FEASIBILITY-STUDY MODEL FOR PEDESTRIAN MALLS

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A model for performing feasibility studies of pedestrian mall proposals is presented and demonstrated by application of the model to a case study. The model is based on the systems approach to solving large-scale decision problems. It is designed to determine which, if any, of a set of possible mall configurations is most feasible based on the results of a comprehensive cost-benefit analysis. A direct benefit-to-cost ratio is calculated for each of the alternatives, which is based on only those direct costs and benefits (increased sales tax and property tax) that can be converted into dollars. If this direct benefit-to-cost ratio is greater than unity for any proposed alternative, then the model has provisions to modify this direct ratio based on the indirect factors that will affect the desirability of the project. The method that is presented is designed to evaluate factors such as noise, pollution, and effect on public transit. First, a summary of available background information on these factors and their relationship to malls is provided. Second, the evaluation problem is presented in a concise format that allows the decision maker to easily evaluate the indirect costs and benefits. This technique assigns a weighting factor to the various indirect costs and benefits and modifies the direct dollar costs and benefits as a result of these weighting factors. The case study was chosen to demonstrate the feasibility-study model with a real-world decision problem—the proposed 16th Street mall for the central business district of Denver. Two alternative mall configurations are compared according to the authors' value systems.

•STIMULATED, perhaps, by the success of the Nicollet Mall in Minneapolis, several civic and business leaders in Denver developed a preliminary plan to construct a pedestrian mall on 1 or 2 of the primary business throughfares in the Denver central business district (CBD). These leaders formed Downtown Denver, Inc., and, in conjunction with the Denver Planning Office, they proposed that a pedestrian mall with an exclusive transit way be built on 16th Street and perhaps on 17th Street (1). 16th Street runs 1 way southeast and contains most of the major retail stores in the CBD. It connects the Skyline Urban Renewal Project with the Civic Center, which includes the State Capital. Seventeenth Street parallels 16th Street and runs 1 way northwest. It has a completely different character than 16th Street and contains most of the major office and financial buildings in the CBD. An overall design concept for the mall and preliminary cost estimates were prepared (2).

ALTERNATIVE CONFIGURATIONS

The study should determine not only whether a proposed project is feasible but also which proposed alternative configuration is optimal. These alternative configurations

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should be synthesized by the project's planners and be subjected to a cost-benefit study to make the optimality decision.

For this study, only 2 alternative configurations were considered: a pedestrian-only mall with cross-street traffic (option 1) and a pedestrian-plus-transit mall with cross-street traffic (option 2). Option 1 would allow mall access to emergency vehicles and perhaps very small people-mover or moving sidewalk systems. Option 2 would allow mall access to buses on an exclusive right-of-way similar to that of the Nicollet Mall in Minneapolis, Minnesota. The time limitations of this study did not permit detailed construction cost estimates to be prepared for each of these alternatives. Thus the calculated construction costs were considered to apply to both options 1 and 2. The difference in other costs between the 2 options were treated separately.

The direct quantifiable benefits of the 2 options also were considered equal because of a lack of reliable data available on the performance of existing pedestrian malls.

MAJOR ASSUMPTIONS

A 25-year planning period was used for making forecasts of operating and maintenance costs and retail sales. The following includes the major assumptions that were made:

1. Retail sales will increase at a decreasing rate for a total of 5 years after project completion, and
2. Retail sales will not increase after 5 years but will remain at a constant higher level than would occur without the mall for the remaining 20 years of the planning period.

Direct costs were included in the evaluation for all items that incur some sort of cost from the public sector. Direct benefits were calculated based on increased property tax revenues and increased sales tax revenues. All other costs and benefits were considered indirect and were treated by a separate methodology either because they were not readily quantifiable into dollar amounts or because there was a lack of data on which to base predictions of the dollar amounts of the indirect costs and benefits. The direct costs that were considered in the case study are as follows:

1. Construction,
2. Demolition,
3. Paving,
4. Architectural treatments such as landscaping, curbs, gutters, and drainage,
5. Irrigation,
6. Fixtures such as lights, kiosks, and benches,
7. Traffic control device improvements,
8. Design fees and legal fees,
9. Utility improvements,
10. Indirect traffic control improvements and street construction,
11. Side-street and alley improvements,
12. Cost growth and uncertainty,
13. Operation and maintenance,
14. Disruption of traffic flow, and
15. Disruption of bus routes.

