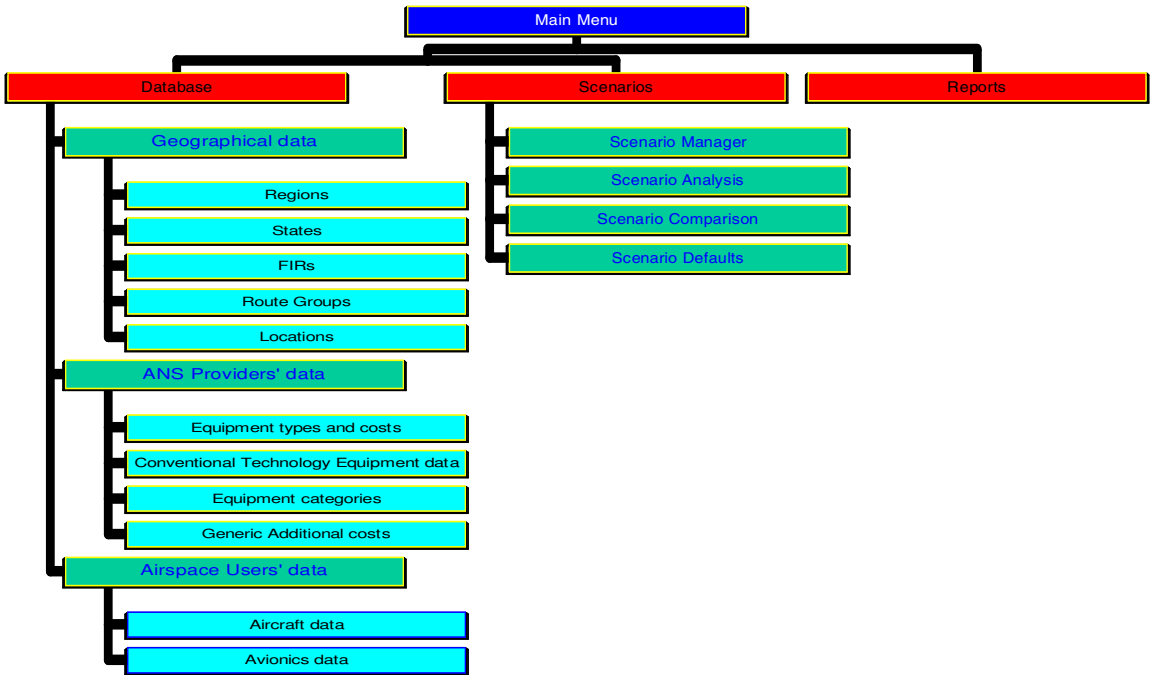
In the case of a multinational facility service, the model has the capability to include the segments attributed to each State separately, although it would not include the shared segments in the scenarios. Such a feature may, however, be added into the model in the future, if it is deemed needed.

This document provides a step by step guide for the user to analyze various scenarios using the tools provided through the various menus options and screens.

DFACS has three main modules:

1. Database
2. Scenarios
3. Reports, as illustrated in figure 1.1

Figure 1.1 : DFACS menu structure



II. Database module

The database module helps the software user manage the reference data required for the creation and evaluation of CNS/ATM implementation scenarios. The reference data is classified into three groups corresponding each to a menu item:

1. Geographical data
2. Air navigation service provider's equipment data
3. Airspace users'data

The following sections describe each of the three menu items.

II.1. Geographical data

The geographical data menu item consists of the following options:

- Regions
- States
- Locations (from the ICAO locations database)

Locations are the central element of the analysis. A location refers to the site where an equipment item (whether conventional technology or new technology) is installed. Each equipment item is installed in a specific location. Each location belongs to a single State and each State belongs to a region. Figure 2.1 below illustrates the various interdependencies.

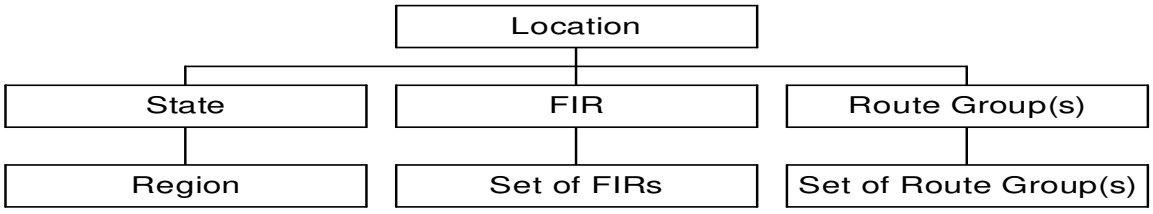


Figure 2.1 : Geographical locations combinations

The software allows the user to base the analysis on:

- one or more Regions or,
- one or more States or,
- a combination of States and Regions.

II.1.1. Generic data set management interface features

Data is classified in data sets. A data set corresponds to one of the following references: Regions, States, locations, conventional and new technology equipment types and costs, equipment categories, additional cost categories, aircraft types and avionics.

Most of the software data set management screens share some common features. In general, a list of the elements in the data set concerned is displayed at the center of the screen. Each row in the list corresponds to an element of the data set. The number of rows (elements) in the list is shown

on the top right side of the screen. Each list has its own columns (or fields), which vary from one data set to another. In each data set section below, a description of the columns is provided. A set of command buttons shown on the right side of the screen provides the user the capability to add, modify or delete rows as required. For example, when the user chooses the "Add New" option, a box appears on the bottom of the screen prompting him to fill in the data element fields as required.Two options are provided: either to save the new data set element or to cancel the operation using one of the command buttons "Save Region" or "Cancel" on the right side of the screen.

In order to modify one or more fields of a given element in the data set, the user should first click in the corresponding row in the list and then click the "Modify" command button. The following steps are similar to the "Add New" option.

The various data sets are interrelated. Relationships have been build between locations and States, States and regions, etc. Therefore, before deleting an element (a location, a State, a region, etc.) from its data set, the user has to take into consideration the possible dependencies previously created between the element concerned and one or more elements of another data set. For example, if the user decides to delete a region, he must check whether any States, in the States data set, are linked to that region. If this is the case, then it is advisable that those States are deleted first. This condition applies to all the other links such as the link between States and locations and the link between locations and equipment items, etc.

To close the data set management screen press the "Done" button on the right side of the screen.

II.1.2. Regions

Figure 2.2 below shows the Regions data management screen. The list of world regions has two columns: Region code and Region Name. Region code is a code provided by the user and Region Name contains the name of the region.

Figure 2.2

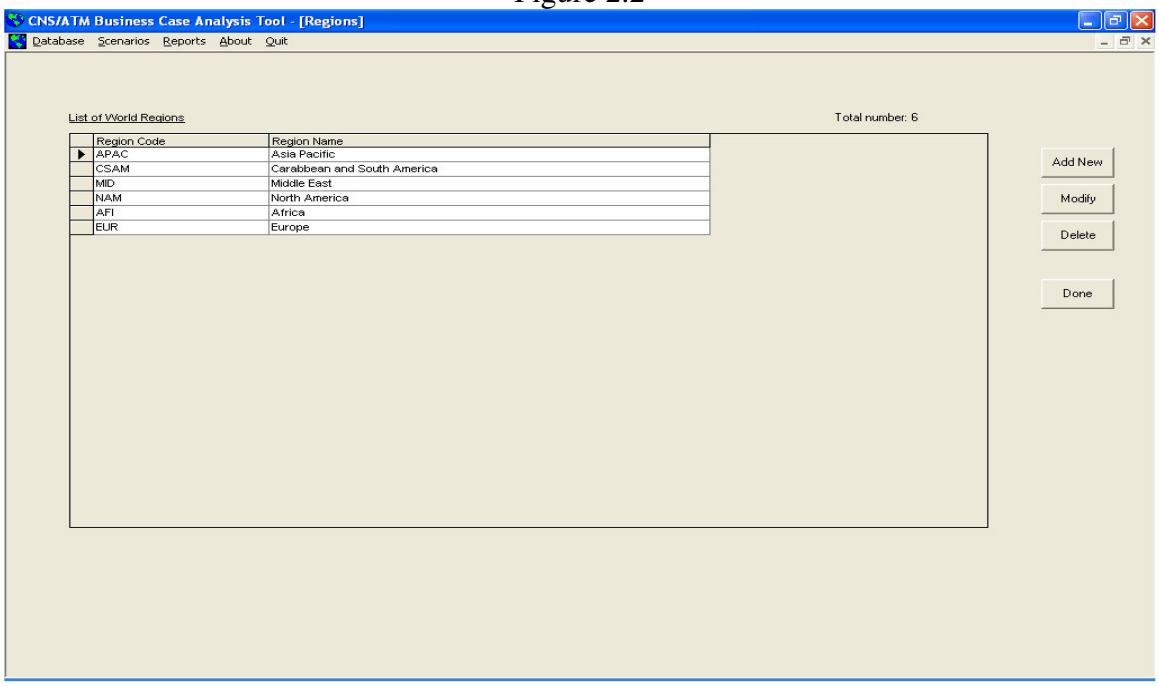
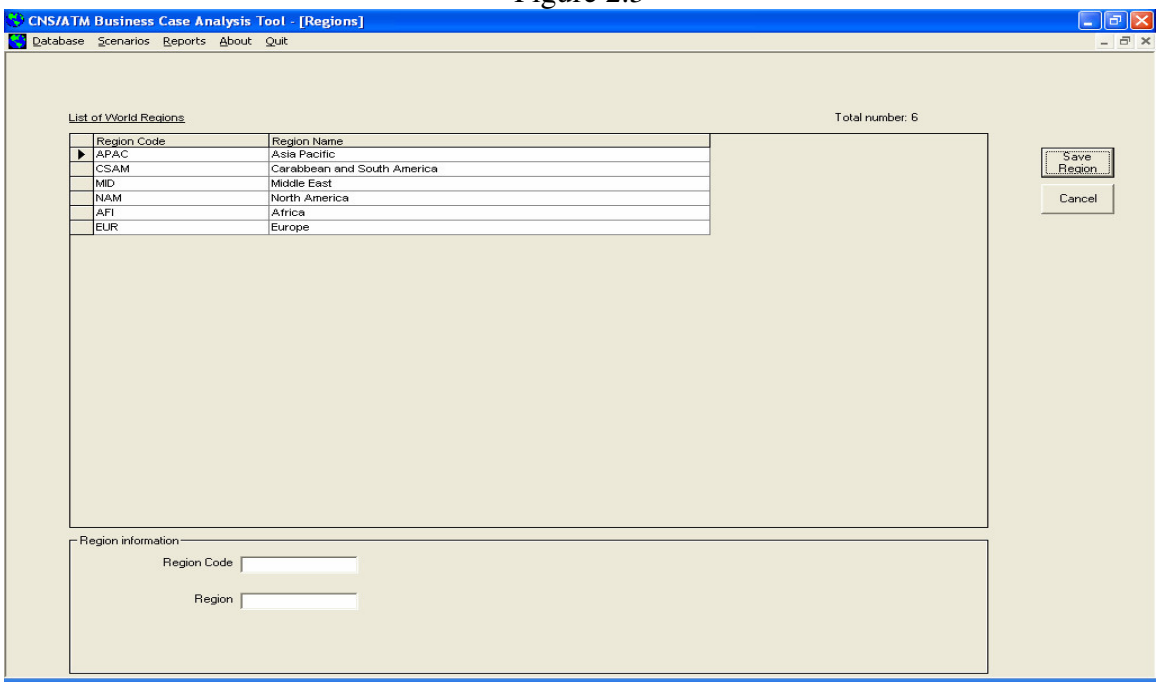


Figure 2.3 below shows the screen when the user chooses the “Add New” or “Modify” options:

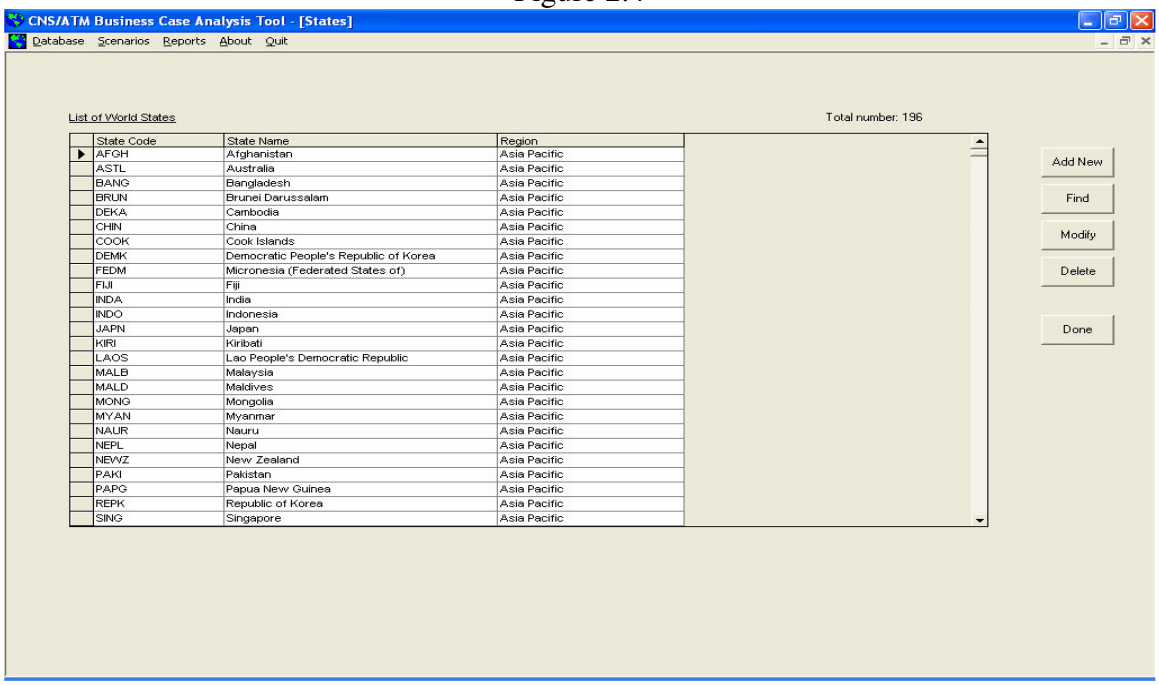
Figure 2.3



II.1.3. States

Figure 2.4 below shows the States data management screen. The list of all States has three columns: State code, State Name and Region. The State code is provided by the user, State Name contains the name of the State and Region refers to the corresponding region.

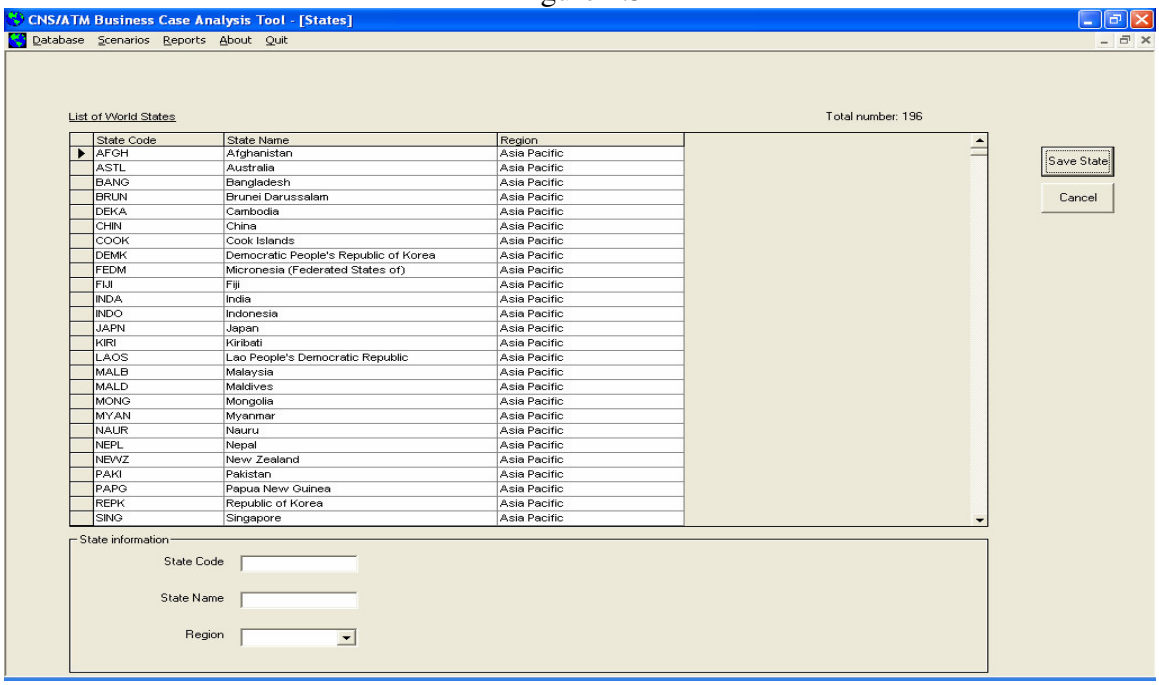
Figure 2.4



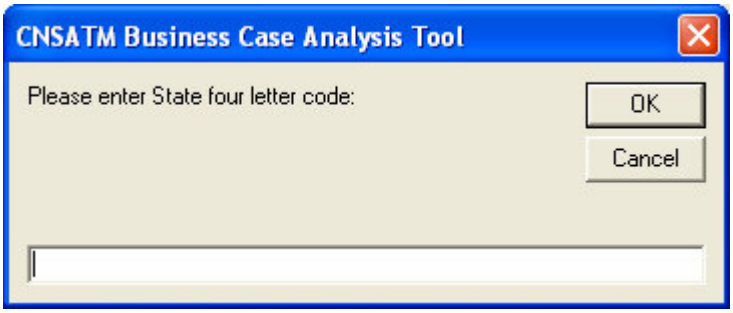
When the user chooses the “Add New” option, a box appears on the bottom of the screen, as illustrated in Figure 2.5, prompting him to enter a State code and a State Name and to select,

from the list of regions, the region to which the State belongs. The same box is used when the user select the “Modify” option.

Figure 2.5



Considering that there could be a large number of States in the database, the software offers a State search option. The command button “Find” located on the right side of the screen launches this option. When the user clicks this command button, the following dialog box appears:

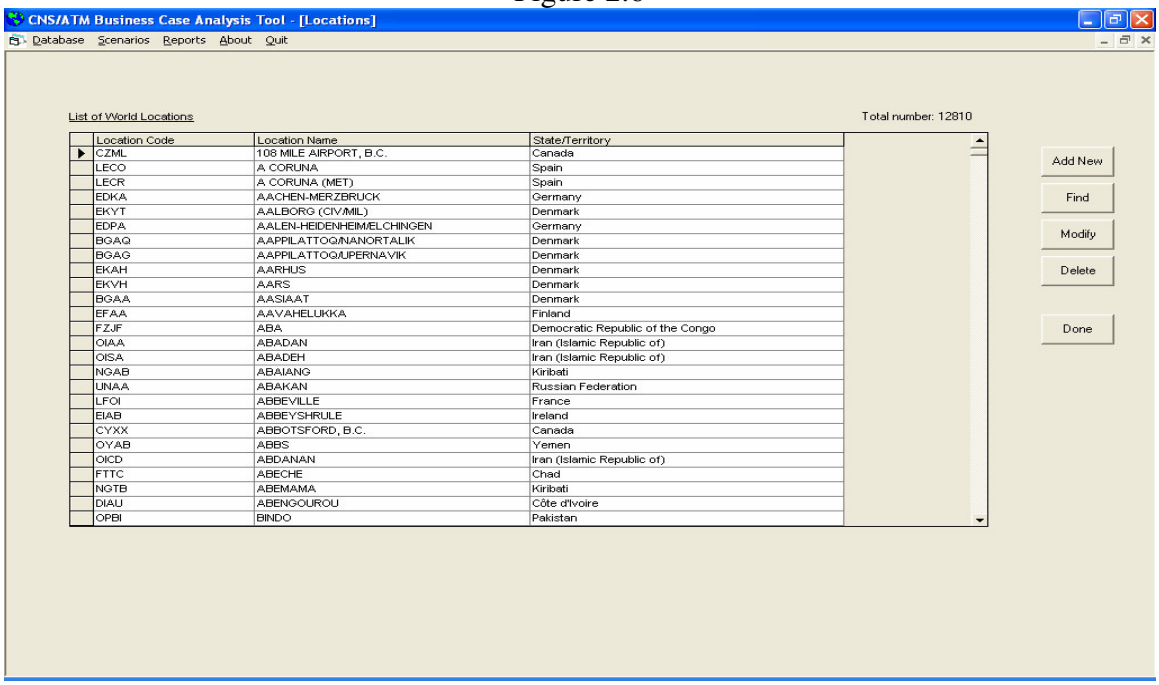


The search is based on the State’s four letter code. This also helps the user avoid introducing duplicate codes into the database (two or more States with the same four letter code).

II.1.4. Locations

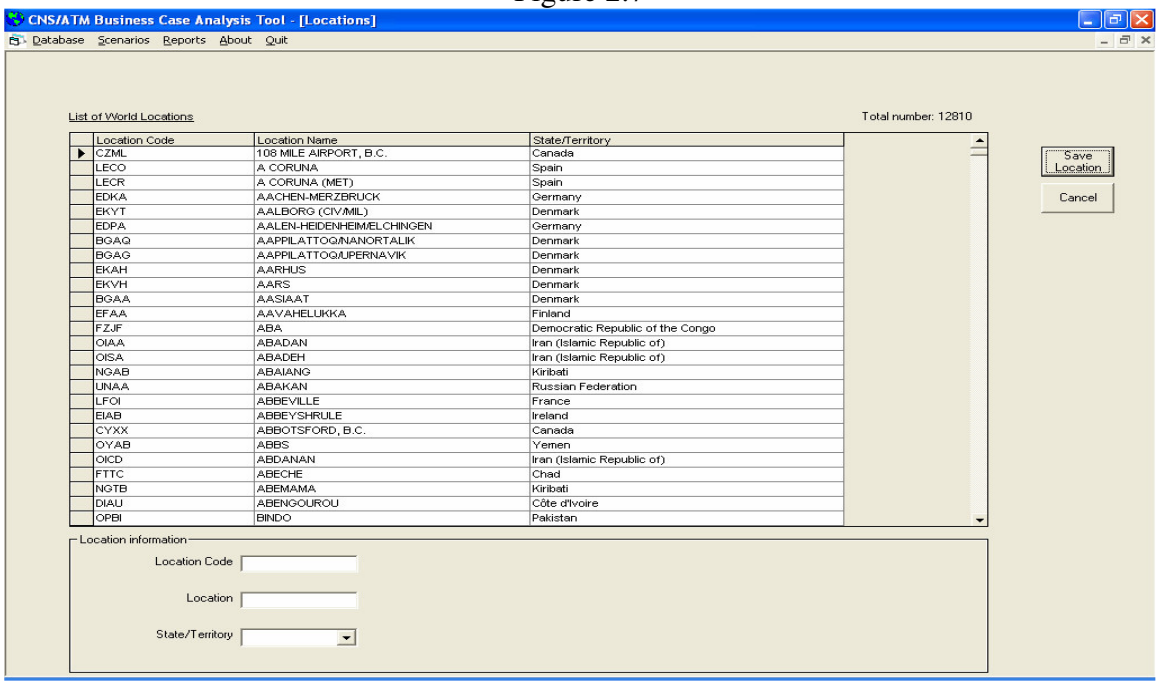
Figure 2.6 below shows the locations data management screen. The list of all locations has three columns: Location code, Location Name and State/Territory. The Location code is a code provided by the user, Location Name contains the name of the location and State/Territory refers to the corresponding State/Territory.

Figure 2.6

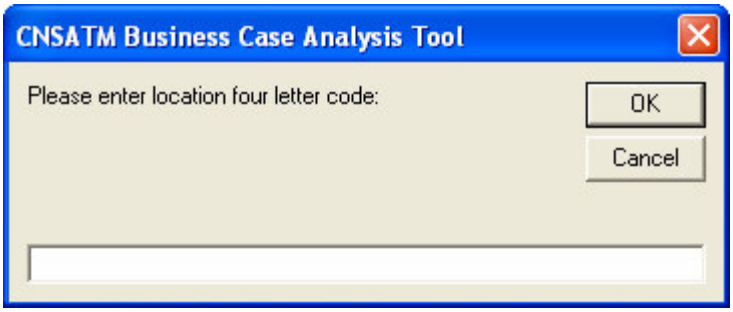


When the user chooses the "Add New" or the "Modify" option, a box appears on the bottom of the screen, as illustrated in figure 2.7, prompting him to enter a location code and a location Name and to select, from the list of State/Territories, the corresponding State/Territory.

Figure 2.7



Since there may be a large number of locations in the database as in the case of States, the software offers a location search option. The command button "Find" on the right side of the screen launches this option. When the user clicks this command button, the following dialog box appears:



The search is based on the location's four letter code. This prevents the user from introducing duplicate codes into the database as before (two or more locations with the same four letter code).

II.2. The air navigation service providers' equipment data

The classification of the air navigations service providers' equipment is illustrated in the figure 2.8 below:

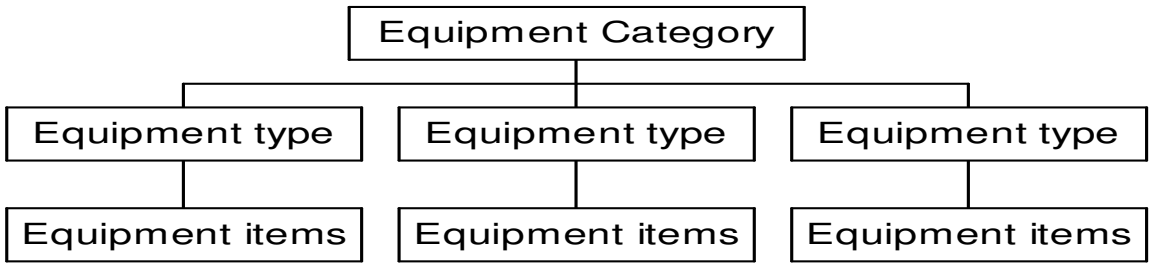


Figure 2.8: Equipment categories

Equipment category

Air navigation equipment is usually classified into categories such as communication, navigation, surveillance, air traffic management, etc. An equipment category corresponds to a set of equipment types contributing to the same air navigation function. For example, VOR and DME belong to the Navigation equipment category while PSR and SSR belong to the Surveillance equipment category.

Equipment type

An equipment type refers to the set of equipment performing the same function within each of the broad categories. Examples of equipment types are VOR, DME, ILS, PSR, etc.

Equipment Item

An equipment item refers to specific equipment installed in a particular location. It is possible to find more than one equipment items of the same type installed in the same location. For example, it is possible to find more than one ILS installed in a particular airport. Each specific ILS is considered an equipment item.

The air navigation service providers' equipment data menu item consists of the following options:

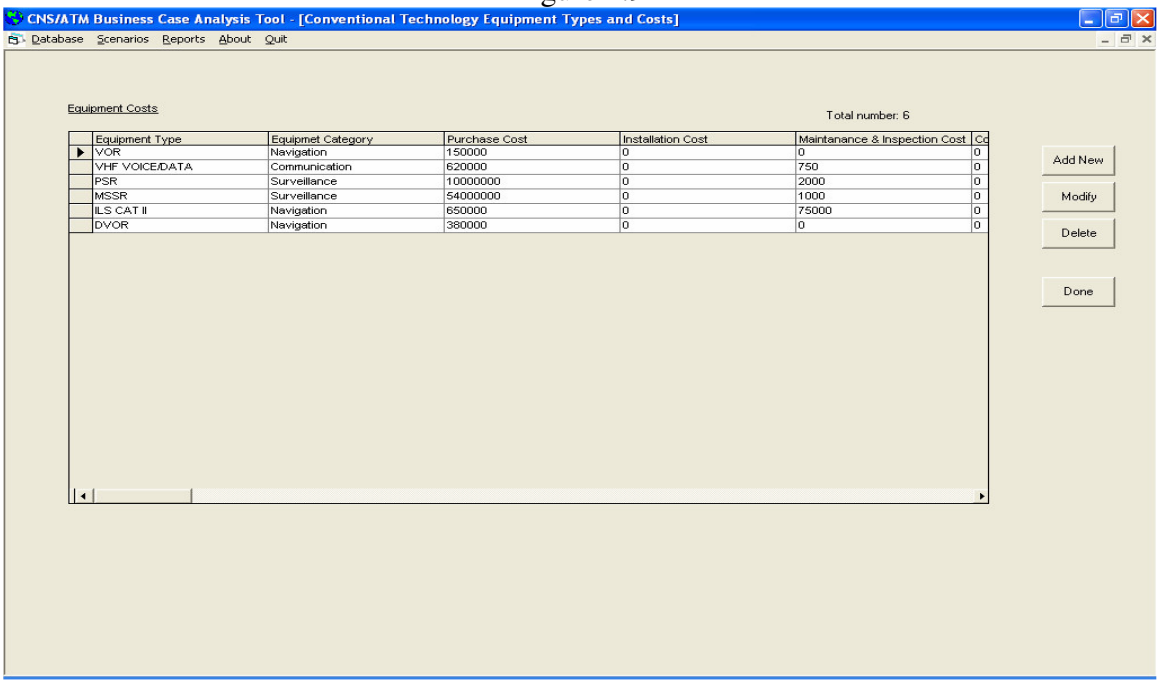
- Equipment types and costs
- Conventional Technology Equipment Data: the list of all equipment installed by location.
- Equipment categories (communication, navigation, surveillance, air traffic management, etc.). The user has the option of creating his own categories and associate a category to each equipment.
- Generic Additional Costs: costs other than equipment costs.

