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PROACT User's Guide: How to Use the Pallet Recovery Opportunity Analysis Computer Tool

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and Philip A. Araman**



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Abstract

Pallet recovery projects are environmentally responsible and offer promising business opportunities. The Pallet Recovery Opportunity Analysis Computer Tool (PROACT) assesses the operational and financial feasibility of potential pallet recovery projects. The use of project specific information supplied by the user increases the accuracy and the validity of the feasibility study. Different scenarios of the same project can also be compared easily because changes in input are instantly reflected in the feasibility study results. PROACT is designed for use with Microsoft® Excel®—the most widely used spreadsheet program on the market today. It is easy to use, even for those unfamiliar with computer spreadsheet programs. PROACT is a workbook with three worksheets. This guide provides users with a complete tour of two of these worksheets—inputs and reports—by describing cells, defining terms, illustrating all on-screen tables and charts, and using an example project.

Keywords: Building materials, economic development, financial analysis, flooring, green products, pallet lumber, pallet recycling, pallets, recycled wood flooring, wood recycling.

Introduction

A large number of discarded pallets are deposited in landfills or ground into low-value wood fiber products. Research indicates that 223.6 million wooden pallets entered municipal solid-waste landfills in 1995 (Araman and others 1997, Hager and others 1998). Discarding these pallets can impact a community because more land is needed to accommodate the pallets and more money is needed to destroy them. Forest resources are also affected when wooden pallets are destroyed because more timber is needed to manufacture new pallets and other wood products.

Operational and financial feasibility studies indicate that valid opportunities exist for private and public business projects that recover discarded pallets (Araman and others 1998). The Pallet Recovery Opportunity Analysis Computer Tool (PROACT) is a user-friendly computer tool that assesses the operational and financial feasibility of potential pallet recovery projects. PROACT is an appropriate acronym because pallet recovery operations proactively address a number of important issues. First, processing discarded pallets reduces landfill requirements and offers communities an opportunity to generate new revenues that offset landfill costs. Second, reclaiming pallet parts for use by the wooden pallet and other wood products industries provides the opportunity to reduce the demand for new lumber. Third, using recovered pallet wood to manufacture value-added products, such as strip wood flooring, paneling, or even furniture, offers local communities an opportunity to create jobs. It also offers the innovative forest-based products entrepreneur an opportunity to develop a profitable business venture.

In PROACT, user supplied information describing the proposed operational plan and key cost and revenue forecasts are used to simulate operations and cash flows. PROACT can also be used to compare various scenarios of the same project. The effect of user input changes are instantly reflected in the feasibility study results. Whether evaluating a basic pallet disassembly project at a local landfill, or a complex pallet removal, pallet-part reclamation, and strip wood flooring business venture, PROACT is a valuable tool. PROACT satisfies the need for a pallet recovery analysis program that evaluates potential projects using project specific information.

The feasibility of any pallet recovery project depends on a variety of factors: quantity, quality, and types of pallets recovered or received; sales price estimates for products produced; equipment and building needs; cost forecasts; operational plans; and cost of capital and tax rates.

By following this guide, users will learn to evaluate potential projects by entering information that addresses these factors into PROACT.

Arrangement of this User's Guide

PROACT is contained in a Microsoft® Excel® file named proact.xls. It is an Excel® workbook with three worksheets: inputs, reports, and model. This guide discusses the information requested in the Inputs worksheet and the interpretation of the output in the Reports worksheet. Detailed tables contained in the Model worksheet may be useful to some users. However, the Model worksheet is easy to understand and is not covered in this guide.

This guide is arranged to facilitate the following activities:

- installing the file
- understanding the concept of workbooks, worksheets, and cells
- inputting the requested information
- interpreting the results
- referencing pertinent literature
- understanding terms
- finding information quickly.

To increase user comprehension, an example project is illustrated, terms are defined, and sidebars are inserted throughout this guide.

Getting Started

Hardware and Software Requirements

PROACT was designed for Microsoft® Excel® 97; however, it will run on more recent versions of Excel®. It is also compatible with Macintosh® versions of Excel®. It is compatible with the Microsoft® Windows® 95, Microsoft® Windows® 98, and Microsoft® Windows® 2000 operating systems. It is also compatible with recent Macintosh® operating systems.

User Requirements

Any user should find PROACT easy to use, even those unfamiliar with Microsoft® Excel®. However, a basic guide to Microsoft® Excel® may be helpful to some users. Many guides are available, including those that focus on using Microsoft® Excel® in the natural resource profession (Fuller and others 1997).

Installation

Downloading from the Internet—PROACT can be downloaded at the following Web site: www.srs4702.forprod.vt.edu. If Internet access is unavailable, contact Philip A. Araman, USDA Forest Service, Southern Research Station, Brooks Forest Products Center, Virginia Polytechnic Institute and State University, 1650 Ramble Road, Blacksburg, VA 24060 [(540) 231-5341] or A.L. Hammett, Center for Forest Products Marketing and Management, Virginia Polytechnic Institute and State University, 1650 Ramble Road, Blacksburg, VA 24061 [(540) 231-2716]. The program developer, E. Bradley Hager, can be contacted online at HAGERBRAD@aol.com. Comments and recommendations for future projects are appreciated.

Installing from a diskette—To start PROACT, use the File-Open menu option within Microsoft® Excel®. Open the file named proact.xls located on the diskette. To improve the performance of PROACT and protect the original diskette, use the File-Save As menu option in Microsoft® Excel® to save PROACT to the hard drive and store the original diskette in a safe place.

Overview

When the user opens PROACT, one of the three worksheets will appear on the opening Microsoft® Excel® screen: Inputs, Reports, or Model. The worksheets appear to lie on top of each other in a workbook. Three worksheet tabs are located at the bottom of the screen. Using the mouse pointer, the user may select a tab to bring the desired worksheet onto the screen.

The three worksheets in the PROACT workbook contain a number of sections. Each section contains tables, and the Reports worksheet also displays charts. Each table contains green, red, and white cells. Green cells are the only cells in which the user can input information. Red and white cells contain labels or formulas and cannot be modified by the user.

The user will notice that the cells in each of the PROACT worksheets already contain information. This information is the example as illustrated in this guide. The user can again use the File-Save As menu option and rename the file for a specific project. The user can then work directly on the renamed file and the original file will serve as the master file. The user can move among cells using the arrow keys (the Enter key will move the user down one cell). The simplest form of the information may be input and PROACT will provide the correct format. For example, a user may enter March 22, 2000 and when the arrow key is pressed, the date will be input as 22-Mar-00. Moreover, the user does not need to enter units; PROACT will automatically enter the correct units for a given cell.

To differentiate between tables with the same numbers in this guide, inputs modifies all tables described for the Inputs worksheet, report modifies all tables described for the Reports worksheet, and chart modifies all tables associated with charts in the Reports worksheet. The tables in the Excel® worksheets will not include these modifiers.

Workbooks, Worksheets, and Cells

A workbook is a collection of worksheets. The use of multiple worksheets helps organize the workbook. Worksheets are composed of rows and columns. A cell is formed at each row-column intersection. Cells are the basic building block of a spreadsheet. Each cell has a unique address that allows a formula in one cell to reference the information contained in other cells. In PROACT, the green cells are user input cells and are the only cells in which the user can modify information.

Inputs Worksheet

The Inputs worksheet allows the user to enter information depicting a specific project. This information includes forecasts and estimates of key factors such as product selling prices and cost rates. The 11 sections (Roman numerals on the worksheet) of the Inputs worksheet follow.

I. Title Information and Basic Financial Inputs

Inputs worksheet table 1 requests two types of information. The first half of the table covers the basics: Who is the client; who is the analyst; what is the date; and what is the project called? There is a tendency to skip these cells; however, a moment spent now

Input Worksheet Table 1. Basic title and financial inputs			
Client name:	PROACT Guide	Cost of capital	12.00%
Analyst name:	Hager, Araman, Hammett	Real business tax rate	40.00%
Date:		Project life (no. years)	5
Project label:			

can save time later when comparing projects or when revisiting results at a later date. The second half of Inputs worksheet table 1 requests the basic financial parameters required for profitability analysis. These inputs greatly impact the estimate of project profitability.

If the firm is using internal funds or if an investor is using personal funds, the cost of capital is the typical rate of return that would be received by investing the money in another project with similar risk. Estimating the cost of capital can be quite complicated. The user may consult an expert, such as a banker or an accountant, to obtain a reasonable cost of capital estimate. Section XI, however, provides the basic tools needed to calculate the weighted average cost of capital.

Forty percent is a generic real business tax rate often used in cash flow analyses. A local accountant, banker, or financial advisor is a good source for the combined tax rate one can expect to pay. A tax incentive by any level of government lowers the real business tax rate. A reduction in the tax rate can affect the feasibility of a project.

The number of years planned for the project life can range from 1 to 10 in this computer tool. Many Inputs worksheet tables throughout the model will accept estimates for each of the first 5 years of a project. Inputs for years exceeding the project life will be ignored. Years beyond year 5 use the year-5 estimate.