The indirect costs that were considered are as follows:

1. Parking problems,
2. Disruption during construction phase, and
3. Disruption of mail and goods delivery.

The direct benefits that were considered were

1. Tax revenues from increased retail sales and
2. Increased land values and resultant property tax revenues.

The indirect benefit that were considered were

1. Open space and aesthetic improvements,
2. Lower noise levels,
3. Lower localized pollution levels,
4. De-emphasis of automobile,
5. Emphasis on public transportation,
6. Social gathering and interaction place,
7. Increased safety,
8. Greater future construction activity, and
9. Uncertainty of mall's revenue generating ability.

DIRECT COSTS

Construction

The construction costs of the mall will be about $280,000/block in 1974 dollars, which, for a 9-block length, will be $2.52 million (2, p. 60).

Design Fees and Legal Fees

The fee for such a large-scale project often can reach 10 percent of the direct construction costs, which would give a total design and legal fee of about $250,000.

Utility Improvements

At present, no utility upgrading is planned for the 16th Street mall. However, it would perhaps be reasonable to include $250,000 for an estimate to include unforeseeable problems.

Traffic Control Device Improvements

For the traffic rerouting scheme shown in Figure 1, approximately 43 intersections will be changed because a reversal in direction is needed on 13th, 14th, and 15th Streets and part of 16th Street. The Department of Public Works of the city and county of Denver has estimated that the cost to retime the signal controllers, remount signs and signals, purchase new signs, change pavement markings, and complete all other necessary changes would be about $10,000/intersection, or $430,000. When this is added to the total of $100,000 required for modifications to the signals and signs on the 10 intersections on the mall itself, the total will reach $530,000. Other changes that may be made at the time the rerouting is completed include the following:

Change	Cost (dollars)
Improvements to Colfax Avenue between Bannock Street and Broadway	100,000
Widening of 18th Street between Broadway and Lincoln Street	20,000
Rerouting of Speer Boulevard northbound between Lawrence and Wazee Streets	350,000
Other miscellaneous changes to 15th and Delaware Streets	175,000
Total	645,000

Total direct and indirect costs for traffic control improvement is $1.175 million.

Side-Street and Alley Improvements

The plan for 16th Street does not provide for alley and side-street improvements, but the analysis could be expanded to include such cost considerations. Such improvements could be used to link the mall directly to other parts of the downtown area and might include improved lighting and pavement and pedestrian canopies. About $200,000 could be spent for alley and side-street improvements for certain key locations on a demonstration and trial basis (2).

Operation and Maintenance

Total cost for mall maintenance and operation has been estimated to be $135,000 for the first year and $82,000 for each additional year. If a 25-year life is assumed and a 6 percent/year inflation factor is used, then the present worth of the operation and maintenance of the mall over a 25-year period, starting in 1974, would be $1.164 million (3, p. 691, Table 7).

Disruption of Traffic Flow

Because 16th Street will be closed, drivers who usually use 16th Street will have to choose an alternate route. Let us attempt to determine the value of the time lost to drivers because of this rerouting according to the following assumptions:

1. Each driver will lose 0.5 min/trip.
2. Total number of people affected per day will be equal to the present weekday vehicular traffic on 16th Street.
3. Time lost will be significant on weekdays only (260 days/year).
4. Value of time lost in 1974 dollars will be $2/h.

The traffic counts conducted by the Joint Regional Planning Program in 1971 showed that a weekday average of about 16,100 vehicles/day travel on 16th Street in the mall area. The value of time lost then would be $34,900/year in 1974 dollars. Over a 25-year period, if we use the uniform series, present worth factor for i = 6 percent, and p = 24 years as we did before, then this would total $472,900.