II.2.1. Equipment types and costs

II.2.1.1. Conventional technology equipment types and costs

Figure 2.9 below shows the "Conventional technology equipment types and costs" management screen. The list of all equipment types has the following columns: equipment type, equipment category, purchase cost, installation cost, maintenance and inspection cost, communications cost, refurbishment cost, decommissioning cost and average life cycle.

Figure 2.9



When the user chooses the "Add New" or the "Modify" option, a box appears on the bottom of the screen, as illustrated in Figure 2.10, prompting him to enter the conventional technology equipment type data as defined in the following paragraphs:

Equipment type: the name of the equipment type. For a definition of equipment type, refer to the definitions given in paragraph II.2. above.

Equipment category: the equipment category to which the equipment type belongs. An equipment type can belong only to one equipment category. For a definition of equipment category, refer to the definitions given in paragraph II.2. above.

Purchase cost: This is estimated as an average generic cost. It is understood that the cost of acquisition may vary from manufacturer to manufacturer and/or with the quantity of equipment acquired or other established contractual details. The user has the flexibility of estimating an average generic cost for each equipment type for inclusion in the analysis.

Installation cost: This is also estimated as an average generic cost. In reality, the installation cost may also vary depending on the location where the equipment is installed and whether this location has an easy access and has all the required utilities available or not. For simplicity, the user defines an average generic installation cost by equipment type as an input to the software.

Maintenance and inspection cost: This is estimated as an average generic annual cost. This cost varies among equipment items and from year to year. For simplicity, the user defines an average generic maintenance and inspection cost by equipment type and used by the software.

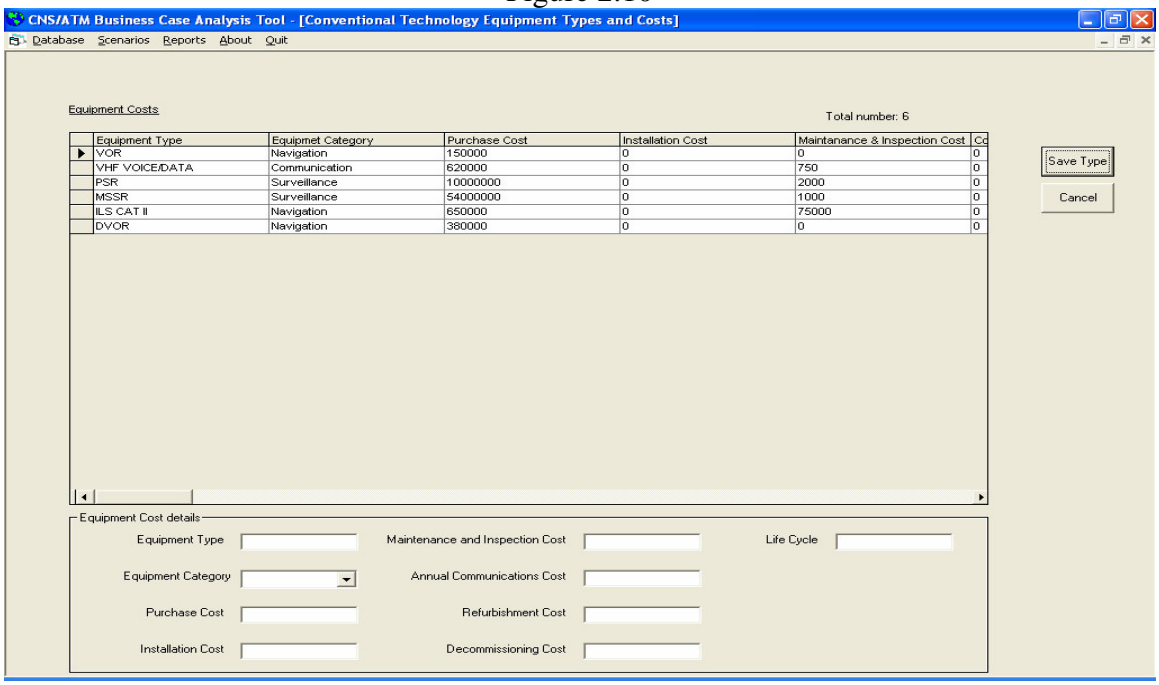
Communications cost: This is estimated as an average generic annual cost. Not all equipment have a communications cost. Communications cost may vary with the location where the equipment is installed and the nature of the contractual arrangements between the air navigation service provider and the telecommunications provider. The simplest case is the cost associated with that of a leased line on an annual basis.

Refurbishment cost: Again, this is estimated as an average generic cost. In many cases, equipment reach their life cycle (life expectancy) while they are still operable. The air navigation service provider may stretch their usage for a few years. In other cases, in order to extend the life of equipment and continue its use, a special maintenance operation may be required by which some parts may be replaced. Such maintenance operation is referred to as refurbishment. For each equipment an average refurbishment cost is estimated by the user.

Decommissioning cost: This is an average generic cost as before. If the air navigation service provider decides to discontinue the use of an equipment and remove it, some costs may be incurred such as the removal, transportation and recycling costs, earth leveling, etc. These costs are cumulatively referred to as decommissioning cost.

Average life cycle (life expectancy): This is estimated as an average generic number of years during which the equipment can be reliably operated with normal maintenance requirements.

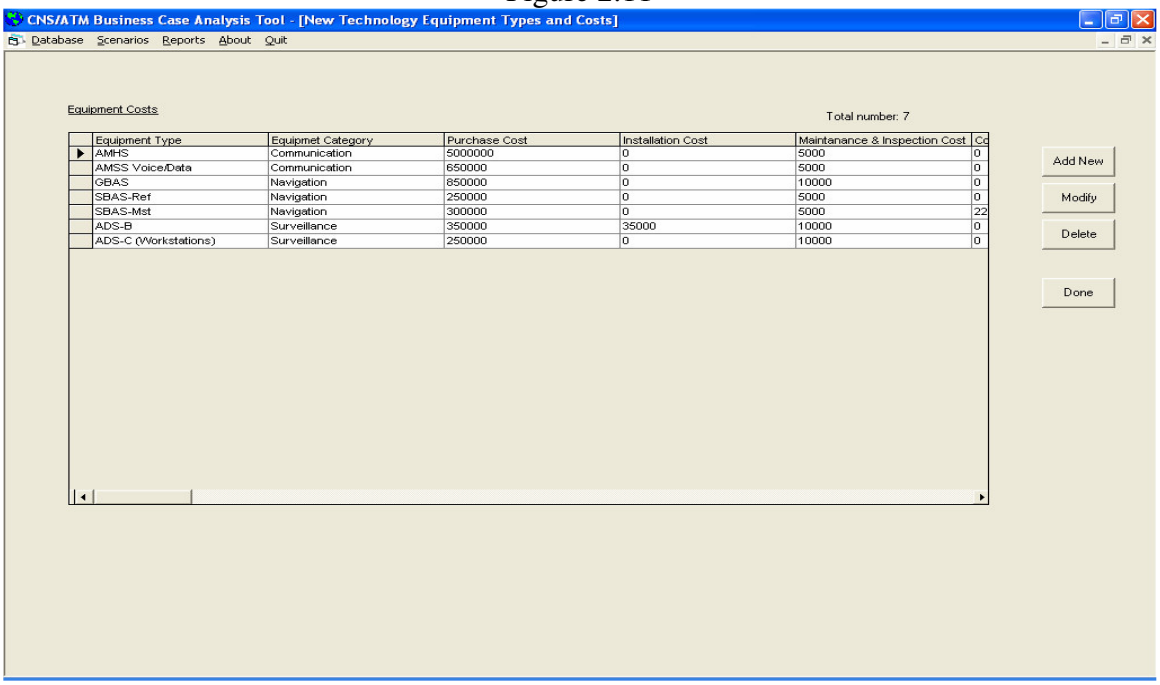
Figure 2.10



II.2.1.2. New technology equipment types and costs

Figure 2.11 below shows the "new technology equipment types and costs" management screen.

Figure 2.11



The New technology equipment types and costs data management process is identical to that of the conventional technology described in the previous section.

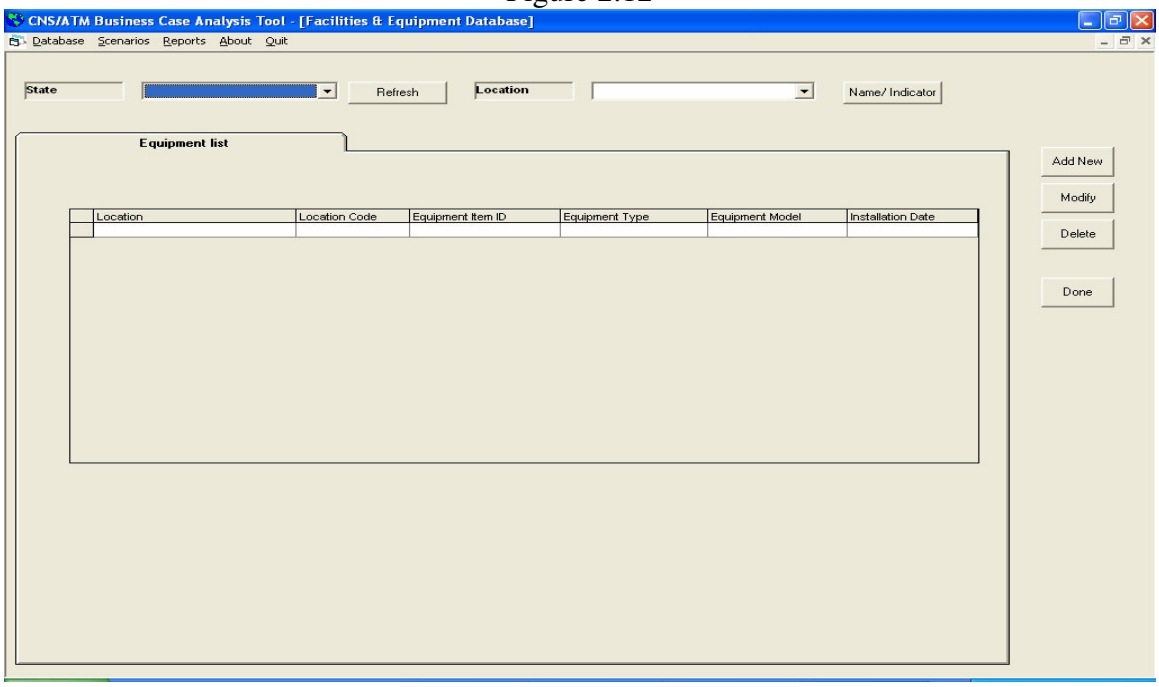
II.2.2. Conventional Technology Equipment Data

All existing conventional technology equipment must be entered in the database using the "Conventional Technology Equipment Data" option.

Figure 2.12 below shows the Conventional technology equipment data management screen. The list of all States/Territories can be accessed through a drop down list on the top left side of the screen. Once a State/Territory is selected, the list of all its conventional technology equipment is shown in the center of the screen. The list of all locations in the selected State/Territory can be accessed through another drop down list on the top right side of the screen. A "Name/Indicator" command button next to the location drop down list switches between the display of the list of location Names and the display of the list of ICAO location four letter indicator. Once a location is selected, the list of all corresponding conventional technology equipment associated with the particular location is shown in the center of the screen.

A "Refresh" command button next to the State/Territory drop down list refreshes the list of locations and equipment and displays all equipment in the selected State/territory. The list of equipment has the following columns: location, location code, equipment item ID, equipment type, equipment model, installation date. A set of command buttons is shown on the right side of the screen giving the user the capability to add new, modify and delete conventional technology equipment as required.

Figure 2.12



When the user chooses the "Add New" or the "Modify" option, a box appears on the bottom left of the screen, as illustrated in Figure 2.13. A message box prompts the user to enter the new conventional technology equipment item data as described in the following paragraphs:

Equipment item ID: this is a name attributed by the ANSP to the equipment. This field may be left empty.

Equipment type: the equipment type name (VOR, DME, ILS, etc.). This field should not be left empty.

Equipment model: the equipment manufacturer and model. This field may be left empty.

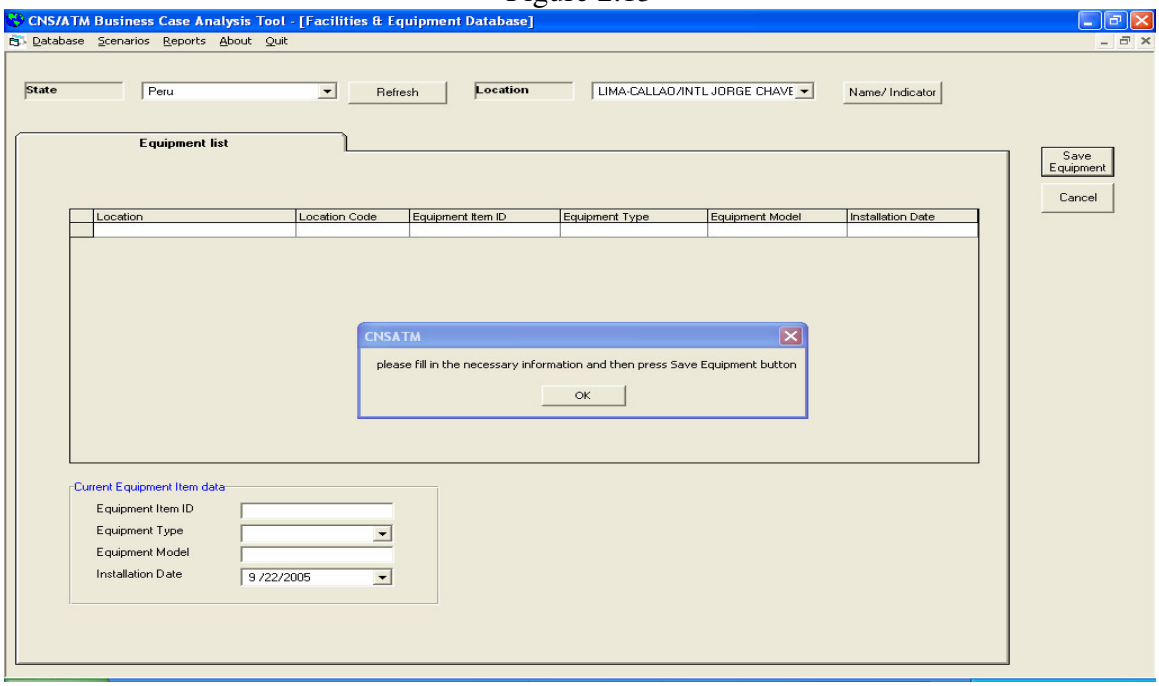
Installation date: the date on which the equipment was installed. This field should not be left empty. This date is used by the software when specific decisions on the fate of the equipment are made at the scenario creation phase. If the field is empty, the software will assign a default installation date chosen by the user.

The equipment list in the centre of the screen shows two additional fields:

Location: displays the name of the location in which the equipment is installed. It corresponds to the location selected through the top down list. If no specific location has been selected, then all equipment in all locations in the selected State/Territory will be displayed. If no State/Territory is selected, the list is empty.

Location code: the corresponding location ICAO four letter code.

Figure 2.13



It is then possible to either save the new equipment or cancel the operation using one of the command buttons “Save Equipment” or “Cancel” on the right side of the screen.

The user would have to decide on the withdrawal of each of the conventional technology equipment for each of the scenarios.

Before deleting a conventional technology equipment from the database, the user has to take into consideration the possible use of the equipment concerned in one or more of the scenarios. In this case, it is advisable to delete those scenarios first.

II.2.3. Equipment categories

This software allows the user to create his own categories and associate a category to each equipment type. For a definition of equipment category, refer to the definitions above.

Figure 2.14 below shows the equipment categories management screen. The list of all equipment categories has only one column: equipment category name.

Figure 2.14

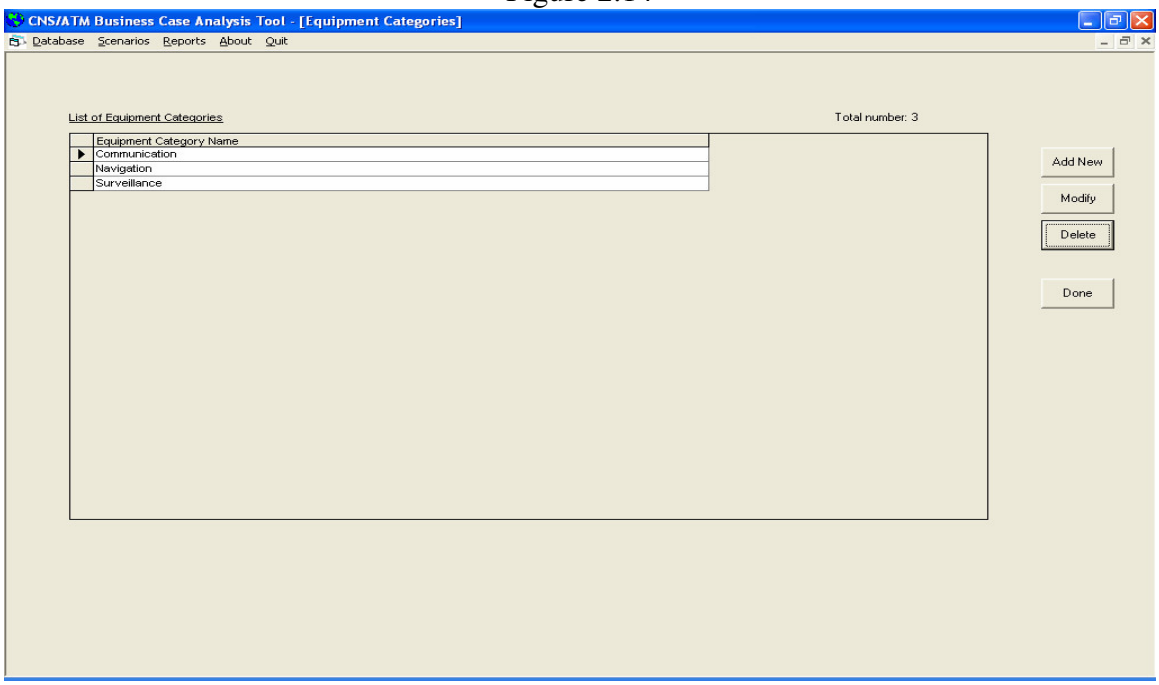
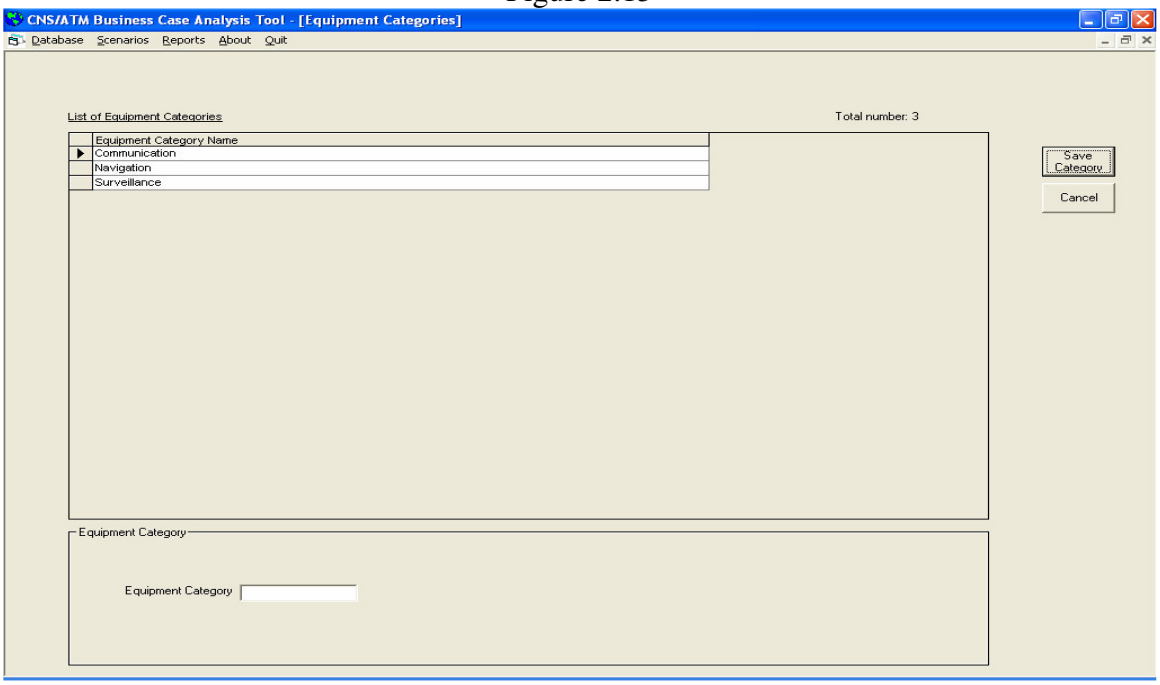


Figure 2.15 below shows the screen when the user chooses the “Add New” or “Modify” options:

Figure 2.15



II.2.4. Generic Additional Costs

The equipment related costs are included in the database while other costs such as labor costs, administrative costs and overhead, rental costs (except equipment related telecommunications), training costs, etc. are not. Provision is allowed for these costs to be included in the analysis by the user for each of the scenarios. The software allows the user to create these generic additional costs in the database for future reference.

Figure 2.16 below shows the generic additional costs management screen. The list of all generic additional costs has only one column: the types of generic additional cost.

Figure 2.16

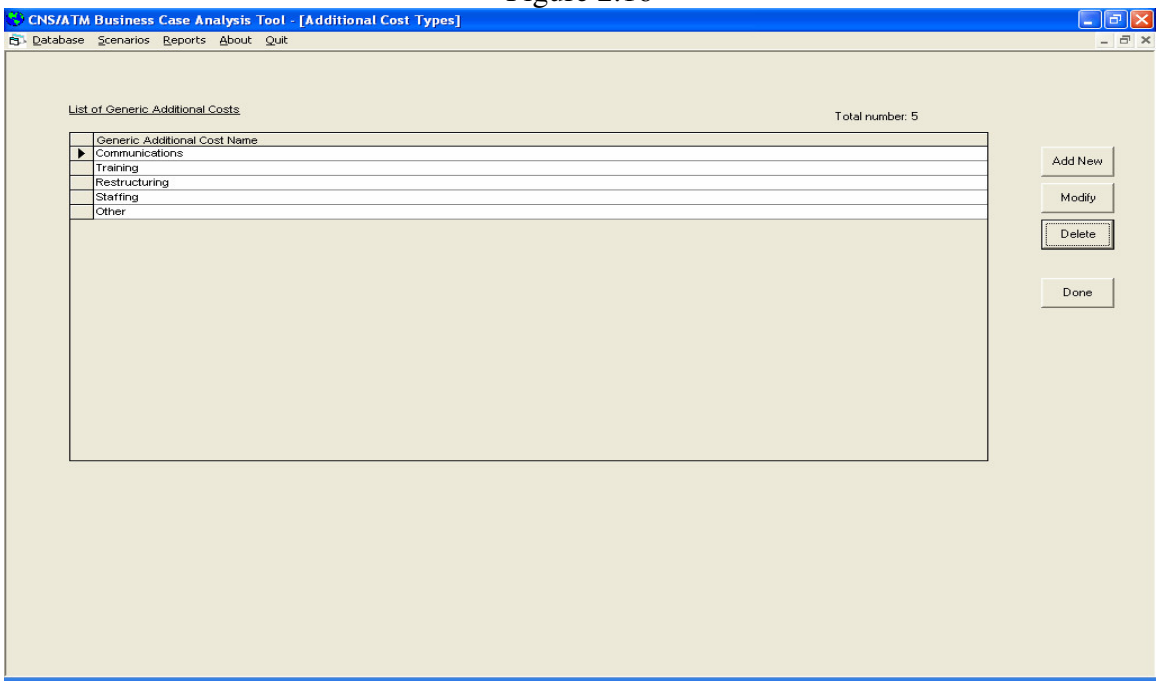
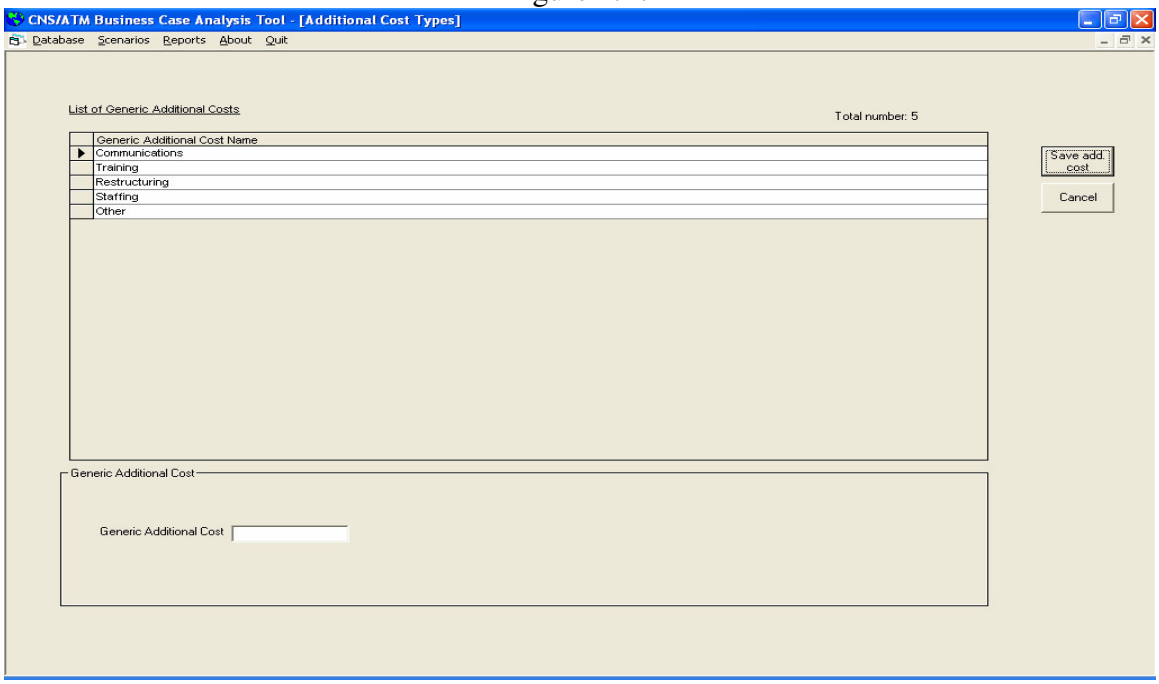


Figure 2.17 below appears when the user chooses the “Add New” or “Modify” options:

Figure 2.17



II.3. The airspace users' data

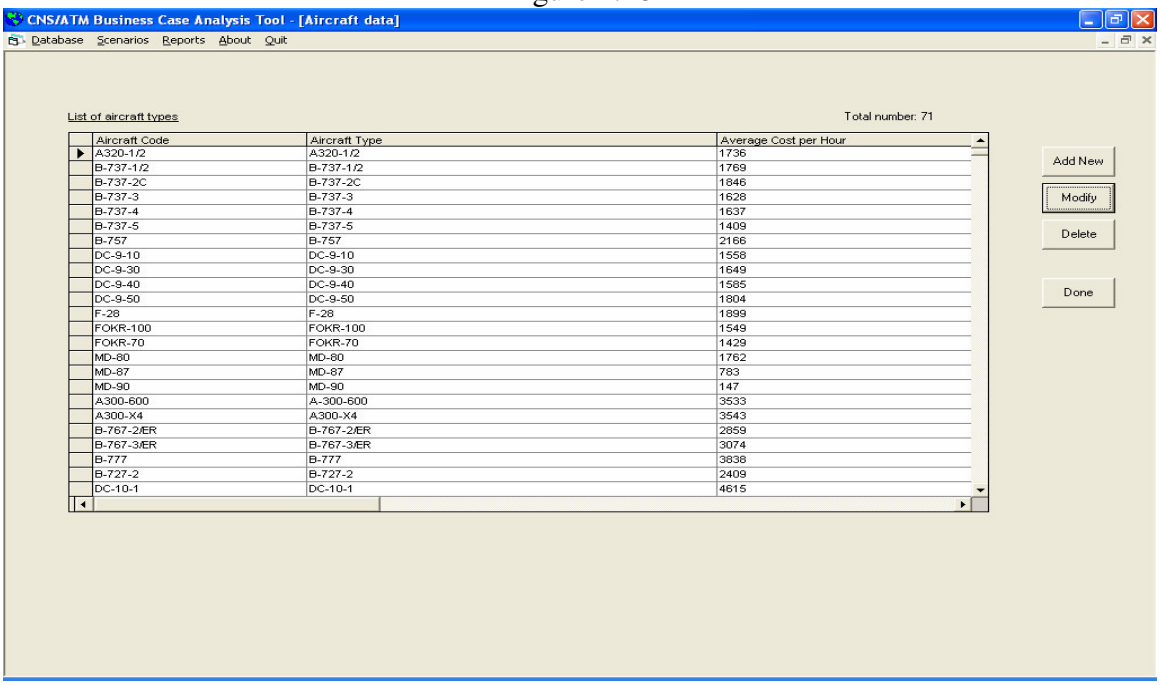
Data for airspace users is also classified into two categories:

- The aircraft type data
- The avionics data

II.3.1. Aircraft type data

Figure 2.18 below shows the "Aircraft type data" management screen. The list of all aircraft types has three columns: Aircraft code, Aircraft Name and Average Cost per Hour. Aircraft code is provided by the user and Aircraft Name contains the name of the aircraft type. The Average Cost per Hour is an average operating cost for the aircraft type. There is a provision to add a new aircraft type to the list for subsequent analysis if and when they become available during the horizon of the analysis.