II. Product Pricing

The objective of this section is to obtain sales price estimates for each of the project’s services and products. PROACT is designed for use on a project that provides receiving and removal services for discarded pallets and the following products: reclaimed whole pallets, reclaimed pallet-part stringers, half stringers cut to length, reclaimed pallet-part deckboards, and two types of hardwood flooring manufactured from used deckboards.

The project need not offer all the services and products listed. PROACT can be used for any mix of these products. The mix of services offered and products actually produced is addressed in section III.

The sales price referred to in this section is the price the project charges the next member in the production process, the marketing chain, or both. For example, if the project sells wood flooring to a distributor for \$2 per square foot and the distributor sells the flooring to a retailer for \$2.25, the sales price requested by PROACT for the project is \$2 not \$2.25. Marketing channel design and its effect on sales price and marketing cost are discussed in section VII.

Inputs worksheet table 2 accepts tipping fee estimates for years 1 through 5. Two types of tipping fees are present in the table: pickup fees and drop-off fees. Pickup fees are higher because the pallet recovery project actually removes the discarded pallets from a client’s location. The project charges drop-off fees when a client transports the discarded pallets to the project’s receiving yard.

Table 2. Pallet Removal Tipping Fees (\$/Ton)		Year				
		1	2	3	4	5
Pickup		\$45.00	\$45.00	\$45.00	\$45.00	\$45.00
Drop-off		\$35.00	\$35.00	\$35.00	\$35.00	\$35.00

Tipping fees can be charged on a per-pallet basis. In PROACT, the per-pallet rate actually charged by the project must be converted to a per-ton rate before it is entered into Inputs worksheet table 2. For example, if the per-pallet rate is \$1 per pallet and there are approximately 40 pallets per ton, the per-ton tipping fee rate is \$40.

Inputs worksheet table 3 accepts price estimates for whole pallets for years 1 through 5. Estimates may be input for four different pallet types, which are defined in section III. By defining pallet types, price estimation should be more accurate. In the example project, only one pallet type has been defined in section III; therefore, only one pallet type is presented in this table.

Table 3. Whole Pallet (\$/Pallet)		Pallet Type			
Year	Type 1	Type 2	Type 3	Type 4	
1	\$4.50				
2	\$4.50				
3	\$4.50				
4	\$4.50				
5	\$4.50				

Inputs worksheet table 4 accepts price estimates for stringers obtained from each pallet type. An extra column in this table allows input on half stringers. Half stringers are cut from damaged stringers that would otherwise be discarded. Half stringers can also be cut from odd size stringers that may be difficult to market.

Table 4. Pallet Part-Stringer (\$/Stringer)		Stringer From Pallet Type				
Year	Type 1	Type 2	Type 3	Type 4	Half Stringer	
1	\$0.50				\$0.15	
2	\$0.50				\$0.15	
3	\$0.50				\$0.15	
4	\$0.50				\$0.15	
5	\$0.50				\$0.15	

Deckboard price estimates are entered in Inputs worksheet table 5.

Table 5. Pallet Part-Deckboard		Deckboard From Pallet Type			
Year	Type 1	Type 2	Type 3	Type 4	
1	\$0.20				
2	\$0.20				
3	\$0.20				
4	\$0.20				
5	\$0.20				

In Inputs worksheet table 6, the user may enter price estimates for rustic wood flooring and clear wood flooring. Rustic in this case could refer to unfinished flooring and clear could refer to finished flooring.

Table 6. Flooring (\$/Ft^2)		Year				
	1	2	3	4	5	
Rustic	\$2.30	\$2.30	\$2.30	\$2.30	\$2.30	
Clear	\$1.90	\$1.90	\$1.90	\$1.90	\$1.90	

In Inputs worksheet tables the abbreviation for square foot is ft^2.

III. Pallet Acquisition, Processing, and Flooring Manufacture

The flow of discarded pallet materials into, through, and out of the operational system of the project can become complicated. Figure 1 is a simplified flow chart for the example project. The more pallet types defined in the program the more complicated the flow of materials. A separate flow chart like the one in figure 1 will exist for each pallet type.

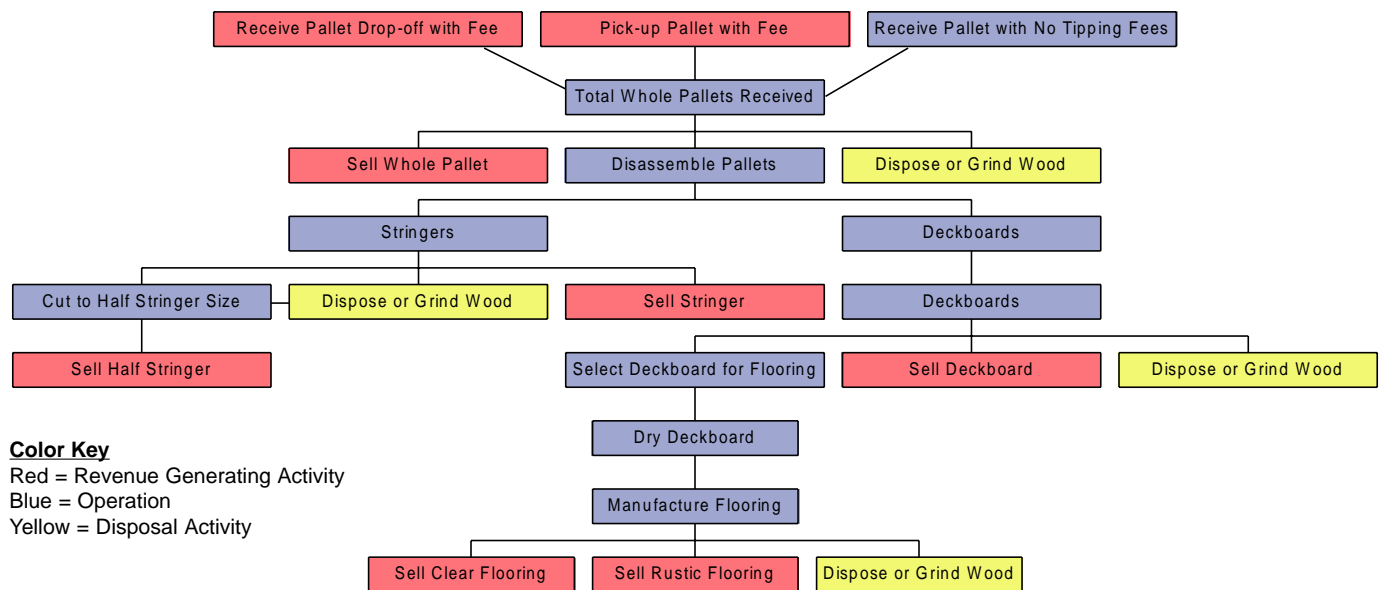


Figure 1—Material flows for the example project. (Figure is not generated by PROACT.)

Graphics labeled as figures are not generated by PROACT. Those labeled as charts are generated by PROACT and appear in the Reports worksheet.

Inputs worksheet tables 7 through 13 are designed to break the system of material processing into a series of steps or decision points. Each table collects information about one step in the system. This allows the user to enter more reliable and detailed information about plans and estimates.

(DB=Deckboards)	Percent of Incoming Pallets	Width No. 1 Size DB (Inches)	Number of No. 1 Size per Pallet	Width No. 2 Size DB (Inches)	Number of No. 2 Size per Pallet	DB Length (Inches)	Average Deckboard Weight (Pounds)	Number Stringers per Pallet	Stringer Weight (Pounds)	Stringer Length (Inches)
Pallet Category										
Type 1	100%	6	4	4	8	40	3	3	5.5	48
Type 2		1	1	1	1	1	1	1	1	1
Type 3		1	1	1	1	1	1	1	1	1
Type 4		1	1	1	1	1	1	1	1	1
	100%									
Half Stringer (Inches)	24									

Should Equal 100%

NOTE: DO NOT ENTER ZEROS ABOVE EXCEPT ON % INCOMING PALLETS IF NECESSARY. USE THE NUMBER 1 AS A PLACE HOLDER.

