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16. Abstract

The purpose of this project was to develop a systematic, comprehensive approach to evaluate the potential to outsource agency functions and activities. The end product of this project was a PC-based software tool to provide a means to evaluate qualitative and cost aspects of contracting out services. The model was applied to three activities in the Louisiana Department of Transportation and Development (DOTD)–maintenance of rest areas, highway markers, and highway striping–to demonstrate its use. The results were in line with the expectations of the officials in the DOTD who have experience of actual outsourcing of these activities. The model has been constructed so that the perspectives it considers and the criteria on which outsourcing is assessed may be altered by the user, thereby allowing the model to be used in a variety of settings.

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DESIGNING A COMPREHENSIVE MODEL TO EVALUATE OUTSOURCING OF LOUISIANA DOTD FUNCTIONS AND ACTIVITIES

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ABSTRACT

The purpose of this project was to develop a systematic, comprehensive approach to evaluate the potential to outsource agency functions and activities. The end product of this project was a PC-based software tool to provide a means to evaluate qualitative and cost aspects of contracting out services. The model was applied to three activities in the Louisiana Department of Transportation and Development (DOTD)–maintenance of rest areas, highway markers, and highway striping–to demonstrate its use. The results were in line with the expectations of the officials in the DOTD who have experience of actual outsourcing of these activities. The model has been constructed so that the perspectives it considers and the criteria on which outsourcing is assessed may be altered by the user, thereby allowing the model to be used in a variety of settings.

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IMPLEMENTATION STATEMENT

Associated with this project, a computer software program called Outsourcing Decision Assistance Model (ODAM) was created to assist management in evaluating alternative modes of service delivery (e.g., in-house provision to contracting out). ODAM incorporates two models to consider: (1) the qualitative issues and (2) the cost issues associated with contracting out. Three functions (rest area maintenance, highway striping, and highway pavement markers) were used to pilot test version 1 of ODAM. The current version of ODAM (Version 2) reflects modifications to the program suggested by the pilot test experience. Implementation of this project involves future utilization of version 2 of ODAM. Specifically, ODAM Version 2 should be used to evaluate functions currently under consideration for outsourcing (i.e., contracting out to private vendors). ODAM can also be used to evaluate alternative methods of in-house provision. Three types of cost rates are incorporated in ODAM's cost model: (1) civil service wage rates, (2) fringe benefit (payroll additive) rate, and (3) support services rate. It is important that these rates be maintained at current levels as determined by human resources, accounting services, and the audit division of the Louisiana Department of Transportation and Development (LaDOTD). Due to the generic design of ODAM, the program may be used by agencies other than LaDOTD. Should that occur, these rates should be adjusted to reflect the cost structure unique to each agency.

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INTRODUCTION

A key issue in public policy today involves the consideration of outsourcing functions and activities. While political climates may drive this trend, decisions to outsource must be based on a logical, systematic process that considers costs, need for expedition, peak work volumes, unique skills, training and retraining, human resource aspects, and the retention of strategic core competencies within the public agency.

Comparing costs of in-house services to those of outside suppliers can produce important information even when the decision is not to outsource the services in question. The information might indicate service areas where the agency can improve its efficiency. Of course, the analysis can also identify areas suitable for outsourcing. The outsourcing decision should be made with consideration given to the following five factors: (1) economic impact, (2) vendor service reliability and service quality, (3) legal ramifications, (4) impact on strategic core competencies, and (5) sociological factors. To consider these factors adequately, a comprehensive approach to outsourcing is preferable to a piecemeal one. The purpose of this project is to develop a generic comprehensive computer model that addresses the qualitative and quantitative warrants of outsourcing so that it can be applied to functions which are envisioned by the Louisiana Department of Transportation and Development (LaDOTD) administration as having outsourcing potential.