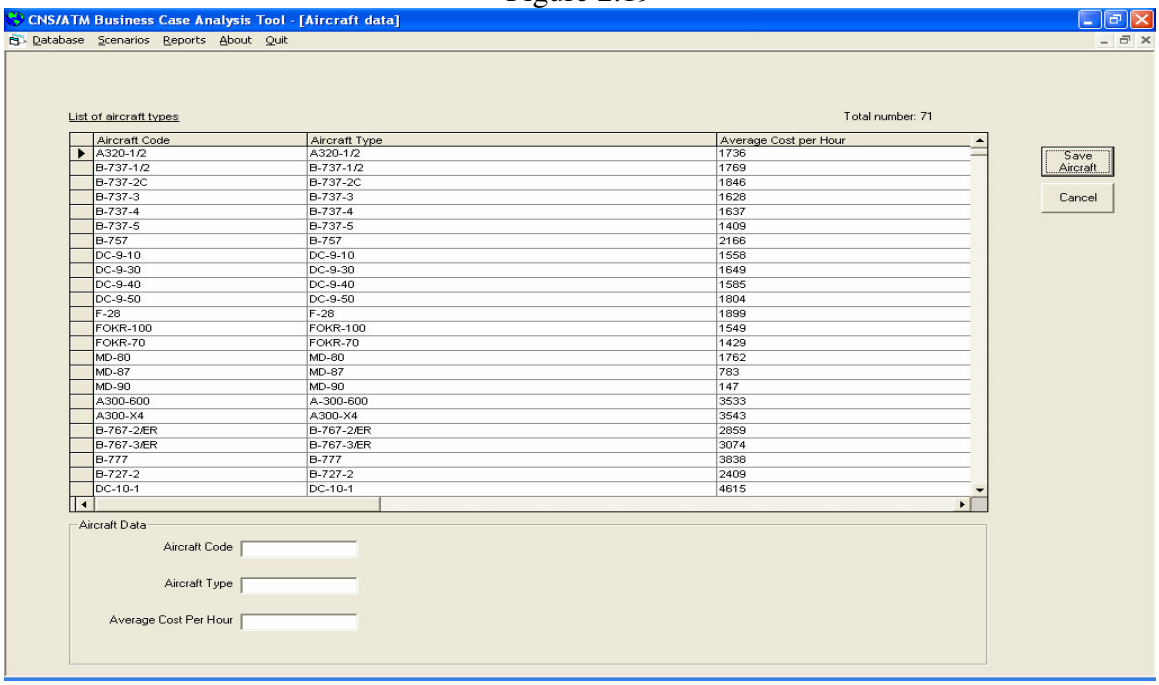
Figure 2.18



Aircraft Code	Aircraft Type	Average Cost per Hour
A320-1/2	A320-1/2	1736
B-737-1/2	B-737-1/2	1769
B-737-2C	B-737-2C	1846
B-737-3	B-737-3	1628
B-737-4	B-737-4	1637
B-737-5	B-737-5	1409
B-757	B-757	2166
DC-9-10	DC-9-10	1558
DC-9-30	DC-9-30	1649
DC-9-40	DC-9-40	1585
DC-9-50	DC-9-50	1804
F-28	F-28	1899
FOKR-100	FOKR-100	1549
FOKR-70	FOKR-70	1429
MD-80	MD-80	1762
MD-87	MD-87	783
MD-90	MD-90	147
A300-600	A-300-600	3533
A300-X4	A300-X4	3543
B-767-2/ER	B-767-2/ER	2859
B-767-3/ER	B-767-3/ER	3074
B-777	B-777	3838
B-727-2	B-727-2	2409
DC-10-1	DC-10-1	4615

Figure 2.19 below shows the screen when the user chooses the "Add New" or "Modify" options:

Figure 2.19



II.3.2. Avionics data

Figure 2.20 below shows the "Avionics data" management screen. The list of all avionic types has the following columns: avionic name, acquisition cost, installation cost, maintenance cost and communication cost.

Figure 2.20

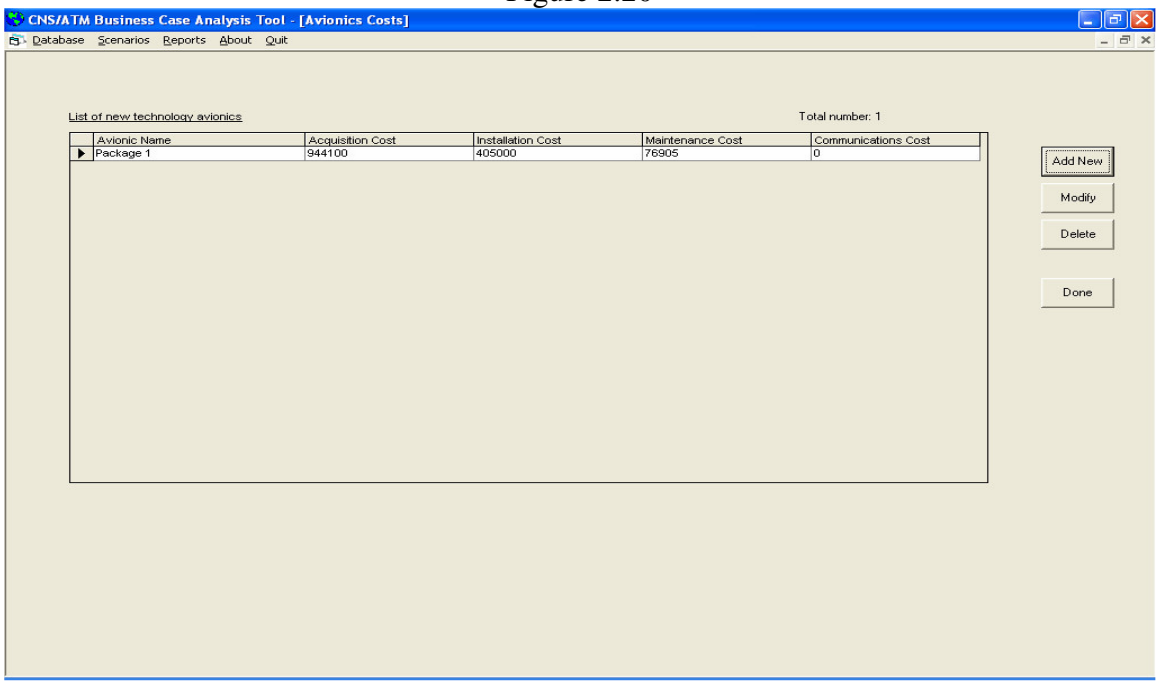
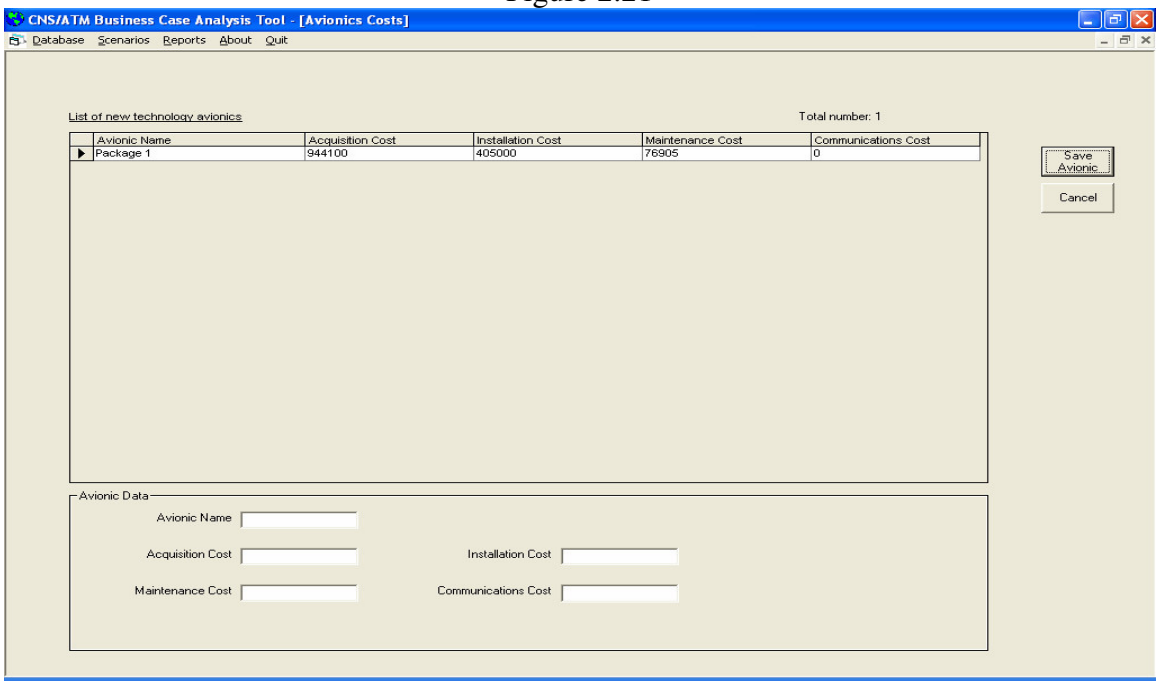


Figure 2.21 below appears when the user chooses the "Add New" or "Modify" options:

Figure 2.21


CNS/ATM Business Case Analysis Tool - [Avionics Costs]
Database
Scenarios
Reports
About
Quit
List of new technology avionics
Total number: 1
Avionic Name
Acquisition Cost
Installation Cost
Maintenance Cost
Communications Cost
Package 1
944100
405000
76905
0
Save Avionic
Cancel
Avionic Data
Avionic Name
Acquisition Cost
Installation Cost
Maintenance Cost
Communications Cost

III. Scenarios Module

The scenario module allows the user to create, copy and analyze scenarios. It has four menu items:

1. Scenario manager
2. Scenario Analysis
3. Scenario Comparison
4. Scenario Defaults

III.1. The Scenario manager

A scenario consists of a set of selections and decisions that the CNS/ATM systems implementation planner makes for evaluation and comparison purposes. There is no limit to the number of scenarios that can be created using this software.

Figure 3.1 illustrates the scenario components:

Figure 3.1

CNS/ATM Implementation Scenario Components

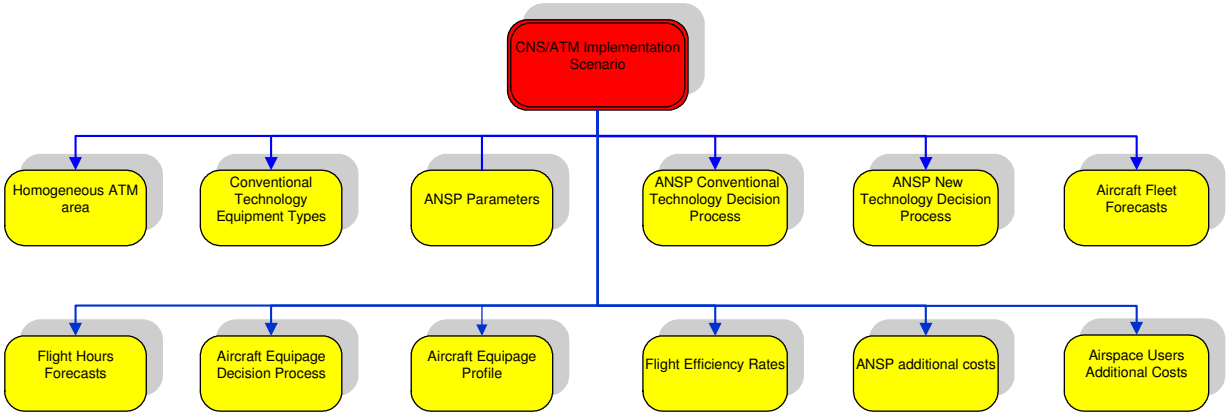
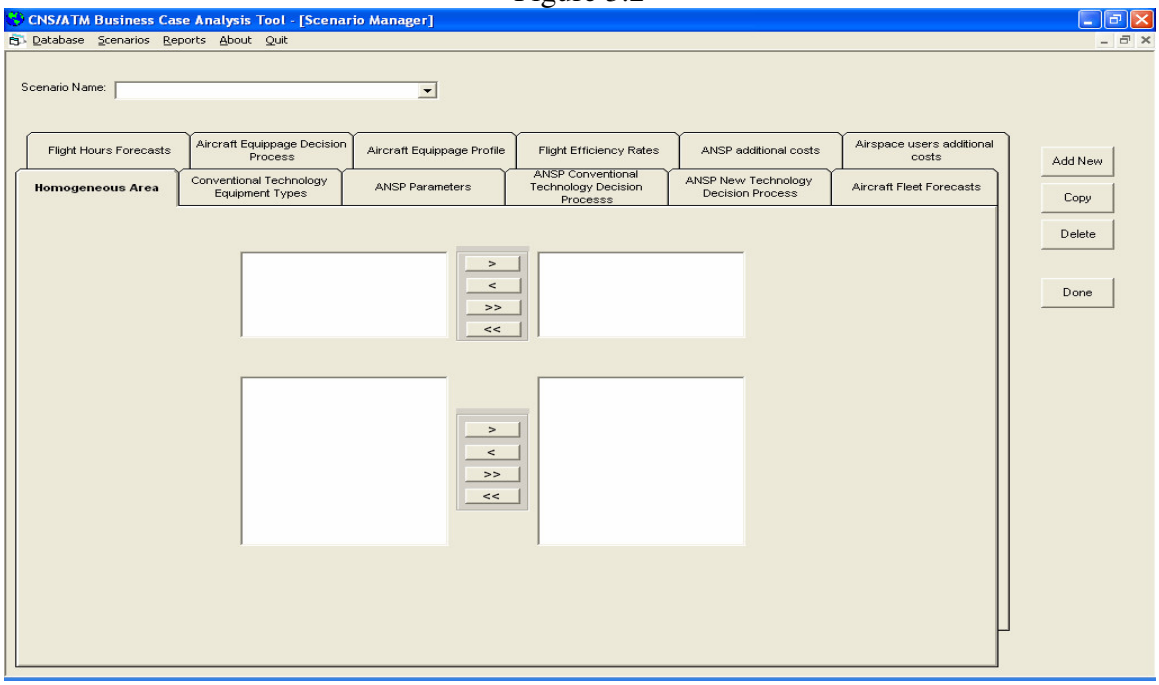


Figure 3.2 shows the scenario manager main screen:

Figure 3.2



On the top left side of the screen appears a drop-down list of all previously created scenarios. The list would be empty if no scenario has been created. In order to show the details of a given scenario, the user has to select it from the drop-down list. In order to create a new scenario the user has to press the "Add New" command button on the right side of the screen. The scenario drop-down list is replaced with an empty box in which the user has to enter the new scenario name and two command buttons ("Save" and "Cancel") appear on the right side of the screen. The user can then enter the scenario data as described in this document. When the scenario data entry is finished, the user can save the scenario by pressing the "Save" command button. It is also possible to cancel the creation of a scenario by pressing the command button "Cancel". After saving the scenario, the list of scenarios is automatically updated.

The user can copy a scenario by first selecting it from the drop-down list and then clicking on the "Copy" command button on the right side of the screen. A message box opens on the screen asking the user to enter a name for the new scenario and to make any changes required before saving. The scenario drop-down list is replaced with an empty text box where the user has to type the name of the new scenario and command buttons ("Save" and "Cancel") appear on the right side of the screen giving the option to either save or cancel. The user can then modify the data to build the new scenario. When the scenario data modification is finished, the user can save the scenario by pressing the "Save" command button. It is also possible to cancel this operation by pressing the command button "Cancel".

In the case of a new scenario or a scenario being copied or when a scenario is selected from the drop-down list, 12 different tabs display the details of the current scenario as follows:

- the selection of a homogeneous ATM area,
- the selection of the existing (conventional technology) equipment,
- the ANSP and airspace users' implementation parameters,
- the ANSP planning decisions concerning the existing (conventional technology) equipment,
- the ANSP planning decisions concerning the new technology equipment,
- the airspace users' fleet forecasts,

- the traffic forecasts in terms of flight hours,
- the airspace users planning decisions concerning the equipage of aircraft with new technology avionics,
- the airspace users planning decisions concerning the aircraft equipage time profile,
- the flight efficiency assumptions,
- the ANSP additional costs,
- the airspace users additional costs.

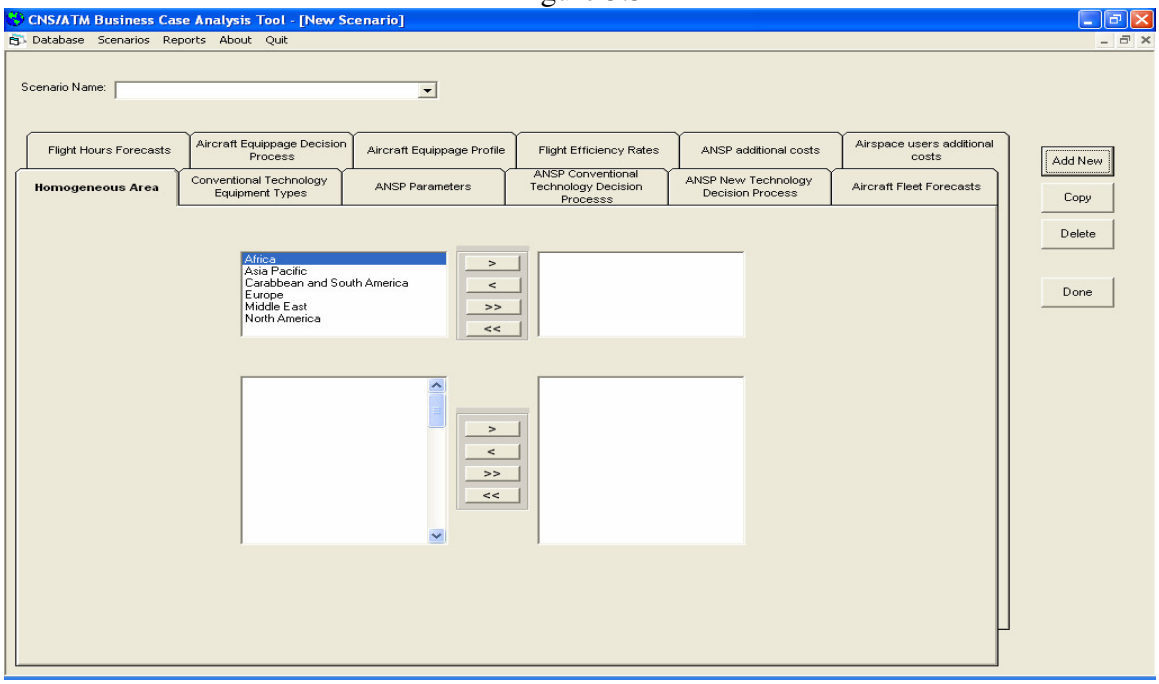
The following sections provide a description of these tabs.

III.1.1. Selection of the Homogeneous ATM area

A homogeneous area can be a State, several States, a region, a combination of States and regions or it can be global.

Figure 3.3 shows the Homogeneous ATM area tab:

Figure 3.3



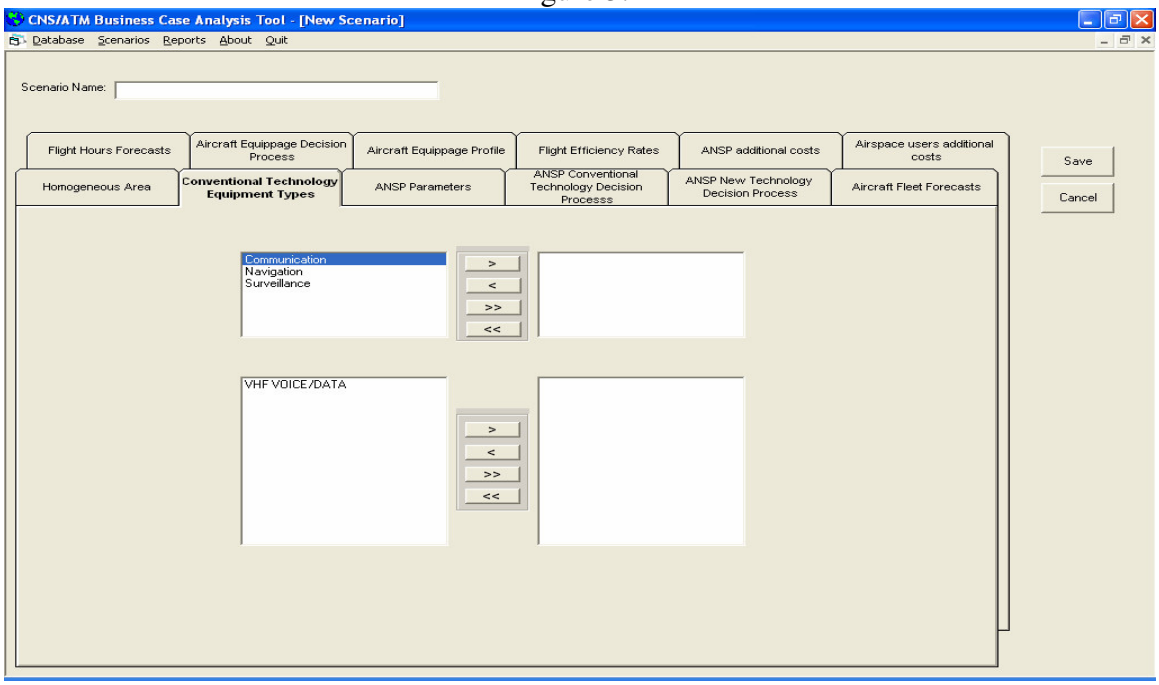
Two boxes appear on the left side of the screen displaying the list of regions (top) and list of States (bottom). States displayed in the lower box correspond to States belonging to the highlighted region in the upper box. The two additional boxes on the right side allow the user to select the desired homogeneous area for subsequent analysis. These would display the selected States or regions. In order to select a State or a region, the software user should first highlight the desired State or region and then click on the "**>**" command button. The name of the selected State or region moves to the box on the right side of the screen. In order to delete a State or a region from the selection, the user should first highlight the desired State or region and then click on the "**<**" command button. If the analysis is conducted for all the States or for all the Regions, the user has the option to click on the "**>>**" command button. To delete all States or all Regions from the selection, the user should click on the "**<<**" command button.

III.1.2. Selection of the conventional technology equipment categories and types

A scenario may cover one or more equipment categories, one or more equipment types or a combination of equipment categories and equipment types.

Figure 3.4 shows the Conventional Technology Equipment Types tab:

Figure 3.4



Two boxes appear on the left side of the screen, the top one displaying the list of equipment categories and the bottom one the list of equipment types. Equipment types displayed in the lower box correspond to equipment types belonging to the equipment category highlighted in the upper box. Another two empty boxes appear on the right side of the screen. These would display the selected equipment categories or types. In order to select an equipment category or an equipment type, the software user should first highlight the desired equipment category or type and then click on the "**>**" command button. The name of the selected equipment category or type moves to the box on the right side of the screen. In order to delete an equipment category or equipment type from the selection, the user should first highlight the desired equipment category or type and then click on the "**<**" command button. In order to select all equipment categories or types, the user should click on the "**>>**" command button and in order to delete all equipment categories or all equipment types from the selection, the user should click on the "**<<**" command button as described previously.

III.1.3. ANSP parameters

Figure 3.5 illustrates the various scenario parameters:

Figure 3.5

CNS/ATM Implementation Scenario Parameters

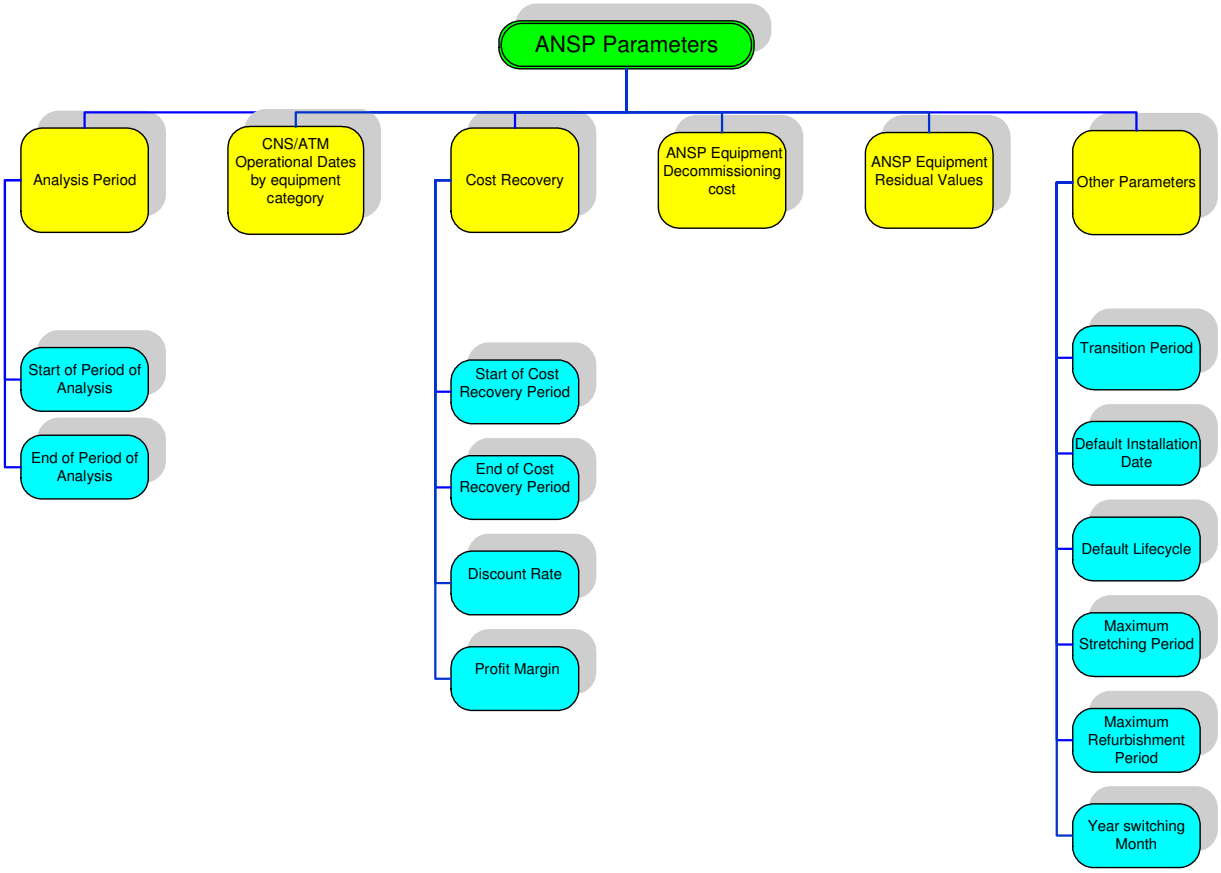
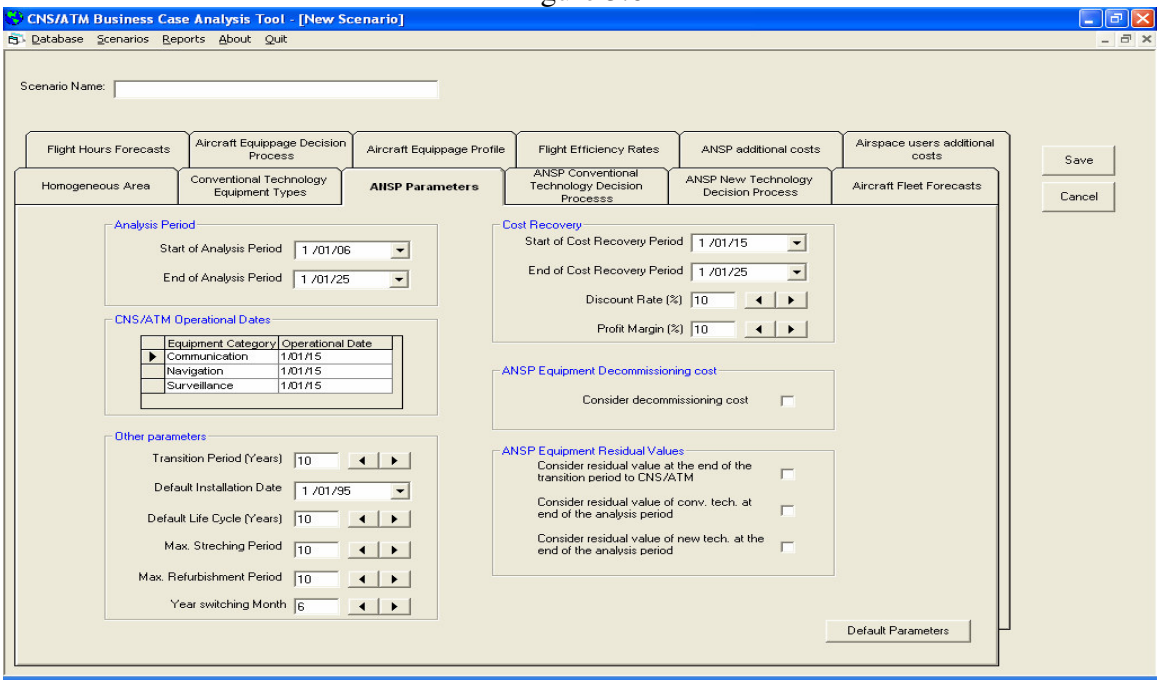


Figure 3.6 shows the ANSP parameters tab:

Figure 3.6



The ANSP parameters are grouped into six groups:

Analysis period

Start of analysis and End of analysis dates: These two dates define the period covered by the analysis specified as day, month and year of the start of the analysis and similarly the day, month and year of the end of the analysis period. Revenues and expenditures incurred outside this period are not included in the analysis. A date selection tool appears in front of the "Start of Analysis Period" and "End of Analysis Period" labels. The software user can either type in the date or click on the date selection tool to select a date from a calendar.

