USER'S GUIDE FOR FIDME–PC: FORESTRY INVESTMENT DECISIONS MADE EASY ON PERSONAL COMPUTERS

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ABSTRACT

FIDME– PC is a personal computer program developed to assist forest managers in evaluating and screening investment alternatives with ease and maximum precision. Up to four investment alternatives can be compared using one of the four following economic criteria:

1) Cost-effectiveness
2) Benefit/cost ratio
3) Present net worth
4) Internal rate of return

The input estimates for the model can be expressed as either point or subjective probability estimates. Simulated results will provide the probability of one investment differing from others. The forest manager can therefore choose, with a known degree of confidence, between investment alternatives. Model applications are demonstrated by several examples.

This instruction manual includes a brief description of the system requirements, contents of the distribution diskette, installation of the program, and setup with the user system peripherals. It also contains four input file examples, with a step-by-step running of the first example, input file creation, editing, and appending of the input data files. Output of the four examples is also included.

RÉSUMÉ

FIDME– PC est un logiciel pour ordinateur personnel; il a été conçu pour aider les gestionnaires de forêts à évaluer et à examiner les projets d'investissement avec facilité et un maximum de précision. Il peut aider à comparer jusqu'à quatre projets suivant l'un des quatre critères économiques suivants:

1) Rentabilité
2) Rapport coût/avantages
3) Valeur nette actualisée
4) Taux de rendement interne

Les prévisions entrées dans le modèle peuvent être exprimées en estimations ponctuelles ou en estimations subjectives de probabilité. Les résultats de la simulation indiqueront la probabilité d'un investissement par rapport aux autres. Le gestionnaire pourra donc choisir, avec une certaine confiance, entre des projets d'investissement. Les applications du modèle sont illustrés par plusieurs exemples.

Le présent guide de l'utilisateur comprend une brève description de la configuration du système, du contenu de la disquette de distribution, de la façon d'installer le logiciel et de son interaction avec les périphériques du système de l'utilisateur. Il contient également quatre exemples de fichier d'entrée (et une explication, pas à pas, du premier exemple), des explications sur la création et la modification de fichiers et sur l'addition de fichiers de données d'entrée. Les résultats des quatre exemples sont également joints.

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INTRODUCTION

Most forest investments are long-term by nature and thus subject to risk and uncertainty. In the case of forest renewal investments in particular, it is essential that they are chosen from the most promising alternatives possible. To evaluate and screen out investment alternatives with greater ease and accuracy, forest managers need a technique that not only enables them to predict the costs and rates of return but also indicates the likelihood of these predictions being achieved.

FIDME – PC (Forest Investment Decisions Made Easy on Personal Computers) is a program designed for foresters with access to an IBM PC compatible computer. The program is a tool to accurately evaluate the relative economic feasibility of various forestry investments. FIDME – PC comes with four typical examples to demonstrate the utilities and features of this program. These examples, combined with a user-friendly method to create specific models, make FIDME – PC a highly versatile investment analyzer.

The objective of this manual is to provide the user with a complete description and tutorial on how to use FIDME – PC's powerful investment-modeling techniques. A list of additional literature is provided in the bibliography for users interested in a more in-depth understanding of investment analysis under risk and uncertainty.

GETTING STARTED: SYSTEM REQUIREMENTS

To install and run FIDME – PC successfully, a computer system is needed with the following hardware:

1) A personal computer that is IBM AT or XT compatible (uses an 80x86 or 8088x8086 processor)
2) A graphics adapter and monitor supporting an EGA, VGA, or SVGA graphics card
3) 640K of memory installed
4) One 5-1/4 inch floppy drive
5) DOS 2.0 or higher

Addition of an 80x87 math coprocessor will increase execution speed noticeably, but is not essential.

THE DISTRIBUTION DISKETTE

The distribution diskette, a 5-1/4 inch double sided/double density (DS/DD) 360 – Kb floppy diskette, contains the following files:

FIDMEPC.EXE The FIDME – PC main executable file

FIDSETUP.EXE The setup executable file to configure serial port communication with an HP plotter and to select the printer port

FIDMEPC.INI The setup ASCII text file containing the serial port configuration and the parallel port selection. Editing this file with an external editor other than FIDSETUP.EXE is **not recommended**. If this file is edited directly with some program other than FIDSETUP.EXE, errors can occur. If this happens, delete the file FIDMEPC.INI and run FIDSETUP.EXE. FIDMEPC.INI will be recreated with default settings.

EXAMPLE(i).DAT Four example data files are included to illustrate each of the four economic criteria available and various other features of FIDME – PC. The first three examples will run on an AT or XT in under 10 minutes (using an 80386/33 with a math coprocessor, the simulation time is under 3 minutes). It might take several hours, however, to run EXAMPLE4.DAT on an AT or XT (using an 80386/33 with a math coprocessor, the simulation time is within 20 minutes).

EX(i).OUT The results or output files of the above four examples

INSTALLATION

On a Hard Disk

To install FIDME – PC on a hard disk, it is recommended that a separate directory be created. With the DOS MKDIR command any name can be used for this directory; this example uses, FIDME.

At the DOS prompt type:

mkdir c:\fidme and press **<ENTER>**.

You can replace "C" with any valid hard drive on your system.

Place the FIDME – PC distribution diskette into drive "A" and type:

copy a:*.* c:\fidme and press **<ENTER>**.

To install FIDME – PC on a different drive or subdirectory, the copy command must be modified accordingly.

This copies all of the files on disk A to the subdirectory "FIDME" on drive "C".

On a Floppy Disk

Place the FIDME – PC distribution diskette into "A" drive and a newly-formatted diskette into "B" drive.

At the DOS prompt type:

copy a:*.* b: and press **<ENTER>**.

If the distribution diskette must be inserted into "B" and the blank diskette into "A", make the appropriate changes in this command line.

If your system has only one floppy drive ("A"), place the distribution diskette into the drive and type the same copy command as given in this section. DOS will start copying. Whenever DOS refers to drive "B", use drive "A".

SETTING UP FIDME – PC FOR PERIPHERALS

To set up FIDME – PC for use with a plotter and printer, the setup program should be executed. To do this, change to the drive and directory that contains your installed version of FIDME – PC.

At the DOS prompt enter:

fidsetup

Make the appropriate selections on the setup menu for your system. Some technical knowledge is required if using a printer or plotter, so be sure to have the plotter manual onhand or someone nearby who can assist you with choosing the correct settings.

What You Need to Know if You Have a Plotter

Serial port: acceptable serial ports are Com1 to Com4
Baud rate: acceptable baud rates are: 110, 150, 300, 600, 1200, 4800, 9600
Parity: acceptable parities are even, odd, none
Data bits: acceptable data bits are 7, 8
Stop bits: acceptable stop bits are 1, 2

If you have an HP 7475A plotter attached to your system, you can plot graphs with FIDME – PC (*see* Section B). If you have a plotter that uses the HPGL language, FIDME – PC can plot graphs with it (*see* Section B).

What You Need to Know to Print Out the Results

Parallel ports: acceptable parallel ports Lpt1 to Lpt3.

FIDME – PC can plot graphs on all versions of the HP LaserJet III or IV Laser printer. It can also plot graphs on an HP LaserJet IIp or IIp+ with an installed HPGL/2 cartridge and 1 megabyte of memory (*see* Section B).

EXAMPLE RUNS

A. Using Existing Input Files

To demonstrate the applications of FIDME – PC, a simple example is used to compare the cost-effectiveness of planting versus seeding jack pine (*Pinus banksiana* Lamb) to produce pulp wood.

1) Change the working directory to FIDME (or the one containing the installed version of FIDME – PC).

Next run FIDME – PC by typing:

fidmepc and pressing **<ENTER>**, at the DOS prompt.

2) After a moment of initialization, the title screen should be displayed. As indicated on the bottom of the title screen, pressing any key will continue to the first menu.

3) The main selection screen is now displayed. It should look similar to Figure 1, which is a prompt to:

"Enter Name of Output Summary File...."

