

A Paper for the National Conference on Criminal Justice Evaluation

X Titled: AN EXAMPLE OF HOW COST-BENEFIT ANALYSIS CAN BE USED FOR  
MANAGEMENT AND EVALUATION OF A COMMUNITY PROGRAM FOR  
JUVENILE CORRECTION

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## Introduction

This paper describes the methodology and results of a short, exploratory study intended to evaluate a new juvenile program direction for the State of Delaware, Division of Juvenile Corrections. The new program provides an alternative to an institutional program for juvenile offenders by: (a) placing them in a community based residential setting, and (b) providing an intensive counseling service program rather than the traditional educational-vocational training program of the institution. The evaluation technique used in this study is a cost-benefit type of analysis. Brief details of the program and the evaluation techniques are provided in the following pages.<sup>1</sup>

### A Description of the Programs Being Compared.

The cost-benefit analysis being described in this paper is based on these identified costs and benefits:

Costs = costs of the "experimental project," in this case the Walnut Street "Y" project - a community based residential setting,

Benefits are of two types--

benefit(CS) = cost savings in a comparison program because students are diverted from this "control" program--this comparison program at the Ferris School for boys (an institution).

benefit(PB) = productivity benefit due to program differences in individual productivity, generally measured as the differences in wages or earnings for boys in either program.

Because the cost savings (CS) are the principal type of benefit that can be claimed, and these costs would occur in another program, this companion or

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<sup>1</sup>More details are provided in the 92 page report titled: "Cost-Benefit Analysis and Hypothesis Testing, An Example Application for Program Evaluation in Juvenile Corrections." Available from the College of Urban Affairs and Public Policy, University of Delaware, Newark, DE 19711.

control project must be included in the analysis. Cost savings could also accrue throughout the whole Criminal Justice System if the experimental program resulted in lowering of offense rates, arrests, court usage, corrections needs, etc. These types of cost savings were not estimated here, as this study was done at the beginning of this experimental project.

This cost-benefit comparison between the two program concepts requires some characterization of the differences in resources use, as these differences in programs are used in accounting for costs and cost savings. A picture of the two programs is outlined in Figure 1. This figure shows the important phases in the Delaware juvenile corrections process for each individual passing through the two programs under consideration: the "Open Program at Ferris" and the alternative "Community Program at the Walnut Street YMCA." The differences in predicted length of time within the treatment phase and in the after-care caseload explain the hypothesized cost savings created by the Walnut Street "Y" project (the community program).

The population of the two programs is drawn from the total population of male juveniles, aged 8 to 18 or 21, convicted in Family and Superior Courts. The youngest, however, tend to be about 12 years old. After a juvenile is committed to the Division of Juvenile Corrections (DJC hereafter) by the courts, he enters the medical reception-diagnostic facility located on the premises of the Ferris school for boys. The intake process here is used to determine the juvenile's problems and a decision is made as to which program or institution he will be placed into. The options for placement are either of two programs at Ferris, another institution under DJC, or a community based treatment center--the Walnut Street "Y." The "Open Program" at the Ferris School was chosen as the "control" program, as this would be the placement choice without the community program.

Criterion for admission to the Open Program at Ferris is defined as absence of need for a secure environment. Indicators include an estimate of the likelihood of the student's running away if placed in the open program, the likelihood of his committing a violent crime if he were to run away, and the likelihood of his hurting himself or others if not under constant supervision.

Figure 1 shows the major differences between the two programs: those placed in the "Y" project are able to continue working or have access to job counseling and find work while in the community program. Alternatively, students are able to continue their schooling in the community. Placement or recommitment to Ferris precludes both. Instead, members of the Ferris Open Program participate in the special academic program there which emphasizes remedial instruction to develop basic skills.

The diagram also indicates the similarities between the two programs: both require counseling to help members to accept responsibility for their actions and the consequences of actions. Both provide supervision when members are not in school or at work.<sup>2</sup> Both provide a recreational program, room and board, clothing, and personal needs. Both provide medical and dental services.