Disruption of Bus Routes

The Denver Regional Transportation District (DRTD) was contacted to determine how many buses traverse 16th Street during weekday rush hour. Rerouting will cause a slight delay for the buses. DRTD indicated that 207 buses were scheduled to go to the CBD between 7 and 8:30 a.m. on weekdays and 222 buses were scheduled between 4:30 and 6 p.m. DRTD also indicated that about 85 percent of these buses travel on 16th and 17th Streets. Let us assume that half of this 85 percent travel on 16th Street. This means that 182 buses will be affected per day. If we assume 0.5 min of delay/bus and that bus occupancy averages 10 people, total number of days per year is 260, and value of time lost is $2/h, then the total value of time lost per year would be $473,000. Over a 25-year period, this would total $6.41 million. This is a tremendously large figure and is probably somewhat unrealistic because planned bus system improvements, such as exclusive bus lanes in the CBD, may alleviate these time delays. Let us assume therefore that all of the bus system improvements will be completed within a year after the mall is completed. The value of time lost then would be $473,000. This cost applies only for option 1.

Total Direct Cost of Mall

When mall operating and maintenance costs for a 25-year period are included, total direct cost of the mall would be $7.6 million for option 1 and $7.1 million for option 2 (Table 1).

DIRECT BENEFITS

Retail Sales Estimate

The 1967 census of manufactures showed that the entire Denver CBD retail sales total for 1967 was $168 million. If we raise this value to 1974 dollars and make no allowance for overall net growth or decline, it would be $237.6 million. The 16th Street Commercial Center does not, however, constitute all of this sales volume. A simple method of estimating the percentage of the total of the CBD retail sales volume that can be allocated to 16th Street has been devised based on the ratio of the retail sales floor space of 16th Street to that of the total CBD.

One source showed that the retail sales floor space for the CBD is 2.543 million ft^2 (0.229 million m^2). A survey by the Denver Planning Office of the establishments on 16th Street showed that a total of 2.025 million ft^2 (0.182 million m^2) of floor space is devoted to retail sales (including eating and drinking establishments) between Lawrence Street and Cheyenne Place on 16th Street. Thus 16th Street retail floor space occupies 79.6 percent of the entire CBD retail floor space. Multiplying the 1974 estimated total of $237.6 million in retail sales for the CBD by this factor results in an estimate of $189.1 million in retail sales for 1974 on 16th Street between Lawrence Street and Cheyenne Place. Of course, this estimate may not be altogether accurate. It represents the best information available at this time. However, retailers are unwilling to provide any information that may divulge their sales figures to their competitors. Other possible sources of such information such as state revenue officials, the Denver Chamber of Commerce, the Denver Planning Office and the Denver Regional Council of Governments were consulted, and no information was received. Certainly if a mall feasibility analysis is to be seriously considered these data must be made available.

Prediction of Increase in Retail Sales

The best method for predicting increases in retail sales for a new mall appears to be one that bases the estimate on the results that have been obtained in other cities where malls have been constructed. Again, however, reliable data are not available. The data given in Table 2 summarize the results that have been reported in other cities. Unfortunately, the techniques that were used to obtain these data were not explained. Most of the sources report that the data are "spotty," but that, generally retail sales have risen from 4 to 40 percent in the first year after the mall opening (4, p. 24).

In Table 2, the figures for retail sales percentage increase represent the lowest value that was found in the literature or an average value if it was available. From the data given in Table 2, it appears reasonable to predict that the 16th Street Mall would produce a 15 percent increase in retail sales for at least the first year. Table 3 gives retail sales predictions (in 1974 dollars) based on the following assumptions:

1. Base-line yearly sales figure will be $189.1 million for 1974;
2. Mall will be completed in 1976;
3. Value of the dollar will increase at 6 percent/year;
4. Retail sales, except those due to the mall, will show no net growth;
5. Mall will cause a 15 percent increase in sales in the first year, and after 5 years this will decrease to zero and hold constant; and
6. Fifty percent of sales tax revenues will be diverted from locations outside Denver, and 50 percent will come from within Denver.