At this prompt enter the name of a file for which FIDME – PC is waiting to write the summary of output and expected results. For the first example, type:

example1 and press **<ENTER>**. A prompt will appear to:

"Enter Name of Data Input File...."

This file should be created to contain details of economic criteria; number of investment alternatives to be compared; rotation ages; and initial, annual, periodic, and final costs and returns.

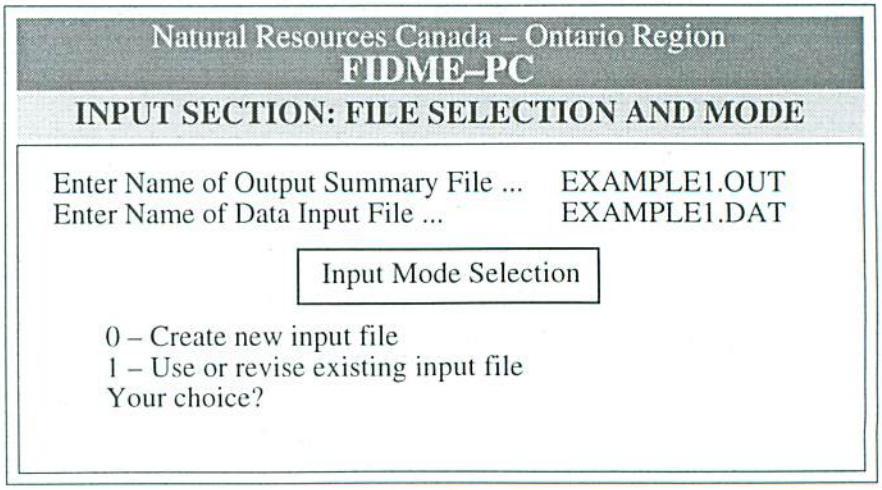

Figure 1. Main selection screen.

Again, for this example type the name of the supplied example file:

example1 and press **<ENTER>**.

To correct any mistakes in entering file names, press <ESC> and follow the red options menu at the bottom of the screen. Press "Q" to quit, "R" to restart, or "C" to continue. If no mistakes were involved so far, press "C" to continue.

4) The screen should now look like the one shown in Figure 1. Because the data input file EXAMPLE1.DAT has been provided with each copy of FIDME – PC, type:

1 and press **<ENTER>** at the prompt to:

"Use or Revise Existing Input File".

(The "0" option will be described in detail in Section C).

5) The next prompt is about appending files. It reads:

"Do You Wish To Append This File? (Y/N)"

Appending files will be discussed later, so type:

N and press **<ENTER>** to proceed.

Pressing **<ESC>** for (5) or (6) will again give you the options of quitting, restarting, or continuing.

6) The question of whether to edit a file is posed as:

"Do You Wish To Edit This File? (Y/N)"

Since the edit operation will be discussed later, type:

N and press **<ENTER>**.

The simulation can be stopped if necessary by pressing the **<ESC>** key. This will give the option of (R) to restart the program (from [3]), or (C) to continue with the simulation.

7) The program will now read the data from the existing input file and begin processing.

During the execution of the simulation, run time information is written to the information window and continuously updated as in Figure 2.

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OUTPUT: RUN TIME INFORMATION

ANALYSIS #1: PLANT J. PINE
Percentage of Iterations Completed: 19.67%
Number of Iterations Abandoned:

Figure 2. Run time information screen.

8) The percentage of iterations completed for each analysis is given so that the amount of time to completion can be estimated. The number of iterations abandoned are also displayed to show how many trials failed to produce acceptable stocking and were therefore regarded as complete failures.

9) Once the simulation is complete, the computer beeps to alert the user to:

"Press any Key to Continue".

This clears the information window and gives a prompt to enter a probability interval for the tabular output. By typing:

5 and pressing **<ENTER>**

the output is displayed in two consecutive screens with 21 probability levels (0–100%). Typing:

10 and pressing **<ENTER>**

will display a single screen table with 11 probability levels (0–100%). Using 10 as an example yields results as in Figure 3.

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OUTPUT: RESULTS OF ANALYSES

Economic Criteria: COST-EFFECTIVENESS

Probability Of Exceeding	PLANT J. PINE	SEED J. PINE
0.00	187.52	189.04
0.10	106.72	113.48
0.20	88.98	94.78
0.30	79.92	84.82
0.40	69.78	76.76
0.50	62.72	71.57
0.60	56.65	66.67
0.70	52.94	62.34
0.80	49.15	57.26
0.90	46.55	52.76
1.00	33.86	35.70
	1.33%	8.00%

Percentage of Iterations Abandoned:
<Hit any key to continue>

Figure 3. Tabular output screen.

A detailed description and interpretation of tabular output is found in Payandeh and Basham (1992). For example, the second row of the output indicates that there is a 10% chance that the future cost of pulpwood will exceed \$106.72/m^3 for planting jack pine, and \$113.48/m^3 for seeding jack pine. Conversely, there is a 90% chance that the future cost per m^3 of pulpwood would be equal to or less than these figures for planting and seeding jack pine. Row 3 of the table indicates that there is a 20% chance that future cost of pulpwood /m^3 will exceed \$88.98 from the jack pine plantation and \$94.78 from seeded jack pine. Conversely, it indicates that there is an 80% chance that the future cost per m^3 will be between \$33.86 and \$88.98 for pulpwood from the jack pine plantation, and between \$35.70 and \$94.79/m^3 for pulpwood from seeded jack pine.

10) After viewing the tabular results the screen should look like that in Figure 4. This is the output options menu, which is the same for all simulation runs. For specific instructions on how to use the output options menu, *see* Section B.

When ready to enter your own input file data, type:

R and press **<ENTER>** to restart the program.

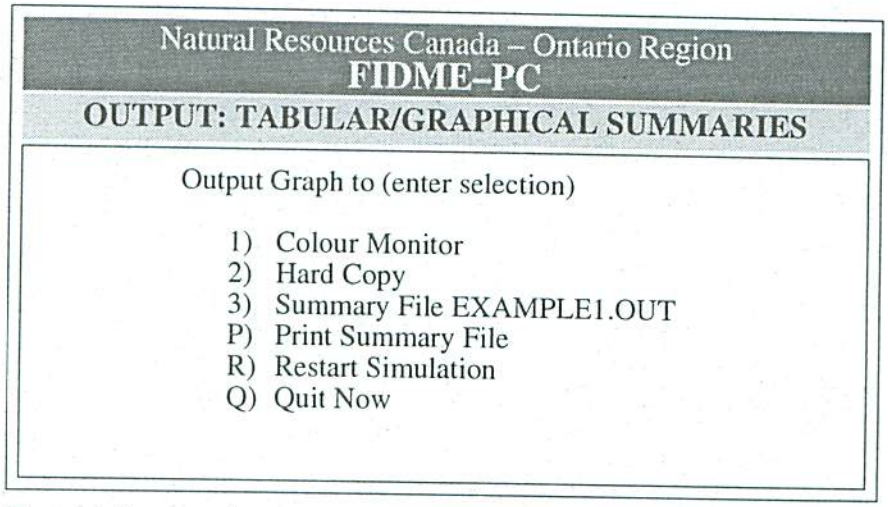

Figure 4. Output options menu.

B. Output Options: Graphics Output to Screen, Plotters, and Printers

A feature of FIDME – PC is its capability to plot graphs of the output to the monitor screen, an HP plotter (Hewlett Packard), or a LaserJet printer. A graph of the output can also be plotted to an ASCII text file. If necessary, refer to the section "Setting up FIDME – PC for Peripherals".

Complete Section A and the screen should look like Figure 4. Options are explained below.

Color Monitor

If you type:

1 and press **<ENTER>**

FIDME – PC will produce a color coded graph of the tabular output that was just viewed on the monitor screen. This option is a quick way of comparing alternative investments. Once viewing the graph is completed, press any key to return to the output options menu.

Hard Copy

If you have access to an HP LaserJet printer or plotter, type:

2 and press **<ENTER>.**

This option can be used to print or write to a file that can be directly printed at a later date. *See* "Hard Copy: The Hard Copy Option" below for discussion on this option.