CNS/ATM operational dates

It is assumed that CNS/ATM systems become operational progressively function by function (or category by category). Each function is assigned an operational date which has to be within the analysis period. The software user can use a table to input the CNS/ATM dates by clicking in the corresponding cell. A date selection tool appears in the cell. The software user has the option of either entering the date or click on the date selection tool to pick a desired date from a calendar.

ANSP Equipment Decommissioning cost

The user also has the option to take the decommissioning cost into consideration when a conventional technology equipment is removed. In order to consider this cost, the user has to check the box labeled "Consider the decommissioning cost".

ANSP Equipment residual values

The software allows for the computation of conventional and new technology equipment residuals values and their inclusion in the analysis. Three independent options are provided so that the user can select the desired option.

- Consider residual values at the end of the transition period to CNS/ATM systems: this option applies to conventional technology equipment that will be removed at the end of the transition period (according to the scenario) earlier than planned before reaching their end of life cycle.
- Consider residual values of conventional technology equipment at the end of the analysis period: this option applies to conventional technology equipment that will be required for continuous operation (according to the scenario) and did not reach their end of life cycle at the end of the analysis period date.
- Consider residual values of new technology equipment at the end of the analysis period: this option applies to all new technology equipment that did not reach their end of life cycle at the end of the analysis period.

The residual value is estimated as the value of the remaining proportion of the equipment life cycle, at the end of the transition period or at the end of the analysis period (depending on the case), multiplied by the corresponding purchase cost. It should be borne in mind that the computed residual value may not correspond to the market value of the equipment.

The software user can select any of the three options above by clicking the appropriate check box.

Cost recovery

Start of cost recovery date: The date on which the ANSP plans to charge the airspace users to recover the costs incurred according to the scenario parameters and decisions for the provision of air navigation services.

End of cost recovery date: The date on which the ANSP plans to end the charge to the airspace users to recover the costs incurred according to the scenario parameters and decisions.

Discount rate: The rate to be used in the calculation of the Present Value (PV) of cash flows. It is also used as cost of capital in the estimation of the annual amount of user charges to be collected by the air navigation services provider from the airspace users.

Profit margin: This should be consistent with the ICAO policies on Air Navigation Services Charges outlined in Doc 9082 .

Other parameters

Transition period: When CNS/ATM systems become operational, it is assumed that all airspace users will not be properly equipped to take advantage of the new systems at the same time. A transition period, during which both the conventional technology and the new technology are in operation, is therefore required. This implies that air navigation service providers would bear both costs during the transition period. The transition costs would be directly proportional to the length of the transition period and will ultimately be recovered from the airspace users. The transition period is initially set to a default value in years. The user has the option to change this value by inserting the new value in the reserved cell, and clicking the appropriate button next to the reserved cell to change the period as required.

Default Installation Date: This date is used by the software if no installation date is provided for any existing conventional technology equipment item. A date selection tool which appears in front of the “Default Installation Date” would allow the user either to type in the date or click to select a date from a calendar.

Default Life Cycle: This life cycle (life expectancy) value is used by the software if no life cycle value is provided for a conventional technology equipment type.

Maximum stretching period: This is defined as the maximum period during which an equipment item can be used without refurbishment after the end of its life cycle. Stretching the life cycle of an equipment may be an option if it was decided to operate it until the end of the transition period and the time period between the end of the equipment life cycle and the end of the transition period is relatively short. However, the maximum stretching period should not exceed the equipment item lifecycle.

Maximum refurbishment period: This is the maximum period during which an equipment item can be used after refurbishment. Refurbishing an equipment often implies changing some of its parts to extend its life cycle. The maximum refurbishment period has to be greater that the maximum stretching period and smaller than the equipment item lifecycle. Both the maximum

stretching period and the maximum refreshment period have the end of the equipment life cycle as a starting point.

Cut Off month: this is a number corresponding to the month after which revenues and expenses are allocated to the next calendar year in the financial analysis. For example, if the cut off month is September, it is represented by the number 9 corresponding to the 9th month, then all costs incurred from January to September of the year are allocated to that year while all those incurred from October to December are allocated to the next year. If the value of this parameter is 12, then all costs incurred in that year are allocated to the same year (calendar year). Since Present Values are calculated on an annual basis, the Cut Off month gives the user more flexibility.

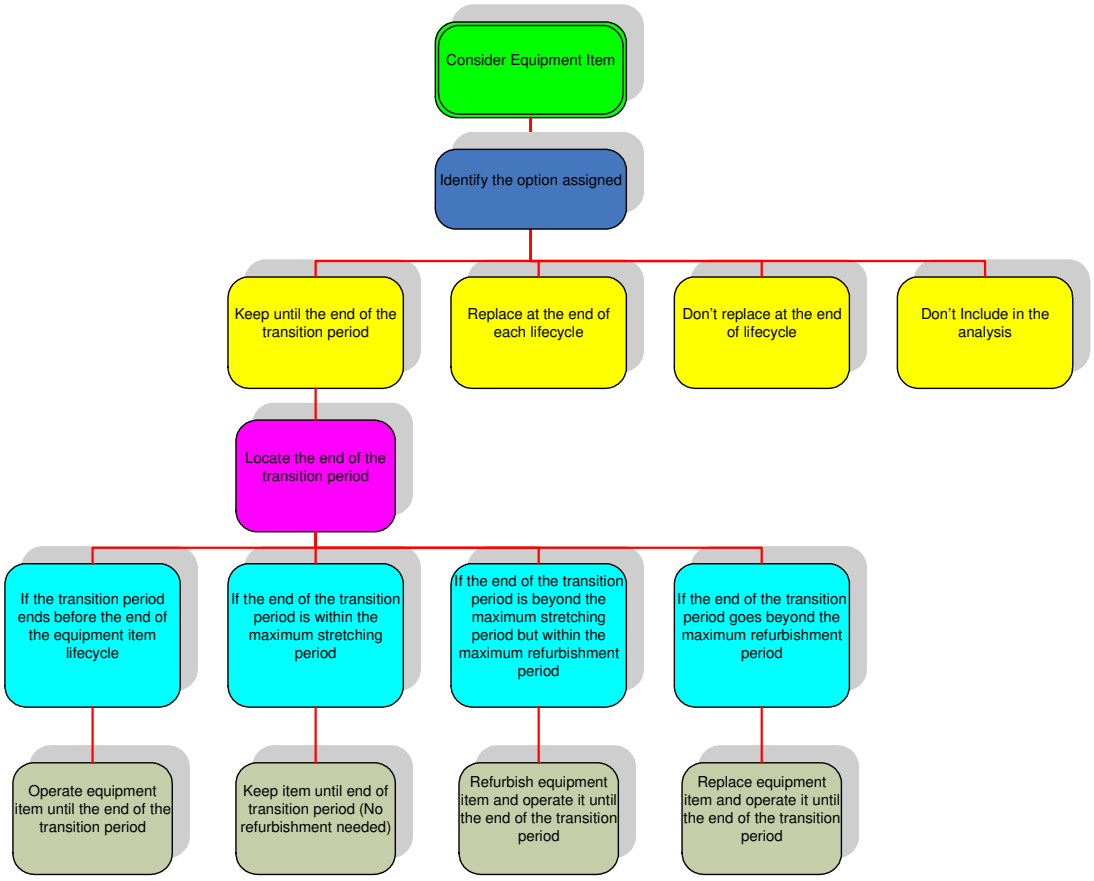
III.1.4. ANSP conventional technology decision process

As part of the scenario, the ANSP planner has to make decisions on the fate of the existing conventional technology equipment.

Figure 3.7 illustrates the decision process:

Figure 3.7

Conventional Technology Equipment Scenario Options



Based on the homogeneous ATM area selected and the conventional technology equipment types covered by the scenario, the list of all conventional technology equipment items concerned is prepared by the software. For each equipment item, the ANSP planner can assign one of the following alternative options:

I. *Replace at the end of each life cycle*: this option is selected when the particular equipment item is expected to be required for continuous operation; it will therefore continue to be operated and replaced at the end of each life cycle within the analysis period; maintenance and inspection costs as well as communications costs will be incurred over the analysis period in addition to the purchase and installation costs at the end of each lifecycle;

II. *Keep until the end of the transition period:* this option is selected when the equipment item is required until the end of the CNS/ATM transition period. If the transition period extends beyond the end of life cycle of the equipment item concerned, one of the following three alternatives would apply:

a) If the end of the transition period is within the maximum stretching period, then the equipment item will continue to be operated, inspected and maintained without any special action; operation, inspection and maintenance costs will continue to be incurred until the end of the transition period;
b) If the end of the transition period is beyond the maximum stretching period but within the maximum refurbishment period, then the equipment item needs to be refurbished in order to extend its life cycle; a refurbishment cost is therefore incurred at the end of lifecycle; Maintenance and inspection costs as well as communications costs will continue to be incurred until the end of the CNS/ATM transition period;
c) If the transition period is much longer and goes beyond the maximum refurbishment period, then the equipment item requires replacement at the end of its life cycle for continuous operation until the end of the CNS/ATM transition period; then the residual value of the equipment item is computed by the software and included as a benefit, if the software user makes this choice under ANSP parameters.

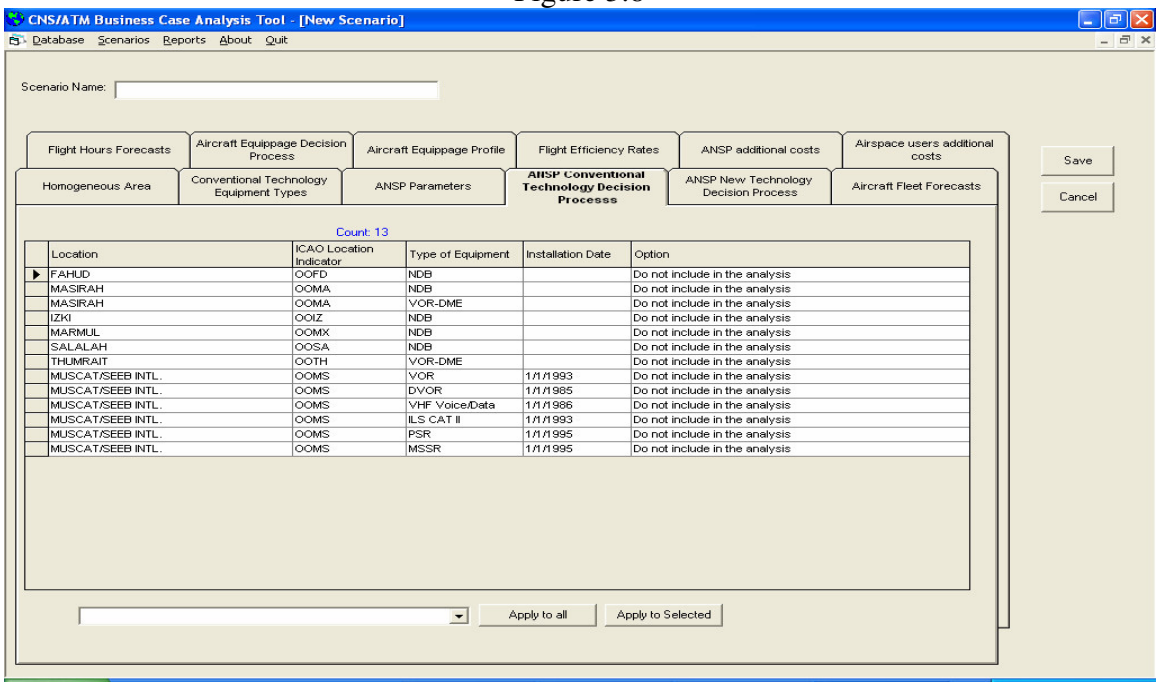
III. *Do not replace at the end of life cycle*: this option is selected when the equipment item is no longer required for daily operations but may be kept until the end of its lifecycle. Maintenance and inspection cost as well as communication cost will be incurred over this period.

IV. *Do not include in the analysis*: The equipment item is not taken into account in the analysis. This particular case implies that there would be no cost incurred neither to the ANSP nor to the airspace users.

It is important that one of the above options be assigned to each equipment item in the list. By default, the option "*Do not include in the analysis*" is assigned to each equipment item, if an option is not selected by the user.

Figure 3.8 shows the ANSP conventional technology decision process screen:

Figure 3.8

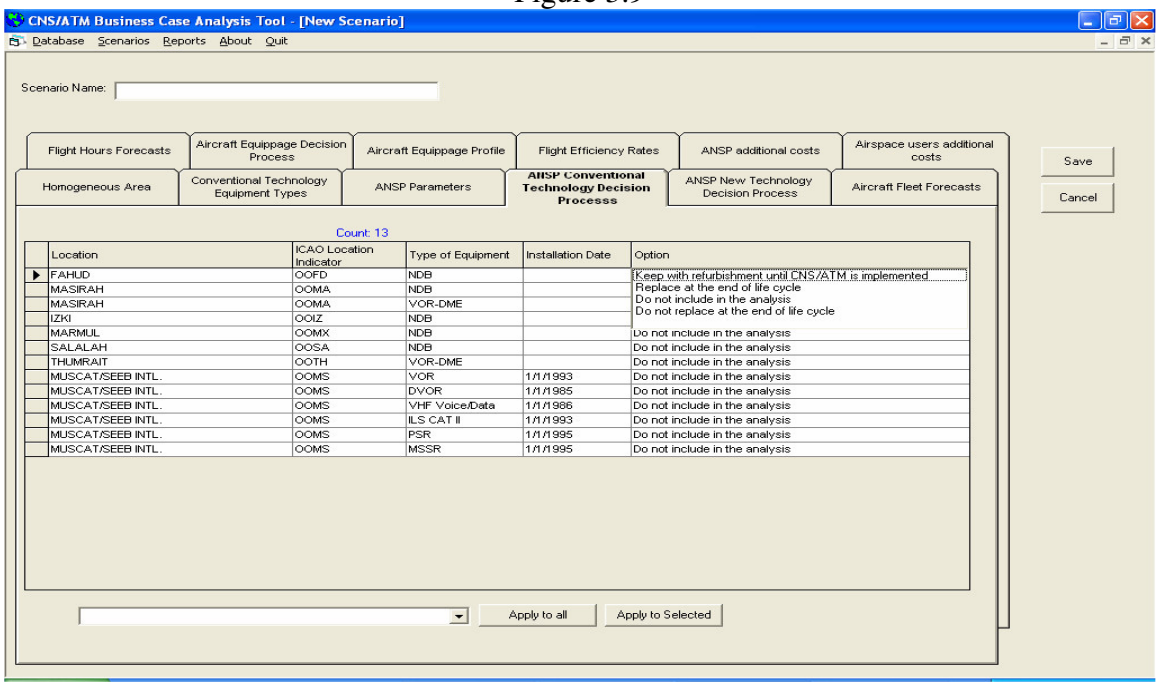


The list of conventional technology equipment items has five columns:

- location
- ICAO location indicator
- Type of Equipment
- Installation date
- Option

The user can only change the “Option” column. To assign a new option to a single equipment item, the user should click on the cell in the “Option” column in front of the equipment item concerned. A drop down list of options then appears in the cell. Another click will display the drop down list:

Figure 3.9

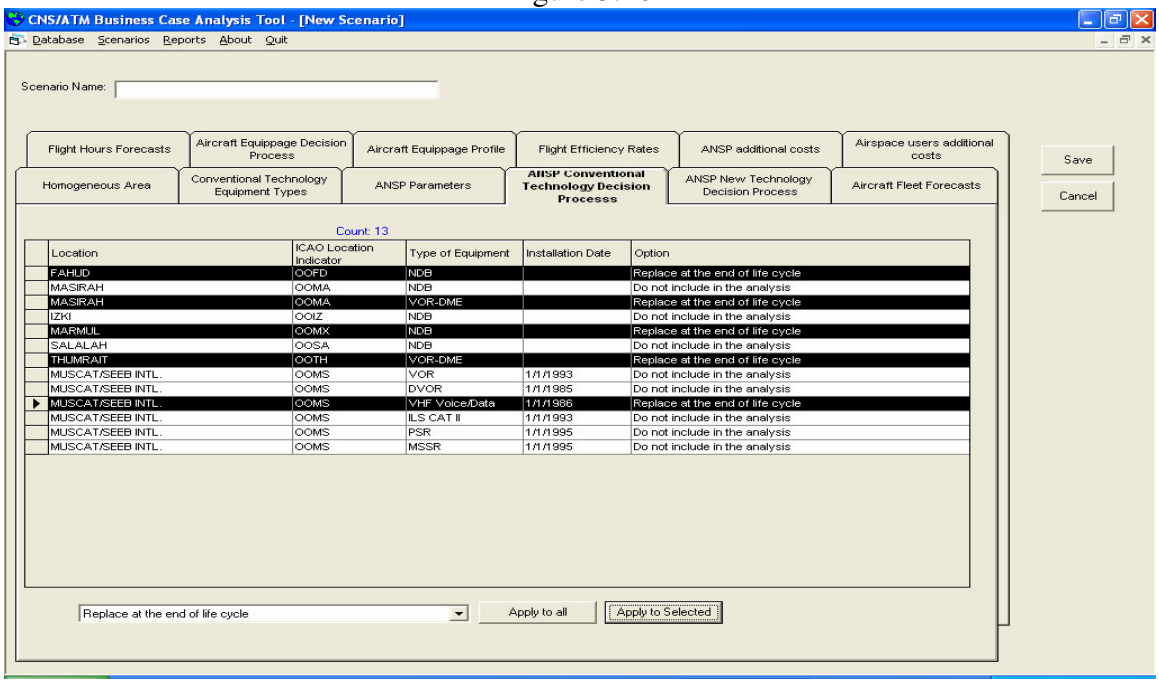


The software user can then select one option by double clicking it. Another drop-down list of options located at the bottom of the screen allows the assignment of an option to more than one equipment item.

In order to apply an option to all equipment items, click on the drop down list and select an option. Then press the "Apply to all" command button located to the right of the drop-down list.

In order to apply an option to more than one but not all equipment items, start with the selection of the equipment items one by one by clicking on the left of the corresponding row in the equipment items list while pressing the "Ctrl" keyboard command button. Then press the "Apply to selection" command button located to the right of drop-down list.

Figure 3.10

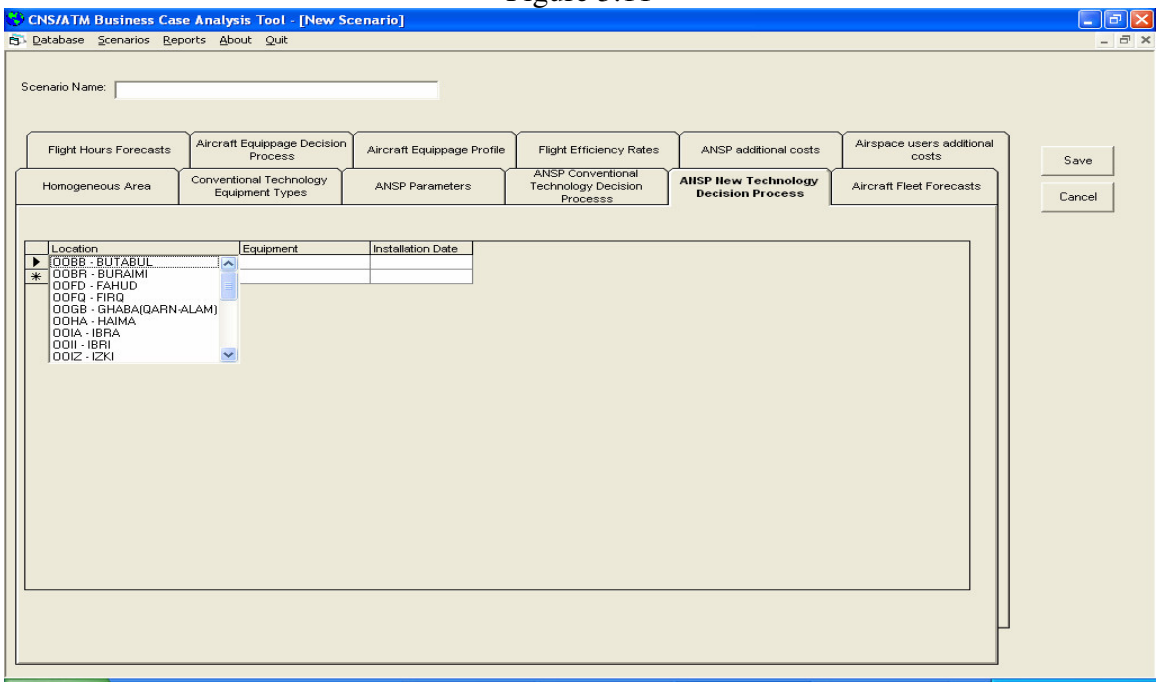


III.1.5. ANSP new technology decision process

The ANSP planner has to make decisions on the new technology to be implemented. For each new technology equipment item, he has to specify the location and the installation date.

Figure 3.11 shows the ANSP new technology decision process screen:

Figure 3.11



The new technology equipment items list has three columns:

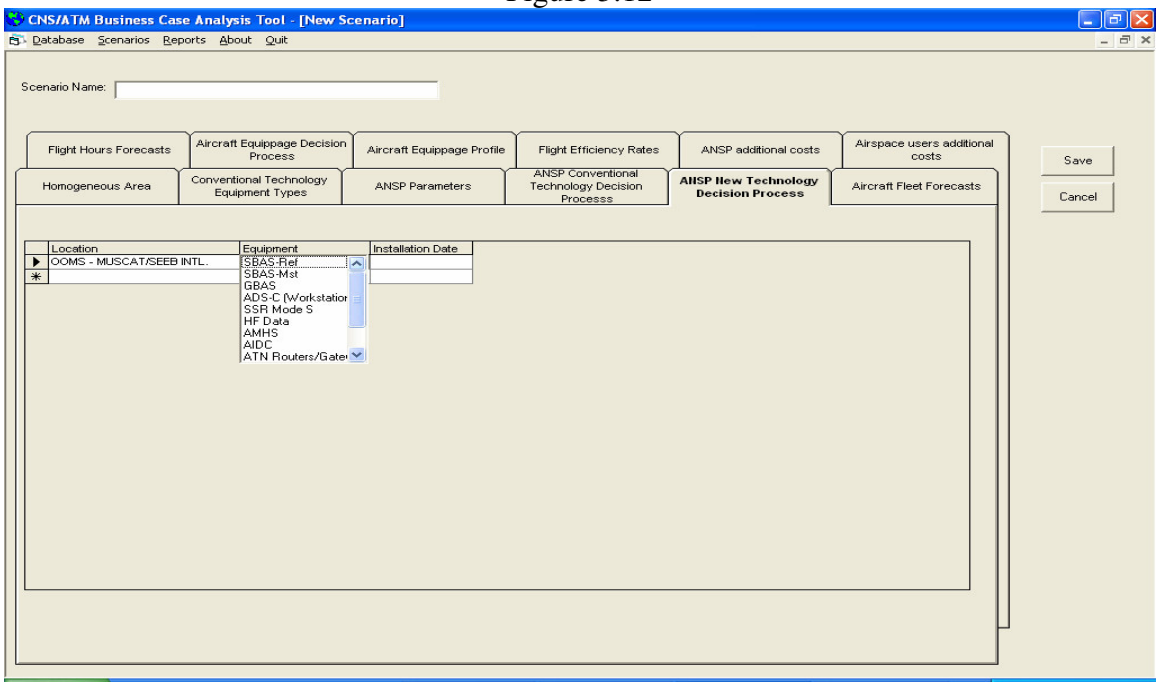
- Location
- Equipment
- Installation Date

The software user has to first select the location where the new technology equipment item is to be installed by clicking on the location cell. The user can then select the desired location by clicking on it from the drop-down list.

A similar procedure is followed in the selection of the equipment type as illustrated in Figure 3.12.

The planned installation date can be introduced by clicking in the corresponding cell. As described earlier, a date selection tool appears in the cell. The software user can either type in the date or click on the date selection tool to pick the appropriate installation date.

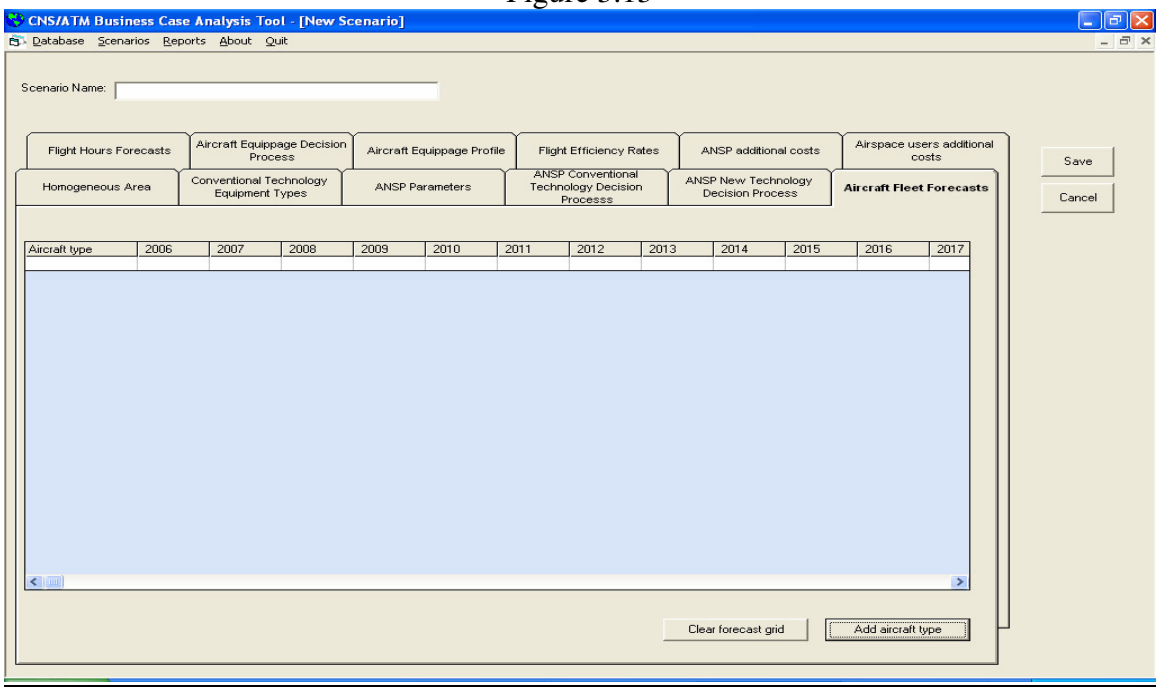
Figure 3.12



III.1.6. Aircraft Fleet Forecast

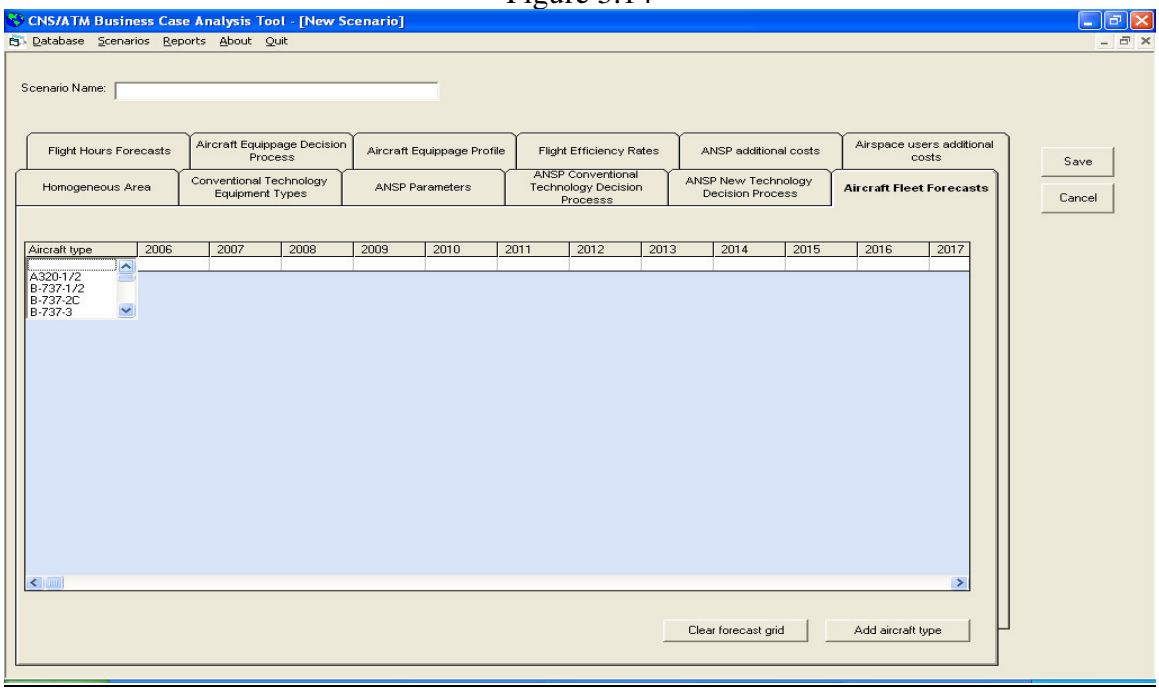
Modules to develop traffic and fleet forecasts are external to the software package. The user is provided with the option of including the forecasts of annual traffic, as well as the fleet by aircraft type for the analysis horizon. At the scenario creation phase, the Aircraft Fleet Forecast screen is empty. In order to input the forecast, the user should press the command button "Build forecast grid". A forecast grid then appears on the screen. Its first column is reserved for the aircraft type followed by the years included in the analysis period as shown in Figure 3.13 .

