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WATERFRONT REDEVELOPMENT:
A COST-BENEFIT ANALYSIS OF KNOXVILLE'S WATERFRONT

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WATERFRONT REDEVELOPMENT: A COST BENEFIT ANALYSIS OF KNOXVILLE'S WATERFRONT PROJECT

Introduction

During the past thirty years, the urban waterfront has experienced dramatic changes. As the primary focus has shifted from the transportation and manufacturing industries, the land use patterns of waterfronts have been altered. Thus, many cities are faced with the problem of vacant and brownfield land. To prevent the further degeneration of waterfronts, cities are actively pursuing revitalization strategies. These strategies increasingly emphasize amenities to attract and retain people and firms to the waterfront area. One such example is Knoxville, Tennessee, which is pursuing a redevelopment scheme for the downtown area adjacent to the Tennessee River. Because public funds are used for the redevelopment project, it is important to ensure the efficient use of these funds. Therefore, through the framework of a cost-benefit analysis, an evaluation of the feasibility of the Knoxville waterfront project will be determined.

The History of the Problem

Over the years, waterways have held three primary functions: "nourishment, irrigation and transportation" (Breen and Rigby 13). Communities are often located near waterways to take advantage of these benefits (11). North American waterways have significantly impacted population and land use patterns

throughout the continent. Early communities' growth hinged upon successful navigation of these streams, rivers, and lakes. Both people to settle the communities, as well as the goods required for sustainment of life, were brought along the waterways. Major industries and modes of transportation, such as railroads, were established adjacent to waterfronts throughout the 1800s. Easy access to the water for use in industrial processes was provided by the nearby waterways (Saliba 1). However, after World War II, ports began to degenerate as industries and transportation moved away from waterways (Breen and Rigby 12). "Technological advances and changes in the field of transportation eventually led to less emphasis of waterways nationwide. Improved trains, trucking, the interstate system, planes, and containerized shipping" all contributed to the decline of the ports and the areas around them (Saliba 1). This decline produced derelict and redundant land areas in central business cores of cities worldwide (Riley and Shurmer-Smith 43). However, this land can provide opportunities for redevelopment by capitalizing on people's affinity for water. In waterfront revitalization projects, this affinity is drawn upon as an amenity in itself, as well as a means for complementing other parts of the broader redevelopment concepts. Phillip Morris states that people "find an essential allure at any water's edge. Nothing can equal a waterfront's sense of distant places and romance." (Saliba 4). Thus, waterfront revitalization projects focus not only on the areas directly adjacent to the water, but also on bolstering the entire central business core.

Just as waterfront areas around the world have changed dramatically, so has the Knoxville waterfront. In Knoxville, the Tennessee River has functioned as a lifeline of transportation and industry. However, with the advent of new technologies, river transportation became obsolete and many industries began moving away from the riverfront and closer to new transportation avenues, such as interstates. Therefore, the waterfront began to play much less important roles in Knoxville. With the exception of *Calhoun's on the River's* establishment, a popular local restaurant, the waterfront possibilities were virtually ignored after industries moved. Finally, in 1996, the City of Knoxville spearheaded an attempt to revitalize the waterfront area with the proposal of *Volunteer Landing*, a cultural and recreational development. Through the redevelopment efforts of the City of Knoxville, economic, social, environmental and preservation concerns are being addressed.

The Need for the Project

The Knoxville waterfront development project involves several issues in urban redevelopment which are a common to waterfront revitalization projects worldwide. Economic, social, environmental, and preservation concerns are primary to most waterfront projects (Breen and Rigby 15-17). In Knoxville's endeavor to create a successful waterfront development, six recommendations from the *Waterfront Task Force* have been considered.

- The establishment of a "Greenway" system of regulations for the waterfront to aesthetically improve the area;
- Recreational development of the area along Neyland Drive;
- Development of the historic facilities at Bicentennial Park;
- Implementation of water quality programs to improve the ecology of the downtown area;
- The encouragement of economic growth; and,
- An entity to manage the project ("Volunteer Landing").