Summary File EXAMPLE1.OUT

Choose this option by typing:

3 and pressing **<ENTER>**.

A graph of the tabular output will be written to the output summary file chosen at the program run. This graph can be viewed on the screen or printed from the DOS environment by using the DOS type or print command.

Print Summary File

Choose this option by typing and pressing **P<ENTER>**. It will print the output summary file on the printer on the port specified using the FIDSETUP program. To print the graph choose option **3** before choosing this option. This will add the graph to the end of the output summary file before printing.

Restart Simulation

This option (**R**) will restart FIDME – PC from the main selection screen.

Quit Now

This option (**Q**) will quit running FIDME – PC.

The above options are simple and straightforward, with the exception of Option 2, which is described below. Press **<ESC>** to pause and optionally stop the printing at any point.

Hard Copy: The Hard Copy Option

Unlike the other options, the hard copy option does not produce immediate results. In this option press **<ESC>** to return to the previous menu screen. You now have the following three options of where you may plot the graph.

1. File

Selecting the file option **F** provides two secondary options of what type of file to plot to: an HP LaserJet file, or an HP plotter file.

(Press **<ESC>** at this point to return to the previous menu.)

After the proper output format is chosen, FIDME – PC then gives a prompt for a file name. Enter a valid file name.

To exit the plotting press **<ESC>**.

Otherwise press any key to continue with a valid file name. If the file name already exists, FIDME – PC prompts the user asking if they wish to overwrite the file. Choose:

N to reenter another file name,
Y to overwrite the previous file,
or press **<ESC>** to exit the plotting routine at this point.

See Appendix 3 for information on how to print graphs from the files created by this option.

2. HP LaserJet

To ensure compatibility with a plotter **other than an HP 7475A,** this option should **always** be used.

Choose option **L** to plot a graph to an HP LaserJet printer. (*See* "Setting up FIDME – PC for Peripherals" for valid HP LaserJet models.) With this option, you can choose plotting onto the default port (selected via FIDSETUP.EXE) or to a new port.

Press **<ESC>** to exit the plotting routine if desired.

Whether the default port or another is chosen, follow the instructions on the screen and continue. When all the plot information has been sent to the printer, a message that the plot is complete will be displayed on the screen.

To terminate or pause the plotting, press **<ESC>** and wait a few seconds for a response. The option to terminate the plot or resume plotting will appear.

3. HP Plotter

Choose the option **P** to plot a graph of the output to an HP 7475A plotter.

(Press **<ESC>** to return to the previous menu if you don't want to use this option.)

The default communication parameters are displayed on the top of the screen as they were set when FIDSETUP.EXE was executed. To change these parameters, follow the instructions on the screen. If at any time (except while entering the baud rate) you wish to cancel your changes to the default settings, press **<ESC>**.

If the default settings are suitable, follow the instructions on the screen to continue. If plotting was not cancelled the complete plot message will appear when the computer is finished sending the information to the plotter.

Cancelling the Plotting

FIDME – PC has only been tested with an HP 7475A plotter connected to its serial port. It should, however, work with other plotters that use the HPGL language and are connected to the serial port.

To pause or cancel the plotting for any reason, press **<ESC>** and wait for a response. There should be no errors during plotting, but should one occur and the computer is not responding, or the plotter is shut off in the middle of the plotting, press the combination **<CTRL-END>** to immediately terminate the plotting.

Shutting off the plotter while printing is not recommended because in some cases the computer will only respond to the keyboard if the plotter is on.

C. Creating New Data Files via Interactive Mode

1) Repeat Sections A–1 to A–3, but instead of entering EXAMPLE1 in Section A–3, enter:

myfile for the output summary file, and data input file.

It is recommended that these files have the same name i.e., MYFILE.OUT and MYFILE.DAT, to keep your directory organized.

2) The screen should now look like Figure 1, except that EXAMPLE1 has been replaced with MYFILE. Respond now to the prompt at the bottom of the screen by typing:

0 and pressing **<ENTER>** to activate FIDME – PC's interactive input routines.

3) A series of screens prompting for analysis or alternative investments and their associated costs/returns will follow. The prompts are logical, self-explanatory, and easy to follow. Part 5 below gives a detailed summary of allowable input ranges and their meanings.

4) Entering **xxx** at any time during the creation of the input data file will abort the file creation and restart the program. If an error has been made (e.g., a percentage value was entered incorrectly) having to abort the file creation can be avoided by continuing to enter the data. When the simulation starts,

press **<ESC>R** to restart the program.

Reenter the file name that had been previously entered, and use the editor to correct the mistakes (*see* "Editing Existing Files, Section D").

5) Specific input variables and data type descriptions for FIDME – PC's interactive mode.

Run identification
Less than 21 characters in length describing the simulation run.

Number of iterations
An integer between 1 and 500 used to set the number of times FIDME – PC is required to simulate the alternative investments involved and their associated calculations.

Number of analyses
Number of alternative investments to be compared in each run.

Random number seed
An integer from -32768 to 32767, with an optimal range between 688 to 28465, used to generate a sequence of uniformly distributed random numbers.

See Appendix 3 for the required and optimal inputs for each of the four economic criteria.

Economic criteria
An integer code between 1 and 4 indicating which of the four economic criteria is to be used for the analysis. Descriptions of these options are given on the screen. Note that when two input fields with different economic criteria are appended, FIDME – PC uses the economic criteria of the original input file.

Analysis title
Less than 15 characters giving a specific title to each analysis (e.g., Plant J. Pine).

Interest rate
An integer between 0 and 20 giving the rate of interest (e.g., 6 = 6% or 0.06).

Inflation rate
An integer between 0 and 20 giving the rate of inflation (e.g., 6 = 6% or 0.06).

Rotation period
An integer indicating the number of years from stand establishment to final harvest, which is less than the years to termination given the rotation age (e.g., if years to termination are 180 and rotation age is 60, then there will be three rotations before termination).

Years to termination
An integer giving the number of years until the forest stand is liquidated or converted to other use. It is best if this number is a multiple of the rotation period.

Lag from preparation to establishment
An integer indicating the number of years between site preparation and the establishment of a stand (e.g., number of years between shear blading and planting). This is usually less than 5 years.

Years from establishment to survey
An integer number indicating the number of years between stand establishment (i.e., planting or seeding) and regeneration survey to determine whether stand establishment was successful. This is also usually under 5 years.

Costs and returns
The number of possible costs/returns for a particular type available in an analysis is indicated in parentheses with the prompting of the name of the cost/return (e.g., Initial Cost [0–3]). Once the number of each cost/return is specified, the program will give a prompt for the type of estimate and for the amount of the cost/return. All costs/returns can be expressed by either point estimate or subjective probability estimates. A point estimate requires only one integer estimate, while a subjective probability estimate requires a low, a high, and a minimum estimate, as well as a probability (entered in percent format) of the cost/return being lower than the low estimate and a probability of the cost/return being lower than the high estimate.

Cost/return labels
Less than 75 characters describing the specific cost or return (e.g., planting black spruce containers @ 1000 seedlings/ha).

Use Ontario stocking standards
To define a level of stand establishment other than the default (Ontario stocking standards), enter N at this prompt. If you answered "N" to this prompt, you will be asked to enter the expected stocking. If a stand or plantation does not meet stocking standards, it will be considered a failure. FIDME – PC will regenerate it up to three times before it rescarifies if necessary. If the site does not produce a satisfactory stock according to the stocking standards, then that site will be abandoned.

These are the default standards used by FIDME-PC when you answer "Y" in the above prompts are as follows:

Ontario stocking standards
Level for success - 0.6500
Level for failure - 0.4500

Annual and periodic costs/returns
These are the same as the other costs/returns except they require a year in which they begin and end. Periodic costs/returns also need an interval at which they are repeated.

Final cost/return
These are costs and returns associated with rotation end but not included in the final products.

Terminal return
This refers to asset liquidation and/or sale of land when investment operation is terminated for good.

Products
Up to eight different products can be chosen. The amount of each product is expressed in number of units of output/unit area (e.g., m^3 or number of Christmas trees/acre). The estimation of the price of the product is the price/unit output in a future year, usually estimated for the next 5–10 years.