The final model is based on a combination of three models in use by state agencies (in Arizona, Texas, and Pennsylvania) and the balanced scorecard approach used by business entities. The following six qualitative "perspectives" are evaluated in the model: (1) customers (focusing on the interests of citizens, legislators, public officials, and special interest groups and compliance with laws and regulations), (2) internal business (focusing on agency core competencies, technology, and human resource expertise), (3) innovation and control (focusing on monitoring and control, the divisibility of the activity, and effects on other governmental agencies), (4) financial (focusing on costs, economic impact, and timeliness), (5) employee (focusing on sociological factors related to employees such as morale, retraining, and relocation), and (6) contractor market (focusing on characteristics of the potential private contractor vendor market including quality, reliability and number). The qualitative model utilizes information available from the current accounting information system (i.e., changes to the system, such as activity-based costing, is not required) and can easily be modified for changes in wage rates and overhead rates. The qualitative and quantitative analysis are converted to normalized indexes that range from 0 to 1, with a value of 0.5 being decision neutral. The indexes are plotted on a graph to show whether quantitative and qualitative analysis favors insourcing or outsourcing.

OBJECTIVE

The objectives of this study are to

(a) develop a decision model to analyze outsourcing opportunities and alternatives,
(b) ensure that the decision model incorporates both quantitative and qualitative factors relevant to the outsourcing decision, and
(c) apply the decision model to one or more LaDOTD functions for which outsourcing potential is envisioned by the administration.

SCOPE

The design of the outsourcing decision model is limited in scope by the current state of the accounting information system at LaDOTD. That is, the model makes use of data readily available from LaDOTD's accounting system and does not require a change in that system. For instance, several similar studies advocate the adoption of activity-based costing (ABC). Although ABC is a useful tool, the purpose of this study was to develop a model that does not require extensive (and costly) accounting system changes. Should such a change occur however, the computer outsourcing model can be reprogrammed to make use of the data from an ABC-based information system with a modest amount of effort. The qualitative assessment phase of the computer outsourcing model is not affected by ABC and would remain fully functional.

METHODOLOGY

Louisiana Department of Transportation and Development Overview

Approximately 4.5 million people reside in the state of Louisiana. At the end of 1999 there were 86,669 state employees with 5,484 working for LaDOTD. Because of an estimated budget deficit of $300 to $400 million dollars for fiscal year 2001, Louisiana Governor M. J. "Mike" Foster issued an executive order creating a hiring and spending freeze and instructed agencies to eliminate almost six percent of the positions (5,218) in the state workforce. LaDOTD was told to reduce its workforce by ten percent (548 positions) as part of the statewide downsizing initiative *[1]*. Budgeted operating expenditures for the state of Louisiana total nearly $14 billion. LaDOTD's 1999–2000 operating budget of $364 million represents 2.6 percent of the total state budget.

LaDOTD Activities. The mission of the department is to "provide, in cooperation with our public and private partners, efficient, effective, safe, and improved intermodal transportation and water resources systems to promote economic development and enhance quality of life" *[2]*. The department has established the following five goals to help it fulfill its mission:

1. Preserve the transportation infrastructure,
2. Improve the safety of the transportation infrastructure,
3. Expand the transportation infrastructure,
4. Develop the state's water resources, and
5. Provide quality management.

LaDOTD oversees infrastructure spending for a diverse combination of services including highways, ports, aviation, flood control, and water resources *[2]*. Louisiana's highway system has over 60,000 miles of public roads. Nearly 17,000 miles (about 28 percent) of the roads are within the state's highway system. Compared to other states, Louisiana has one of the highest percentages of roads under state management. Four of the top ten U.S. ports are in Louisiana (ports of South Louisiana, Baton Rouge, New Orleans, and Plaquemine). Louisiana ports handle 20 percent of all foreign trade and 15 percent of domestic trade. Louisiana operates the nation's only "super port" (Louisiana Offshore Terminal Authority) to service deep draft tankers too large for the Mississippi River. Roughly 12 percent of the daily crude oil imports flow through the offshore terminal. The aviation system manages over 650 public and private facilities. LaDOTD operates 14 passenger ferries. LaDOTD's capital outlay expenditures are funded by state fuel taxes dedicated to Louisiana's Transportation Trust Fund. As shown in figure 1, annual construction costs for 2000 is nearly $600 million *[3], [1]*.