Table 8. Projected Number Incoming Pallets					
	Year				
	1	2	3	4	5
Total No. Pallets Per Week	1650	1850	2050	2250	2450
Percent W/Pickup Tip Fees	60%	60%	60%	60%	60%
Percent W/Drop-off Tip Fees	40%	40%	40%	40%	40%
Percent W/O Tip Fees					
	100%	100%	100%	100%	100%

Table 9. Whole Pallet Processing				
	Type 1	Type 2	Type 3	Type 4
Percent of Incoming Pallets Resell As Is	10%			
Percent of Incoming Pallets Dispose	10%			
Percent of Incoming Pallets Disassemble	80%			
	100%			

Table 10. Stringer Processing				
	Type 1	Type 2	Type 3	Type 4
Percent of Stringers Resell	75%			
Percent Sell as Half Stringers	10%			
Percent of Stringers Dispose	15%			
	100%			

Table 11a. Processing Deckboards		Type 1	Type 2	Type 3	Type 4
Percent Deckboards Resell	Year 1	65%			
Percent Deckboards Dispose		15%			
Percent Deckboards for Flooring		20%			
		100%			

Table 12a. Processing Deckboards into Flooring Types					
	Year 1	Type 1	Type 2	Type 3	Type 4
Percent Deckboards for Rustic		60%			
Percent Deckboards for Clear		40%			
		100%			

Table 13. Yield From Deckboard (ft^2) to Flooring (ft^2)				
	Type 1	Type 2	Type 3	Type 4
Deckboard to Rustic Flooring	60%			
Deckboard to Clear Flooring	40%			

Pallet types coming into the facility are defined in Inputs worksheet table 7. Each row collects information on one type of pallet received. The first column, Percent of Incoming Pallets, is asking the following question: Of all the pallets received what percent will be of this type? The red cell at the bottom of this column is a check cell. Because pallet types 1 through 4 should represent all pallets received, the check cell value (red colored) should equal 100 percent. Check cells are used throughout the Inputs worksheets.

The other columns in this table collect information on the physical dimensions of each pallet type. These inputs give the computer model a quantified image of each pallet type. This image is used extensively in the model. Half-stringer length is requested in a cell beneath the main portion of the table. It is assumed that all half stringers will be cut to the same length regardless of the original stringer size.

The expected number of incoming pallets and the percent with and without tipping fees are entered into Inputs worksheet table 8. The number of incoming pallets is the average weekly number of pallets received from all sources.

In Inputs worksheet tables 9 through 13, estimates are required for each type of pallet defined in Inputs worksheet table 7. In Inputs worksheet table 9, the user estimates what will be done with the discarded whole pallets received. There are three possible actions: resell the pallet as is, dispose of the pallet, or disassemble the pallet. Estimates may vary for different pallet types. For example, standard size pallets may be relatively easy to market if they are in acceptable condition. However, a less common type of pallet may be impossible to market regardless of its condition.

The user estimates the processing plan for stringers produced when pallets are disassembled in Inputs worksheet table 10. The user has three options: resell stringers, cut stringers to half stringers and resell, or dispose of stringers.

Table 11a is a representation of tables 11b through 11e, which are in the computer program. In Inputs worksheet tables 11a through 11e, the user estimates how deckboards obtained by disassembling pallets will be used. The project may resell deckboards, dispose of deckboards, or use deckboards to manufacture flooring. Input is entered in a separate table for each of the first 5 years of the project.

Multiphase projects and Inputs worksheet tables 11a through 11e—Some projects may consist of more than one phase. For example, the project manager may plan only to resell pallets, reclaimed deckboards, and reclaimed stringers during the first 2 years. In year 3, however, the developer may intend to begin manufacturing strip flooring from deckboards. Using separate tables for years 1 through 5, PROACT simulates this two-phase scenario. In another example, the project developer plans to manufacture flooring from year 1; however, an increase in the manufacturing of flooring is planned as the market develops. Using separate tables for years 1 through 5, the user can input this information.

The user estimates what percentage of deckboards will be used for the manufacture of rustic wood flooring and clear wood flooring for the first 5 years of the project in Inputs worksheet tables 12a through 12e. The input in these tables should only apply to deckboards already selected for flooring manufacture. The sum of the cells in each column in the first five tables should equal the 100 percent in the check cells.

The value-added product mix and Inputs worksheet tables 12a through 12e—A separate table for each of the first 5 years of the project allows the user to represent an operational strategy. For example, the user may intend to manufacture only clear flooring until the market for rustic flooring can be developed. In this case, the percent of deckboards used for the manufacture of clear flooring would be greater in the first year of the project than in later years.

Inputs worksheet table 13 requires a yield estimate. In this case, the yield is the percent of the square footage of deckboards initially selected for flooring manufacture that actually become flooring. For example, if 50 square feet of flooring are produced for every 100 square feet of deckboard material, the percent yield is 50 percent. The yield estimate recognizes that some deckboard material will be lost in both the drying and manufacturing stages of flooring production. A separate yield estimate is required for rustic flooring and for clear flooring. The terms rustic and clear can represent any type, species, or grade flooring the project plans to manufacture. For example, the firm may plan to manufacture unfinished and finished strip flooring as opposed to rustic and clear flooring.

IV. Labor

Inputs worksheet table 14 enables the user to specify the project's planned labor requirements throughout the life of the venture. The user can represent a constant labor force or a labor force that gradually increases or decreases. The user also can specify an abrupt change in labor requirements that often occurs in multiphase projects. The two input cells above the main table must be completed with the number of workweeks in the year and the rate adjustment factor.

The wages paid to workers are seldom equal to the total labor cost to the employer. Worker compensation is one example of the extra costs of labor to the employer. In hazardous occupations, such as forest harvesting, the cost of insurance may greatly increase the cost of labor. The rate adjustment factor is a straightforward method to

Table 14. Labor Requirements

Number Work Weeks in Year
Rate Adjustment Factor

50
1.5

Number	Job Title	Number Personnel	Pay Rate/Hr	Year				
				1 Hrs/wk.	2 Hrs/wk.	3 Hrs/wk.	4 Hrs/wk.	5 Hrs/wk.
1	Opns Mgr.	1	\$17.00	40	40	40	40	40
2	Bus Mgr.	1	\$14.00	40	40	40	40	40
3	Truck Driver	2	\$9.00	40	40	40	40	40
4	Driver Asst.	1	\$7.00	40	40	40	40	40
5	Disassembler Tech.	1	\$8.50	40	40	40	40	40
6	Disassembler Tech.	1	\$8.50	40	40	40	40	40
7	Disassembler Tech.	1	\$7.50	20	20	20	20	20
8	Disassembler Tech.	1	\$7.50	20	20	20	20	20
9	Cut-Off Saw	1	\$7.50	20	20	20	20	20
10	Rip Saw	1	\$8.50	20	20	20	20	20
11	Rip Saw	1	\$7.50	20	20	20	20	20
12	Molder	1	\$9.50	40	40	40	40	40
13	Molder	1	\$7.50	20	20	30	30	30
14	Sorter/Shipping	2	\$7.00	40	40	40	40	40
15	Trim Saw	1	\$7.50	40	40	40	40	40
16	Fork Lift Operator	1	\$7.50	40	40	40	40	40
17								
18								
19								
20								

account for the total per hour labor cost to the project. A common rate adjustment factor for project planning is 1.5. A less hazardous project may have a smaller factor and a more hazardous type project may have a higher factor. The user should not underestimate the labor cost because it usually has a great impact on the profitability estimation.

The main portion of Inputs worksheet table 14 consists of eight input columns. The first three input columns are self-explanatory. The last five input columns require an estimate of the number of hours each employee will work each week during years 1 through 5. The user should note that two truck drivers are indicated in row number 3 of the example project. The hours per week estimates are for each truck driver, not the combined hours of both drivers. If the drivers are not expected to work the same number of hours per week, each driver should be listed on a separate row in the table. For example, the disassembler technician in row number 6 works full time and the disassembler technician in row number 7 works part-time. In addition, if the workers have the same job titles and their pay rates differ, they should be listed on separate rows.

V. Facility and Transportation Costs

Expected facility costs, such as building lease payments and monthly utilities, are entered into Inputs worksheet table 15. Utility costs for gas, electric, water, and other utilities are each estimated separately on the next four rows of the table. The last two rows in Inputs worksheet table 15 include a miscellaneous (other) row and a facility and equipment maintenance row. Leased equipment and facilities should be entered in the other row. While the example project forecasts the costs in Inputs worksheet table 15 to remain constant over the 5 years of the project life, changes can result from increases in rates or from increases in production volumes. Separate columns are provided for each of the first 5 years to reflect these changes.

Table 15. Facility Costs (Monthly)		Year				
		1	2	3	4	5
Lease/Month		\$1,875.00	\$1,875.00	\$1,875.00	\$1,875.00	\$1,875.00
Insurance/Month		\$200.00	\$200.00	\$200.00	\$200.00	\$200.00
Utilities/Month	Gas	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00
	Electric	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00
	Other					
	Water	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00
Other						
Maintenance/Month		\$100.00	\$100.00	\$100.00	\$100.00	\$100.00

Purchasing facilities rather than leasing—Facilities, such as warehouses and manufacturing buildings, might be purchased rather than leased. If facilities are purchased, the amount should be entered into Inputs worksheet table 21 in section VIII. Purchased facilities should also be entered as a depreciable asset in Inputs worksheet table 22 in section IX.

Table 16a is a representation of tables 16b through 16c, which are in the computer program. Inputs worksheet tables 16a through 16c and 17 address transportation costs. In the example project, transportation costs refer only to the cost of transporting discarded pallets to the project's receiving yard and the cost of moving wood waste to local landfills. In this example, the final product will be distributed as freight on board, and the project will only bear the cost of loading the product on a commercial carrier.