"Born from these goals, *Volunteer Landing* is a three phase project encompassing public and private developments of cultural and recreational amenities as well as commercial and residential developments" ("Volunteer Landing").

The Role of the Government

Because open-access recreational and cultural facilities are rarely provided by the private sector, the City of Knoxville decided to provide such accommodations with Volunteer Landing. The public projects of *Volunteer Landing*, such as the riverfront area, the Women's Basketball Hall of Fame, and the Gateway Regional Visitor's Center, provide for collective consumption. Collective consumption is a case where many individuals can enjoy the benefits of these facilities without reducing the benefits enjoyed by others, contrasting greatly with the provision of private goods. Because the social benefits and costs from the project will not be met the profit motive of the private sector, an under provision of the good is expected (Messner 16). For example, if constructed by the private sector, the walkways and riverfront area at *Volunteer Landing* would not have been as extensive. Instead, these facilities would have been developed

solely to support private businesses. The cultural and recreational objectives of the large-scale waterfront project also lead to problems with "free riders." In the private world, people can easily avoid the construction costs, but then take advantage of the project's benefits if it is a public project. To avoid this free-rider problem, the project can be completed by the government; thus everyone is forced to pay for the project, even those who do not value the facility (16). The private sector usually has no direct advantages in building a public use recreational facility. A private company may provide recreational or cultural facilities if the project complements their business goals or if they are interested in philanthropic contributions to the community. Therefore, the public sector must bear the costs of the waterfront project. But, the presence of collective consumption opportunities is insufficient. The question remains as to whether this investment is a net social gain for the community.

Background of a Cost-Benefit Analysis

Methodology

Through a specific methodology built upon the standard principles of a cost-benefit analysis, the appropriateness of this public intervention will be determined. This cost-benefit methodology will determine the feasibility of the Knoxville waterfront project on the Tennessee River. In a cost-benefit analysis, increases in the utility of the population are ideally weighed against the project costs to justify a project. But, since utility is not directly observable, this study

focuses on comparing the monetary costs to the perceived benefits of the project. To complete a cost-benefit analysis, several steps must be taken in order to appropriately compare costs and benefits. Of course, the categorization of the costs and benefits of the project significantly affects the outcome of the analysis.

The first step of the cost-benefit analysis is determining the applicable costs and benefits. How costs and benefits are categorized can strongly influence the outcome (Messner 31). Obviously, the costs of the project include the costs of construction, plus any detrimental effects on the environment or society that the project might have. Implicit to the computation of the costs is a reasonable degree of competitiveness for the project. Since bidding generally determines the price of public projects, a reasonable degree of competition can be assumed for this project.

The benefits will include the measurable stimulation of the economy as well as the immeasurable aesthetic and recreational improvements (19). Although "a basic assumption of a cost-benefit analysis is that the value of goods or services produced by a public project can be determined," in many instances, these costs or benefits cannot be measured (19). Thus, the treatment of immeasurable costs or benefits, or intangibles, can significantly alter the final analysis. These intangible benefits are the non-quantifiable aspects of the project, such as the value of a view, environmental effects, or solutions which account for distributional concerns (20). For this project, only measurable costs and benefits will be used.

Just as the categorization of the benefits and costs can greatly impact the analysis, so can the choice of the relevant population. The population which is affected must be carefully identified. This study will focus on gains to the City of Knoxville, using monetary gains as a proxy for increases in utility. Therefore, increases in revenues spent in Knoxville will be considered a benefit and the relevant costs will be the monetary input of the City of Knoxville to the project.

Capital Budgeting Issues

Next, capital budgeting issues must also be examined when performing a cost benefit analysis. Issues such as the project time path, the appropriate choice of discount rate, and the other possible methodologies arise. The benefits and costs accumulate over a period of years (Messner 21). In the case of the Knoxville waterfront, the project's time path will be assumed to be twenty-five years. Within these twenty-five years, structural deterioration as well as changing trends in recreation and retailing may have surpassed the project's usefulness.