Figure 3.13



In order to select an aircraft type, click in the aircraft type cell which provides a list of aircraft types in a drop down box as shown in Figure 3.14 .

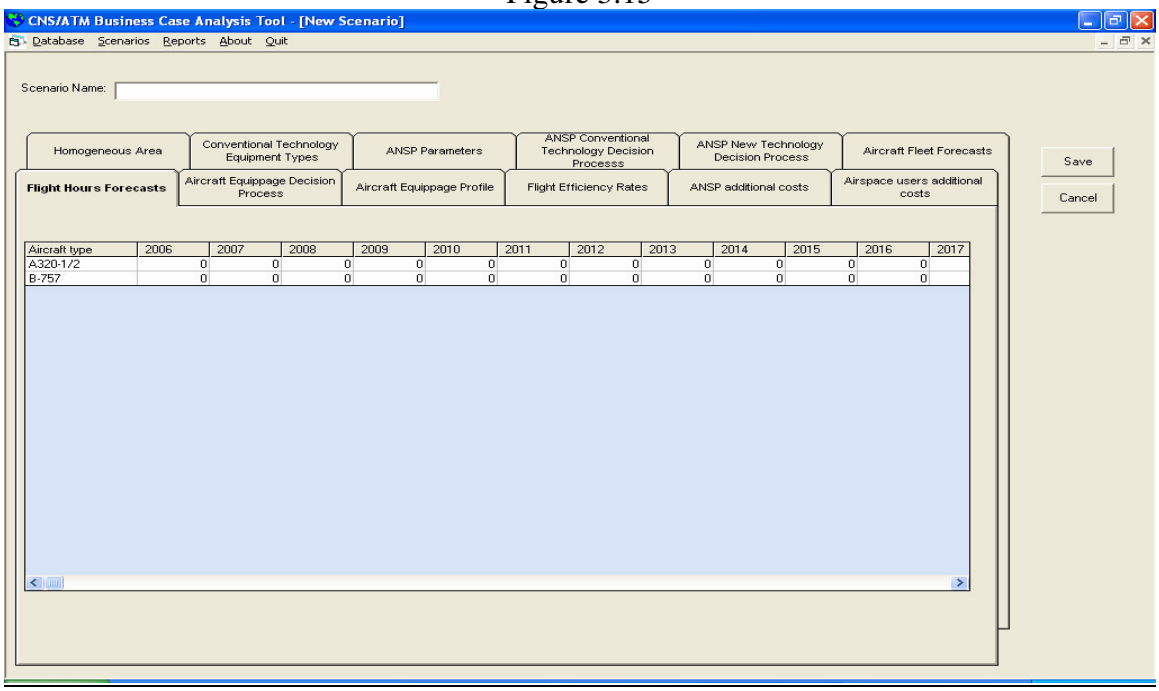
Figure 3.14



For each of the aircraft type selected, the user can enter the corresponding number of aircraft in the fleet for each year of the analysis period. In order to add a new aircraft type to the grid, click on the command button “Add aircraft type” at the bottom of the screen and repeat the process. Another command button “Clear forecast grid” appears at the bottom of the screen.

Upon completion of the Aircraft Fleet Forecast grid, the user can move to the Flight Hours Forecast screen to input the flight hours for each aircraft type for each year of the analysis period.
If the user anticipates that a new aircraft type may be introduced into the service during the horizon of the analysis, this aircraft type must initially be included in the database and subsequently added to the forecast grid.

Figure 3.15



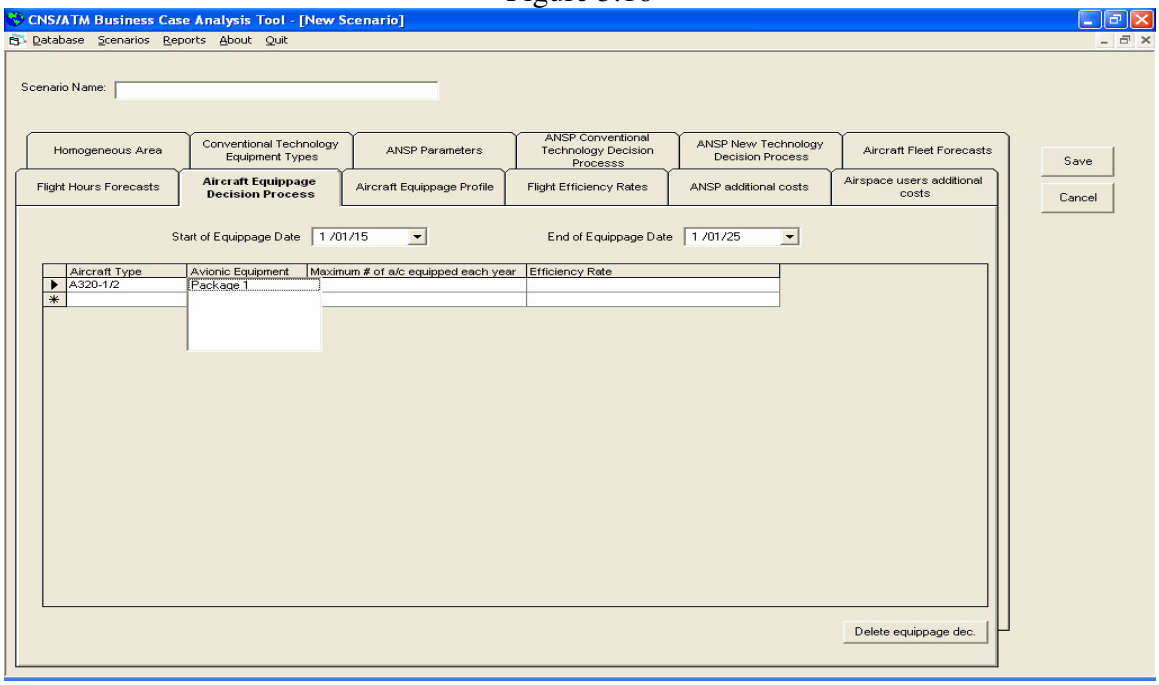
Should it be necessary to modify the aircraft types shown on this screen, the user can make the required changes in the Aircraft Fleet Forecast screen.

III.1.7. Aircraft equipage decision process: airspace users planning decisions concerning the equipage of aircraft with new technology avionics

The software allows airspace users to decide on the type(s) of new technology avionics to be implemented on each aircraft type and to determine the maximum number of aircraft to be equipped each year. The user then has to estimate the rate of improvement in flight efficiency as the fleet is brought to compliance in a progressive manner.

Figure 3.16 shows the aircraft equipage decision process screen and illustrates the procedure to input the required data.

Figure 3.16



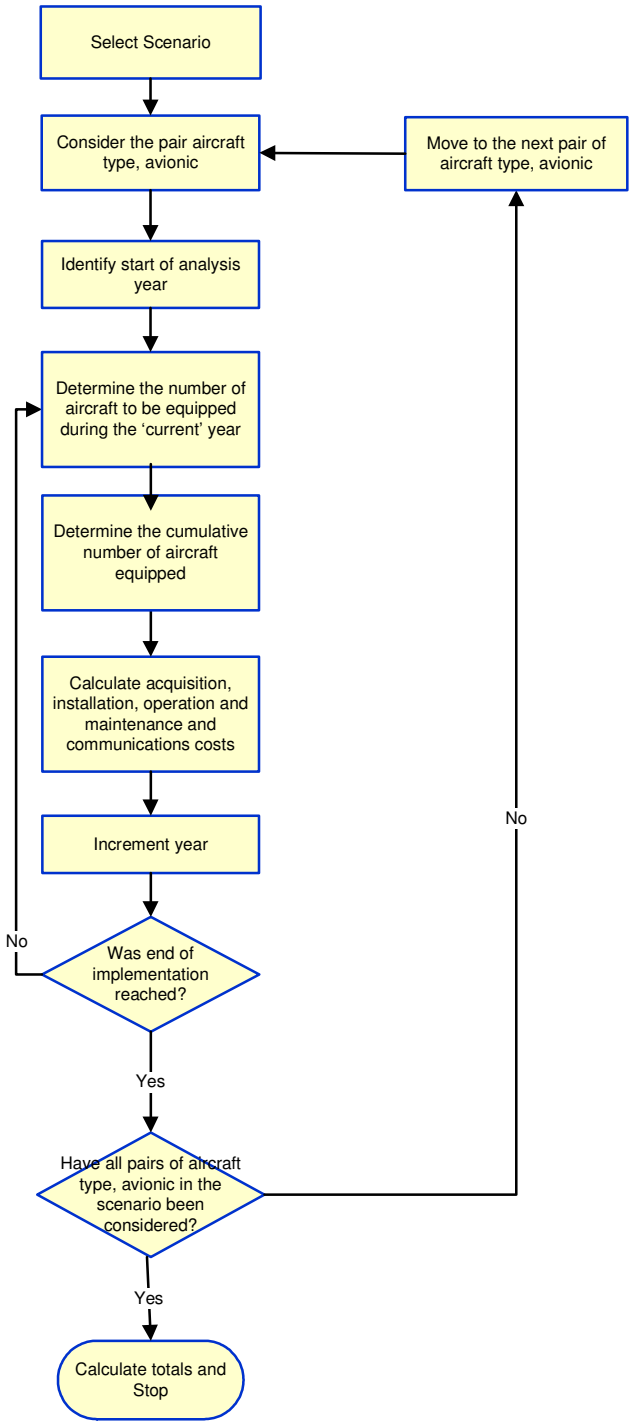
First, the user has to modify the dates on top of the screen to indicate the start and end of the equipage process. The user then selects the aircraft type from the list of aircraft types included in the fleet forecast followed by the avionic to be implemented on the selected aircraft type. In the third column, the user introduces the maximum number of aircraft to be equipped in each year. Based on these inputs, the software creates a new line in the aircraft equipage profile screen, which associates the avionic to the aircraft type concerned. For each year within the timeframe defined by the two dates on top of the screen, the software sets the number of aircraft by type concerned to be equipped with the selected avionic. The user has the flexibility to modify the "Start of equipage date" and "End of equipage date" for any aircraft type and avionic combination. The cumulative number of aircraft equipped at any given year is smaller than or equal to the total fleet of the aircraft type concerned for that year and the maximum number of aircraft to be equipped is smaller than or equal to the maximum number provided by the user. The user has the option to make changes on the number of aircraft equipped each year at the "aircraft equipage profile" screen.

It should be noted however that airspace users prefer to have all the avionics installed at one time rather than avionic by avionic in order to minimize the aircraft downtime. In this case, the avionics can be combined to form a package which has to be entered as a single avionic in the avionics data set (using the "Database"menu item) and whose costs (purchase, installation, maintenance, etc.) are the sum of the corresponding individual avionic costs.

The flow chart in Figure 3.17 illustrates the procedure to calculate the avionics' costs:

Figure 3.17

Avionics costs computation procedure



The implementation of CNS/ATM systems will lead to efficiency benefits to the airspace users resulting from a reduction in the flight time through the provision of more direct routes. These efficiency benefits however will depend on the equipage of aircraft.

In the fourth column of the "aircraft equipage" grid, the user inputs the estimated flight efficiency rate resulting from the equipage decision. The user has the option to change the initial date at which the flight efficiency goes into effect by modifying the "Start of equipage date". The

efficiency rate should be entered as an integer number between 0 and 100. Based on this input, the software creates a new line in the flight efficiency rates screen, which associates the aircraft type to the avionic. The efficiency rate will be applied from the "Start of equipage date" set by the user until the end of the analysis period. The software allows for the introduction of an efficiency rate for any aircraft type and avionic combination. By design, the software assumes that a given flight efficiency rate results only from the corresponding equipage decision. In practice, however, flight efficiency benefits results from the installation of more than one avionic onboard each aircraft and will also depend on the availability of ground equipment. In the case where efficiency benefits result from the implementation of more than one avionic onboard an aircraft, the user has the following two equivalent options:

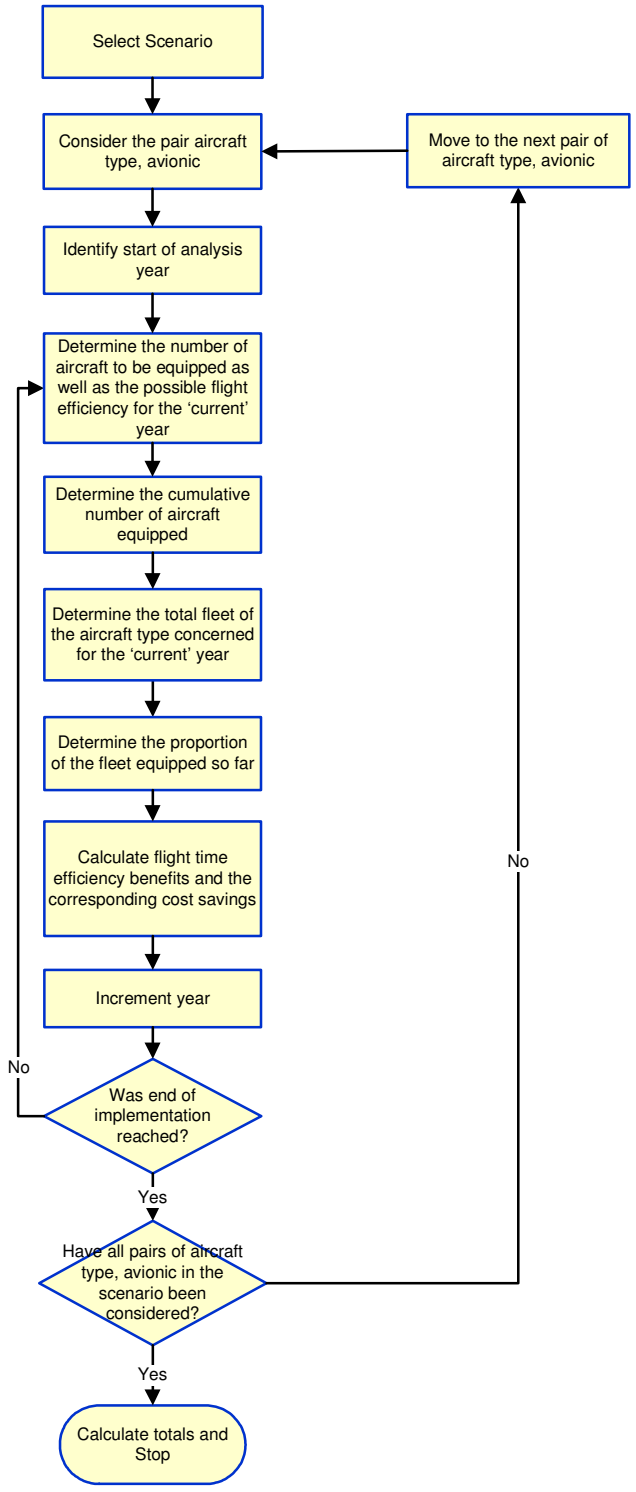
- Create a package of avionics in the avionics database and estimate the relevant costs (purchase, installation, maintenance and inspection and communication) associated with the package. This package will be treated as a single equipment item when creating various implementation scenarios. At the Aircraft equipage decision process screen, select the aircraft type and the package. The efficiency rate introduced will be associated to the implementation of the whole package.
- Select the avionics separately one by one by adding a new line each time; select the same aircraft type and then the avionic. In the flight efficiency rate column, include an efficiency rate only in one line (for one avionic) and set the value for the other lines (avionics) to 0.

The user has the option to make changes on the yearly flight efficiency rates at the flight efficiency rates screen.

Figure 3.18 illustrates the airspace users benefits computation procedure:

Figure 3.18

Airspace users benefits computation procedure



III.1.8. Aircraft equipage profile

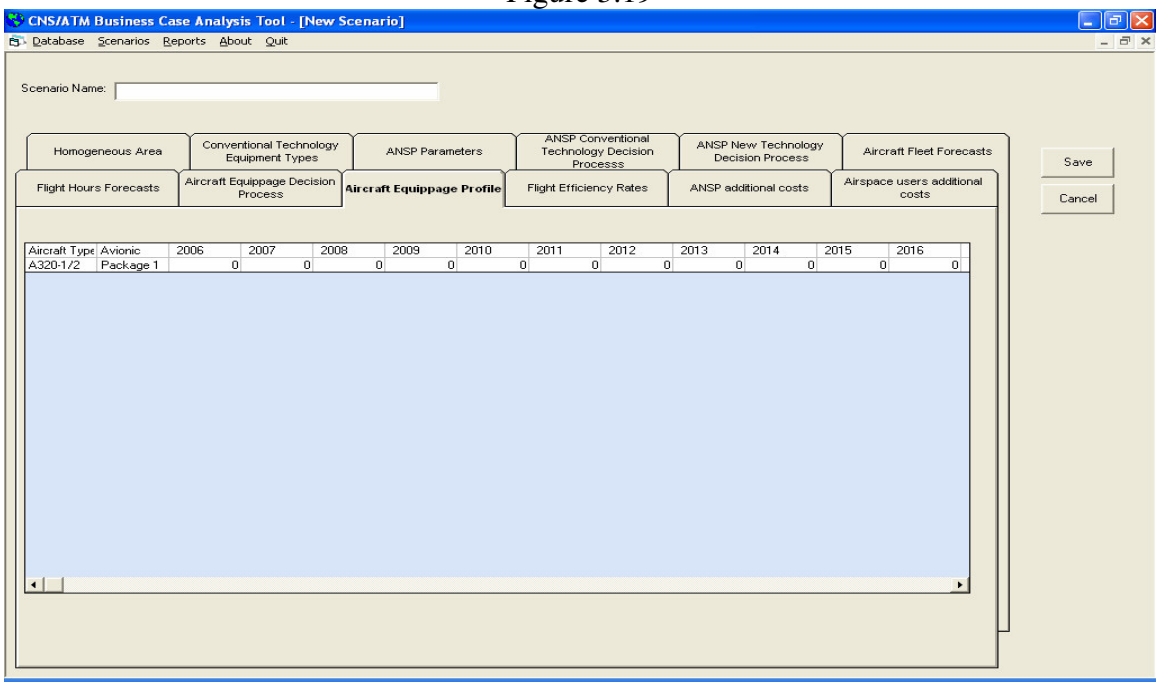
While making decisions on aircraft equipage and providing the maximum number of aircraft to be equipped each year, the aircraft equipage profile grid is constructed automatically by the software. After finishing the aircraft equipage decision process, the software user can move to

the aircraft equipage profile screen to make any changes on the aircraft equipped each year. The user should make sure that the changes introduced are consistent with the fleet forecast. For example, the cumulative number of aircraft (of a specific aircraft type) equipped at any given year should not exceed the forecast fleet (of that aircraft type) for that year.

In the event the user requires modification of the aircraft types and avionics combinations shown on this particular screen, this change must be carried out at the Aircraft equipage decision process screen.

Figure 3.19 shows the aircraft equipage profile screen:

Figure 3.19



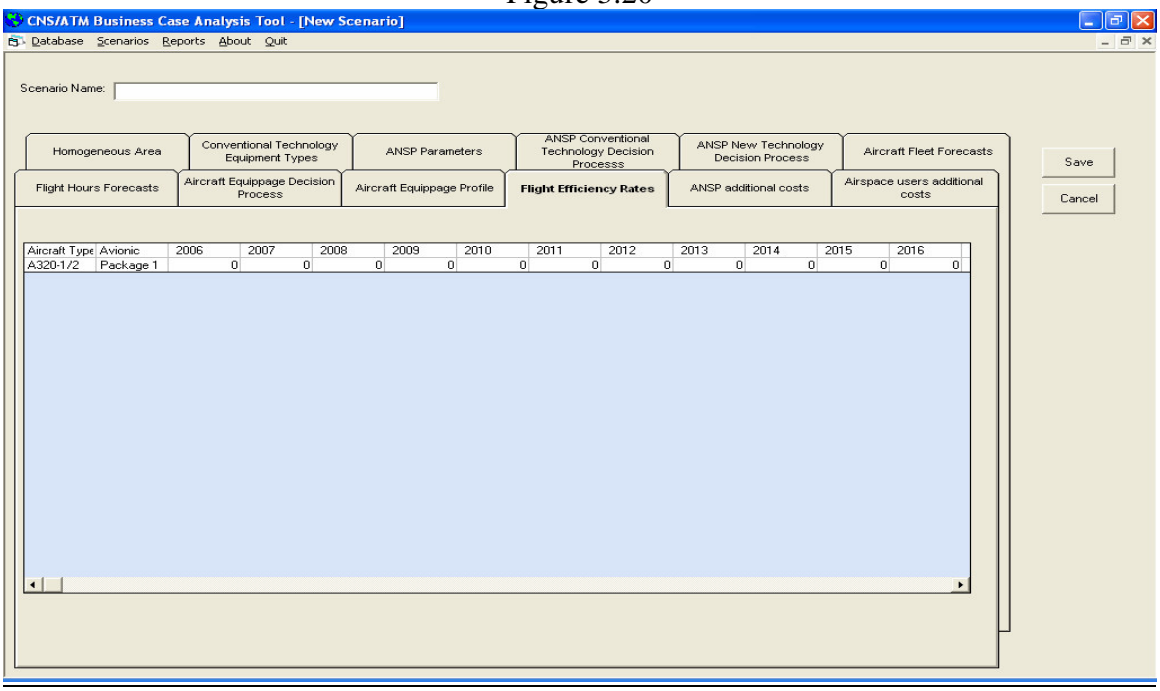
III.1.9. Flight efficiency rates

When the user provides the flight efficiency rate at the aircraft equipage process screen, the flight efficiency rates grid on the flight efficiency rates screen is constructed automatically by the software. After the completion of the aircraft equipage decision process, the user can move to the flight efficiency rates screen to make any changes on the yearly efficiency rates.

As previously mentioned, any modification to the aircraft types and avionics combinations shown on the left of the grid should be done at the aircraft equipage decision process screen.

Figure 3.20 shows the flight efficiency rates screen:

Figure 3.20

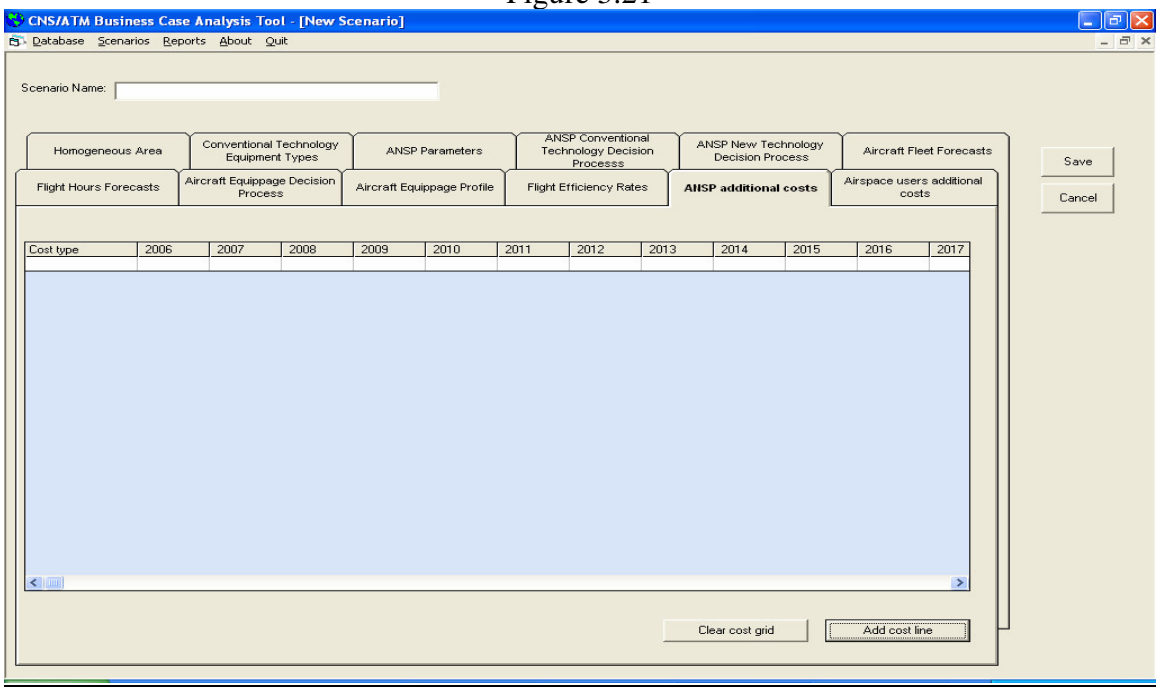


III.1.10. ANSP Additional costs

Only equipment related costs have so far been taken into account by the scenario for both the ANSP and the airspace user. Costs such as labor cost, administrative costs and overhead, rental costs (except equipment related telecommunications), training costs, etc. have not been included. The user can include these costs in the scenario through the "Additional costs" screens.

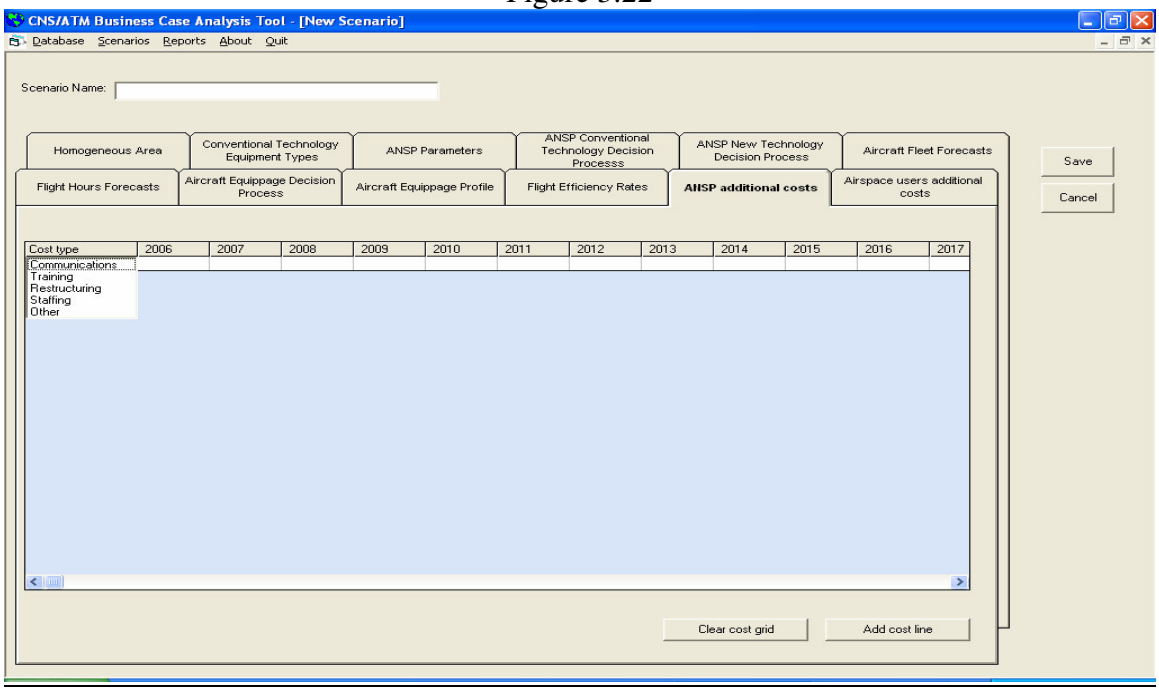
The user can input these costs annually by cost type over the analysis period. At the scenario creation phase, the ANSP Additional cost screen is empty. In order to input these costs, the user should press the command button "Build cost grid". A cost grid then appears on the screen. Its first column is reserved to the cost type. The following columns display the years covered by the analysis period as illustrated in Figure 3.21:

Figure 3.21



In order to select a cost type, click in the cost type cell. The list of additional cost types drops down.