6) After the data input file is completely entered, it is saved automatically and the simulation will begin. See Sections A–7 to A–10 for the rest of the instructions.

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COST, RETURN, OR PRODUCT INPUT ESTIMATES

– – Analysis 1: Preparation Costs – –
Preparation Cost #1
Enter a label for this cost: Light Shear Blading
– – – – – – Enter Subjective Estimates – – – – – –

Low Estimates: 110 High Estimate: 140
Prob. < Low (10 = 0.1): 10 Prob. < High (90 = 0.9): 95
Absolute Minimum: 100
Accept? (Y/N): y

Figure 5. The use of subjective probability estimates allows the user to incorporate personal experience and judgment into the analysis.

D. Editing Existing Files

1) Before running FIDME – PC, make a copy of the example files to practice editing. To back up the files, type at the DOS prompt:

copy example?.dat *.edt and press **<ENTER>**

2) Replace "example1" with **example1.edt** when entering the data input file name, and follow the instructions in Section A–1 to A–6.

3) In response to: **"Do You Wish To Edit This File? (Y/N)"**

type **Y** and press **<ENTER>**.

4) After a moment of initialization, the top portion of EXAMPLE1.EDT (which was originally EXAMPLE1.DAT and was renamed for editing purposes) is on the screen ready to be edited.

5) FIDME – PC's editor displays the location of the end-of-line carriage return by displaying a "¶", and designates the end of the file with a ☺.

The line number being edited, along with the column, are displayed in the upper left border of the screen. The bottom of the screen shows how to save and run, save and return, and return (abort) a file. Use the arrow keys to move the cursor around on the screen. When editing, it is important not to change the format of the file; only change numbers or titles that **you** entered. If order or format is changed (e.g., numeric to alphanumeric, integer to real) FIDME – PC will abort or produce unreliable results.

To reduce chances of errors while editing, FIDME – PC does not allow the user to delete characters or insert lines. Characters can be deleted by overwriting or use of the space bar.

6) To begin, the first input file change is the preparation cost label for Analysis 1. Using **<PgDn>** and the arrow keys, move the cursor to line 50, and change:

"Light Shear Blading" on that line to **Heavy Shear Blading**.

The next line (line 51) also appears but is not read by FIDME – PC. Next, on line 52 change:

110.0000 to **250.0000**
140.0000 to **320.0000**
100.0000 to **230.0000**

The rest of the line is left as is.

7) See Appendix 2 for a summary of the different parts of the data (*.DAT) files.

If mistakes have occurred (such as entering letters where numbers should have been, or values that were out of range), an error message will be displayed instead of the simulation. Refer to Appendix D for an explanation of the error.

8) Now that site preparation cost has been changed, continue with the simulation. To return to the main selection screen and save any changes:

hold down the **<ALT>** key and press **W** simultaneously.

To return to the main selection screen and disregard all changes:

press **<ALT>X**

To save changes and begin the simulation:

press **<CTRL>C**.

In this example we will proceed with the simulation and press **<CTRL>C**.

9) After the simulation is complete and the output tables have been viewed:

type **1** and press **<ENTER>** to display the output graph on the screen as in Figure 6.

Notice that the "Plant J. Pine" future cost per unit is much higher than the previous run of EXAMPLE1 (*see* Fig. 6). The editor can be a powerful tool to allow you to perform "what if" changes in various costs and returns to determine the best combinations.

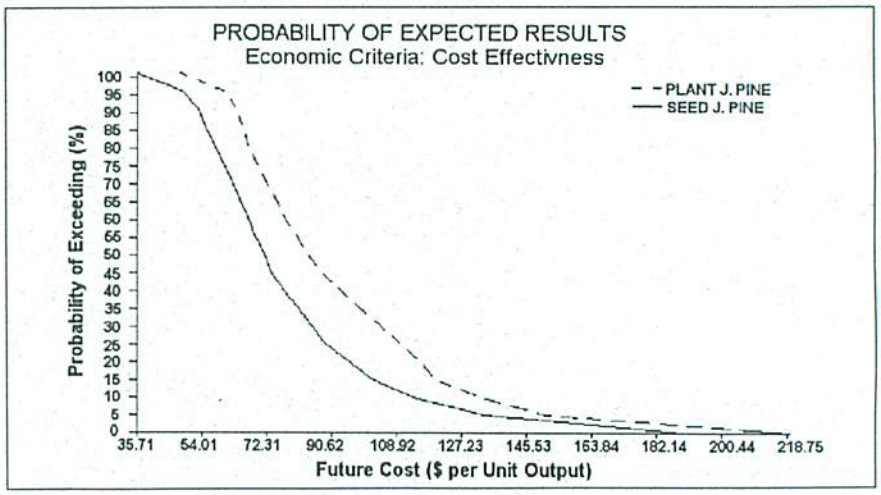

Figure 6. An example of FIDME-PC's graphics output for EXAMPLE1.DAT.

E. Appending Files

This new feature was added to FIDME – PC for two reasons: small data files containing a single alternative investment are easier to create, edit, and test, and; the larger the data file with three or four analyses, the greater the chance of making mistakes and the longer the simulation will take. In addition, small data files containing single analysis can be combined in numerous ways.

1) In order to append two files, two data files are needed that, when combined, will have no more than four analyses. One of these files can be EXAMPLE1.DAT, and the other must be one created using the "Interactive Mode" of FIDME – PC (*see* Sections A and B) with either one or two analyses.

2) Start FIDME – PC and at the prompt: "Enter Name of Output Summary File" type:

appendexp and at the prompt: "Enter Name of Data Input File" type:

example1.

3) Respond to the input mode selection by typing:

1 to **"Use or Revise Existing Input File"**.

4) You are now given the prompt:

"Do You Wish to Append this File? (Y/N)"

Respond to this question by typing:

Y and pressing **<ENTER>**.

6) The screen now looks similar to the one in Figure 5 (except for the menu at the bottom of the figure). Enter the full name of the file being appended to EXAMPLE1.APP (including extension if it is other than .DAT). If you have completed Section C, type:

myfile

If you have not completed that section, use EXAMPLE2.

If a file name is entered that does not exist or is invalid, FIDME – PC says so and gives a prompt to press any key to reenter the file name or type:

X to cancel the append operation.

If the two files appended have different economic criteria, FIDME – PC will say which criterion will be used for the combined file. To carry out the analysis with another criterion, edit the combined file and change its criterion.

7) Assuming that the combination of the two files does not exceed four analyses, FIDME – PC will notify you that the append operation is complete. The file appended to EXAMPLE1.DAT has been copied to the same name with a .BAC extension.

You are now given three choices:

- Enter the editor
- Run the analysis
- Return to file menu

8) From this point, any operation can be performed.

PROGRAM STRUCTURE

Turbo Pascal (Borland International Inc., Scotts Valley, California) was the programming environment chosen for the FIDME – PC prototype because of its increasing popularity among programmers in forestry, its extensive libraries of graphics and text manipulation routines, and its ability to compile large programs with ease.

As a first step toward the development of a prototype, the existing model FIDME was converted from FORTRAN under the VAX/VMS environment into Turbo Pascal under the MS DOS operating system. Corresponding runs of both programs, each receiving identical input, were used to compare accuracy and optimized through the elimination of redundancies and implementation of data structures not available under a FORTRAN environment.

New, desirable features of the program are the generation of X–Y plots on EGA/VGA monitors, on the Hewlett Packard HP 7475A plotter, on the HP LaserJet III and IV series printers (series II is also supported with proper memory and cartridges), and to files for later output to LaserJet printers or other models of HP plotters using the HPGL language.

SUMMARY AND CONCLUSIONS

FIDME – PC is a user-friendly simulation model that will assist forest managers, policy makers, and administrators to make rational economic decisions based on personal experience and known facts. With the aid of this decision-making model, forest managers can choose a forest management system with the best chance of being the most economical or, alternatively, the management system that has the best chance of producing wood at the lowest future cost/unit volume.