Figure 1. Possible revised traffic routing for 16th Street Mall.

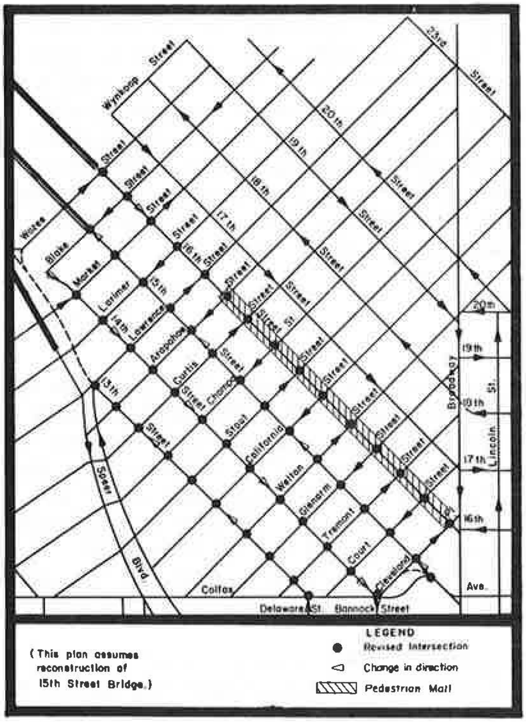

Table 1. Estimate of total direct costs.

Item	Cost (dollars)
Construction	2,520,000
Design and legal fees	250,000
Utility improvements	250,000
Traffic control device improvements	530,000
Other traffic control improvements and street construction	645,000
Side-street and alley improvements	200,000
Cost growth and uncertainty allowance[a]	1,095,000
Operating and maintenance costs[b]	1,164,000
Disruption of traffic flow	472,000
Disruption of bus routes[c]	473,000
Total for option 1	7,599,000
Total for option 2	7,126,000

[a]Based on approximately 25 percent of $4,395,000, which is the subtotal of the first six items.
[b]For 25-year period i = 6 percent: $135,000 first year and $82,000 each successive year.
[c]For option 1 only.

Table 2. Characteristics of selected U.S. malls.

Location	Cost/Linear Foot (dollars)	Cost (thousands of dollars)	Percent Increase in Retail Sales
Fresno, California	1,010	1,841	14
Springfield, Illinois	—	—	14
Kalamazoo, Michigan	108	120	15
Knoxville, Tennessee	712	313	20
Pomona, California	213	640	20
Atchison, Kansas	333	300	11
Danville, Illinois	—	112	7
Jackson, Michigan	97	75	30
Providence, Rhode Island	543	530	5
Santa Monica, California	391	703	5
Miami, Florida	200	600	10
Eugene, Oregon	1,587	1,800	16
Minneapolis, Minnesota (7)	1,460	3,874	13
Louisville, Kentucky (8)	615	1,500	15
Denver, Colorado[a]	850[b]	2,520	—

Note: 1 ft = 0.305 m.
[a]Proposed.
[b]Uses construction costs as estimated for this report for a mall length of 2,970 ft (103 m) (9 blocks).

Table 3. Estimate of increased sales tax revenues.

Year	Retail Sales Without Mall (millions of dollars)	Retail Sales With Mall (millions of dollars)	Percent Increase Over Previous Year
1976	189	218	15
1977	189	245	12
1978	189	262	9
1979	189	278	6
1980	189	286	3
1981 to 2000	3,780[a]	5,720[b]	0
Total	4,725	7,009	

[a]$189 million/year. [b]$286 million/year.

Increased sales due to the mall will be $2,284 million, increased city sales tax (at 3 percent) will be $7.1 million, and direct benefits due to increased sales tax revenues (half of the total) will be $3.6 million. The increased sales base that results in 1980 also provides a greater sales volume on each of the 20 remaining years of the mall's possible 25-year lifetime by $97 million/year, if we assume that the sales level will remain constant after 1980. Unfortunately, we do not have enough long-term data on malls to determine whether the gains in sales that occur early in the life of the mall will hold constant later or whether they will taper off. These gains may be permanent because, historically, malls have proved to be a stimulus for new construction and investment in the area after they have been in operation for some time.