#### Some Objectives for the Walnut Street "Y" Program.

This community program was developed as an alternative to the institutional type of placement and corrections. There was a need for such a facility because a number of juveniles committed to DJC were not serious offenders, and they had to learn how to successfully cope with the realities of work or school. It was argued that these youths need a minimum of treatment before being able to return to the community. Two of the stated operational objectives for this program are these:

- (1) The primary objective of the program is to provide shelter and alternative living arrangements for a minimum of 12 and maximum of 32 boys annually from the Ferris school.
- (2) Another objective was to reduce the length of stay at Ferris from the usual 5 to 9 months to 2 to 5 months at Walnut Street. (The cost-savings benefit again).

A third objective was to demonstrate the usefulness and viability of a community-based treatment center. A particular evaluation objective that was

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<sup>2</sup>The Walnut Street "Y" program provides less supervision, which helps to save or control costs. But the original staffing level on supervision was found inadequate, so more resources are committed to supervision at present.

implied here is this--that the Walnut Street "Y" program could achieve equal or better results than the Ferris program in terms of recidivism and employment. (The productivity and cost savings benefits are implied here). This evaluation objective can be stated in the form of a hypothesis and an experimental design analysis can be established. This type of analysis was not done because a control group and random assignment of cases were not developed. In the absence of a classical experimental design situation, another type of evaluation was used. This is the cost-benefit analysis approach using a comparison of costs, cost savings and productivity benefits for two programs. There can be at least three purposes of cost-benefit analysis: (a) pre-project analysis done to evaluation project feasibility or compare alternative project designs, (b) post-project analysis done on an operating or completed project to test whether the outcomes met the performance expectations, and (c) a type of cost-benefit analysis done to provide managers with some targets for self-evaluation of their ongoing operations and alert them to problems in operations. The study being reported here proceeded with purposes (a) and (c) in mind. A simple simulation model was developed, and some details and conclusions are described in the remaining pages.

#### Cost-Benefit Analysis and Hypothesis Testing.

Cost-benefit analysis implicitly involves a comparison of alternative uses of resources. In this study, the resources are those of the Division of Juvenile Corrections, and these resources of personnel, facilities, supplies, etc., can be used in either of two comparison programs. The presumption here is that the community program being particularly evaluated, the Walnut Street "Y" program project for older juvenile boys, is an alternative to the traditional institutional program offered at the Ferris School for boys. The evaluation hypotheses that follow from this comparison are of this general format: That the Walnut Street "Y" program is "better" than the alternative Ferris program because of .... The "because of" reasons that one program is better can be attributed to lower costs for the same effects, a greater benefit ÷ cost ratio, or more benefits for the same cost.

The particular hypotheses that were examined in this study are these:

Hypothesis (Question) 1. Do the costs of the Walnut Street "Y" program plus associated costs at Ferris due to recommitments or revocations exceed the cost savings at Ferris due to the diversion of some boys to the Walnut Street "Y" program?

Hypothesis (Question) 2. Are the costs less earnings of juveniles in the Walnut Street "Y" program less than the cost savings at Ferris?

The answer to the question posed in each statement of a hypothesis above is maybe!

This "maybe" answer is based on several considerations, as follows: first, the Walnut Street "Y" program is relatively new and the initial results, judged by returns to Ferris, were not as good as the recent results, and second, because many of the cost components of the juvenile corrections program are "relatively fixed" or difficult to change quickly, there may be a substantial difference between the "potential" cost savings at Ferris and the actual cost savings in the first years of program operation. The important variables which determine whether the questions or hypothesis stated above can be answered yes or no include these:

- the cost savings at Ferris due to a diversion of boys to the Walnut Street "Y" program;
- the additional costs of operating the Walnut Street "Y" program plus the existing programs in the Division of Juvenile Corrections;
- the number of boys returned (recommitments or revocations) from Walnut Street "Y" to the Ferris program (which means some wasted resource use);
- the number of boys who are employed and productive in the Walnut Street "Y" program (which opportunity may not be available in the Ferris open program).<sup>3</sup>

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<sup>3</sup> A more rigorous description of the cost, cost savings, and productivity benefit estimates and estimating procedures is provided in the report cited in footnote 1.