Table 16a. Transportation Costs (Monthly)					
Truck Type 1 (Monthly)	Year				
	1	2	3	4	5
No. Trucks This Type	1	1	1	1	1
Truck Lease/Month/Truck	\$260.00	\$260.00	\$260.00	\$260.00	\$260.00
Lease Mileage Cost per Mile/Truck	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10
Insurance/Month/Truck	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00
Miles per Gallon	8	NEVER LEAVE ZERO			
Fuel Cost/Gallon	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
Monthly Mileage per Truck	4585	4585	4585	4585	4585
Total Monthly Mileage Estimate	4585	4585	4585	4585	4585

Table 17. Other Monthly Costs for All Trucks					
(Monthly)	Year				
	1	2	3	4	5
Maintenance					
Other					

Assuming distribution costs—The project may distribute its products or ship via a commercial carrier. If project trucks will be used for distribution, the user would enter the cost of the trucks in table 16. If a commercial carrier will be used, the user would enter shipping costs into Inputs worksheet table 19 next to Shipping/Packaging in section VII.

Inputs worksheet tables 16a through 16c are identical and allow the user to input information about different types of trucks. For example, if the project is using one large truck and two small trucks, information about the large truck would be entered in Inputs worksheet table 16a, and information about the two small trucks would be entered in Inputs worksheet table 16b. Because only one truck is used in the example project, Inputs worksheet tables 16b and 16c are not completed.

In the example project, only one truck is required and it is leased from a rental agency. Renting simplifies operations because the rental agency is responsible for maintenance. Also, when a truck breaks down, the rental company will provide a replacement truck while the original truck is repaired.

Inputs worksheet table 17 requests information about monthly maintenance costs for all trucks and can be left blank if the trucks are leased and the leasing company will maintain them. If trucks are purchased, the project must allocate funds for maintenance. All purchased trucks should be listed in Inputs worksheet table 21 in section VIII and in Inputs worksheet table 22 in section IX if they can be depreciated.

VI. Wood Waste Disposal Costs

The user enters costs or revenues into Inputs worksheet table 18 based on whether the project must pay to dispose of wood wastes (costs) or the project can sell its wood

Table 18. Wood Disposal Costs of Revenues (\$/Ton)		
Costs: enter positive numbers Revenues: enter negative numbers		
	Whole Pallets	Parts and Scraps
YEAR	1	(\$10)
	2	(\$10)
	3	(\$10)
	4	(\$10)
	5	(\$10)

wastes (revenues). Wood waste disposal costs refer to the cost of disposing of pallets too damaged to process and wood scraps created during the reclamation of pallet parts and the manufacture of flooring. These costs include waste-handling costs and the tipping fees charged by landfills or by firms with wood grinders; they are not the costs associated with transportation. Landfills tend to charge higher rates for whole pallets than for disassembled pallets or general wood waste. Some landfills will not accept whole pallets. Inputs worksheet table 18 accepts separate rate estimates for whole pallets in one column and pallet parts and general wood waste in the second column. Costs of disposal are entered as positive numbers in Inputs worksheet table 18. If the project developer intends to sell the wood waste to other firms (example project), revenues are generated. Revenues from disposal are entered as a negative number in Inputs worksheet table 18.

Selling wood wastes (entering negative numbers into Inputs worksheet table 18)—

In some situations revenues are generated by the sale of wood wastes. In the example project, wood waste will be sold to local firms for use as fuel. Because the example project expects to receive \$10 per ton for wood waste, a negative 10 is entered into Inputs worksheet table 18. Selling wood waste increases the project's overall wood recycling volume and generates additional revenues.

VII. Marketing and Management Costs

Inputs worksheet table 19 addresses marketing costs such as shipping and packaging. Two additional rows are provided for other types of marketing costs not listed.

Table 19. Marketing Costs (Yearly)			Year		
	1	2	3	4	5
Shipping/Packaging	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000
Promotions/Advertising	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Personal Sales Expenses	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Other					
Other					

Marketing channels—The marketing costs the manufacturer (the project) incurs and the price the manufacturer receives for products are related to the marketing channel design adopted. Case A in figure 2 represents the design chosen by the example project for recycled wood flooring. The proposed project may plan to perform the numerous channel functions required to market the product. Marketing channel functions include promotion, advertising, physical transportation, warehousing, and packaging. Excluding the end consumer, there are only two channel members in case A, which means the manufacturer must perform any channel function not performed by the retailer. Generally, the more functions a channel member performs or the more value the channel member adds to the product, the greater price that member can demand from the next channel member. However, performing more functions also increases the manufacturer's marketing costs.

At first glance, case A appears to be the most profitable because the product is being sold directly to the retailer. However, sometimes a channel with many members is actually more efficient than a channel with few members. Greater channel efficiency can mean greater net revenues and a stronger competitive position for the manufacturer.

In the longer marketing channel depicted in case B, one processing firm could glue individual flooring strips together to form flooring panels. Another processing firm could sand, stain, and apply a finish to the flooring panels. The additional members of

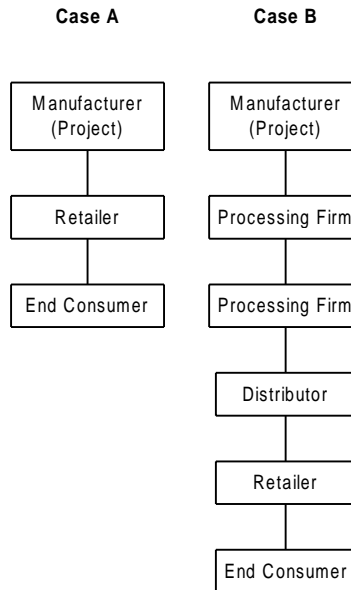


Figure 2—Potential marketing channel designs. (Figure is not generated by PROACT.)

the marketing channel add more value to the final product, which could also lead to a stronger competitive position for the manufacturer.

The user inputs basic management and administrative costs, such as legal, accountant, and licensing fees, in Inputs worksheet table 20. Two additional rows are provided for additional administrative costs or expenses.

	Year				
	1	2	3	4	5
Legal Fees	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Accountant Fees	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Licenses	\$200	\$200	\$200	\$200	\$200
Trade Association Expenses	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Employee Training	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Equip Maint/Blade Sharpening					
Other					

VIII. Equipment and Facility Purchases

In Inputs worksheet table 21, the user enters the equipment and facility purchases and their costs. PROACT was designed primarily for projects where the majority of equipment is purchased as opposed to renting or leasing. Rented or leased equipment should be entered into Inputs worksheet table 15 in section V.

The basic operating system for the example project is depicted in figure 3. The equipment names, quantity, and cost (including installation and year purchased) are entered into Inputs worksheet table 21. Note that if an asset is purchased at the beginning of the project, the user enters a zero. Zeros are recognized by PROACT but are not displayed on the screen.

Table 21. Equipment and Facility Purchases

Name	Quantity	Cost w/Install.	Year (0-10) Purchased (0=Initial)	Total Cost
Pallet Disassembler 1	1	\$9,000		\$9,000
Pallet Disassembler 2	1	\$9,000		\$9,000
P. D. Blades	60	\$37		\$2,220
Cut-off Saw	1	\$10,000		\$10,000
Cutt-off Saw Blades	5	\$100		\$500
Rip Saw	1	\$14,000		\$14,000
Rip Saw Blades	6	\$100		\$600
Double Trim Saw	1	\$7,000		\$7,000
Trim Saw Blades	5	\$100		\$500
Molder	1	\$24,000		\$24,000
Pallet Jack	1	\$400		\$400
Forklift	1	\$8,000		\$8,000
Hot Box Dryer 1	1	\$4,000		\$4,000
Hot Box Dryer 2	1	\$4,000		\$4,000
Hot Box Dryer 3	1	\$4,000		\$4,000
Hot Box Dryer 4	1	\$4,000		\$4,000
Steel Band Strapper	1	\$400		\$400
Poly Strapper	1	\$50		\$50
Air Dry Shed	1	\$3,500		\$3,500
Sorting Boxes	1	\$500		\$500
Misc. Supplies	1	\$5,000		\$5,000
Conveyors	1	\$10,000		\$10,000
Computer System	1	\$3,200		\$3,200

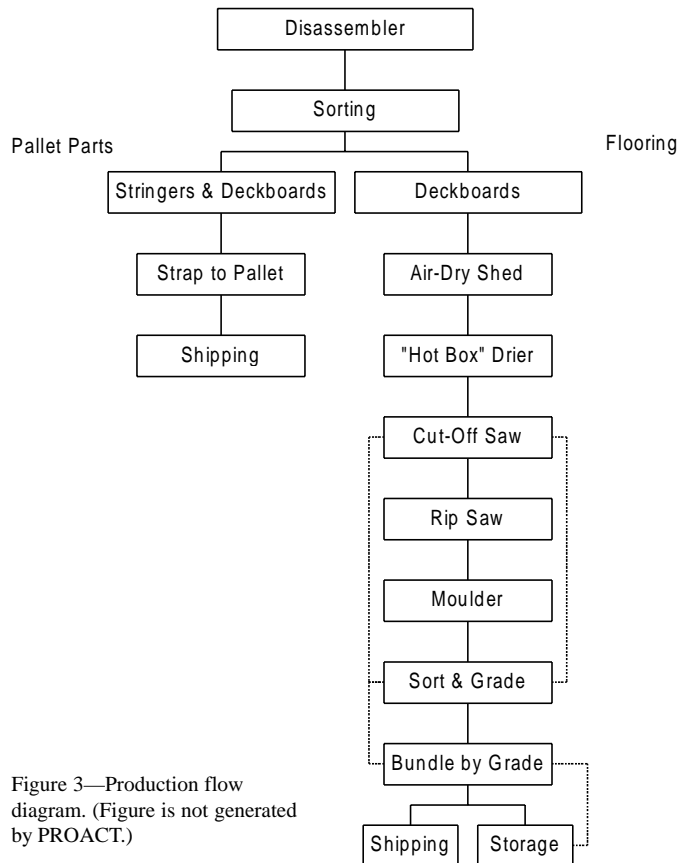
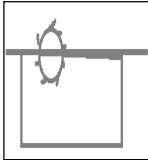


Figure 3—Production flow diagram. (Figure is not generated by PROACT.)