Figure 3.22



Select an additional cost type by clicking it, then enter the corresponding costs figures for each year of the analysis period. In order to add a new cost type to the grid, click on the command button “Add cost line” at the bottom of the screen and repeat the process. Another command button “Clear cost grid” appears at the bottom of the screen should the grid require deletion.

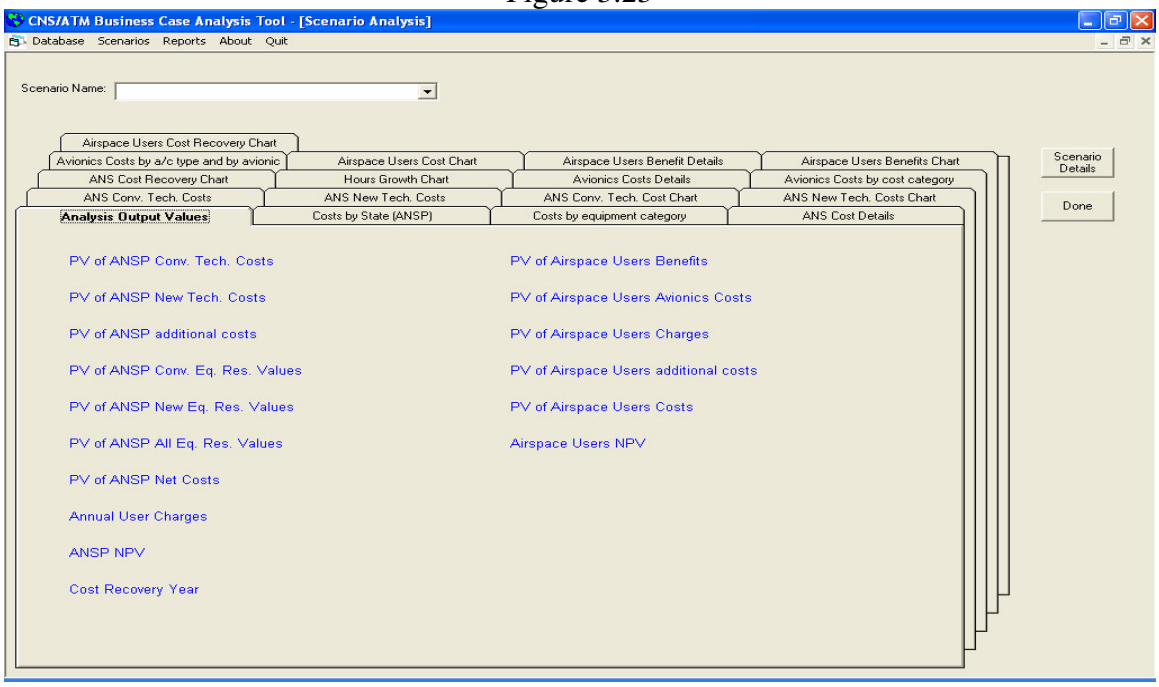
III.1.11. Airspace users Additional costs

Another tab is allocated to the airspace users’ additional costs. The procedure to input these costs is identical to that of ANSP described in the paragraph above.

III.2. The Scenario Analysis

After creating a scenario, the user can select the Scenario Analysis menu item and the screen in Figure 3.23 below will be displayed:

Figure 3.23



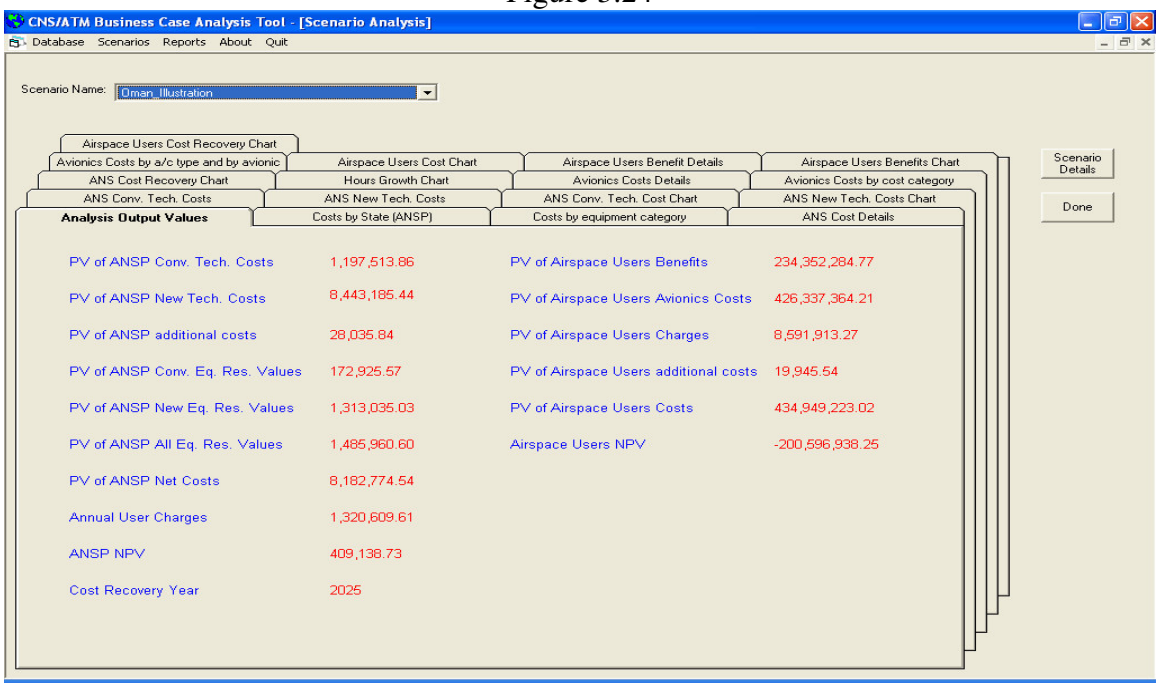
On the top of the screen appears a drop-down list where the user can view all the previously created scenarios and select a desired scenario for analysis. Two command buttons are shown on the right side of the screen: the "Scenario details" command button and the "Done" command button. The "Scenario details" command button will switch to the scenario manager screen to shown the details of the scenario under analysis. The "Done" command button closes the screen and returns the main menu.

The middle of the screen displays the following 17 different tabs:

- Analysis output values
- Costs by State (ANSP)
- Costs by equipment category
- ANS Cost Details
- ANS Conv. Tech. Costs
- ANS New Tech. Costs
- ANS Conv. Tech. Costs Chart
- ANS New Tech. Costs Chart
- ANS Break-even Chart
- Hours Growth Chart
- Avionics Costs Details
- Avionics Costs by Cost Category
- Avionics Costs by a/c type and by avionic.
- Airspace users Costs Chart
- Airspace users Benefits Details
- Airspace users Benefits Chart
- Airspace users Break-even Chart

III.2.1. Analysis output values

Figure 3.24



This screen shows summary results for both the air navigation service provider and the airspace users (the airlines). These summary results are as follows:

- *PV of ANSP Conv. Tech. Costs*: This provides the Present Value of all costs incurred during the scenario analysis period and related to the conventional technology equipment installed and/or operated by the air navigation services provider.

- *PV of ANSP New Tech. Costs*: This provides the Present Value of all costs incurred during the scenario analysis period and related to the new technology equipment installed and/or operated by the air navigation services provider.

- *PV of ANSP additional costs*: This provides the Present Value of the additional costs included in the scenario and incurred by the air navigation service provider.

- *PV of ANSP Conv. Eq. Res.Values*: This amounts to the Present Value of the residual values of conventional technology equipment. Some of these equipment will be removed from operation at the end of the transition period before they reach the end of their life cycle. For the equipment items remaining in service at the end of the analysis period, the residual value is calculated at the last year of this period. The total residual value will depend on the scenario parameters related to residual values and on the options assigned to each conventional technology equipment item in the scenario.

- *PV of ANSP New Eq. Res.Values:* This is the Present Value of the residual values of new technology equipment at the end of the analysis period.

- *PV of ANSP All Eq. Res.Values:* This amounts to the sum of the Present Values of the residual values of conventional technology equipment as well as new technology equipment .

- *PV of ANSP Net Costs:* This is the sum of the Present Values of the conventional technology, and new technology and additional costs less the Present Value of all equipment residual values shown in the previous line.

- *Annual User Charges:* The total average annual user charges that the air navigation service provider has to collect from the airspace users each year in real terms. Several options are available to the air navigation service provider for the collection of these charges as described below:

    - A traffic related charge: this is an estimated annual user charge based on the traffic density of that year over the homogeneous airspace concerned. Traffic density can be estimated as a function of aircraft movement in that year. The traffic related charge could vary from year to year based on the traffic.
    - A lump-sum charge paid each year by the airspace users, based on the traffic density agreement between the airspace users and the air navigation service provider.

- *ANSP NPV:* This is the Net Present Value for the air navigation service provider which is the present value of benefits accrued through the provision of air navigation services less the present value of the accrued costs by the providers based on ICAO cost recovery and policy guidelines.

- *Cost Recovery Year:* This is the year at which the Present Value of cumulative revenues (user charges) collected by the air navigation service provider is equal to the Present Value of Net Costs for the air navigation service provider. If the scenario profit margin parameter is set to zero, this year should be equal to last year of the analysis period. However, if the scenario profit margin parameter is different from zero, then the cost recovery occurs prior to the last year of the analysis period.

- *PV of Airspace users Benefits:* This is the present value of the total Airspace user cost savings due to the flight efficiency benefits resulting from the reduction in flight time.

- *PV of Airspace users Avionics Costs:* This is the present value of the total costs of installation and operation of new technology avionics onboard aircraft.

- *PV of Airspace users Charges:* This is the present value of the user charges paid by the airspace users to the air navigation service provider.

- *PV of Airspace users Additional Costs:* This is the Present Value of the additional costs included in the scenario and incurred by the airspace users for the equipage of avionics etc.

- *PV of Airspace users costs:* This is the sum of the Present Value of Avionics Costs, User Charges and Additional costs incurred by the airspace users.

- *Airspace users NPV:* This is the difference between the present value of airspace users benefits and costs.

III.2.2. Costs by State (ANSP)

Figure 3.25

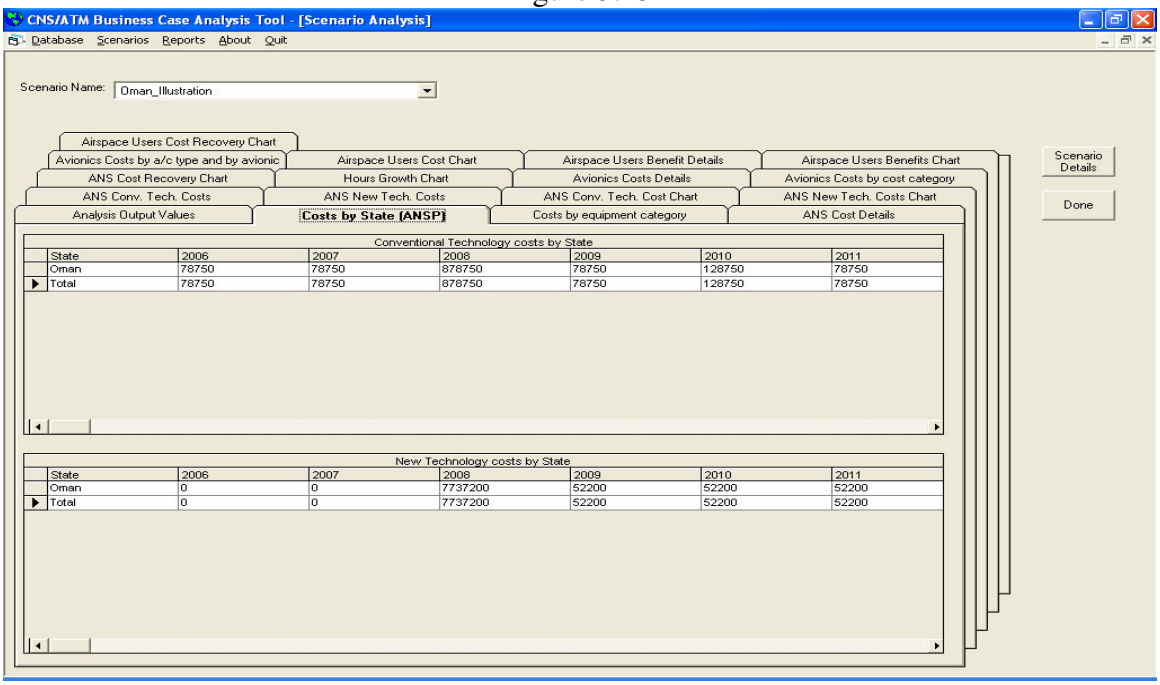


Figure 3.25 above displays two grids. The top grid shows the sum of conventional technology costs by State for each year during the scenario analysis period. The bottom grid shows the sum of new technology by State for each year during the scenario analysis period. If the scenario involves a single State, only that State is shown on each grid.

III.2.3. Costs by equipment category

Figure 3.26

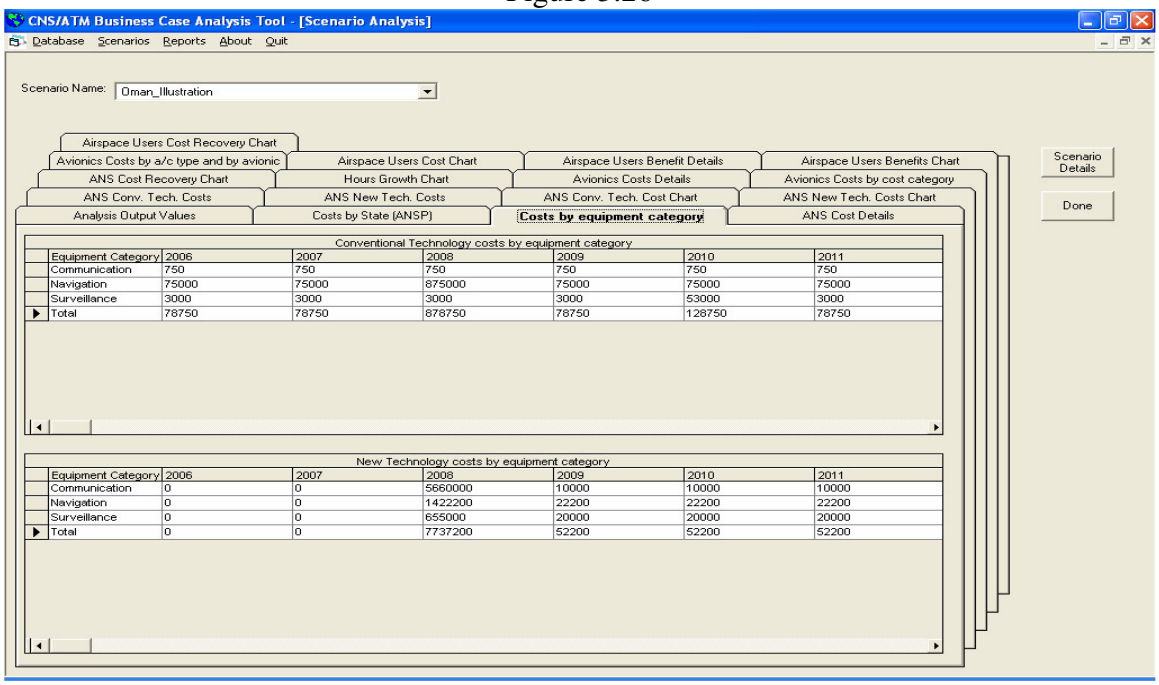
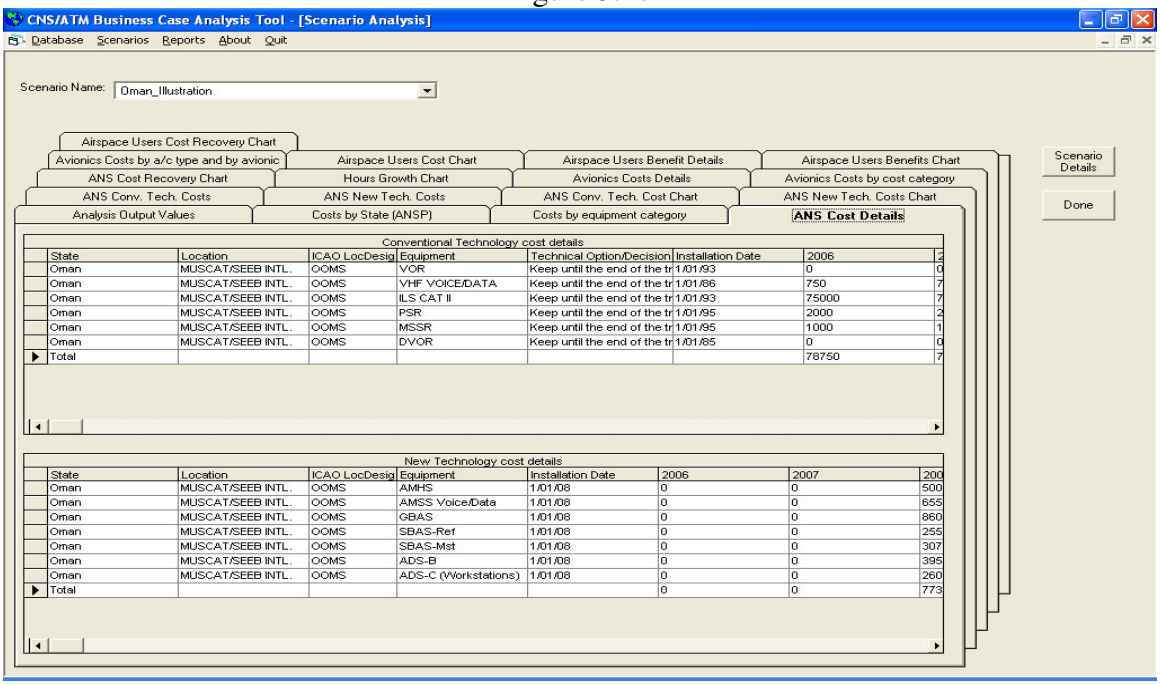


Figure 3.26 displays two grids, conventional and new technology costs sub-totals by equipment category.

III.2.4. ANS Cost Details

Figure 3.27



The conventional technology cost details' grid in Figure 3.27 displays all conventional technology equipment items (each in a separate row). For each equipment item the following data is displayed:

- The State where the equipment is located;
- The location name;
- The ICAO location four letter code;
- The type of equipment;
- The option/decision assigned to this equipment under the current scenario;
- The installation date;
- The total cost for each year incurred by the air navigation service provider to operate this equipment.

The new technology cost details grid in Figure 3.27 displays all new technology equipment items. For each equipment item the following data is displayed:

- The State where the equipment is located;
- The location name;
- The ICAO location four letter code;
- The type of equipment;
- The installation date;
- The total cost for each year incurred by the air navigation service provider to operate this equipment.

III.2.5. ANS Conv. Tech. Costs

Figure 3.28

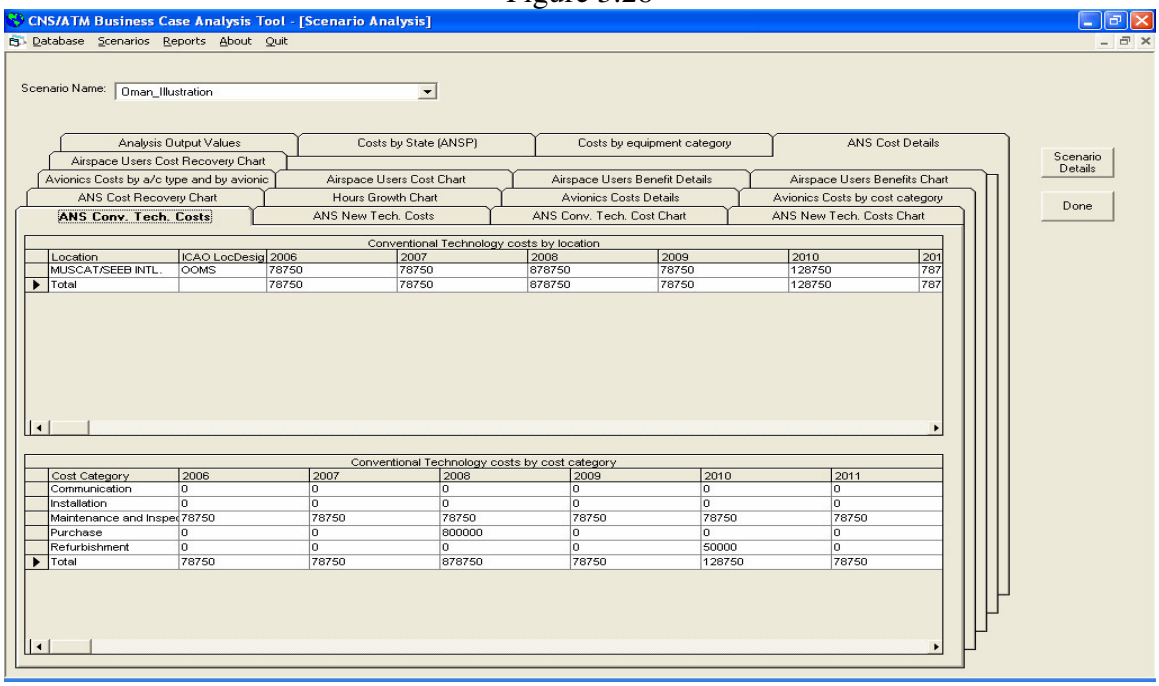


Figure 3.28 displays two grids. The first grid shows the conventional technology costs for each year by location and the second shows these costs by cost category.

III.2.6. ANS New Tech. Costs

Figure 3.29

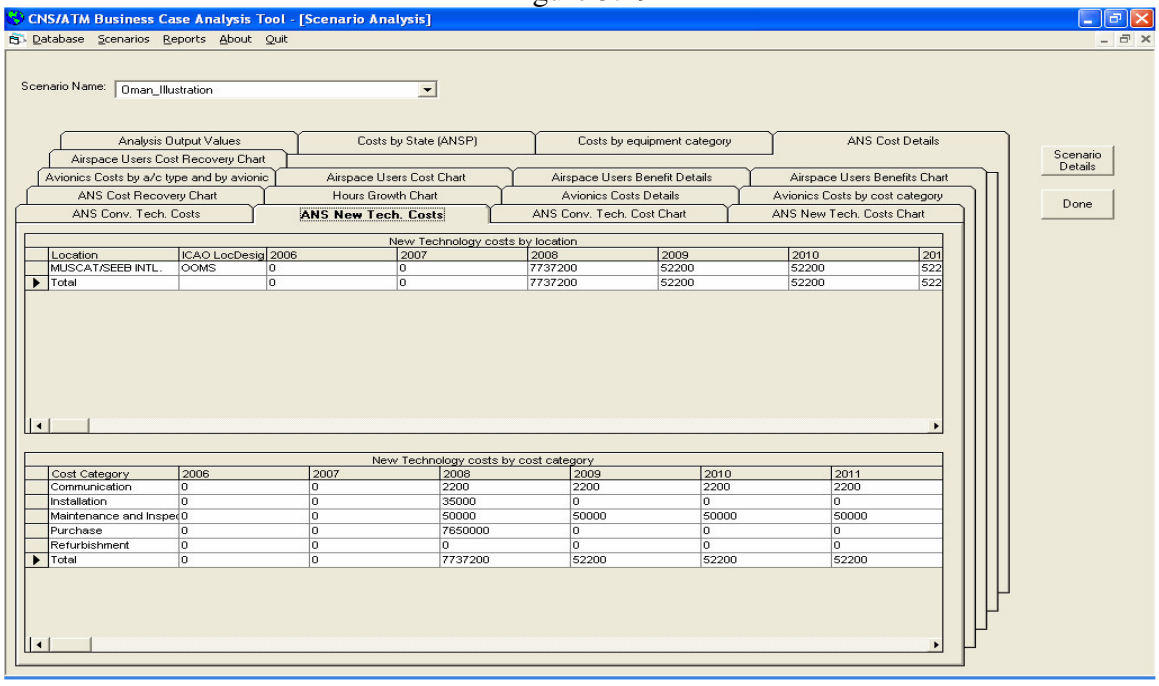


Figure 3.29 displays two grids. The first grid shows the new technology costs for each year by location and the second shows these costs by cost category.

III.2.7. ANS Conv. Tech. Costs Chart

Figure 3.30

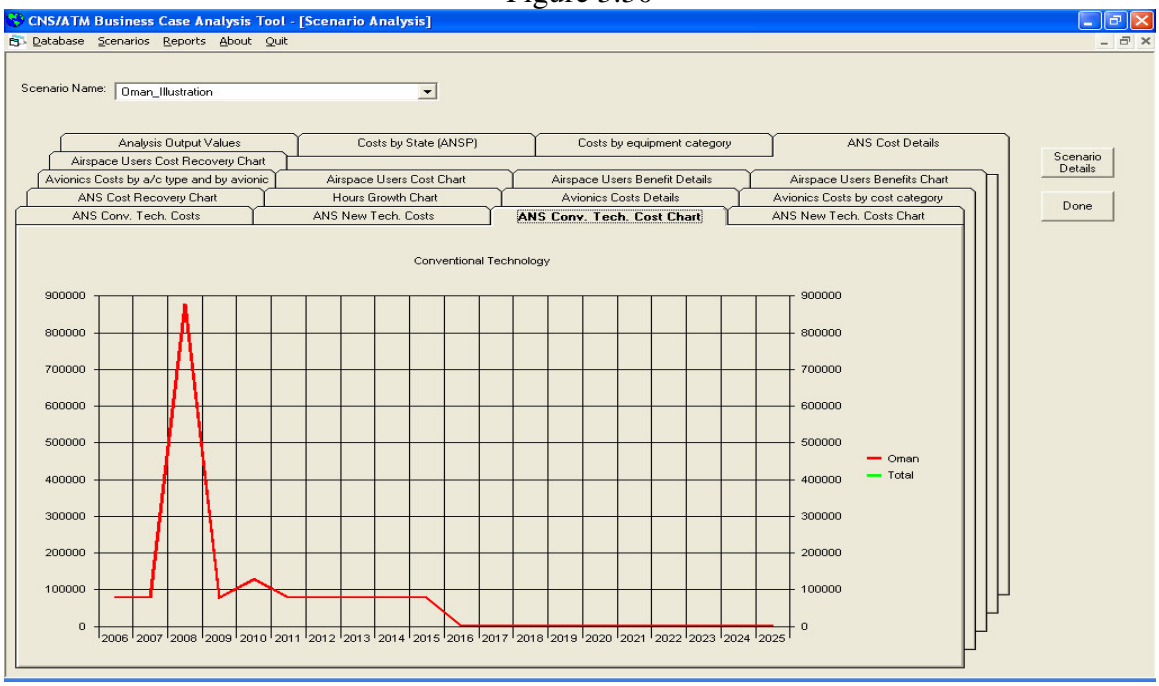


Figure 3.30 shows the chart of conventional technology costs by State as well as the total over the analysis period.

III.2.8. ANS New Tech. Costs Chart

Figure 3.31

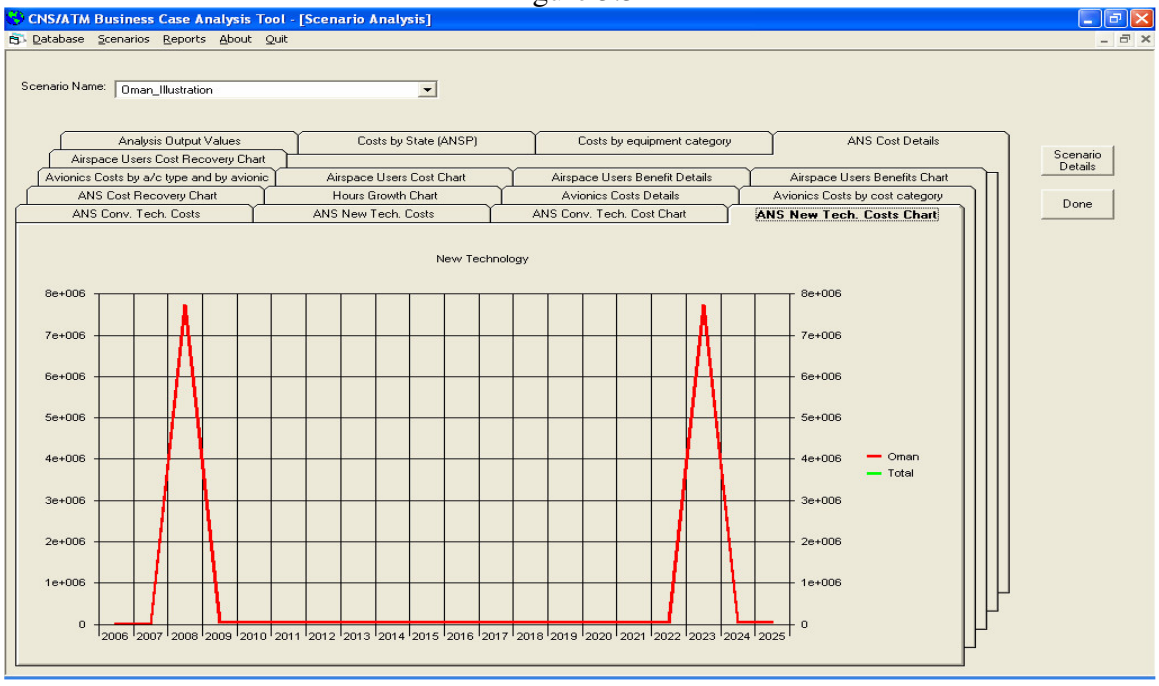


Figure 3.31 shows the chart of new technology costs by State as well as the total over the analysis period.