The results of considering these several factors can be summarized in two figures, Figures 2 and 3. These show the relationship of the factors for two situations; one view (Figure 2), represents the possible cost-benefit results in the early years of the new program, with a second view (Figure 3) showing what could evolve if the Walnut Street "Y" program successfully continues in operation.

The cost assumptions underlying Figure 2 are straight-forward: one being that the cost savings at Ferris realized from a diversion to the Walnut Street "Y" program will not include any savings in personal services costs! Since personal services are a dominant part of the resources used in DJC, this is an important assumption. A second assumption here is that the Walnut Street program can be operated with some minimal increase in DJC staff and personal services expenses. This pair of assumptions, (which are discussed in the study report) resulted in an initial estimate of \$10,300 annual cost savings at Ferris, (due to a reduced population) and an annual cost of \$24,640 for the Walnut Street " Y" (These cost estimates would be classified as the "short-run marginal costs" in economic jargon.) This \$10,300 "saved" vs. \$24,640 "cost of saving" comparison means that Hypothesis 1 cannot be accepted, as the Walnut Street "Y" program may cost more than the cost saving produced. If a substantial proportion of the boys in the Walnut Street "Y" program are employed, then Hypothesis 2 can be accepted for some situations. This hypothesis asks whether the productivity benefits or employment earnings are sufficient to offset the additional costs of the Walnut Street "Y" program? For example, if 6 boys are returned to Ferris, but 10 are employed, out of a group of 20 boys in the Walnut Street "Y" program, then the net cost of the Walnut Street "Y" program is \$2,140. (Calculated as \$21,550 base cost for the Walnut Street "Y" program, plus \$3,090 cost for the returnees, less \$22,500 for the employment earnings, which is a net cost of \$2,140. This cost is offset by the \$10,300 cost savings (benefit) figure for Ferris and society has a net benefit of \$8,160.) Figure 2 shows the two possible conclusions about Hypothesis 2. The shaded area on the right side of the triangle includes those combinations of rate of returnees to Ferris and employment rate where Ferris is the "better"

program using the Hypothesis 2 criterion. The unshaded area on the left and upper part of the triangle indicates the combinations of rates where the Walnut Street "Y" program may be a better program. A dashed line indicates the lower boundary of a triangular area where the productivity benefits will exceed the costs--meaning that productivity benefits exceed costs for those combinations of rates.

Figure 3 presents a different view of the two-program comparison. This figure is based on the presumption that the continued operation of the Walnut Street "Y" program or a comparable program could lead to some savings in personal services costs at Ferris. This eventually may take several years, and would be accompanied by some reorganization at Ferris. Using this assumption, a cost savings estimate of \$58,000 at Ferris is initially estimated. This is a crude estimate, and is much larger than the \$10,300 estimate used for figure 2, but this cost may be representative of potential cost savings, if a cost cutting program was undertaken and the student population at Ferris was substantially reduced. Now it can be seen that in this different, longer-range perspective that we could possibly accept Hypothesis 1 in favor of the Walnut Street "Y" program. The comparison of combinations in Figure 3 vs. Figure 2 shows that there is a larger set of combinations of rates of return and employment that are favorable for the Walnut Street "Y" program with this longer-range view.

The general conclusion that should be argued here is that the Walnut Street "Y" program may be judged as either better or worse than keeping juveniles at Ferris. The result with the initial group of 10 boys would lie in the shaded areas of both Figures 2 and 3. But the results with later groups are better (discussed later). No firm conclusion is given here, as the program is only 2 years old. The important observation to note is that there is a good case to be made for the possible probable superior results of the Walnut Street "Y" program as evaluated by the criteria embodied in Hypotheses 1 and/or 2. The approach outlined here is an example of how cost-benefit analysis can be used to judge the "potential" of a new or proposed program, the purpose (a) analysis mentioned earlier. A purpose (c) approach is discussed next!