Up to four investment alternatives can be compared using any one of four economic criteria:

- Cost effectiveness
- Benefit/cost ratio
- Present net worth
- Internal rate of return

Application of subjective probability estimates by FIDME – PC serves three objectives: it serves as a built-in mechanism to adjust for risk and uncertainty associated with the long-term investments under consideration; it provides a simple method of using limited data augmented by personal experience or judgements about future outcomes of a given set of conditions; and it allows incorporation of variability and associated probability with the results.

ACKNOWLEDGMENTS

The authors thank J. Field and D. Basham of Natural Resources Canada, Canadian Forest Service – Ontario; M. Punch of the Ontario Lottery Corporation; and S. Rossi, a student from the University of Western Ontario, for their programming contributions in developing FIDME – PC.

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APPENDIX 1. Required and optimal categories for each economic criterion

Criterion	Required input	Optimal inputs
Cost-effectiveness	• At least one analysis • At least one product • Amount only; product price is ignored	• No return categories because they are not used and will slow down the execution time and complicate the output summary.
Benefit/cost ratio	• At least one analysis • At least one cost category • At least one return category or product	
Present net worth	• At least one analyses • At least one cost category • At lease one return category	
Internal rate of return	• At least one analysis • At least one cost or return	• At least one cost and return. If discounted costs exceed returns, output will be expressed in negative rates.

APPENDIX 2. Input/output file conventions

1) Entering File Names

When a file name is entered into FIDME–PC, the program looks for a three-letter file name extension. If this extension is not present, FIDME–PC will attach the extension .OUT onto the output summary file and .DAT onto the input data file. If the name entered is longer than eight characters, FIDME–PC will take only the first eight characters as the first part of the file name. If the name entered has a period (.) in it, the first three characters after the period will be the extension; otherwise FIDME–PC will append the appropriate extension onto it.

If an invalid file name has been entered (e.g., one with symbols such as "1", "?", or "*"), the program will reprompt you for both file names.

2) File Types

FIDME–PC uses ASCII text files for its .DAT and .OUT files, both of which can be edited with an ASCII editor or the editor supplied with FIDME–PC. **It is strongly recommended that users do not edit the .DAT files with any editor other than the one included with FIDME–PC, because the addition of new lines can cause the file to become unreadable for analysis by FIDME–PC.**

3) Data File Organization

The Data (.DAT) files are organized into three basic sections.

First is the Global Variable Section. This is illustrated using EXAMPLE1.DAT. This section contains the following important data that are common to all the simulation runs:

```
First Example
Number of Iterations              -   300
Number of Analyses                -     2
  Random Seed                     -  1334
  Economic Criterion              -     1
```

The next section is the Analysis Specific Section. This is where the title and specific numbers of costs and returns are specified. This section begins with Analysis 1.

```
PLANT J. PINE
Rate of Interest                  -     6.0000
Rate of Inflation                 -     1.0000
Rotation Period                   -    70
Years to Termination              -    70
Lag From Prep To Estab            -     0
Years From Prep.to Survey         -     2

   Initial Costs (0-3)            -     0
   Preparation Costs (0-3)        -     1
   Establishment Costs (0-3)      -     1
   Level of Establishment Specified -  Yes
   Annual Costs (0-8)             -     0
```

```
   Periodic Costs (0-8)                -     0
   Liquidation Costs (0-3)             -     0
   Annual Returns (0-8)                -     0
   Periodic Returns (0-8)              -     0
   Final Returns (0-8)                 -     0
   Terminal Returns (0-3)              -     0
   Products (0-8)                      -     1

SEED J. PINE
Rate of Interest                       -     6.0000
Rate of Inflation                      -     1.0000
Rotation Period                        -    70
Years to Termination                   -    70
Lag From Prep To Estab                 -     0
Yrs From Prep to Survey                -     2

   Initial Costs (0-3)                 -     0
   Preparation Costs (0-3)             -     1
   Establishment Costs (0-3)           -     1
   Level of Establishment Specified    -   Yes
   Annual Costs (0-8)                  -     0
   Periodic Costs (0-8)                -     1
   Liquidation Costs (0-3)             -     0
   Annual Returns (0-8)                -     0
   Periodic Returns (0-8)              -     0
   Final Returns (0-8)                 -     0
   Terminal Returns (0-3)              -     0
   Products (0-8)                      -     1
```

The third section, the Cost/Return Estimates Section, contains the costs and returns for all the analyses, beginning with those of Analysis 1. To determine the order of costs/returns, the file is organized in the same order in which the cost/returns are declared in the second section of the data file (i.e., initial costs, if any; site preparation costs if any; etc.). Note that the numbers in the left column specify the estimate type: 0 = point estimate, 1 = subjective probability estimate.

```
Light Shear Blading
       Low Est.     High Est.      Prob Low     Prob High Absolute Minimum
  1    110.0000     140.0000       0.1000       0.9500     100.0000

Manual Planting @ 1000  Seedlings/ha
       Low Est.     High Est.      Prob Low     Prob High Absolute Minimum
  1    250.0000     350.0000       0.0500       0.9500      20.0000

Ontario Standards
       Level for Success -        0.6500
       Level for Failure -        0.4500

Expected stocking level
       Low Est.     High Est.      Prob Low     Prob High Absolute Minimum
  1      0.4000       0.9500       0.1000       0.9000       0.3500


Pulpwood (Cubic Meter/ha)
       Low Est.     High Est.      Prob Low     Prob High Absolute Minimum
  1    200.0000     300.0000       0.0500       0.9000     150.0000

  0      0.0000
       Year of Price Forecast - 0

Heavy Shear Blading
       Low Est.     High Est.      Prob Low     Prob High Absolute Minimum
  1    250.0000     320.0000       0.1000       0.9500     230.0000

Aerial Seeding @ 200000 Seeds/ha
       Low Est.     High Est.      Prob Low     Prob High Absolute Minimum
  1     30.0000      60.0000       0.1000       0.9000      20.0000
```

Ontario Standards
Level for Success - 0.6500
Level for Failure - 0.4500

Expected stocking level

	Low Est.	High Est.	Prob Low	Prob High	Absolute Minimum
1	0.2000	0.9500	0.1000	0.8000	0.0000

Precommercial and Commercial Thinning Cost

	Low Est.	High Est.	Prob Low	Prob High	Absolute Minimum
1	75.0000	300.0000	0.0500	0.8000	50.0000

Beginning in Year - 15
Ending in Year - 30
Duration of Period - 20

Pulpwood (Cubic Meter/ha)

	Low Est.	High Est.	Prob Low	Prob High	Absolute Minimum
1	150.0000	250.0000	0.1000	0.9500	120.0000

0 0.0000
Year of Price Forecast - 0

APPENDIX 3: Printing LaserJet and plotter files

1) HP LaserJet files: (use PCL5 and HPGL/2 Commands)

Make sure that the LaserJet being used is a version III or IV (all models are supported, i.e., IIIp, IIIsi, IVp, IVsi, etc.). If it is a version II, refer to the section *Setting up FIDME-PC for Peripherals* in this manual.

LaserJet files can be printed directly to a LaserJet printer with the DOS PRINT command. For example, assume EXAMPLE1.LJ3 is a file to be printed (*see* Example Runs, Section B for details on printing to files.) This file would be printed by typing:

print example1.lj3

at the DOS prompt. The print command could then ask for a printer port, so be sure to know which port the LaserJet is on before trying to print.

2) HP Plotter files (use HPGL Commands)

Make sure the plotter uses the HPGL language. Using a plotter file is complicated and involves the use of DOS MODE command (refer to MS DOS user's manual for help on the MODE-Configuring Serial Ports command). Mode must be used first to set the serial port to communicate with the plotter. This means that the user must know the baud rate, parity, data bits, and stop bits settings of the plotter. Then (assuming the plotter is on Com2, and the file created using FIDME-PC's "Hard Copy"-"File" option is named EXAMPLE1.PLT), the file can be copied to the serial port. At the DOS prompt, type:

copy example1.plt com2

When the file is finished plotting, DOS will report that one file was copied. This method is recommended if the plotter connected to the system is over a network, or if the plotter is not an HP 7475A.