Property Tax Revenues

The Assessment Division of the city and county of Denver was contacted to estimate the assessed value of the retail establishments on the proposed mall. The 1973 property tax records were used to determine total property tax revenues received by the city and county of Denver from all of the owners of property with frontage on 16th Street on the 9-block length of the proposed mall. Table 4 gives the assessed value and property taxes by block according to the 1973 mill levy of $73.301 per $1,000 assessed valuation.

The total 1973 property tax revenues from these businesses was $2.190 million. Let us assume that the mall will increase the property values of these businesses in a fashion based on the following results for malls in 3 other U.S. cities (4):

1. Kalamazoo, Michigan, reported a 30 percent increase in property values;
2. Knoxville, Tennessee, reported a 27 to 75 percent increase in property values; and
3. Pomona, California, reported a 20 percent increase in property tax revenues.

From these results it appears reasonable to assume that assessed value and, consequently, property tax revenues will increase by at least 20 percent. The planning period again will be 25 years. We will assume that

1. Property tax revenues will increase at an annual rate of 4 percent/year for 5 years and then will hold constant for the remainder of the 25-year period.
2. Net assessed values will stay constant except for increases due to the mall.
3. Mill levies will be $73.301 per $1,000 assessed value.

A summary of the situation is given in Table 5. Increased property tax revenues will be approximately $11 million.

Total Direct Benefits

Total direct benefits of the mall is the sum of the increase in sales tax and property tax revenues attributable to the mall. This estimate for both options 1 and 2 is $14.4 million.

Direct Benefit-to-Cost Ratio

At this point in the study, calculating a benefit-to-cost ratio for direct costs and benefits is possible. If at this point the benefit-to-cost ratio is less than unity, the proposal should be deemed unfeasible. If the ratio is greater than 1, then one should evaluate the effects of the indirect costs and benefits on the direct benefit-to-cost ratio. For option 1, the direct benefit-to-cost ratio is $14.4 million/$7.6 million or 1.9. For option 2, the direct benefit-to-cost ratio is $14.4 million/$7.1 million or 2.0.

COST-BENEFIT ANALYSIS

After calculating a benefit-to-cost ratio for the direct quantifiable costs and benefits, one must determine the effect on the benefit-to-cost ratio of those factors that are not readily quantifiable. The technique presented here involves presenting the decision maker with the following:

1. Relevant background information that shows, if possible, the results of experience gained in other cities with malls,
2. Evaluation in the form of a decision tableau that the decision maker uses to assign a weighting factor for each of the cost and benefit areas and for each of the alternative configurations, and
3. Benefit-to-cost ratio adjustment that takes into account the results of the weighting factor assignment.

Indirect Costs

Parking Problems

A study of parking availability in the Denver CBD (5) indicated that "in relationship to the proposed 16th Street mall the existing supply of parking appears to be adequate as to both amount and location." So for this study no cost impact for parking will be shown.

Disruption During Construction Phase

Little comment on this problem has been made in the literature. Consequently, even though one might anticipate a certain decrease in retail sales and an increase in congestion during construction, this effect will have to be estimated by assigning a weighting factor because of the lack of available data.

Disruption of Mail and Goods Delivery

Preliminary plans for the Denver mall call for the use of existing cross streets and alleys for goods delivery. This is similar to the method used on the Nicollet Mall where there have been no serious problems with store deliveries. The possibility of problems occurring especially during the early stages of the mall's operation should not be overlooked, however. Therefore, weighting factors should be included to allow for this contingency, and the factor for option 2 will be somewhat lower than that for option 1 because the transit way may be used for mail delivery.

Indirect Benefits

Open Space and Aesthetic Improvements

This factor is clearly a function of mall design. Its relative importance will be determined by the decision maker's value system in assigning a weighting factor. Architectural renderings of the mall help in making this evaluation.