## Using Cost-Benefit Analysis for Management.

The analysis above indicates that the Walnut Street "Y" program, as an alternative program, could be judged as superior to the Ferris School "institutional" program. But this is realistically a possibility only, as there are certain combinations of unrealized cost savings, low-employment rates, and high returnee rates that can be used to argue that the Ferris program is equally good or better! (As shown in Figures 2 and 3). What should be recognized and even imprinted in the readers' mind is that this cost-benefit analysis represents a form of hypothesis testing, and whether the hypothesis "becomes true" depends upon management actions and concerns for seeing that the alternative program is successful. The alternative program is not automatically successful upon implementation. Continual attention by a set of "managers" is necessary for the initial and continued success of this alternative program. This question might be asked: How can "management" act to create a successful program operation?

One approach for successful management would require attention to this set of factors, which affect the alternative program's success. These factors are:

1. Realization of the potential cost savings at the Ferris School.
2. Cost control for the Walnut Street "Y" program.
3. Careful screening and selection of students for the Walnut Street "Y" program.
4. An adequate "package of services" being provided for the students at the Walnut Street "Y", which package of services results in a low rate of returnees to Ferris.
5. Provision of employment counseling or job finding services such that the student finds and/or remains employed, thus realizing the earnings prediction.

These five factors are not all-inclusive of the factors which determine the success of a program like the Walnut Street "Y" alternative. But they are undeniably important factors and the cost-benefit analysis herein is based on these factors. Management can develop useful "indicators" or targets

for management purposes based on these factors, i.e., indicators about costs, cost savings, rates of services, delivery, rates of returnees, rates of employment, etc. These indicators such as presented in graphical form as in Figures 2 and 3, can be used to guide management such that the promise of this alternative program is realized. It is feasible and valuable to develop these indicators or targets as part of the planning tasks, as these can become targets for better management.

### Epilogue.

The Walnut Street "Y" program is now in its third year of operation. The study reported here was completed in June 1975, and was used as part of an early evaluation of this experimental project. The initial 6 months furnished the study data, and the performance results were disastrous, with 7 of 10 boys being returned to Ferris for offenses. The LEAA supported funding agency in Delaware did not continue funding this project after the initial two year funding period. The State of Delaware legislature "picked up" the funding responsibility and parts of the study report were used to support the funding request. (Note: no credit is claimed for either the LEAA agency actions or the Delaware legislatures actions to continue the program but these consequences may illustrate the ambivalent interpretations possible from this analysis!). The recent project performance data are encouraging due to some management responsibility changes and increased supervisory personnel being assigned to the project. The statistics for the first six months of 1976 show a movement of 14 boys through the Walnut Street "Y" program with 4 of these being returned to Ferris. The employment rate averaged 19 percent, due to the general economic situation. This combination of a .28 returnee rate and a .19 employment rate can be plotted on Figures 2 and 3. The judgment would be that the Ferris program is "better" using Hypothesis 2 and Figure 2, but the Walnut Street "Y" program is better using the Figure 3 calculation basis!

Some Conclusions About Using Cost-Benefit Analysis for Evaluation.

The reasons for the ambivalent conclusions about the comparison of the experimental Walnut Street "Y" project with the more traditional Ferris program should be understood. These propositions about the use of cost-benefit analysis for Criminal Justice evaluation (or similar situations) are offered:

- (1) That cost-benefit analysis is a type of hypothesis testing. The technique is especially good for comparing alternatives, but the technique is subject to the same risks and limitations we associate with statistical hypothesis testing.
- 2) That cost-benefit results are very much a function of management actions.
- (3) That cost-benefit analysis can be used to develop objectives and targets for management monitoring and self-evaluation, and these guidelines should help the project managers.