APPENDIX 4: Common or possible error types

Before using the data file specified in *Example Runs, Section A* to run the simulation, FIDME–PC checks the file to determine whether its data are valid. If FIDME–PC finds that the data file contains bad data, it will provide an error message. Be sure to read the error message and the analysis to which it refers, along with the title of the cost or return that generated the error. These messages are classified in two types: ERROR 1 and ERROR 2. In both instances, FIDME–PC returns to the editor on the line where the error occurred in order to fix the error. Refer to Example Runs, Section C–5 for a detailed listing of all limits and requirements for the input data.

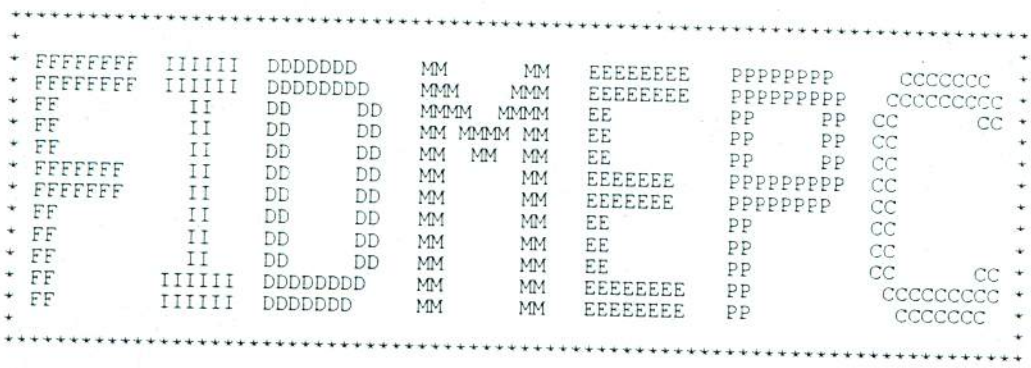
ERROR 1: Message 1
Message 2
Press any Key to enter the editor.

Generating a number that is out of range (e.g., using the editor to set iterations to 700) will cause this error. **Message 1** will give the value of the number that is out of range and then tell the user what the number represents. If the error is not in Section 1 of the data file, FIDME–PC will also display which analysis number it is in. For errors occurring in Section 3, **Message 2** will display the label of the cost or return in which the error occurred. Upon entering the editor, the cursor will be positioned on the line where the error occurred.

ERROR 2: Message 1
Message 2
Press any key to enter the editor.

This type of error is generated by an illegal number reference. This error is somewhat more serious and vague than Error 1. It is generated when FIDME–PC encounters data that it can not read. For example, the error will occur if a real (decimal) number is entered in place of an integer number. **Message 1** will display which number is invalid (e.g., invalid interest rate). For errors occurring in Section 3, **Message 2** will display the label of the cost or return where the error occurred. Upon entering the editor, the cursor will be positioned on the line where the error occurred.

APPENDIX 5: Output of example runs



...Forestry Investment Decisions Made Easy...
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Programmed by D. Basham, M. Punch, S. Rossi
and D. Dukes

at Canadian Forest Service-Ontario
Sault Ste. Marie, Ontario

```
   RUN IDENTIFICATION:  First Example

 Number of Iterations:  300
   Number of Analyses:  2
          Random Seed:  1334
    Economic Criteria:  COST EFFECTIVENESS

     Input Data File:  EXAMPLE1.DAT
      Output Summary:  EXAMPLE1.OUT

   ANALYSIS #1   PLANT J. PINE
   ================================
   Rate of Interest          : 6.00
   Rate of Inflation         : 1.00
   Rotation Period           :70
   Years To Termination      :70
   Lag From Prep To Estab    :0
   Yrs From Prep To Survey   :2
```

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Light Shear Blading		110.00	140.00	0.10	0.95	100.00
ESTABLISHMENT COST #1-> Manual Planting @ 1000 Seedlings/ha		250.00	350.00	0.05	0.95	20.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.40	0.95	0.10	0.90	0.35
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:		200.00	300.00	0.05	0.90	150.00

ANALYSIS #2 SEED J. PINE

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:70
Years To Termination	:70
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Heavy Shear Blading		250.00	320.00	0.10	0.95	230.00
ESTABLISHMENT COST #1-> Aerial Seeding @ 200000 Seeds/ha		30.00	60.00	0.10	0.90	20.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.20	0.95	0.10	0.80	0.00
PERIODIC COST #1-> Precommercial and Commercial Thinning Cost Beginning: 15 Ending: 30 Interval: 20		75.00	300.00	0.05	0.80	50.00
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:		150.00	250.00	0.10	0.95	120.00

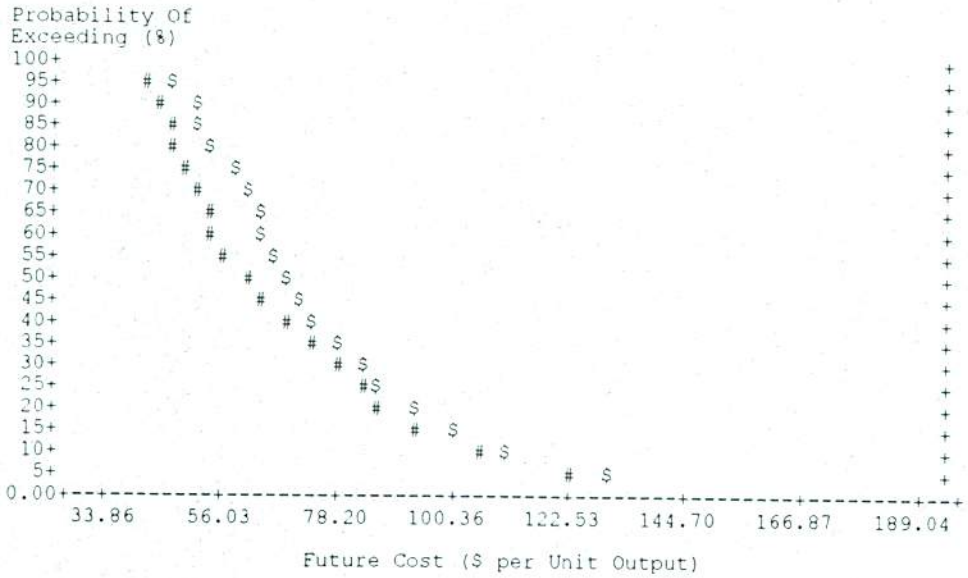
RESULTS OF ANALYSIS

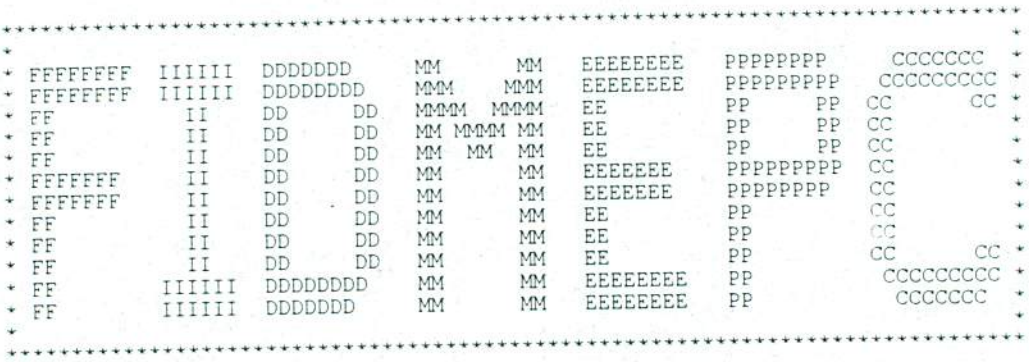
Economic Criteria: COST EFFECTIVENESS

Prob. of Exceeding	PLANT J. PINE	SEED J. PINE
0.00	187.52	189.04
0.10	106.72	113.48
0.20	88.98	94.78
0.30	79.92	84.82
0.40	69.78	76.76
0.50	62.72	71.57
0.60	56.65	66.67
0.70	52.94	62.34
0.80	49.15	57.26
0.90	46.55	52.76
1.00	33.86	35.70
Percentage of Iterations Abandoned:	1.33%	8.00%