In order to compare the costs and benefits, the net present value approach is utilized to discount the value of the costs and benefits to a comparable standard. Several concerns must be considered when using the net present value method. Most importantly, the costs and benefits of a public project often occur over a period of time. The "analysis must include a time dimension to reflect time preferences" for money received today rather than money received in the future (Messner 21). To account for these preferences, a discount rate, or social rate of

discount, is chosen to represent the opportunity cost of taking money out of private sector consumption and investment. Instead, this money is invested in the public sector (21). Projected benefits and costs will be discounted to 1997, the beginning year of the project. Using the formula

$$NPV = \sum_{t=1}^{r} = \frac{B_t - C_t}{(1+r)^t} \qquad (1)$$

the net costs will be compared to the net benefits in order to decide on the project's success. As a secondary method of deeming the project's worthiness, the benefit cost ratio will be computed. The formula

$$\frac{B}{C} = \sum_{t=1}^{n} = \frac{B}{(1+r)^t}$$

$$\sum_{t=1}^{n} \frac{C}{(1+r)^t} \qquad (2)$$

computes the ratio of benefits to costs. If the ratio is greater than one, the project is deemed a "winner" and should be completed. Through the use of a discount rate, the net present value of the project will be calculated.

Not only can such aspects of the project as the change the outcome of the analysis, but so can other issues involved with computing the ratio. Inappropriate choice of discount rates can lead to improper justification or rejection of projects; so, the use of an appropriate discount rate is vital to the credibility of the analysis.

If a high discount rate is chosen with a project which provides small short term benefits vis-à-vis long term benefits, the present value of the project will be quite small. Thus, a cost-benefit ratio would reject a great number of projects. The opposite is true for a low discount rate. Because projects are accepted or rejected based on the chosen discount rate, this choice has taken on ideological overtones. Those people who oppose large governments might, for example, tend to prefer high discount rates. Conversely, those who agree with government intervention might prefer lower discount rates (Rosen 231-233). With this in mind, three discount rates representing a range of possibilities will be used in measuring the benefits and costs of the Knoxville waterfront project. This method of "sensitivity testing" demonstrates the discount rates' effects on the assessment of the project. Inflation must also be considered in these discount rates (225-227). Nominal discount rates will also include the nominal cost of inflation, which averaged about 2.43% for the past five years (Bureau of Labor Statistics). A discount rate of six percent will represent the opportunity cost of taking money out of consumption in the private sector. The eight percent discount rate will denote an intermediate opportunity cost, the combination of opportunity costs of private investment and consumption. Finally, the highest estimation of the discount rate at ten percent will represent the opportunity cost solely of private investment (Rosen 231). By providing information on several discount rates, any disputes

over the appropriateness of the results can be avoided. Using these discount rates, the benefits accrued because of the waterfront project can be measured.

The Cost-Benefit Analysis

Measuring Benefits

The localized benefits of Knoxville's riverfront development consist of increases in utility of Knoxvillians, which would not have arisen without the project. Both quantifiable and non-quantifiable benefits in the Knoxville area have emerged due to the waterfront project. One of the goals of the Volunteer Landing is to promote economic development near the banks of the Tennessee River. This goal has been met with the construction of such facilities as the Riverside Tavern, the Women's Basketball Hall of Fame, the private condominium development, the private "strip mall," the additions to the public boat docks and the Gateway Regional Visitor's Center. These facilities all promote economic activity along the river and within Knoxville. As for non-quantifiable benefits, the recreational facilities (walking/jogging path and benches, etc.) and the aesthetic qualities of the improved riverfront correspond to another goal of Volunteer Landing—to provided better recreational and leisure facilities along the river ("Volunteer Landing"). Due to the riverfront project, many increases in utility of Knoxvillians can be observed.