IX. Depreciation

The depreciation of assets can have a substantial effect on cash flow analysis. This is particularly true of manufacturing projects that require large capital asset investments. In PROACT, the user enters each depreciable asset and its purchase and installation costs into Inputs worksheet table 22.

Asset Title	Equip. Cost	Install. Cost	Act. Salvage Value at End of Project Life	Class 1,3, 5, 7, 10,15 or 20 years	Year Purchased (0-10)
Air Shed	\$3,500	\$1,000		15	
Pallet Disassembler	\$8,500	\$500	\$1,000	5	
Pallet Disassembler	\$8,500	\$500	\$1,000	5	
Double Trim	\$7,000		\$2,000	5	
Rip Saw	\$14,000		\$5,000	5	
Molder	\$24,000		\$10,000	5	
Forklift	\$8,000		\$5,000	5	
Dryer 1	\$3,500	\$500	\$500	5	
Dryer 2	\$3,500	\$500	\$500	5	
Dryer 3	\$3,500	\$500	\$500	5	
Dryer 4	\$3,500	\$500	\$500	5	
Cut-off Saw	\$10,000		\$2,000	5	
Conveyer	\$9,000	\$1,000	\$2,500	5	
Computer	\$3,000	\$200		1	

The user also inputs the actual salvage value of the asset at the end of the project. This is seldom equal to the book value of an asset. The depreciation class is entered as the number of depreciable years prescribed for the type of asset. The user also enters the year of purchase for cash flow analysis. If a depreciable asset is purchased at the beginning of the project, the user enters a zero.

The Modified Accelerated Cost Recovery System is used to calculate the depreciation schedule in this computer model. This system should yield a reasonable estimate of depreciation; however, this computer model only estimates depreciation. The rules covering depreciation and the various methods by which to compute depreciation are quite complex. An accountant can provide expert advice in the selection of depreciation methods.

X. Net Working Capital and Deposits

Inputs worksheet table 23 addresses the initial deposits that may be required from the project before operations begin. PROACT enters information (red cells) about monthly costs from previous tables and the user enters the number of months the initial deposits must cover. PROACT then calculates the totals for each category. In addition to the basic categories listed, the user can input information about other categories that require initial deposits.

	Monthly Rate	No. Months	Cost
Building Lease	\$1,875	6	\$11,250
Insurance-Building	\$200	6	\$1,200
Truck Leases	\$260	6	\$1,560
Insurance-Trucks	\$100	6	\$600
Other			
Other			
Other			

In Inputs worksheet tables 24a through 24f, PROACT addresses the net working capital requirements of the project. Typically, the cost to operate a project and manufacture products is incurred before revenues from those products can be collected.

Table 24. Initial Net Working Capital			
Table 24a. Building and Facilities			
	Monthly	No. Months	Cost
Building Lease	\$1,875	6	\$11,250
Insurance Building	\$200	6	\$1,200
Gas	\$800	6	\$4,800
Electric	\$1,000	6	\$6,000
Other Utilities			
Water	\$100	6	\$600
Other			
Maintenance	\$100	6	\$600

Table 24 f. Other New Working Capital			
	Monthly	No. Months	Costs
Petty Cash	\$500	6	\$3,000
Marketing and Mgt.	\$3,350	6	\$20,100
Other			
Other			

PROACT uses monthly cost information from previous sections (red cells). The user then indicates the number of lease payments (or months) of capital desired for net working capital. The number of months selected should represent the time required to collect revenues, plus a safety period.

Tables 24a and 24f are representations of tables 24b through 24e, which are in the computer program. In some categories in Inputs worksheet table 24, such as petty cash (Inputs worksheet table 24f), a monthly cost has not been provided in previous tables. Therefore, both the monthly amount and the number of months must be entered. Both the monthly amount and number of months are also required in the other category (provided to cover categories not addressed by PROACT).

In Inputs worksheet table 25, the user can estimate additional deposits and net working capital requirements that may arise later in the project. For example, if a project plans to double manufacturing capacity in year 5, additional funds, i.e., for new equipment to increase production, will probably be required.

Table 25. Additional Deposits and Net Working Capital										
	Year									
	1	2	3	4	5	6	7	8	9	10
Deposits										
Net Working Capital										
Total										

XI. Optional Tools (Weighted Average Cost of Capital Calculator)

The weighted average cost of capital calculator (WACC) is one method commonly used to estimate a project's cost of capital. Inputs worksheet tables 26 through 29 provide some tools that can be used to calculate the WACC. Accountants, bankers, or financial advisors are good sources for a reasonable cost of capital estimate. However, Inputs worksheet tables 26 through 29 will calculate the WACC if the user knows the project's planned capital structure, cost of debt, and required rates of return on common and preferred equity.

Inputs worksheet table 26 calculates the weighted average cost of debt. The table contains three input columns. The data in these columns are used to calculate the weighted average interest rate. The weighted average cost of debt is calculated by adjusting the weighted average interest rate to account for the tax benefit of debt financing.

Table 26. Weighted Average Cost of Debt Calculator					
Loan No	Lender	Present Value	Interest Rate Yearly-Nom.	Total Debt = \$198,000	
				(PV/Tot Debt)*Int. Rate	
1	A Bank	\$104,000	13.00%		6.83%
2	B Bank	\$47,000	11.00%		2.61%
3	C Bank	\$47,000	15.00%		3.56%
4	D Bank				
5					
6					
7					
8					
9					
10					
				Weighted Average Interest Rate	13.00%
				Business Tax Rate	40.00%
				Weighted Average Cost of Debt	7.80%

Table 27. Cost of Debt, Common Equity, and Preferred Equity		
Cost of Debt	If table 26 is used enter the weighted average cost of debt.	7.80%
	If entering another number, ensure the tax benefit of debt is considered where the Interest Rate is multiplied by (1-tax rate).	
Required Rates of Return		
	Required Rate of Return Common Equity (Common Stock)	17.00%
	Required Rate of Return Preferred Equity (Preferred Stock)	15.00%

Table 28. Capital Structure	
Source	Percent of Capital
Debt	50.00%
Common Stock	30.00%
Preferred Stock	20.00%
Should equal 100% →	100.00%

Table 29. WACC	
Weighted Average Cost of Capital (WACC)=	12.00%

In Inputs worksheet table 27, the user enters estimates for the cost of debt, the required rate of return for common equity, and the required rate of return for preferred equity. If Inputs worksheet table 26 is used, the weighted average cost of debt should be used for the cost of debt estimate. If common or preferred stock or both are issued to help finance the project, the required rate of return estimates should be available from the issuing agency. Otherwise, a financial expert, such as a banker, should be consulted. The methods used to estimate the required rate of return for equity are beyond the scope of this guide.

Personal investments and the WACC—Often in the case of the small firm, owners provide a significant portion of the start-up capital. Personal investments can be treated

like common equity for WACC purposes. Personal investments by individuals that the owners agree to give payback priority (repayment of equity before the owners recover their personal investments) can be treated like preferred equity for WACC purposes. It must be realized, however, that debt obligations always receive payback priority over equity when a firm is dissolved.

Inputs worksheet table 28 asks the user for information about the project's capital structure. The capital structure for the example project is shown in this table.

Inputs worksheet table 29 reports the project's WACC. The WACC for the example project is 12 percent. If the user wishes to use the WACC estimate that is displayed in Inputs worksheet table 29, the estimate must be entered manually into Inputs worksheet table 1 in section I. The WACC estimate displayed in Inputs worksheet table 29 is not automatically used by PROACT.

The Reports Worksheet

The results of the feasibility study are presented in the Reports worksheet. The Reports worksheet consists of three sections. Section I contains Report table 1—the Summary Report. The Summary Report includes basic indices that measure the project's performance in key areas. In Section II—Report tables 2 through 5 display revenues and net cash flows by year, the flow of materials through the project by year, and a complete cash flow analysis. In Section III, charts 1 through 7 and their accompanying tables (chart tables 1 through 7) display the sensitivity of profits to changes in tax rates, cost of capital rates, and various revenue and cost categories.