PROBABILITY OF EXPECTED RESULTS

Economic Criteria: COST EFFECTIVENESS
#-> PLANT J. PINE
$-> SEED J. PINE





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Sault Ste. Marie, Ontario

RUN IDENTIFICATION: SECOND EXAMPLE

Number of Iterations: 300
Number of Analyses: 2
Random Seed: 35
Economic Criteria: BENEFIT/COST RATIO

Input Data File: EXAMPLE2.DAT
Output Summary: EXAMPLE2.OUT

ANALYSIS #1 J.P. BARE ROOT

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:70
Years To Termination	:70
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Heavy Shear Blading						
		250.00	320.00	0.10	0.95	230.00
ESTABLISHMENT COST #1-> Planting @ 1000 Container Stock/ha						
		140.00	230.00	0.10	0.95	130.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:						
		0.45	0.95	0.05	0.95	0.40
PRODUCT #1-> Pulpwood (Cubic meter/ha) Amount:						
		200.00	300.00	0.10	0.95	150.00
Price: $/Unit Output, Year of Forecast: 10						
		4.00	8.00	0.10	0.90	2.00

ANALYSIS #2 J.P. CONTAINER

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:70
Years To Termination	:70
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Light Shear Blading						
		110.00	140.00	0.10	0.95	100.00
ESTABLISHMENT COST #1-> Manual Planting @1000 Bare Root Seedlings/ha						
		250.00	350.00	0.05	0.95	225.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:						
		0.40	0.95	0.10	0.95	0.35
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:						
		200.00	300.00	0.10	0.95	150.00
Price: $/Unit Output, Year of Forecast: 10						
		4.00	8.00	0.10	0.90	2.00

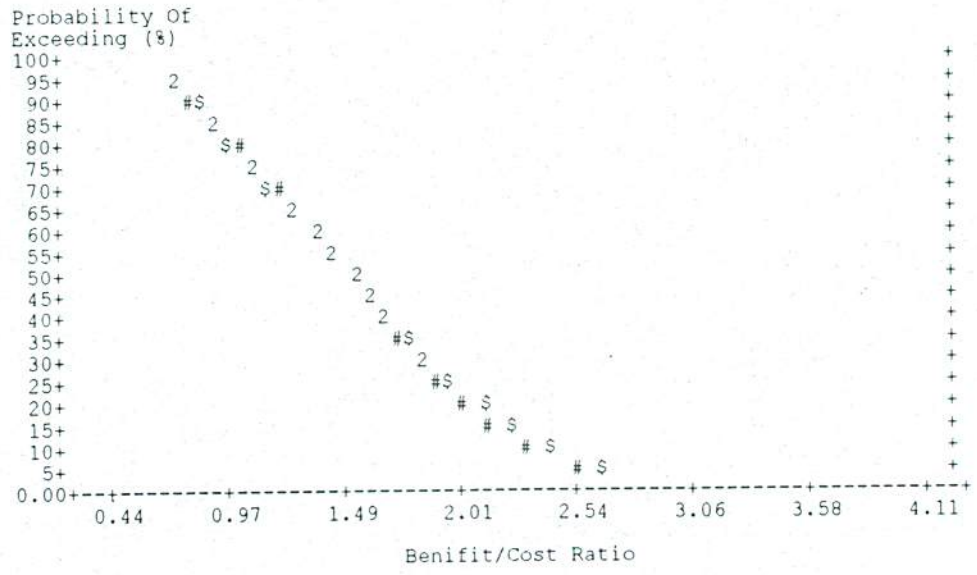
RESULTS OF ANALYSIS

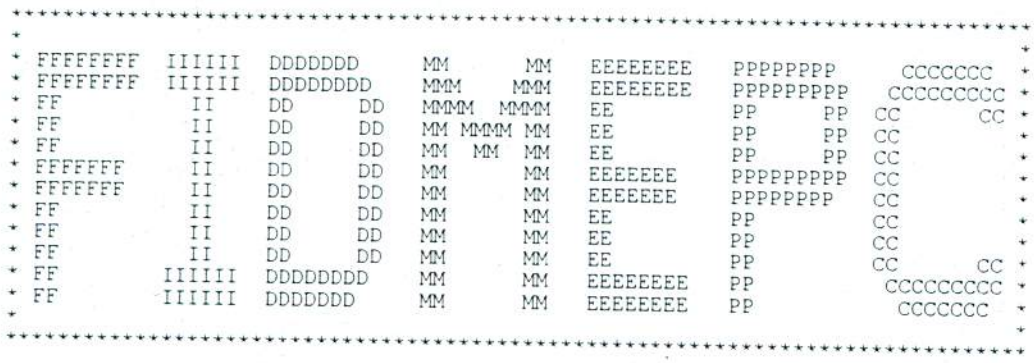
Economic Criteria: BENEFIT/COST RATIO

Prob. of Exceeding	J.P. BARE ROOT	J.P. CONTAINER
0.00	3.58	4.11
0.10	2.38	2.48
0.20	2.05	2.18
0.30	1.87	1.91
0.40	1.71	1.74
0.50	1.59	1.60
0.60	1.40	1.41
0.70	1.25	1.22
0.80	1.08	1.05
0.90	0.85	0.89
1.00	0.47	0.44
Percentage of Iterations Abandoned:	0.00%	1.67%

PROBABILITY OF EXPECTED RESULTS

Economic Criteria: BENEFIT/COST RATIO
#-> J. P. BARE ROOT
$-> J. P. CONTAINER





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at Canadian Forest Service-Ontario
Sault Ste. Marie, Ontario

RUN IDENTIFICATION: THIRD EXAMPLE

Number of Iterations: 300
Number of Analyses: 3
Random Seed: 985
Economic Criteria: PRESENT NET WORTH

Input Data File: EXAMPLE3.DAT
Output Summary: EXAMPLE3.OUT

ANALYSIS #1 J.P. BARE ROOT

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:70
Years To Termination	:70
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Light Shear Blading		110.00	140.00	0.10	0.95	100.00
ESTABLISHMENT COST #1-> Manual Planting @ 1000 Seedlings/ha		250.00	350.00	0.05	0.95	225.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.40	0.95	0.10	0.90	0.35
PRODUCT #1-> Pulpwood (Cubic meter/ha) Amount:		200.00	300.00	0.10	0.95	150.00
Price: $/Unit Output, Year of Forecast: 10		4.00	8.00	0.10	0.90	2.00

ANALYSIS #2 B.S. BARE ROOT

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:90
Years To Termination	:90
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Light Shear Blading		110.00	140.00	0.10	0.95	100.00
ESTABLISHMENT COST #1-> Manual Planting @ 1000 Seedlings/ha		250.00	350.00	0.05	0.95	225.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.35	0.90	0.10	0.95	0.30
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:		180.00	230.00	0.10	0.95	150.00
Price: $/Unit Output, Year of Forecast: 10		4.00	8.00	0.10	0.90	2.00

ANALYSIS #3 W.S. CONTAINER

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:80
Years To Termination	:80
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
PREPARATION COST #1-> Heavy Shear Blading		250.00	320.00	0.10	0.95	230.00
ESTABLISHMENT COST #1-> Planting @ 1000 Container Stock/ha		140.00	230.00	0.10	0.90	130.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.45	0.95	0.05	0.95	0.40
PERIODIC COST #1-> Herbicide application (1.5 kg Vision/ha) Beginning: 3 Ending: 10 Interval: 2		35.00	60.00	0.10	0.90	25.00
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:		280.00	350.00	0.10	0.90	250.00
Price: $/Unit Output, Year of Forecast: 10		4.00	8.00	0.10	0.90	2.00