Lower Noise Levels

An interesting experiment in this area was conducted during the summer of 1970 with

Table 4. 1973 assesed value and property taxes on 16th Street by block.

Block	Assessed Value (thousands of dollars)		Property Taxes (thousands of dollars)	
	Southwest Side	Northeast Side	Southwest Side	Northeast Side
Curtis	2,452.6	6,487.0	179.8	475.5
Champa	331.4	501.4	24.3	36.8
Stout	645.2	821.8	47.3	60.2
California	2,060.7	726.0	151.1	53.2
Welton	753.3	957.2	55.2	70.2
Glenarm	592.9	474.2	43.5	34.8
Tremont	670.7	1,395.6	49.2	102.3
Court	3,753.2	980.2	275.1	71.8
Cleveland	5,534.0	738.0	405.6	54.1

Table 5. Estimate of increased property tax revenues.

Year	Property Taxes Without Mall (millions of dollars)	Property Taxes With Mall (millions of dollars)	Percent Increase Over Previous Year
1976	2.19	2.28	4
1977	2.19	2.37	4
1978	2.19	2.46	4
1979	2.19	2.56	4
1980	2.19	2.66	4
1981 to 2000	43.80[a]	53.20[b]	0
Total	54.75	65.53	

[a]$2.19 million/year. [b]$2.66 million/year.

Table 6. Indirect cost evaluation.

Cost Area	Weighting Factor[a]	
	Option 1	Option 2
Parking problems	0	0
Disruption during construction	10	10
Disruption of mail and goods delivery	10	5
Total	20	15

[a]This factor can range from zero to 100. One hundred is equivalent to all direct quantifiable costs that will result from the mall.

Table 7. Indirect benefit evaluation.

Benefit Area	Weighting Factor[a]	
	Option 1	Option 2
Open space and aesthetic improvements	10	5
Lower noise levels	10	5
Lower localized pollution	10	5
De-emphasis of automobile	5	5
Social gathering and interaction place	5	3
Emphasis on public transportation	5	10
Increased safety	10	7
Greater future business activity	10	10
Uncertainty of mall's revenue generating ability	-25	-25
Total	40	25

[a]This factor can range from zero to 100. One hundred is equivalent to all direct quantifiable costs that will result from the mall.

the temporary closing of New York City's Fifth Avenue to vehicular traffic. Noise levels dropped from 78 decibels to 58 decibels, which is extremely significant (6). There is no reason to assume a similar decrease would not occur in an urban mall such as the proposed 16th Street mall. Option 1 would decrease noise levels more than option 2.

Lower Localized Pollution Levels

The Fifth Avenue closure produced impressive results in decreasing the level of carbon monoxide along the avenue. The reduction was from 30 parts per million to 5 parts per million. Equally impressive results were recorded in Tokyo, Japan, and Marseilles, France. Exclusion of vehicles reduces street-level concentrations of pollutants, especially carbon monoxide, but does little to improve the city-wide pollution problem. Thus the value of this local pollution reduction effect is difficult to determine directly and a weighting factor is used. Option 1 would serve to reduce pollutants along the mall better than option 2. This should be reflected in the weighting factors.

Emphasis on Public Transportation

Option 2 probably would emphasize public transportation more than option 1, and this should be reflected in the weighting factors.

De-emphasis of Automobile

This is an indirect benefit of vehicle-free zones because they may tend to orient people's thinking toward finding alternatives to the automobile for shopping.

Social Gathering and Interaction Place

Malls in other cities have served to bring people together for community-related purposes such as art festivals, fund-raising drives, and musical presentations. The value of this aspect of the mall will be estimated by the decision maker by what weighting factor is assigned. Option 1 probably would be of more value than option 2 in serving as a public gathering place.

Increased Safety

The improvement in safety that will result from the mall can be quantified in terms of a dollar cost reduction to society.