Figure 1

Systems Sketch: Ferris Open Program, Walnut Street "Y"

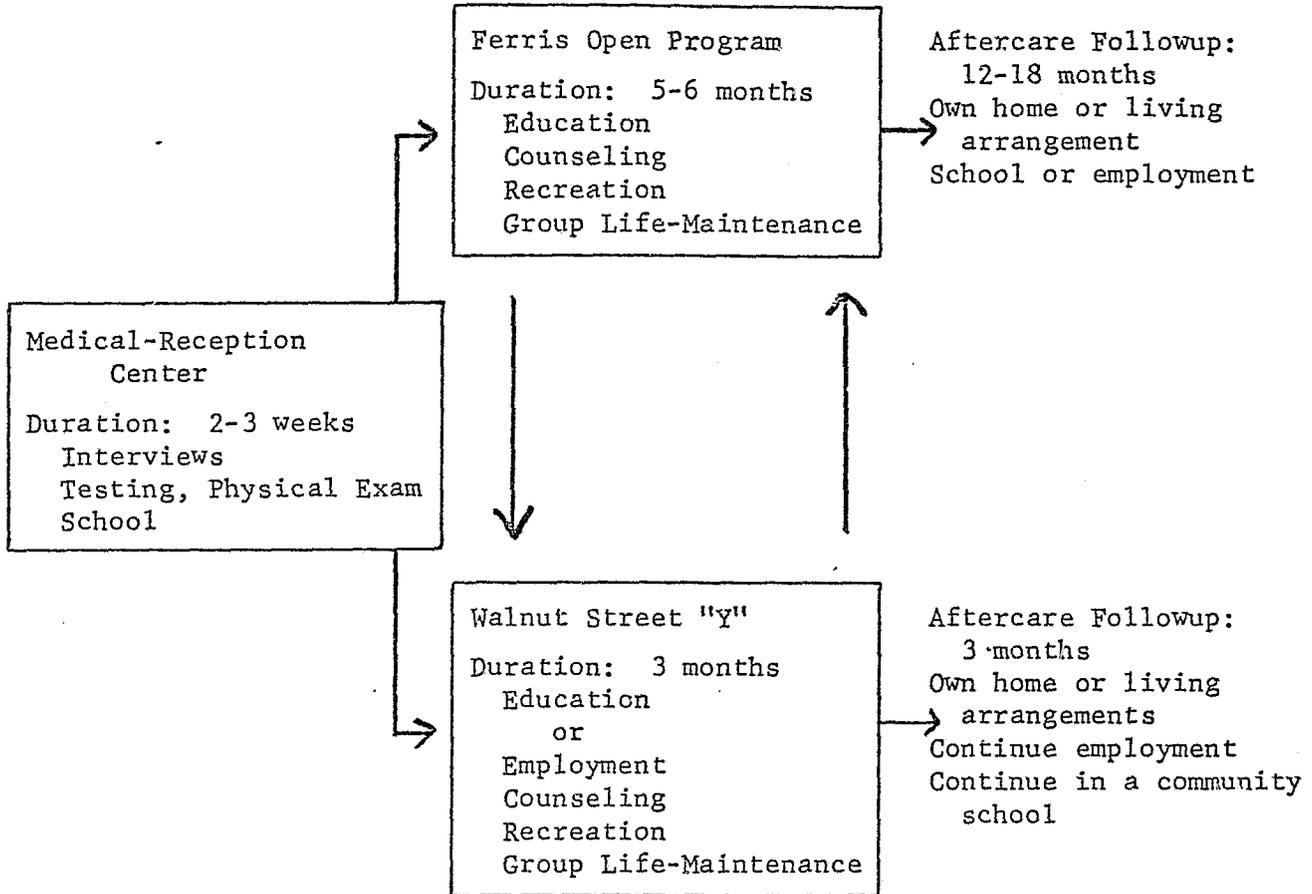
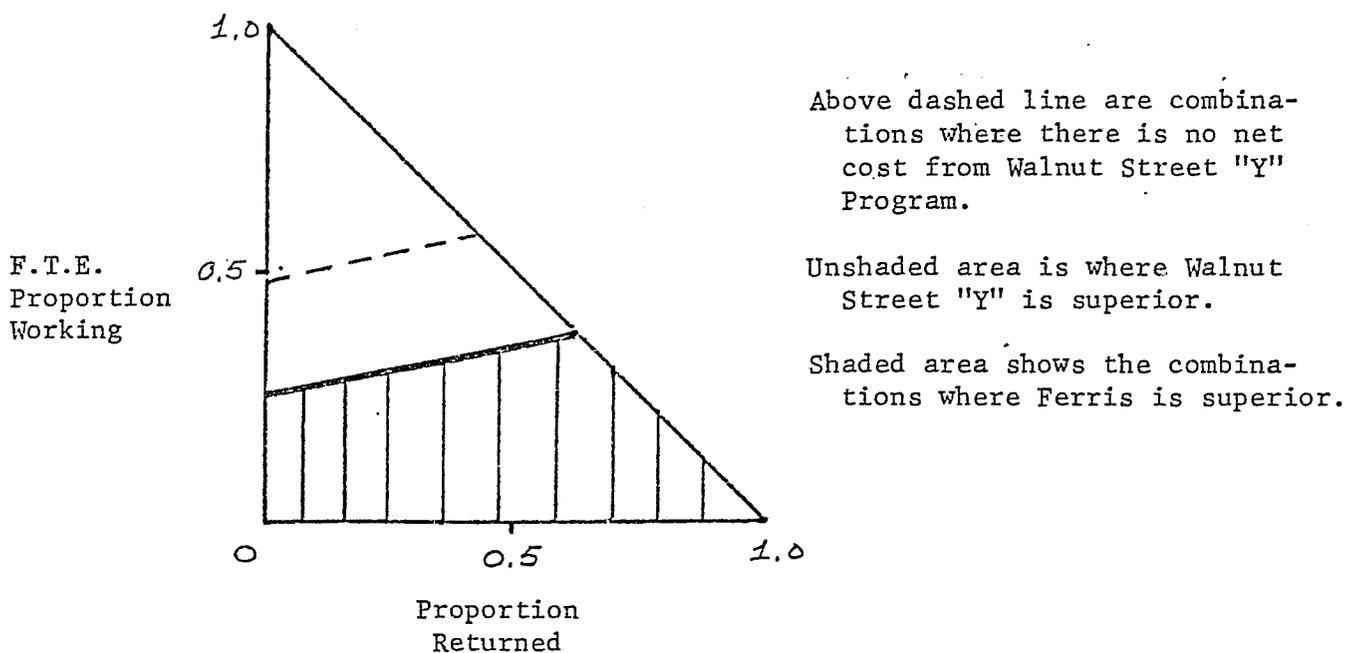