III.2.9. ANS Cost Recovery Chart

Figure 3.32

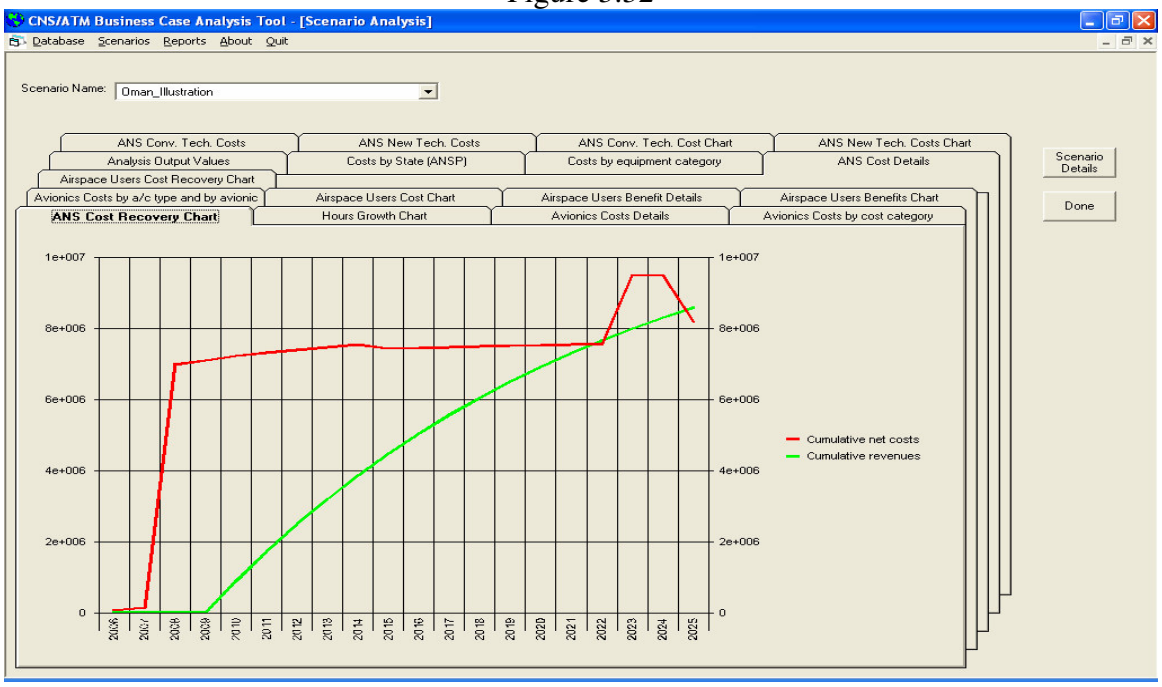


Figure 3.32 displays the cost recovery chart for the air navigation service provider. Two curves are shown: the cumulative costs and the cumulative revenues. The intersection point indicates the break even point ie where the cumulative revenues equals the cumulative costs.

III.2.10. Hours Growth Chart

Figure 3.33

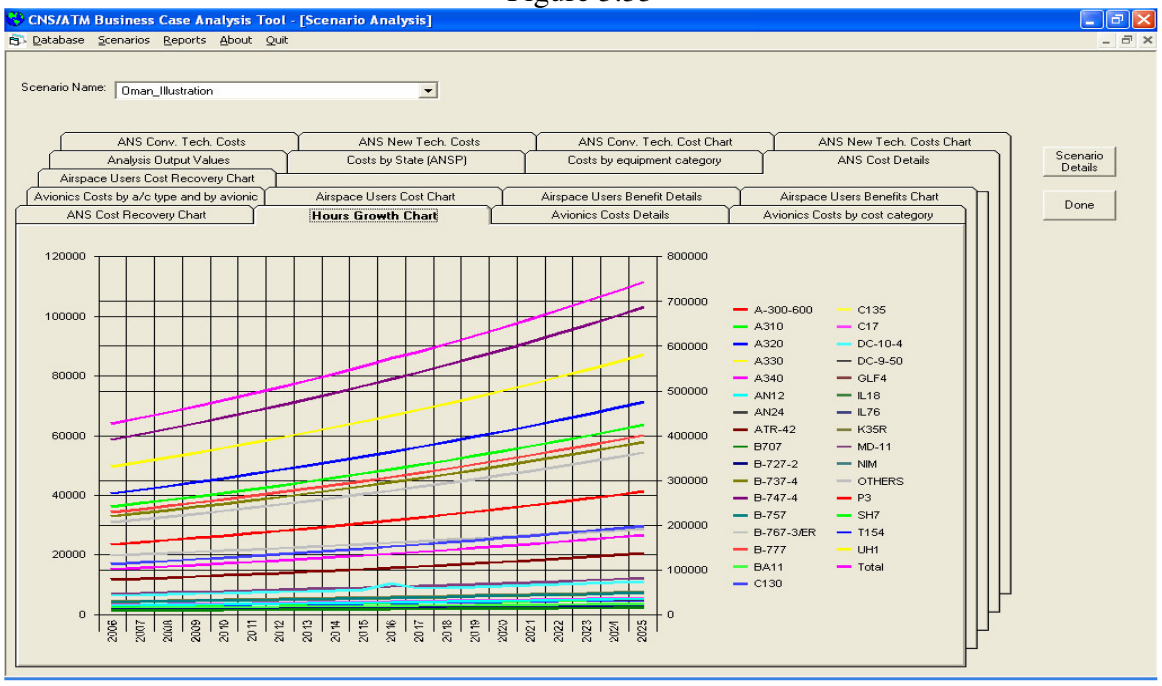


Figure 3.33 displays the traffic forecast chart in terms of flight hours by aircraft type as well as the total.

III.2.11. Avionics Costs Details

Figure 3.34

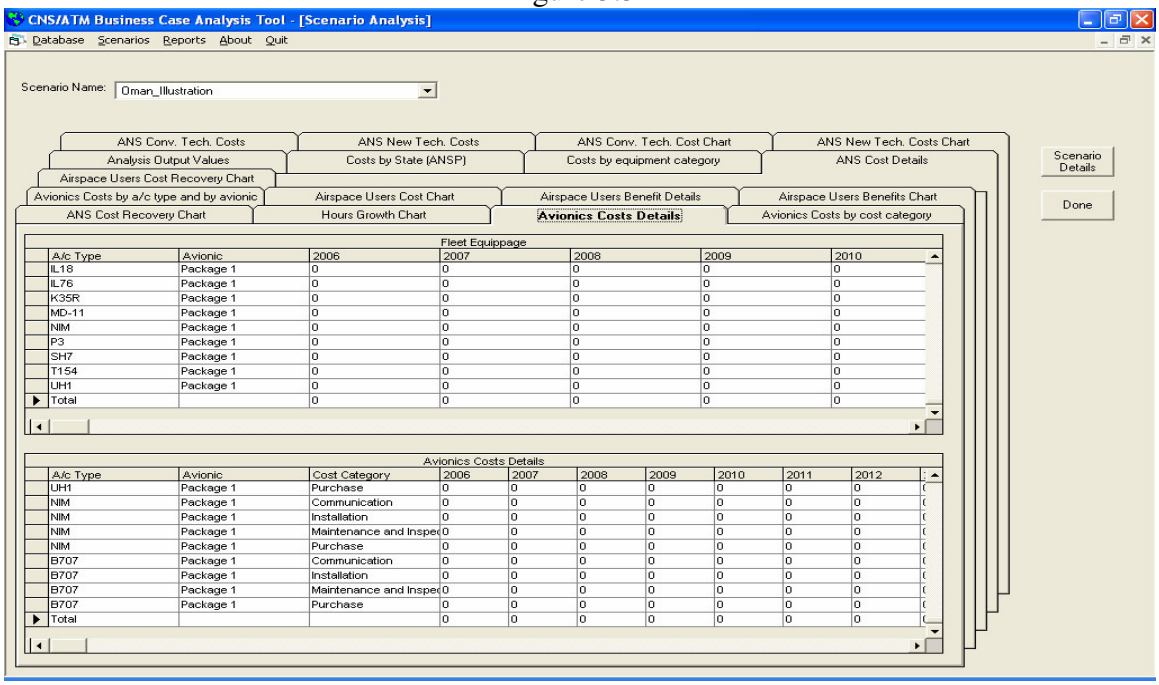


Figure 3.34 displays two grids. The top grid shows the fleet equipage process. Each row of the grid displays the equipage profile of an aircraft type with an avionic. For each of the years within the scenario analysis period, the grid shows the number of aircraft equipped.

III.2.12. Avionics Costs by Cost Category

Figure 3.35

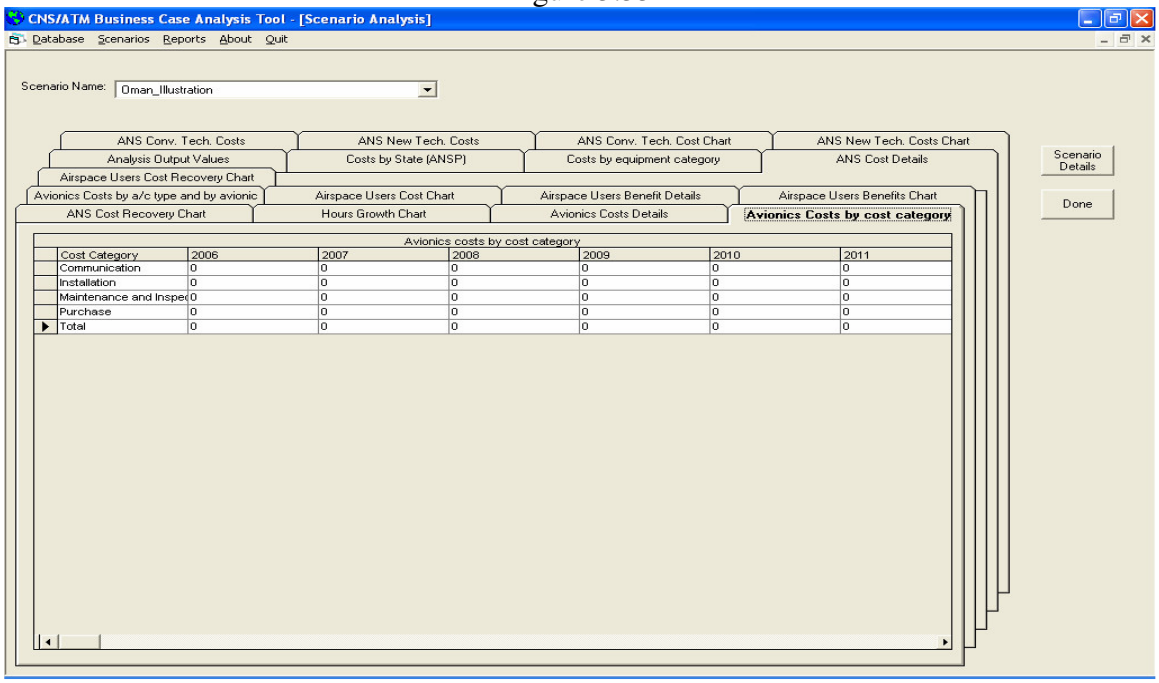


Figure 3.35 displays avionics costs by cost category as well as the total cost.

III.2.13. Avionics Costs by a/c type and by avionic.

Figure 3.36

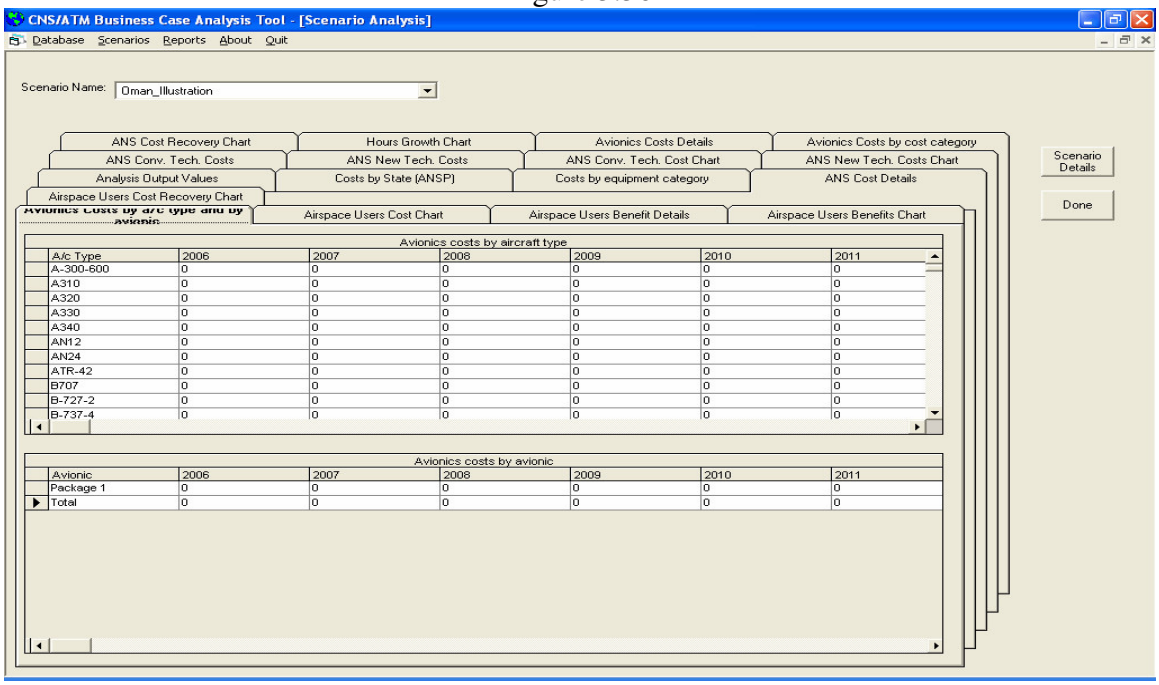


Figure 3.36 displays two grids. The top grid shows the avionics costs by aircraft type while the bottom grid shows these costs by avionic for each year of the analysis.

III.2.14. Airspace Users Costs Chart

Figure 3.37

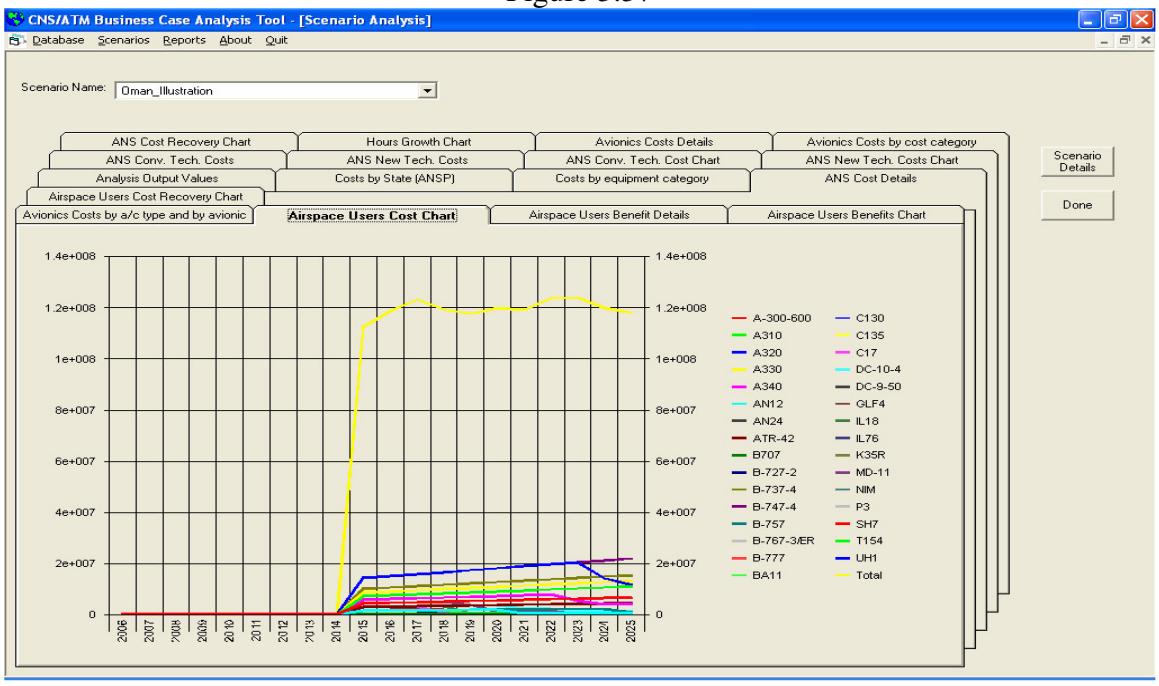


Figure 3.37 displays the airspace users avionics costs chart by aircraft type.

III.2.15. Airspace users Benefits Details

Figure 3.38

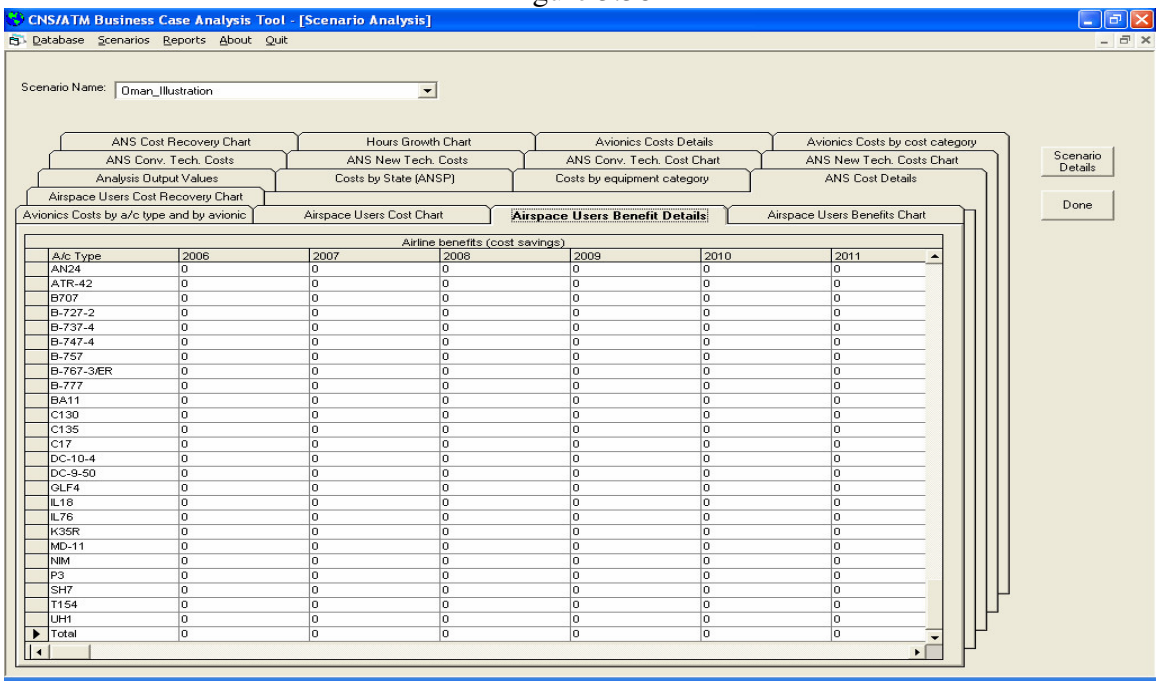


Figure 3.38 displays for each year the Airspace users benefits in terms of costs savings in monetary terms and by aircraft type.

III.2.16. Airspace users Benefits Chart

Figure 3.39

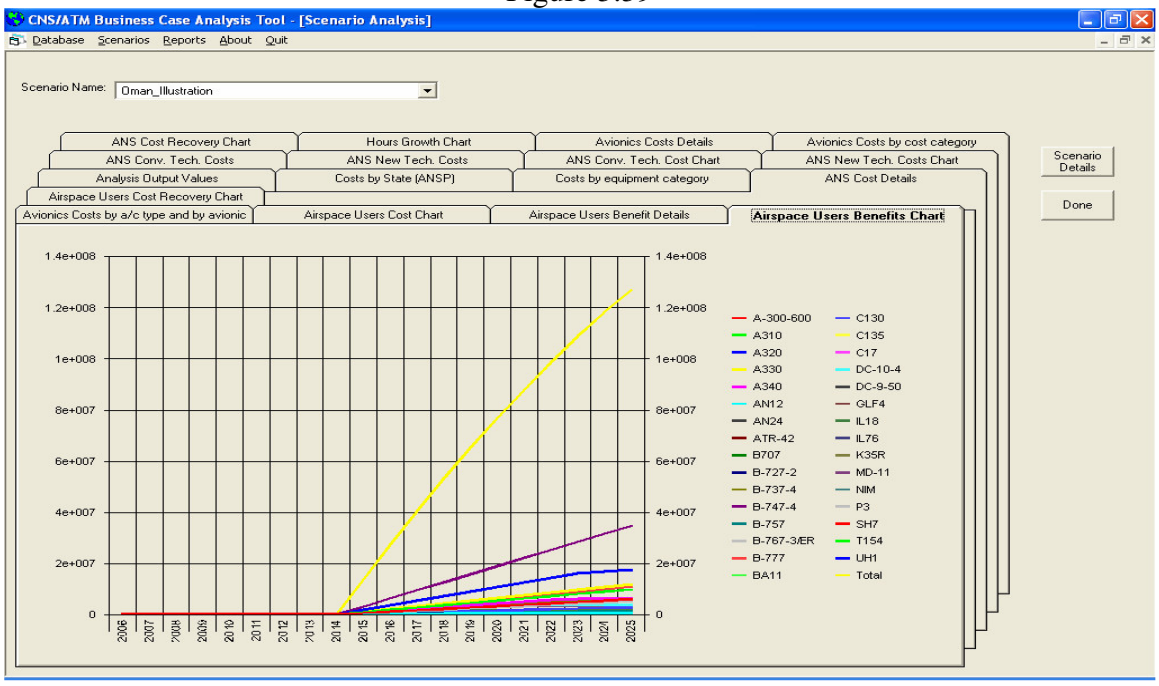


Figure 3.39 shows the airspace users costs savings chart by aircraft type.

III.2.17. Airspace users Cost Recovery Chart

Figure 3.40

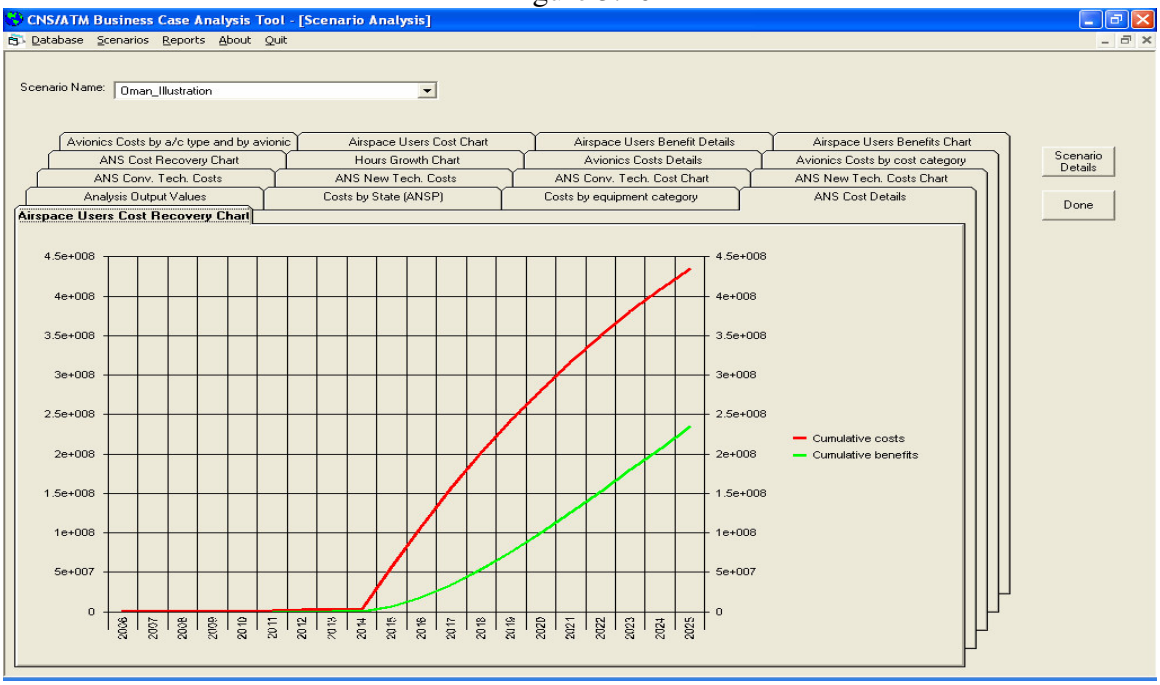


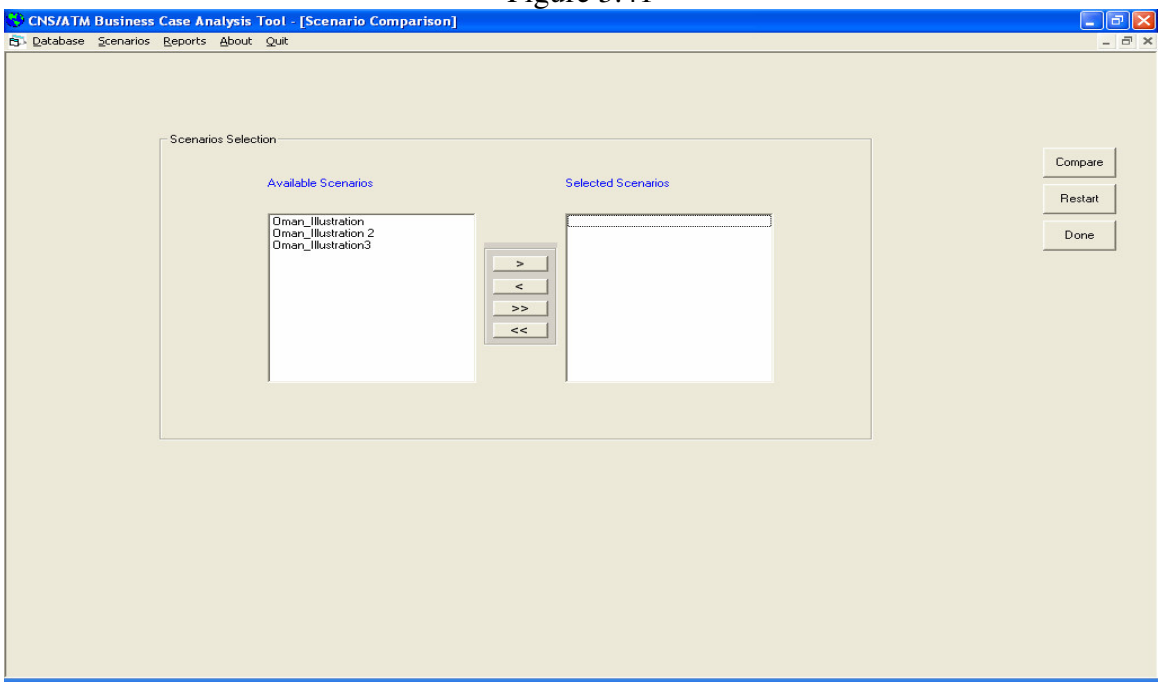
Figure 3.40 shows the airspace users cost recovery chart. Two curves shown are the cumulative costs and the cumulative revenues.

III.3. Scenario Comparison

The software allows the user to compare among several scenarios.