I. Summary Report

The Summary Report (Report table 1) includes several performance measures. The Net Present Value (NPV) and the Internal Rate of Return (IRR) indicate the project's profitability. A brief explanation of how to interpret each of these indices follows.

Table 1. Summary Report			
Client	PROACT Guide	Date:	
Analyst	Hager, Araman, Hammett	Project	
Net Present Value:	\$122,226	Tax Rate:	40.00%
Internal Rate of Return:	19.9%	Cost of Capital:	12.00%
Initial Cost:	-\$396,818	Project Life (years):	5
This Project Reduces Discarded Pallet Wood Going Into Landfills by (Tons)			13,453
Tons Reduced to Fiber (Ground)			3,664
Tons Recovered for Solid Wood Products			9,789
Percent of Wood Received Recovered for Solid Wood Products			72.8%
Total Wages and Other Expenses for Employees Over Project Life			\$2,034,375
The Average Revenue Generated per Discarded Pallet (Excluding fiber products)			\$6.53

The NPV indicates the change in the firm's net worth if a project is undertaken. If the NPV is greater than zero, the net worth of the firm will increase. A positive NPV means the project is profitable and a negative NPV means the project is not profitable. The NPV also allows the comparison of different scenarios or different projects if they are similar in magnitude and duration. Projects with different risk levels can be compared using the NPV method because the cost of capital for each project accounts for risk. The example project is profitable and should be undertaken.

Comparing different projects using the NPV—Frequently, decisionmakers must determine which of several projects is the most attractive. If profitability is the primary selection factor, the NPV can be used. However, using the NPV to compare different projects has some limitations.

The NPV can be used to compare projects if the projects are similar in magnitude. The NPV does not report a rate of return; therefore, comparing projects of different sizes may lead to misleading results. One project may appear more profitable than the other but may require a much greater capital investment. In this case, the rate of return may be greater for the project with the lower NPV.

In addition, projects should be similar in duration when using the NPV to compare projects. Consider two projects with equal NPV estimates. They may seem equally attractive; however, if one project lasts 10 years and the other lasts only 5 years, the project with the shorter life would be more attractive.

Projects with different risk levels can be compared using the NPV. The risk of a project is included in the cost of capital used to calculate the NPV. A riskier project will require a higher cost of capital. Using a higher cost of capital will lower the NPV for the riskier project and allow for a valid comparison to the lower risk project.

The IRR measures the return on investment in the project. For example, an IRR equal to 20 percent can be interpreted to mean that for each dollar invested 20 cents will be returned annually. In reality, 20 percent is closer to the average estimated annual return over the life of the project. If the IRR method is used to decide whether to undertake a project, a hurdle rate must be used.

Often the cost of capital is used as the hurdle rate. If the IRR is greater than the hurdle rate, the project should be undertaken. The IRR can also be used to compare scenarios or projects of similar magnitude and duration; however, different hurdle rates should be used to compare projects with different risk levels. Because the IRR in the example project is higher than the cost of capital, the project should be undertaken.

Setting hurdle rates lower than the cost of capital—In some cases, the hurdle rate used to evaluate a project may actually be lower than the cost of capital. A certain project may yield benefits that are not fully accounted for by cash flows. For example, recycling may be viewed as an additional benefit to the community that is not reflected in a project's cash flows. For instance, a city commission may choose to lower the standard hurdle rate in such a case. Another organization may recognize the value of improved public relations if a certain project is undertaken. In these cases, the hurdle rate may be set lower than the cost of capital to make the project acceptance-decision rule less stringent.

Both the NPV and IRR are widely used to estimate the profitability of a project. Managers tend to prefer the IRR method and academics prefer the NPV method. Typically, more than one profitability measure is considered.

The initial cost of the project is also included in the Summary Report. This amount is especially useful when the project consists of only one phase. The initial cost amount on the Summary Report does not reflect additional capital requirements characteristic of multiphase projects.

Next, the Summary Report presents the total tonnage of wood that escapes the landfills. This estimate includes both wood recovered and used in solid wood products, and wood used in wood fiber products (nonsolid wood). The tonnage of wood that is reduced to fiber products is also presented.

The Summary Report also includes two measures of the project's solid wood recycling performance. First, the tonnage of pallet wood recovered and used in solid wood products over the life of the project is calculated. Second, the tonnage of pallet wood recovered and used for solid wood products is expressed as a percent of the total tonnage of pallet wood received. This calculation is referred to as the solid wood recycling efficiency. The overall recycling efficiency may actually be higher if additional wood waste is used for fuel or ground and sold as mulch or some related product.

The last two measures reported in this table are the total labor costs over the life of the project and the average revenue generated for each wood pallet recovered. Total labor costs are an estimate of the project's contribution to the local labor market. The average revenue generated includes the sum of revenues from tipping fees and solid wood products divided by the total number of pallets recovered. It illustrates the economic activity generated by recovering wood pallets for solid wood products.

II. Summary of Annual Net Cash, Revenues, and Material Flows

The tables (Report tables 2 through 5) in this section provide the user with information about revenues, material flows, and cash flows. Each table can display up to 10 years of data.

Table 2. Net Cash Flows and Gross Revenues					
	1	2	Year 3	4	5
Net Cash Flows	\$29,544	\$74,356	\$104,441	\$140,725	\$180,305
Gross Revenues:	\$538,533	\$603,810	\$669,086	\$734,363	\$799,640
Table 3. Revenues by Product					
	1	2	Year 3	4	5
Tipping Fees	\$88,791	\$99,553	\$110,316	\$121,078	\$131,841
Whole Pallets	\$37,125	\$41,625	\$46,125	\$50,625	\$55,125
Stringers/Half Str.	\$77,220	\$86,580	\$95,940	\$105,300	\$114,660
Deckboards	\$102,960	\$115,440	\$127,920	\$140,400	\$152,880
Rustic Flooring	\$170,016	\$190,624	\$211,232	\$231,840	\$252,448
Clear Flooring	\$62,421	\$69,988	\$77,554	\$85,120	\$92,686
Table 4. Materials Flow					
	1	2	Year 3	4	5
No. Pallets Received	82,500.0	92,500.0	102,500.0	112,500.0	122,500.0
Tons Wood Received	2,165.6	2,428.1	2,690.6	2,953.1	3,215.6
Tons Dispose or Recover Fiber	589.9	661.4	732.9	804.4	875.9
Tons Recovered Solid	1,575.8	1,766.8	1,957.8	2,148.8	2,339.8

Table 5. Cash Flow Analysis Table						
Cash Flows	0	1	2	3	4	5
Revenues		538,533	603,810	669,086	734,363	799,640
Equipment and Facility Purchases	(123,870)					
Deposits and Net Working Capital	(272,948)					
Costs:						
Facility		(48,900)	(48,900)	(48,900)	(48,900)	(48,900)
Marketing and Management		(40,200)	(40,200)	(40,200)	(40,200)	(40,200)
Disposal		5,899	6,614	7,329	8,044	8,759
Labor		(403,500)	(403,500)	(409,125)	(409,125)	(409,125)
Transportation		(18,075)	(18,075)	(18,075)	(18,075)	(18,075)
Depreciation		(23,225)	(36,268)	(20,931)	(12,652)	(12,616)
Earnings before taxes		10,532	63,481	139,184	213,455	279,483
Business taxes		(4,213)	(25,392)	(55,674)	(85,382)	(111,793)
		6,319	38,088	83,510	128,073	167,690
Add back depreciation		23,225	36,268	20,931	12,652	12,616
After tax income		29,544	74,356	104,441	140,725	180,305
Actual Salvage Value Assets						30,500
Salvage Value Tax						(8,596)
Net Salvage Value						21,904
Recovered NWC and Initial Deposits						272,948
Total Terminal Cash Flow						294,851
Initial outlay	(396,818)					
Net cash flows	(396,818)	29,544	74,356	104,441	140,725	475,157
Cost of Capital	12.00%	Net Present Value (NPV)		\$122,226		
Present Value Cashflows exclude Initial Outlay	\$519,043.65	Internal Rate Return (IRR)		19.9%		

III. Sensitivity Analysis

This section contains seven charts and their accompanying tables. Chart 1 as well as chart table 1 illustrates the importance of each product or service to the project’s total revenues.