Figure 2  
Testing the Hypotheses--Short-Run View

Hypothesis 1: Cost savings at Ferris = 10,300  
Costs at Walnut Street "Y" = 21,550 + Returnees  
Conclusion : Reject Hypothesis 1!

Hypothesis 2: Plot of Different Combinations of Rates



Conclusions : Can accept or reject Hypothesis 2 depending upon combination of rates.

Figure 3

Testing the Hypotheses--Longer-Range View

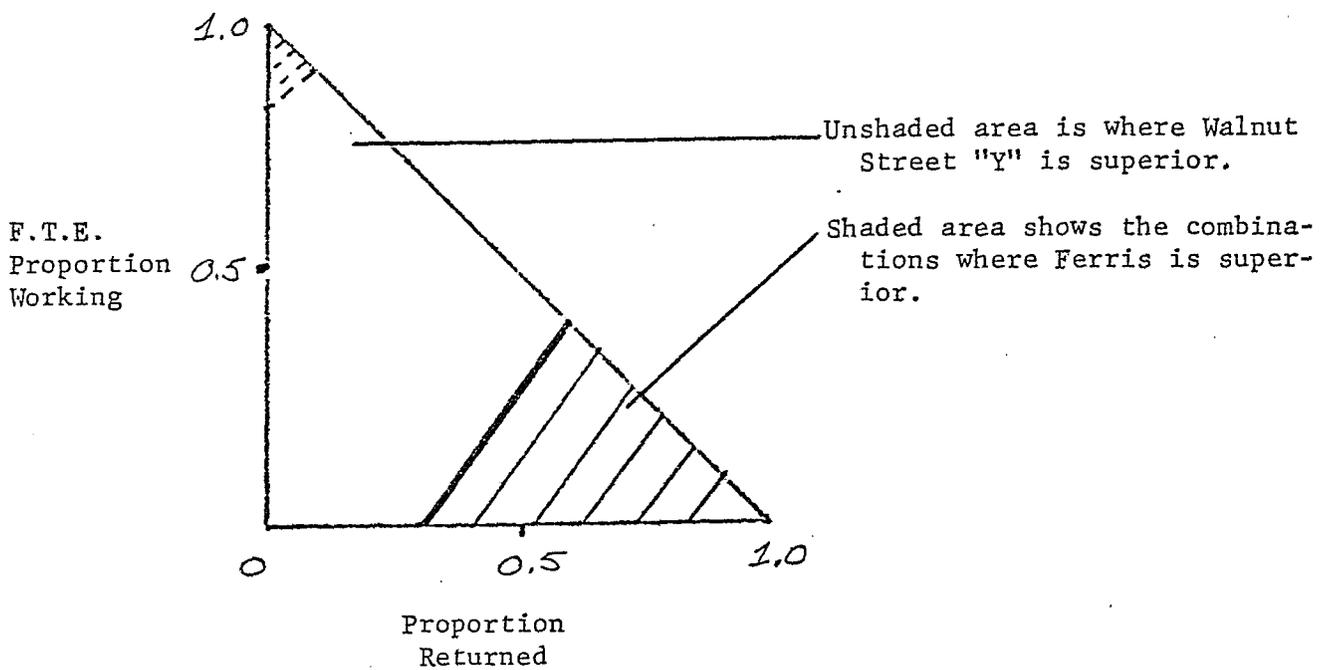
Hypothesis 1: Cost savings at Ferris = 58,500

Cost at Walnut Street "Y" = 38,050 + Returnees

Conclusion : Could accept hypotheses if Returnees rate less than 7 in 20

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Hypothesis 2: Plot of Different Combination of Rates



Conclusions : Can accept or reject Hypothesis 2, depending upon combination of rates.

Technical Note - How to Derive Figures 2 and 3

The basis for the two figures is an equation which defines the combination of the "proportion working" versus "proportion returned" that result in the judgment about the comparison of the two programs. The equation is:

$$\begin{aligned} & [\text{Cost (Walnut Street)} + (\text{Number returned}) * (\text{Cost of Returnees}) \\ & \quad - (\text{Number working}) * (\text{Wages when working})] \\ & \text{is (less than, equal to, or greater than)} \\ & [\text{Cost of the Open Program at Ferris}] \end{aligned}$$

This equation was solved for an assumed annual caseload of 20 boys, and these two equations following were used to find the diagonal line separating the areas where one or the other program is superior.

Figure 2 equation:

$$[\$21,550 + (\text{Number returned}) * 525 - (\text{Number working}) * 1500] = \$10,300$$

Figure 3 equation:

$$[\$38,500 + (\text{Number returned}) * 2925 - (\text{Number working}) * 1500] = \$58,500$$

If the left side of the equation is less than the right side, then the Walnut Street program is judged superior. The converse applies for the Ferris program.



**END**