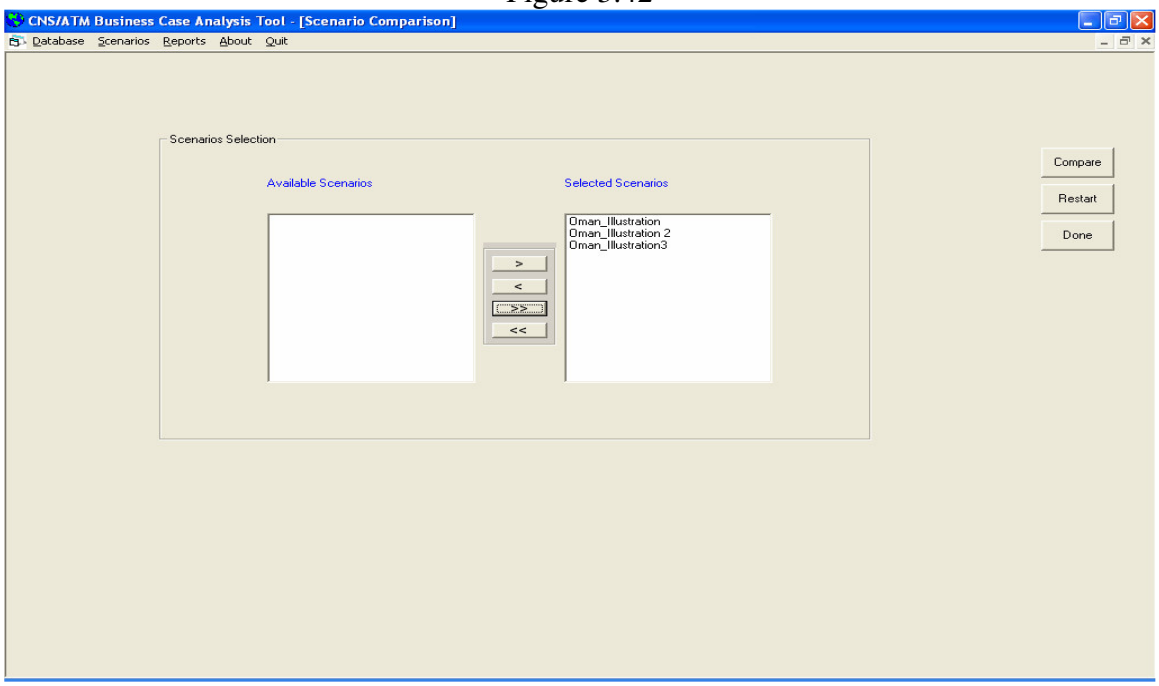
When the user selects the Scenario Comparison menu item, the following screen shown on Figure 3.41 appears:

Figure 3.41



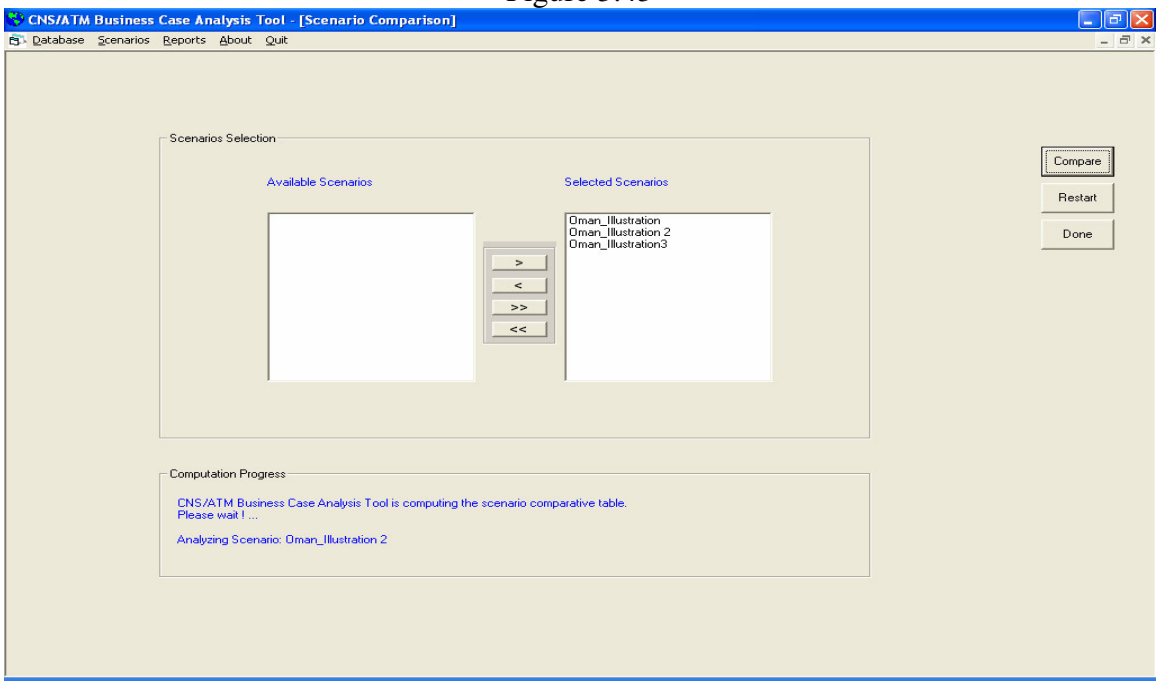
The list of available scenarios is shown on the left side of the screen. The user can select scenarios either one at a time or all at once. The selected scenarios will appear on a separate list on the right side of the screen, as shown in Figure 3.42 .

Figure 3.42



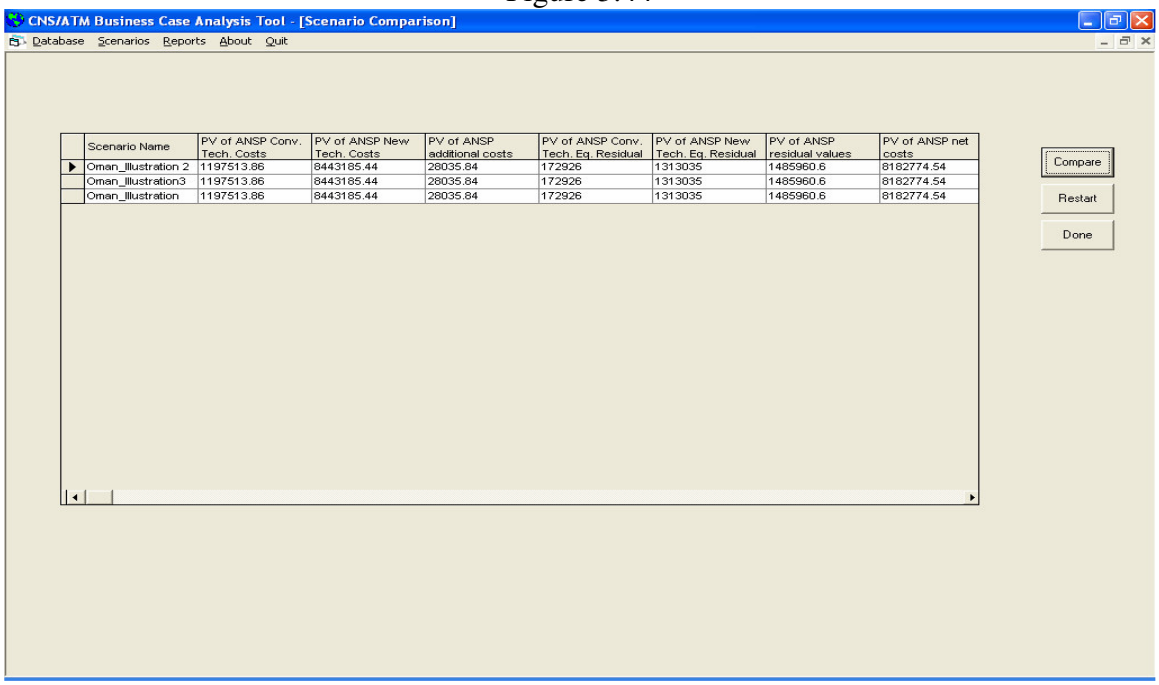
Once the selection is done, the user should press the command button “Compare” in order to compute the scenario comparison table.
After pressing the command button “Compare”, a computation progress box appears on the bottom of the screen as shown in Figure 3.43 below:

Figure 3.43



The computation progress box informs the user of the scenario being processed. When all scenarios are processed, the screen shown on Figure 3.44 below is displayed:

Figure 3.44



Scenario Name	PV of ANSP Conv. Tech. Costs	PV of ANSP New Tech. Costs	PV of ANSP additional costs	PV of ANSP Conv. Tech. Eq. Residual	PV of ANSP New Tech. Eq. Residual	PV of ANSP residual values	PV of ANSP net costs
Oman_Illustration 2	1197513.86	8443185.44	28035.84	172926	1313035	1485960.6	8182774.54
Oman_Illustration3	1197513.86	8443185.44	28035.84	172926	1313035	1485960.6	8182774.54
Oman_Illustration	1197513.86	8443185.44	28035.84	172926	1313035	1485960.6	8182774.54

The comparison table displays in front of each scenario the following results:

- PV of ANSP Conv. Tech. Costs
- PV of ANSP New Tech. Costs
- PV of ANSP additional costs
- PV of ANSP Conv. Eq. Res.Values
- PV of ANSP New Eq. Res.Values
- PV of ANSP All Eq. Res.Values
- PV of ANSP Net Costs
- Annual User Charges
- ANSP NPV
- Cost Recovery Year
- PV of Airspace user Benefits
- PV of Airspace user Avionics Costs
- PV of Airspace user User Charges
- PV of Airspace users Additional Costs
- PV of Airspace users costs
- Airspace users NPV
- Start of Analysis Period
- End of Analysis Period
- Transition Period
- Maximum Stretching Period
- Maximum Refurbishment Period
- Default Life Cycle
- Year Switching Month
- Default Installation Date
- Interest Rate
- Consider Residual Value at the end of the transition period
- Consider Residual Value at the end of the analysis for the conventional technology equipment
- Consider Residual Value at the end of the analysis for the new technology equipment
- Consider Decommissioning cost
- Start of cost recovery period
- End of cost recovery period
- Profit Margin

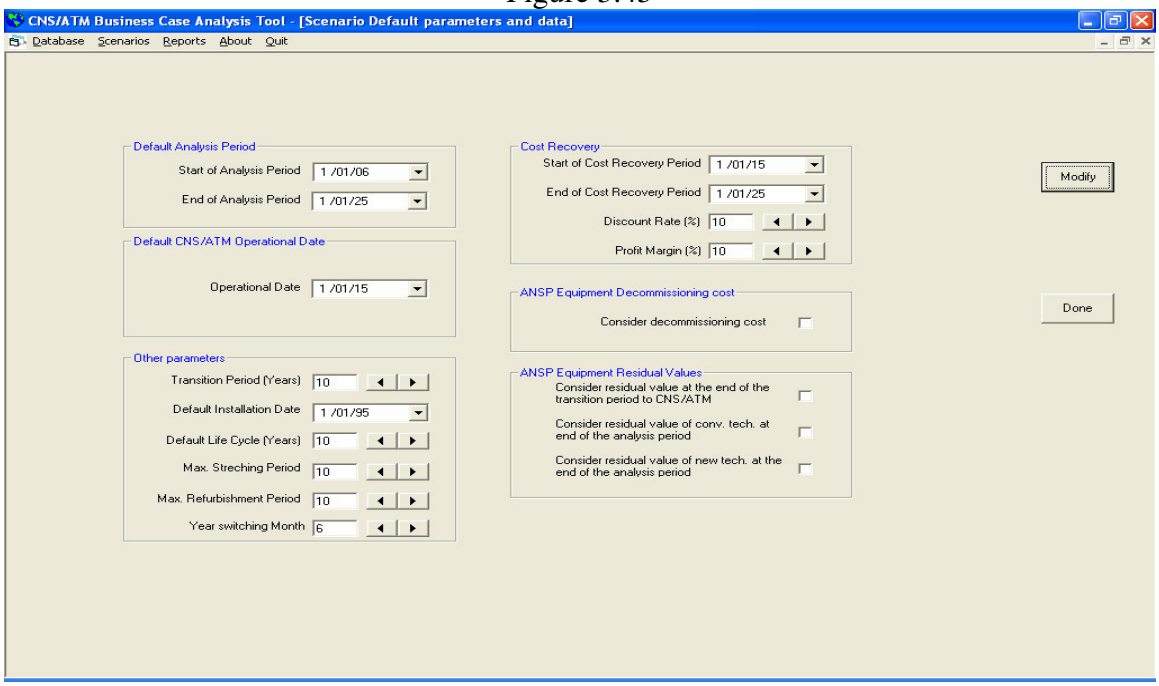
The titles on the top of each column in the comparison table may not be fully visible when this table is displayed. The user can increase the width of any column by placing the cursor on the left or on the right limit of the column and then click and drag.

Should the user decide to make another comparison, he needs to press the command button “Restart”; a new selection screen is then displayed and the user can start a new comparison.

III.4. Scenario Defaults

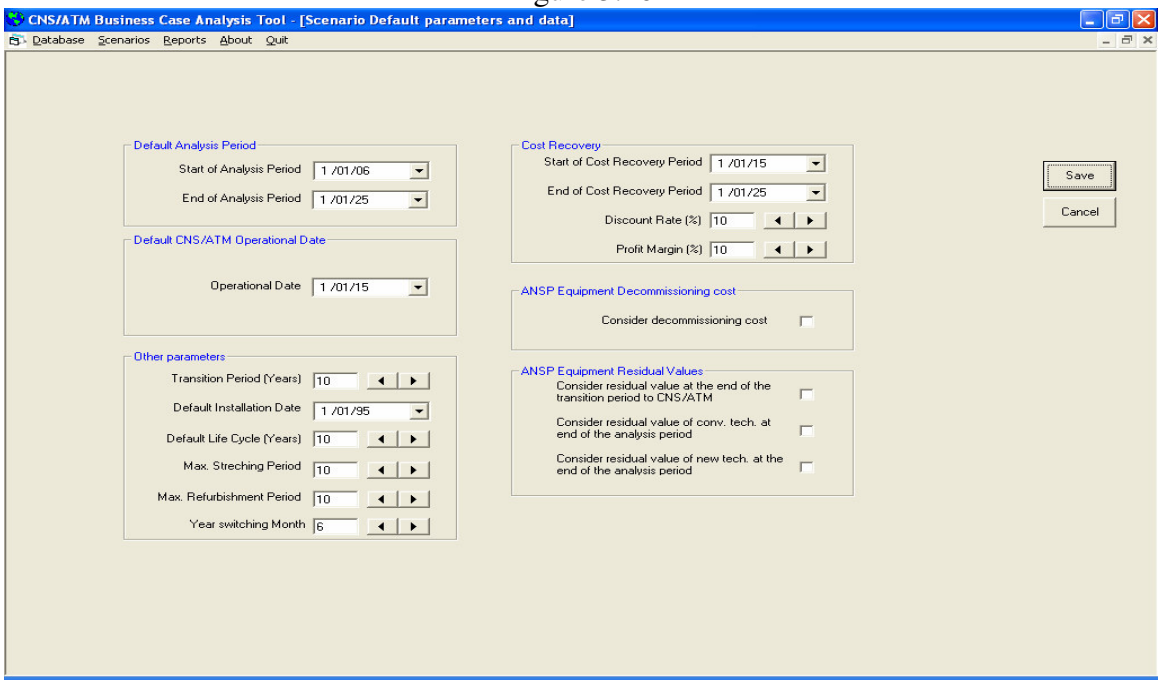
Part of a scenario is a set of parameters regarding the analysis period, the CNS/ATM operational dates, the cost recovery, the decommissioning cost, the residuals values and other parameters as described in the scenario manager section. Each time a new scenario is created, the software loads default parameters stored in the database. The user can then modify them depending on his assumptions for the current scenario. The scenario defaults menu item allows the user to change the default parameters. When this option is selected, Figure 3.45 below is displayed. It is similar to the scenario ANS parameter screen.

Figure 3.45



In order to modify the default parameters, the user should press the “Modify” command button, make the changes and then press the “Save” command button to save the changes or press “Cancel” to cancel them.

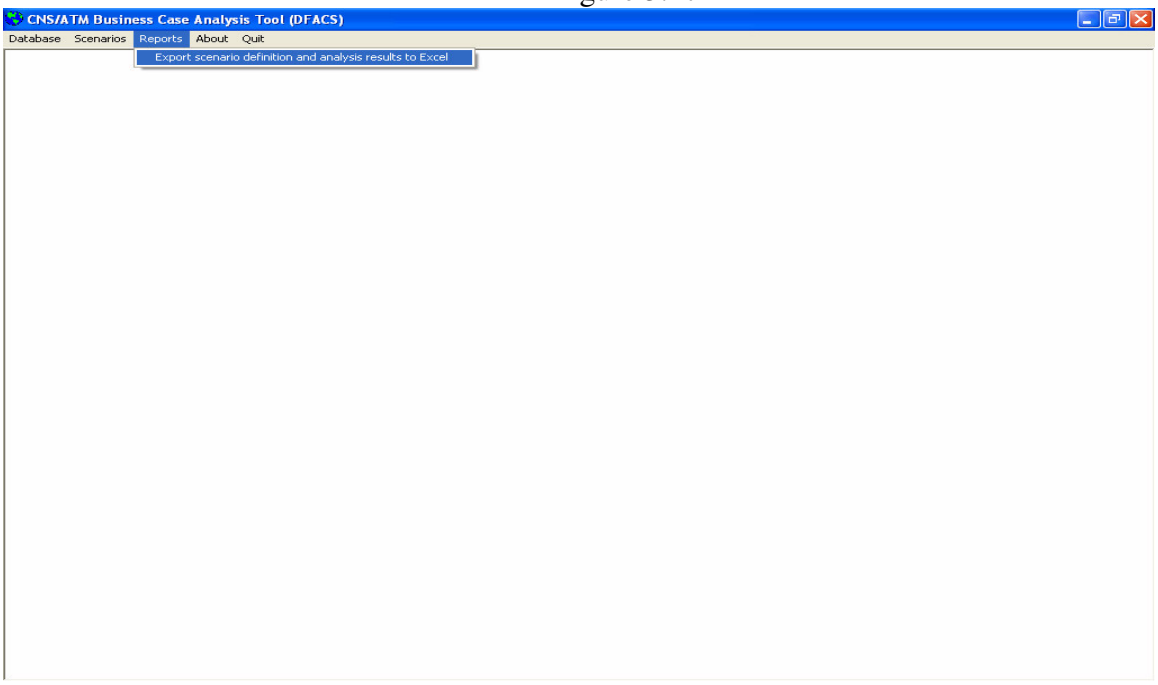
Figure 3.46



III.5. Reports

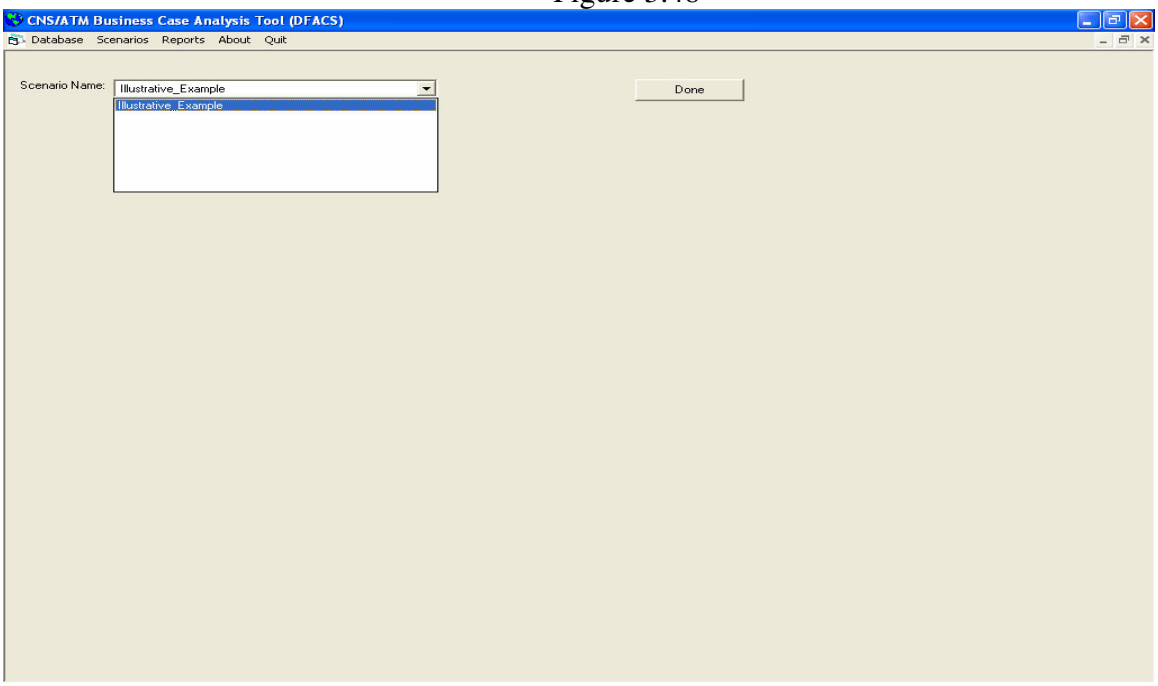
A report can be generated for each scenario including a detailed definition and the results of its analysis. The report is saved in Excel format as illustrated in Figure 3.47.

Figure 3.47



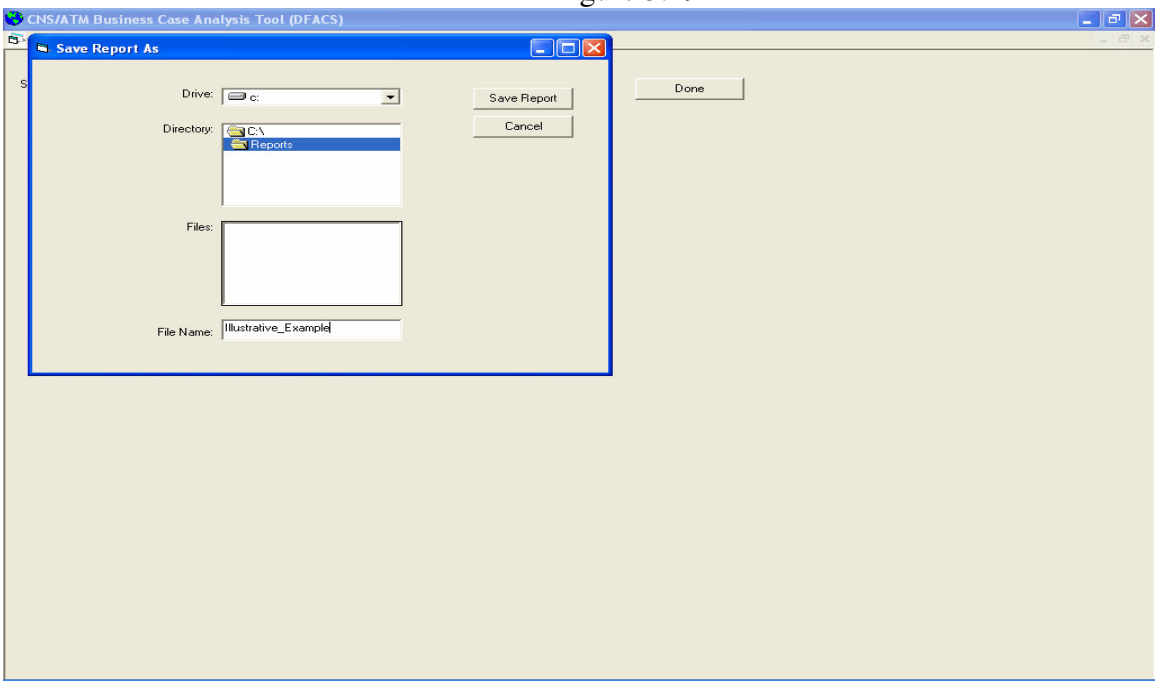
After choosing the report option, the user selects the scenario for which the analysis report is to be saved as shown in figure 3.48.

Figure 3.48



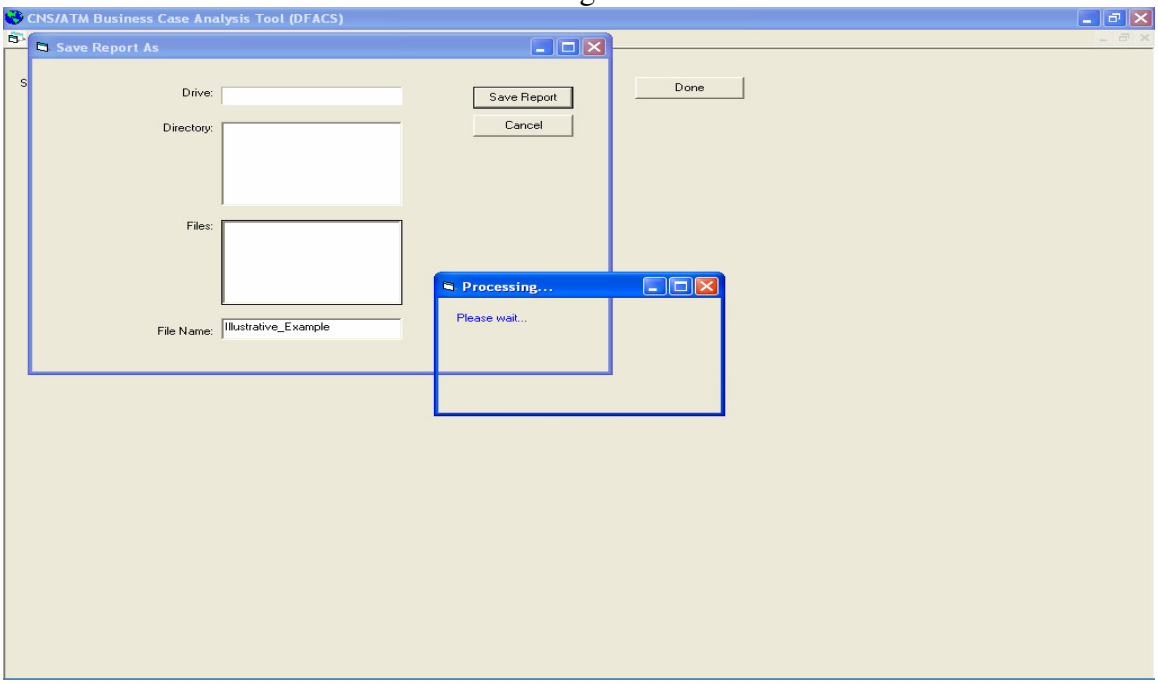
A new window named “Saved Report As” pops-up, as shown in Figure 3.49, asking the user to choose the path where the Excel file report is to be saved as well the file name. This name should not include any extension. The “.xls” extension will be added to the file name by the application.

Figure 3.49



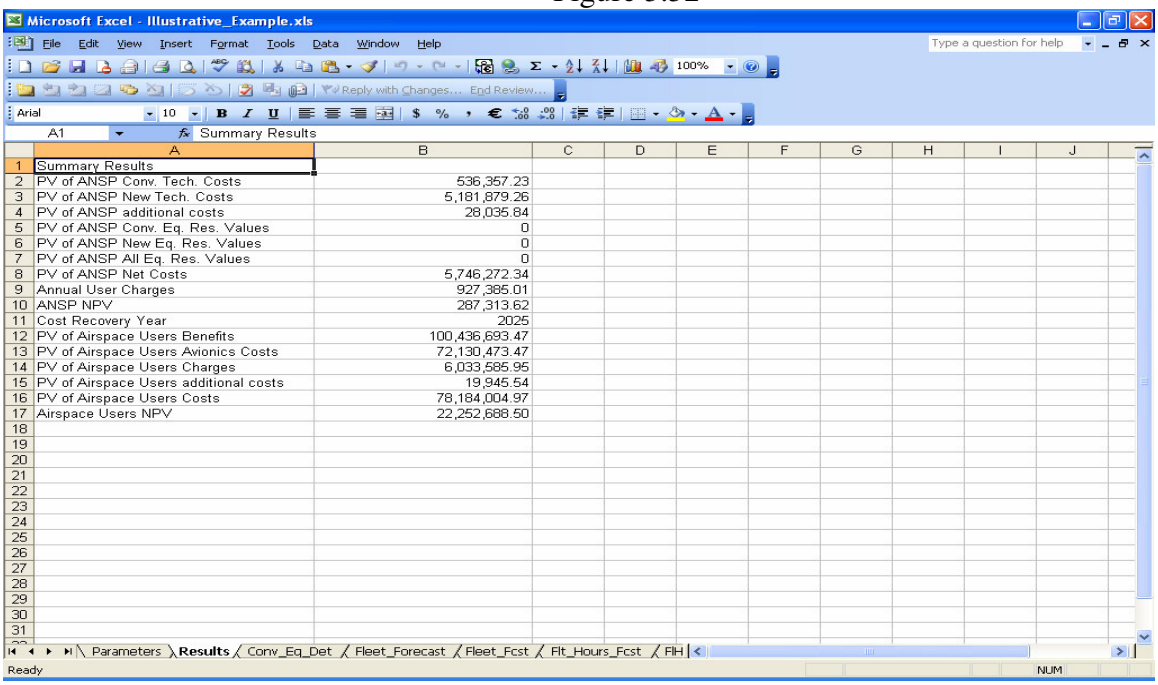
Click the “Save Report” command button and Figure 3.50 will appear.

Figure 3.50



The report file may be opened using Excel as shown in Figure 3.52.

Figure 3.52



	A	B
1	Summary Results	
2	PV of ANSP Conv. Tech. Costs	536,357.23
3	PV of ANSP New Tech. Costs	5,181,879.26
4	PV of ANSP additional costs	28,035.84
5	PV of ANSP Conv. Eq. Res. Values	0
6	PV of ANSP New Eq. Res. Values	0
7	PV of ANSP All Eq. Res. Values	0
8	PV of ANSP Net Costs	5,746,272.34
9	Annual User Charges	927,385.01
10	ANSP NPV	287,313.62
11	Cost Recovery Year	2025
12	PV of Airspace Users Benefits	100,436,693.47
13	PV of Airspace Users Avionics Costs	72,130,473.47
14	PV of Airspace Users Charges	6,033,585.95
15	PV of Airspace Users additional costs	19,945.54
16	PV of Airspace Users Costs	78,184,004.97
17	Airspace Users NPV	22,252,688.50