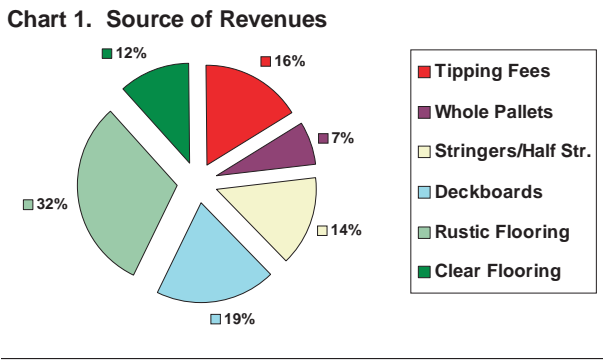
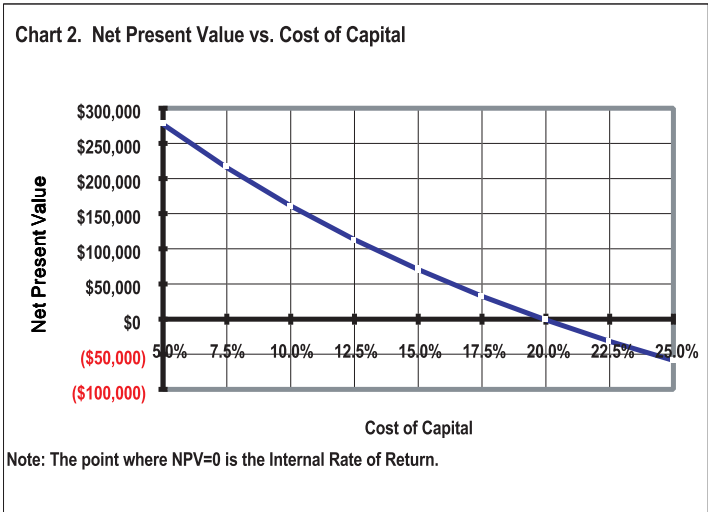


Chart Table 1. Source of Revenues Over Life of Project

Tipping Fees	\$551,578
Whole Pallets	\$230,625
Stringers/Half Str.	\$479,700
Deckboards	\$639,600
Rustic Flooring	\$1,056,160
Clear Flooring	\$387,769

Chart 2 as well as chart table 2 illustrates the sensitivity of NPV to changes in the cost of capital. As the cost of capital decreases, the NPV increases. Because the cost of debt contributes to the overall cost of capital, lowering the cost of debt increases the project’s NPV. With this chart, the user can identify how changing the cost of debt and,

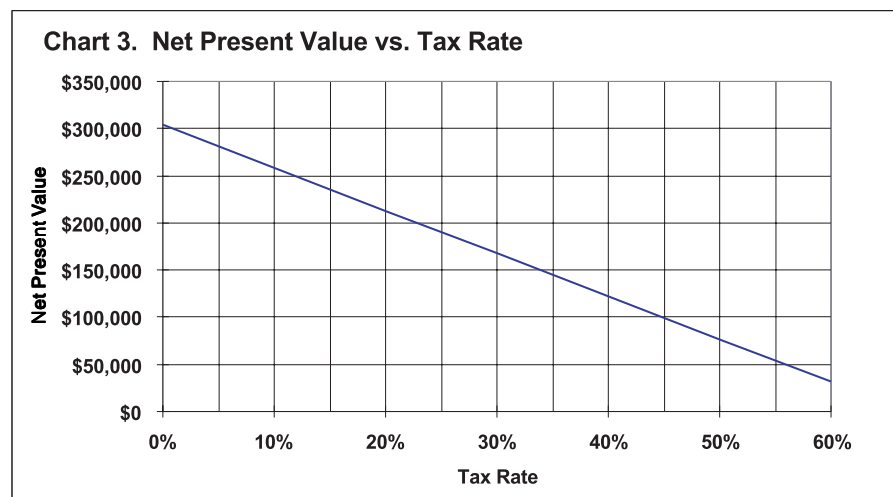


**Chart Table 2. Net Present Value
for Various Cost of Capital Rates**

Cost of Capital	Net Present Value
5.0%	\$276,910.14
7.5%	\$215,293.29
10.0%	\$160,986.06
12.5%	\$112,960.89
15.0%	\$70,354.86
17.5%	\$32,440.32
20.0%	(\$1,398.76)
22.5%	(\$31,685.86)
25.0%	(\$58,867.48)

in turn, the cost of capital affects the project's NPV. The availability of low interest debt, such as industrial revenue bonds, may make an otherwise unprofitable project feasible.

Chart 3 as well as chart table 3 illustrates the sensitivity of NPV to changes in the overall tax rate. Clearly, lower tax rates make a project more attractive. With this chart, a user could determine the tax break (rate reduction) required to make an otherwise unprofitable project feasible. Chart 3 of the example project shows that the project is feasible at tax rates < 60 percent. It also shows that lowering the tax rate from 40 to 20 percent increases the NPV by approximately \$90,000.



**Chart Table 3. Net Present Value
for Various Tax Rates**

Tax Rate	NPV
	\$303,355
10%	\$258,043
20%	\$212,731
30%	\$167,419
40%	\$122,107
50%	\$ 76,795
60%	\$ 31,483

Chart 4 as well as chart table 4 depicts the sensitivity of NPV to changes in revenues. Each line in chart 4 indicates the change in NPV to a percent change in revenues from a specific revenue category. In the example project, a 20-percent decrease in wood flooring revenue changes the NPV from \$122,000 to \$0. A 20-percent decrease in tipping fees, on the other hand, would only lower the NPV from \$122,000 to approximately \$80,000. The profitability of the project is much more sensitive to wood flooring revenues than to tipping fees.

Chart 4 can also be interpreted in terms of percent selling price changes. If the sales volume of all products and services is assumed to remain constant, a percent change in revenues will only result from changes in selling prices. In the example project, chart 4 shows that a 20-percent decrease in pallet part prices would lower the NPV from \$122,000 to approximately \$20,000.

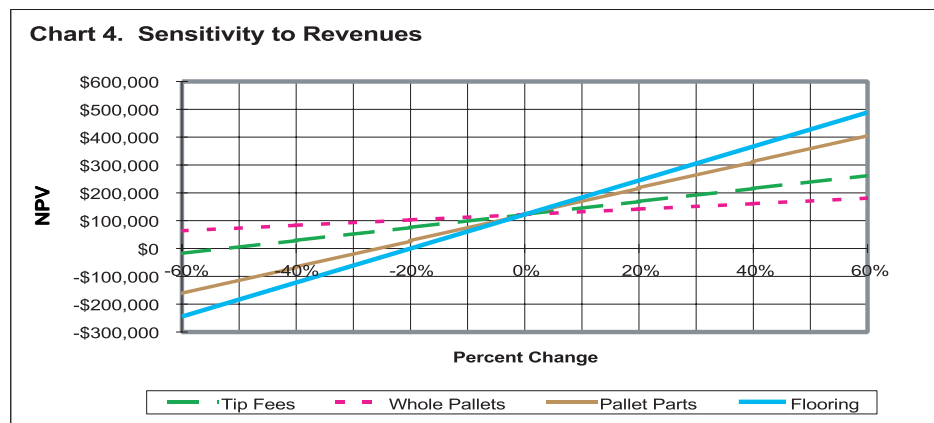
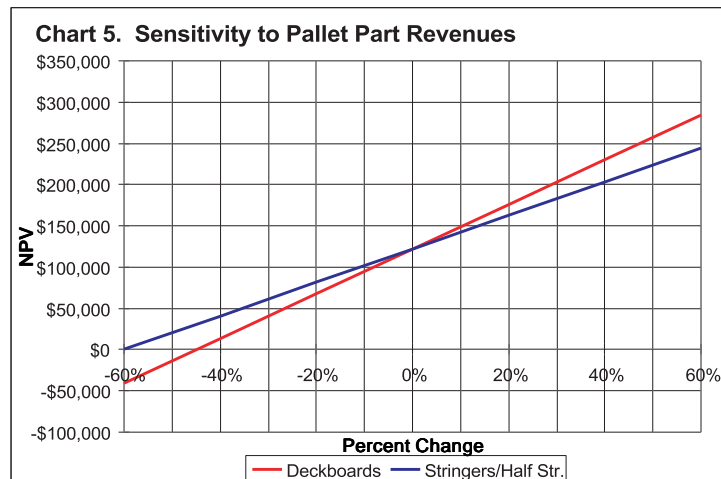


Chart Table 4. Sensitivity to Revenues

Percent Change	Net Present Value			
	Tip Fees	Whole Pallets	Pallet Parts	Flooring
-60%	-\$17,904	\$63,566	-\$162,012	-\$244,415
-40%	\$28,767	\$83,080	-\$67,306	-\$122,241
-20%	\$75,437	\$102,593	\$27,401	-\$67
0%	\$122,107	\$122,107	\$122,107	\$122,107
20%	\$168,777	\$141,621	\$216,813	\$244,281
40%	\$215,447	\$161,134	\$311,520	\$366,455
60%	\$262,117	\$180,648	\$406,226	\$488,628

Charts 5 and 6 as well as chart tables 5 and 6 are interpreted in the same manner as chart 4. Chart 5 illustrates changes in whole pallet, pallet deckboard, and pallet stringer revenues. Chart 6 illustrates changes in rustic flooring and clear flooring revenues.