After establishing the preceding benefits, they must also be classified as real or transfer benefits. But, an important distinction between real and transfer

benefits must be drawn in any cost benefit analysis. Because increases in utility may simply be transferred from another section of the city, they cannot be considered in the final analysis. However, it is impossible to determine if the utility is simply transferred from one section of the city or if utility actually increases. Therefore, this study assumes that the parts of the project that have reasonable substitutes in the Knoxville vicinity will be considered transfer benefits because their increase in utility is indeterminable. Under this precept, several of the perceived benefits of the riverside project must be withdrawn from the cost-benefit analysis. For instance, the Riverside Tavern is an important addition to the riverfront project. However, as Knoxville has many restaurants of similar nature and one such restaurant also on the waterfront, it is assumed that the revenues from Riverside Tavern are simply being transferred from these other restaurants. Likewise, it is assumed that the private condominium development is transferring benefits from other condominium and apartment developments within the city. Also, the private strip mall and the recreational facilities also exist elsewhere in Knoxville; therefore, they too are excluded from the final analysis. After all the transfer benefits from the Knoxville community are excluded, [1] the waterfront project has produced only three benefits which will be considered real

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[1] The transfer benefits may, in fact, produce greater utility gains (the utility of eating at one restaurant or another may be greater to an individual). But, it is impossible to reasonably estimate these utility increases.

benefits:[2] the Women's Basketball Hall of Fame, the Gateway Regional Visitors Center, and the additions to the public boat docks. The sum of the real benefits is computed by discounting future benefits to the present.

In order to quantify the benefits of the Women's Basketball Hall of Fame and the Gateway Regional Visitor's Center, attendance projections are necessary. For this study, only the out-of-town visitors will be considered because the residents of Knoxville are simply transferring their expenditures from other local attractions. Therefore, the expenditures at these locations are assumed to produce no net gain in utility (revenues) for Knoxville. Any gains are merely transferred from other attractions in Knoxville. According to the Gateway Regional Visitor's Center projections and statistics published in the Knoxville News-Sentinel, attendance per year will be as follows.

Table 1

Expenditure Source	Estimated Number of Yearly Visitors	Estimated Number of Out-of-Town Yearly Tourists
Gateway Regional Visitor Center	42,000	8,400
Women's Basketball Hall of Fame	66,000	46,200

Source: Gateway Regional Visitor's Center and Flesner

[2] Although some of the spending at these facilities is generated by Knoxville residents, no way to reasonably estimate the increase in utility exists.

Now, the attendance projections are multiplied by the average projected expenditures of visitors. Although both in-town and out-of-town people visit the attraction, a distinction between the two must be drawn because the in-town visitors are simply transferring benefits from other areas of town. The out-of-town visitor must include such expenses as lodging and high transportation costs in their total expenditure. Because visitors to the riverfront attractions are assumed to have heterogeneous preferences, their total expenditures along the waterfront will be tabulated. The Knoxville Chamber of Commerce estimates that out-of-town visitors will spend $20 per person at the Visitor's Center and $30 per person at the Hall of Fame. These expenditures include expenses associated directly with visits to the Hall of Fame or Visitor's Center. For example, a simple weighted average admission price of $6.95 at the Women's Basketball Hall of Fame is included.[3] Also, a meal or souvenir is also included (Women's Basketball Hall of Fame). However, the entire price of lodging and transportation is not included because these expenses are not directly incurred as a result of visits to the riverfront area. Lodging and transportation expenses may be spread among several local attractions.

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[3] Although admission prices are determined by age, a simple weighted average of the admission prices is used because other necessary information is not available for a true weighted average based on age-determined admission price.

The total yearly revenues generated from out-of-town tourists will be approximately $1.6 million dollars per year. The multiplier effect must now be factored in to the equation to account for the number of times that money is "re-spent" in Knoxville.

Table 2

Expenditure Source	Revenue Generated from Out-of-Town Tourists*
Gateway Regional Visitor Center	168,000
Women's Basketball Hall of Fame	1,386,000
Total	**$ 1,554,000**

* $20 per person-Visitor's Center
$30 per person-Hall of Fame

Source: Hall of Fame and Chamber of Commerce

The multiplier effect takes into account the overall effect of an expenditure. In addition to the initial expenditure, that money is "re-spent" and again stimulates the economy. Using an output multiplier of 1. 67, the initial revenues are multiplied by the output multiplier (U.S. Data Center).