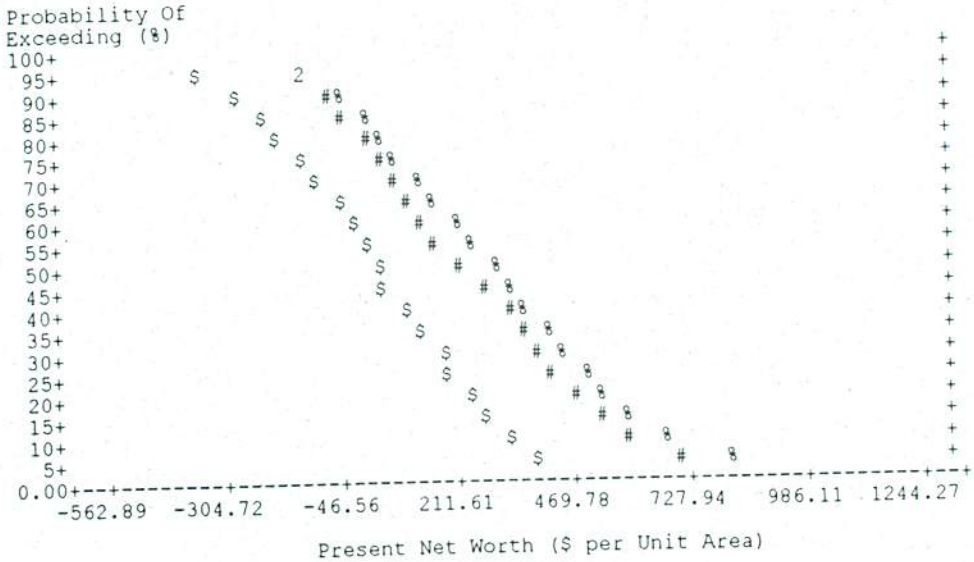
RESULTS OF ANALYSIS

Economic Criteria: PRESENT NET WORTH

Prob. of Exceeding	J.P. BARE ROOT	B.S. BARE ROOT	W.S. CONTAINER
0.00	1174.35	670.47	1244.27
0.10	608.76	359.77	694.53
0.20	488.19	261.24	568.34
0.30	407.58	201.14	481.29
0.40	341.59	115.55	385.29
0.50	242.59	57.06	319.51
0.60	162.07	15.60	245.06
0.70	109.44	-66.81	149.78
0.80	37.80	-156.82	70.55
0.90	-49.98	-245.75	-18.23
1.00	-562.89	-529.74	-333.12
Percentage of Iterations Abandoned:	1.33%	5.67%	0.00%

PROBABILITY OF EXPECTED RESULTS

Economic Criteria: PRESENT NET WORTH
#-> J.P. BARE ROOT
$-> B.S. BARE ROOT
%-> W.S. CONTAINER



...Forestry Investment Decisions Made Easy...
on IBM Compatible Personal Computers

Developed by B. Payandeh and J. Field
Programmed by D. Basham, M. Punch, S. Rossi
and D. Dukes

at Canadian Forest Service-Ontario
Sault Ste. Marie, Ontario

RUN IDENTIFICATION: FOURTH EXAMPLE

Number of Iterations: 500
Number of Analyses: 3
Random Seed: 1235
Economic Criteria: INTERNAL RATE OF RETURN

Input Data File: EXAMPLE4.DAT
Output Summary: EXAMPLE4.OUT

ANALYSIS #1 J.P. BARE ROOT

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:70
Years To Termination	:70
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
INITIAL COST #1-> Land Market Value ($/ha)	100.0					
PREPARATION COST #1-> Light Shear Blading		110.00	140.00	0.10	0.95	100.00
ESTABLISHMENT COST #1-> Manual Planting @ 1000 Bare Root Seedlings/ha		250.00	350.00	0.05	0.95	225.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.40	0.95	0.10	0.90	0.35
ANNUAL COST #1-> Property tax, etc. ($/ha/year) Beginning: 1 Ending: 70	4.0					
PERIODIC COST #1-> Precommercial and Commercial Thinning cost $/ha Beginning: 15 Ending: 45 Interval: 20		75.00	300.00	0.05	0.80	50.00
ANNUAL RETURN #1-> Users fee for Hunting and/or Fishing ($/ha) Beginning: 10 Ending: 70	4.0					
PERIODIC RETURN #1-> Return from Commercial Thinning ($/ha) Beginning: 35 Ending: 45 Interval: 20		60.00	100.00	0.20	0.80	50.00
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:		150.00	200.00	0.10	0.95	100.00
Price: $/Unit Output, Year of Forecast: 10		4.00	8.00	0.10	0.90	2.00
PRODUCT #2-> Sawlogs Amount:		75.00	100.00	0.10	0.95	50.00
Price: $/Unit Output, Year of Forecast: 10		10.00	15.00	0.10	0.90	5.00

ANALYSIS #2 B.S. BARE ROOT

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:70
Years To Termination	:70
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
INITIAL COST #1-> Land Market Value ($/ha)	25.0					
PREPARATION COST #1-> Light Shear Blading		110.00	140.00	0.10	0.95	100.00
ESTABLISHMENT COST #1-> Manual Planting @1000 Bare Root Seedlings/ha		250.00	350.00	0.05	0.95	225.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.35	0.90	0.10	0.95	0.30
ANNUAL COST #1-> Property tax, etc. ($/ha/year) Beginning: 1 Ending: 70	1.0					
PRODUCT #1-> Pulpwood (Cubic Meter/ha) Amount:		180.00	230.00	0.10	0.95	150.00
Price: $/Unit Output, Year of Forecast: 10		4.00	8.00	0.10	0.90	2.00

ANALYSIS #3 SCOTS PINE CH.

Rate of Interest	: 6.00
Rate of Inflation	: 1.00
Rotation Period	:10
Years To Termination	:20
Lag From Prep To Estab	:0
Yrs From Prep To Survey	:2

COSTS AND RETURN ESTIMATES

Cost/Return Category	Point Estimate	Subjective Estimates				
		Low	High	Prob. < Low	Prob. < High	Min
INITIAL COST #1-> Land Market Value ($/ha)	500.0					
PREPARATION COST #1-> Heavy Shear Blading		250.00	320.00	0.10	0.95	230.00
ESTABLISHMENT COST #1-> Manual Planting @ 1000 Bare Root Seedlings/ha		250.00	350.00	0.05	0.95	225.00
STOCKING STANDARD ->Ontario Standards Level For Success: 0.65 Level For Failure: 0.45 Expected Stocking:		0.80	0.95	0.10	0.95	0.50
ANNUAL COST #1-> Property tax, etc. ($/ha/year) Beginning: 1 Ending: 10	20.0					
PERIODIC COST #1-> Herbicide Application (1.5 kg Vision/ha) Beginning: 2 Ending: 9 Interval: 2		35.00	60.00	0.10	0.90	30.00
PERIODIC COST #2-> Prunning and Shaping of Christmas Trees ($/ha) Beginning: 1 Ending: 9 Interval: 1		120.00	150.00	0.10	0.90	100.00
LIQUIDATION COST #1-> Sales Commision ($/ha)	50.0					
TERMINAL RETURN #1-> Land Sales Price ($/ha)	700.0					
PRODUCT #1-> Christmas Trees/ha Amount:		800.00	950.00	0.10	0.90	700.00
Price: $/Unit Output, Year of Forecast: 10		5.00	10.00	0.10	0.90	3.00

RESULTS OF ANALYSIS

Economic Criteria: INTERNAL RATE OF RETURN

Prob. of Exceeding	J.P. BARE ROOT	B.S. BARE ROOT	SCOTS PINE CH.
0.00	0.08	0.08	0.16
0.10	0.07	0.07	0.13
0.20	0.07	0.07	0.13
0.30	0.07	0.06	0.13
0.40	0.07	0.06	0.12
0.50	0.07	0.06	0.12
0.60	0.06	0.06	0.11
0.70	0.06	0.06	0.11
0.80	0.06	0.05	0.11
0.90	0.06	0.05	0.10
1.00	0.05	0.03	0.08
Percentage of Iterations Abandoned:	2.00%	5.40%	0.00%

PROBABILITY OF EXPECTED RESULTS

Economic Criteria: INTERNAL RATE OF RETURN
#-> J. P. BARE ROOT
$-> B. S. BARE ROOT
%-> SCOTS PINE CH.