Unfortunately, neither the Police Department nor the Traffic Engineering Department was able to provide any accident statistics for 16th Street in the proposed mall area. The street is a heavily traveled 1-way thoroughfare with an average daily traffic volume of nearly 20,000 vehicles at the southern end of the proposed mall and an average daily traffic volume of about 13,500 vehicles at the northern end. One-way cross streets are spaced at $\frac{1}{16}$-mile (0.88-km) intervals. One can assume that several accidents must occur each year along the 9-block length of the proposed mall. If the mall is constructed, however, it is reasonable to assume that those accidents that occur at the intersections will be eliminated. Because of the lack of data on accidents on 16th Street, we recommend that safety be treated as an indirect benefit for this example. Of course, pedestrian safety also should be considered, and one would expect that option 1 should have a slightly higher weighting factor for safety than option 2.

Greater Future Construction Activity

Several cities have noted a significant increase in business activity after malls have been in operation. Business activity can take the form of lower vacancy rates, increased investment, new construction, and higher rental rates. The Minneapolis Nicollet Mall has apparently generated more than $250 million in new construction, according to the Denver Planning Office. As more data become available from other malls, this factor can be moved from the indirect to the direct benefit category. For this study, using the weighting factor method for evaluation will suffice.

Uncertainty of Mall's Revenue Generating Ability

The direct benefits of the mall depend on predictions of increased retail sales and increased land values. Although these predictions are based on data reported by cities with malls in operation, these predictions are, to a certain degree, uncertain because of the assumptions that must be made. This uncertainty will be considered as a "negative benefit" and will be assigned a negative value in the benefit evaluation table.

Evaluation of Indirect Costs and Benefits

After the decision maker has received a presentation of the supporting information, he or she can complete the weighting factor assignment by using a form similar to Tables 6 and 7, the evaluation tables. In Tables 6 and 7, the weighting factors given are ours and are included only for illustration. This approach is conceptually and mathematically simple and is based on the value system of the decision maker.

Adjusted Costs

The procedure for determining adjusted costs is as follows:

$$C_j = \text{direct costs} + \text{indirect costs}$$

$$= \text{direct costs} + (\text{direct costs} \times \text{sum of weighting factors in decimal form})$$

where C_j = adjusted costs for option j. According to the data in Table 6, the following applies for options 1 and 2:

$$C_1 = \$7.60 \text{ million} + (\$7.60 \text{ million} \times 0.20)$$

$$= \$9.12 \text{ million}$$

$$C_2 = \$7.13 \text{ million} + (\$7.13 \text{ million} \times 0.15)$$

$$= \$8.20 \text{ million}$$

Adjusted Benefits

The procedure for determining adjusted benefits is as follows:

B_j = direct costs + indirect costs

= direct costs + (direct benefits × sum of weighting factors in decimal form)

where B_j = adjusted benefits for option $_j$. According to the data in Table 7, the following applies for options 1 and 2:

B_1 = \$14.4 million + (\$14.4 million × 0.40)

= \$20.2 million

B_2 = \$14.4 million + (\$14.4 million × 0.25)

= \$18.0 million

Overall Benefit-to-Cost Ratio

Any alternative with a benefit-to-cost ratio less than 1 should not be considered feasible. Of those feasible alternatives, the one with the largest benefit-to-cost ratio should be selected for implementation.

$R_j = B_j \div C_j$

where R_j = benefit-to-cost ratio for option j. For our case study of option 1

B_1 = \$20.2 million

C_1 = \$9.1 million

R_1 = 2.2

and option 2

B_2 = \$18.0 million

C_2 = \$8.2 million

R_2 = 2.2

Thus for this case study both options appear to be feasible. That the benefit-to-cost ratios were the same is to be expected because the direct benefits for the 2 alternative configurations were considered equal. This was done because no other information was available on which to base the estimates.

RECOMMENDATIONS

The model presented herein is only as meaningful as the information on which the feasibility study was based. There is a pressing need to accumulate a large amount of data on the costs and benefits of malls currently in operation. And this necessitates the release of certain information, such as retail sales data, that is not generally released by private enterprise. If such data could be obtained, then this model would be more than just an exercise in making learned assumptions; it could be a helpful tool.

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