Table 3

Expenditure Source	Total Initial Revenues	Total Revenues due to Multiplier Effects*
Gateway Regional Visitor Center	168,000	280,560
Women's Basketball Hall of Fame	1,386,000	2,314,620
Total	**$ 1,554,000**	**$2,595,180**

*Output Multiplier is 1.67

Source: U.S. Data Center and Author's Calculations

By considering the multiplier effect, the total annual revenues grow to approximately $2.6 million. In order to compare these benefits to the costs, they must be summed and discounted to the base year of 1997.

"Sensitivity testing" is used to produce revenues at three discount rates. These discount rates are six, eight, and ten percent are each used in Equation (1) with a time-frame of twenty-five years.

Table 4

Discounting Benefits

Expenditure Source	6%	8%	10%
Gateway Regional Visitor Center	$3,586,498	$2,994,915	$2,546,654
Women's Basketball Hall of Fame	29,588,612	24,708,050	21,009,898
Total	**$33,175,110**	**$27,702,966**	**$23,556,553**

Source: Author's calculations

As shown in Table 4, the total real benefits of the Knoxville waterfront project vary from $23.5 million to $33.1 million, depending upon the discount rate utilized. In order to complete the cost-benefit analysis, the costs of the project must be identified next.

Determining Costs

In identifying the costs involved in creating the waterfront project, total public expenditures related to the construction and maintenance of the facilities is considered. Due to substantial private investment, the public contributions constitute only a fraction of the entire cost of the project; however, these private contributions are not considered since the private sector is primarily profit motivated. Instead, only the public contributions are considered when determining the costs of the project. The project's effectiveness is being evaluated on the basis of the City of Knoxville, rather than by state, region, or country, because the project primarily benefits the city of Knoxville. The costs of the riverfront project include the construction, maintenance and energy costs of

Volunteer Landing, the construction costs of the Gateway Regional Visitors Center, the construction costs of the Women's Basketball Hall of Fame, and the construction costs of the Volunteer Landing Marina. After the benefits and costs are identified, they will be measured and weighed to conclude the net value of the waterfront project.

In measuring the costs of the waterfront project, the total project costs are determined. First, initial outlays for Volunteer Landing, the Gateway Regional Visitors Center, the Women's Basketball Hall of Fame, and the Volunteer Landing Marina are discounted to 1997, the beginning year of the project ("On-going Projects"). The maintenance costs of Volunteer Landing are projected to grow at 7.08 percent per year based on the growth between 1997 and 1998 ("Proposed Operating Budget 1999-2000"). These projections continue for five years until 2002, when they level off at $300,000 due to uncertainty of maintenance costs in the future.

Table 5

Estimated Costs

	1997	1998	1999	2000	2001	$x per year 2002-2022
Volunteer Landing (1997)	$ 10,000,000					
Gateway Regional Visitor Center (1999)		5,600,000.00				
Volunteer Landing Marina (1999)		100,000.00				
Women's Basketball Hall of Fame		164,000.00				
Maintenace Costs	202,683.62	217,033.62	232,399.60	248,853.50	266,472.32	300,000.00

7.09% per year until 2002

From 2002-2022 $300,000 per year

Source: Author's calculations based on City of Knoxville Publications

Next, these costs are discounted to the year 1997 and summed to determine the total costs for each discount rate.

As the discount rate increases, the present value of the total costs decreases.

Table 6

Discounted Costs
Base Year 1997

	6%	8%	10%
Volunteer Landing	$ 10,000,000	$ 10,000,000	$ 10,000,000
Gateway Regional Visitor Center	$ 4,983,980	$ 4,713,408	$ 4,628,099
Volunteer Landing Marina	$ 89,000	$ 84,168	$ 82,645
Women's Basketball Hall of Fam	$ 145,959	$ 138,036	$ 135,537
Maintenance Costs	$ 4,825,768	$ 2,902,179	$ 2,145,167
Total	**$ 20,044,708**	**$ 17,837,791**	**$ 16,991,448**

Source: Author's calculations

Therefore, the discounted costs at base year 1997 range from $16.9 million to $20 million. To complete the cost-benefit analysis, these costs must be compared with the benefits to determine the appropriateness of the project.