**Chart Table 5. Sensitivity to Pallet-Part Revenues**

Percent Change	Net Present Value	
	Stringers/Half Str.	Deckboards
-60%	\$342	-\$40,247
-40%	\$40,930	\$13,871
-20%	\$81,518	\$67,989
0%	\$122,107	\$122,107
20%	\$162,695	\$176,225
40%	\$203,284	\$230,343
60%	\$243,872	\$284,461

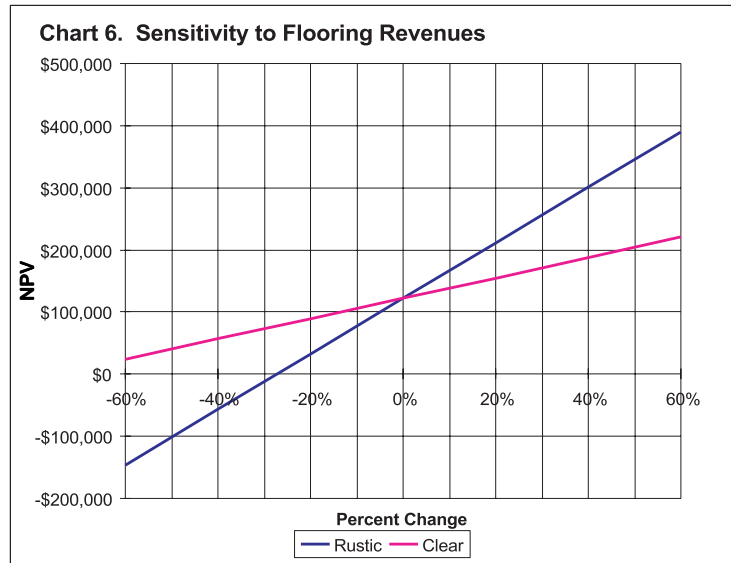


Chart Table 6. Sensitivity to Flooring Revenues

Percent Change	Net Present Value	
	Rustic	Clear
-60%	-\$145,985	\$23,677
-40%	-\$56,621	\$56,487
-20%	\$32,743	\$89,297
0%	\$122,107	\$122,107
20%	\$211,471	\$154,917
40%	\$300,835	\$187,727
60%	\$390,199	\$220,537

Chart 7 as well as chart table 7 illustrates the sensitivity of NPV to changes in key cost categories. In the example project, the NPV is very sensitive to changes in labor costs. An increase of approximately 6 percent in labor costs would make the project unprofitable. The profitability of the example project is not very sensitive to changes in transportation costs or waste disposal costs.

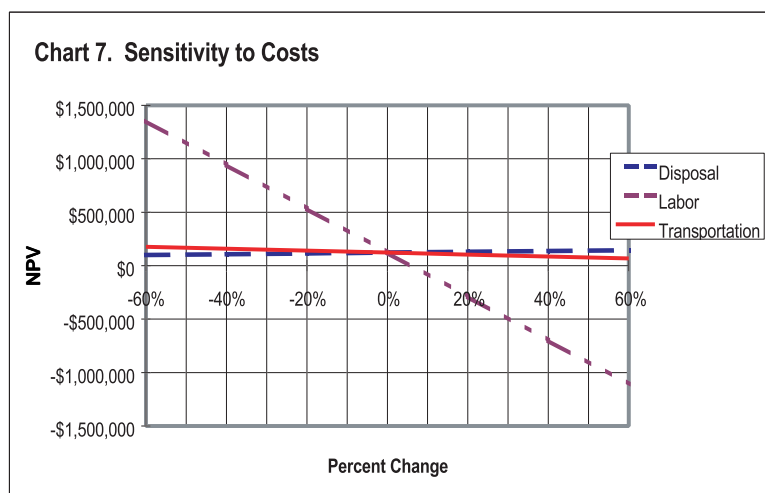


Chart Table 7. Sensitivity to Costs

Percent Change	Net Present Value		
	Disposal	Labor	Transport.
-60%	\$100,571	\$1,352,957	\$176,838
-40%	\$107,749	\$942,674	\$158,594
-20%	\$114,928	\$532,390	\$140,351
0%	\$122,107	\$122,107	\$122,107
20%	\$129,286	-\$288,176	\$103,863
40%	\$136,464	-\$698,460	\$85,619
60%	\$143,643	-\$1,108,743	\$67,376

Conclusion

Pallet lumber recovery projects are environmentally responsible, save valuable forest resources, and offer promising business opportunities. PROACT is a valuable tool that can evaluate a wide range of pallet recovery projects. The use of project specific information supplied by the user increases the accuracy and the validity of the feasibility study. Different scenarios of the same project can also be compared easily because changes in inputs are instantly reflected in the feasibility study results. Designed for use in Microsoft® Excel®, PROACT is easy to use, even for those unfamiliar with computer spreadsheet programs. This computer tool satisfies the need for a user-friendly pallet recovery opportunity analysis.

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Glossary of Terms

actual salvage value: the dollar amount that will actually be received by selling, scrapping, or trading in the asset at the end of the project life. For actual salvage values consult equipment dealers in your region.

book value: the value of a business as stated in a book of accounts.

capital assets: any long-term assets such as a building.

capital structure: the proportion of capital obtained from each of the three basic capital sources. In the example project, the capital structure is made up of 50-percent debt, 30-percent common equity, and 20-percent preferred equity.

clear flooring: flooring that does not contain defects or character marks such as knots, holes, and bark.

cost of capital: the return investors and lenders demand from the funds made available to the project (see Keown and others 1996). In the case of debt, it is the interest rate minus the tax benefit of debt financing.

cost of debt: interest rate payments plus potential loan fees.

deckboard: surface pallet boards on the top and bottom of a pallet.

depreciation: the decrease in value due to wear and tear, decay, decline in price, etc. as allowed in computing the value of property for tax purposes.

drop-off fee: fees charged to leave pallets at a pallet recovery firm.

hurdle rate: the minimum acceptable rate of return for a project of a given risk level. The hurdle rate is used with the internal rate of return profitability analysis method.

initial deposit: minimum amount needed to open an account.

internal rate of return (IRR): the exact discount rate that equates the present value of the project's future cash flows with the initial cost of the project (Tracy 1996).

marketing channel: different ways of getting products from a producer to end customers.

net present value (NPV): the present value of the project's future cash flows minus the initial cost or capital investment (Brigham and Gapenski 1993).

net working capital: in the context of this computer model, net working capital is defined as the money required to keep the business operating between the time costs that are incurred and the time that revenues are received.

pallet: a structural device used to store and move products on.

pallet parts: parts used to make a pallet.

pickup fee: fee charged to remove unwanted pallets from a pallet user's facility.

project life: the number of years for which the project is planned.

rate adjustment factor: the factor used to convert the hourly wage rate paid to the worker into the actual hourly employee cost to the project.

real business tax rate: the total tax rate paid to Federal, State, and local governments.

required rate of return: the minimum rate of return necessary to attract an investor to purchase or hold a security (Keown and others 1996). Common and preferred stocks are types of securities.

rustic flooring: flooring that contains small sound defects or character marks, such as small sound knots, holes, bud traces, and in the case of flooring made from used pallet boards the flooring could also contain nail holes and some splits.

sales price: the price per unit of service or product actually received by the project from their immediate customer.

salvage value: residual value left when life of investment period is over.

solid wood products: products composed primarily of solid wood such as pallets, pallet parts, hardwood flooring, and lumber.

stringer: parts that separate deckboards in pallets so that forks can be used to lift and move pallets.

strip wood flooring: random length flooring that is usually 2¼ inches wide, but also comes in widths ranging from 1½ to 3¼ inches.

tax benefit of debt financing: debt payments are deducted from the firm's cash flows before income taxes are calculated; therefore, financing with debt shields some income from taxes. The weighted average interest rate for debt financed capital is multiplied by 1 minus the real business tax rate to account for the tax benefit.

tipping fees: fees charged the client to remove discarded pallets from the client's location (pickup fees) or fees charged the client when discarded pallets are delivered to the project's receiving yard (drop-off fees).

weighted average cost of capital (WACC): the weighted average of the cost of common equity, the cost of preferred equity, and the after tax cost of debt. Commonly used as an estimate of the project's cost of capital.

wood fiber products (nonsolid): products composed of small pieces of wood, such as wood chips, mulch, or wood scraps, that could be suitable for fuel.

Hager, E. Bradley; Hammett, A.L.; Araman, Philip A. 2003. PROACT user's guide: how to use the pallet recovery opportunity analysis computer tool. Gen. Tech. Rep. SRS-69. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 30 p.

Pallet recovery projects are environmentally responsible and offer promising business opportunities. The Pallet Recovery Opportunity Analysis Computer Tool (PROACT) assesses the operational and financial feasibility of potential pallet recovery projects. The use of project specific information supplied by the user increases the accuracy and the validity of the feasibility study. Different scenarios of the same project can also be compared easily because changes in input are instantly reflected in the feasibility study results. PROACT is designed for use with Microsoft® Excel®—the most widely used spreadsheet program on the market today. It is easy to use, even for those unfamiliar with computer spreadsheet programs. PROACT is a workbook with three worksheets. This guide provides users with a complete tour of two of these worksheets—inputs and reports—by describing cells, defining terms, illustrating all on-screen tables and charts, and using an example project.

Keywords: Building materials, economic development, financial analysis, flooring, green products, pallet lumber, pallet recycling, pallets, recycled wood flooring, wood recycling.



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