Analysis

The estimated costs and benefits of the Knoxville waterfront project have been determined at three different discount rates for the 25 year time horizon for the

study. The following table provides a comparison of the projected benefits and costs of the waterfront project.

Interestingly, the project reaps benefits at all discount rates, ranging from $6.5 million to $13.1 million. Because these discount rates favor different assumptions about the social cost, it is important to note that in each case the project is successful. Using Equation (2), the cost-benefit ratio can be computed at a 6%, 8%, and 10% discount rate. These benefit-cost ratios are well above the minimal 1.00 used to justify a project. Quantitatively, the Knoxville waterfront project is a success. But not only must these quantitative figures be examined, but also the qualitative issues.

Table 7			
	6%	**8%**	**10%**
Benefits	$33,175,110	$27,702,966	$23,556,553
Costs	20,044,708	17,837,791	16,991,448
Difference	**$13,130,403**	**$9,865,175**	**$6,565,104**
Source: Author's calculations			

Table 8			
	6%	**8%**	**10%**
Benefits	33,175,110	27,702,966	23,556,553
Costs	20,044,708	17,837,791	16,991,448
Ratio	**1.66**	**1.55**	**1.39**
Source: Author's calculations			

Intangible benefits from the Knoxville waterfront project must also be considered in the final analysis. Issues such as distributional concerns (i.e. which groups in Knoxville benefit from the project), prevention of suburban sprawl, aesthetic enhancement and increase in the quality of life are all at play in the

project. First, geographical distributional issues make the project even more attractive. In recent years, much private development has taken place in the West Knoxville area to the detriment of other regions of Knoxville. This project, as previously mentioned, not only concentrates on the area around the water's edge, but also the central business core. By redeveloping areas such as the central business core, Knoxville is preventing "suburban sprawl"—the "ever increasing congestion on arterial roads, a lack of meaningful civic life, the loss of open space, limited opportunity for children and others without cars, and a general discontent among suburbanites" (Fulton). This concept of an ever-increasing suburb "eating up" land and resources is an important issue for the urban and ecological environments. This new planning vision is a "reaction to conventional suburban planning as it has been practiced in the United States since the 1940s" (Fulton). In 1999, Public Chapter 1101 was enacted by the Tennessee State Legislature. This legislation gives each city and county the responsibility of managing growth. Increasing economic growth in the downtown area is a significant step in Knoxville's prevention of suburban sprawl, especially as Knoxville grapples with the Public Chapter 1101.

Just as distributional concerns affect the project's attractiveness, so do the enhancements to downtown Knoxville. The six goals of the Knoxville waterfront project include the aesthetic, cultural and recreational enhancement of the riverside area. The new cultural and recreational opportunities provided by the

Gateway Regional Visitor's Center, the Women's Basketball Hall of Fame and the Volunteer Landing help to improve the quality of life for Knoxvillians. These centers for learning and leisure enhance the Knoxville community. In addition, the improved aesthetic appearance of the riverside area also adds to the quality of life for Knoxvillians. Notably, quality of life is a major factor considered by businesses in their relocation efforts. By providing cultural, recreational, and aesthetically pleasing amenities, the Knoxville waterfront project is improving the quality of life for Knoxvillians, which in turn helps return exiting firms and attract relocating businesses. These same businesses, in turn, stimulate additional economic growth for the city. When both the quantitative and qualitative benefits and costs are considered, the Knoxville waterfront project can be deemed valuable.

Conclusion

The waterfront area in cities around the world is changing. As industries change, cities are reevaluating their urban waterfronts. Now, communities are redeveloping their waterfront to include recreational, commercial and retail facilities. One example of a city trying to revitalize its waterfront is Knoxville, Tennessee.

This paper examines the benefits and costs of the Knoxville waterfront project in accordance with a cost-benefit analysis framework, using monetary values as proxies for changes in welfare. Using this methodology, the cost-benefit

impacts of the economic stimulus can be measured. Quantitatively, this economic stimulus alone is enough to justify the public involvement in the project. However, when considered alongside the qualitative issues, the project is deemed a resounding success. The Knoxville waterfront project meets many of the initial goals of improving the riverside area in Knoxville.

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