The current organizational structure of LaDOTD has five divisions beneath the office of the Secretary. The divisions are as follows: (1) management and finance, (2) public works and intermodal transportation, (3) planning and programming, (4) highway programs, and (5) district operations. The highway programs division has four divisions: maintenance, construction, project development, and research. Figure 2 shows the 1999-2000 operating budget for each division. District operations consumes nearly 60% of LaDOTD's annual operating budget. There are nine districts: Bridge City, Lafayette, Shreveport, Monroe, Lake Charles, Alexandria, Chase, Baton Rouge, and Hammond.

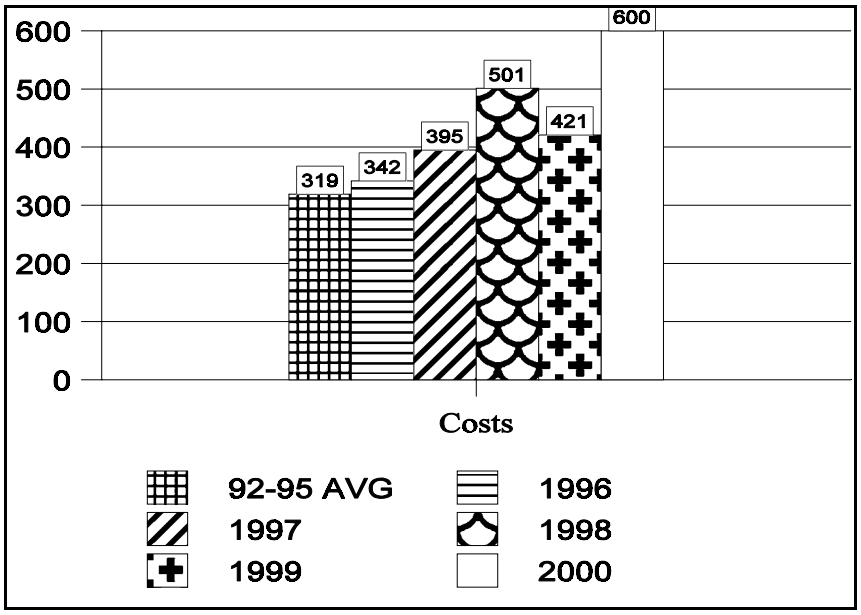

Figure 1
Annual highway construction costs
(in millions of dollars)

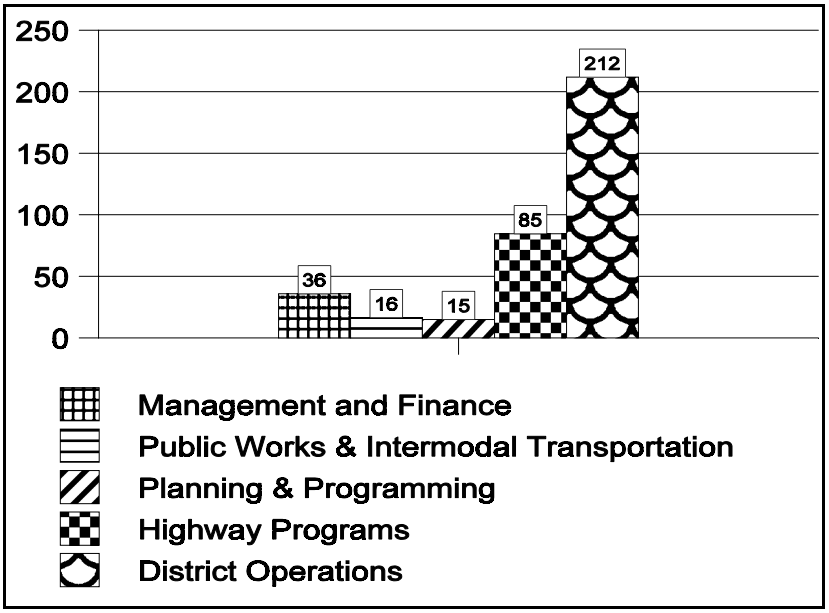

Figure 2
1999-2000 LaDOTD operating budget
(In millions of dollars)

LaDOTD Core Competencies. Based on interviews and a review of LaDOTD written materials, core competencies were

identified. Core competencies are activities vital to the organization in order to fulfill its mission. Five core competencies were identified by the team: (1) service to the public, (2) service to the government, (3) maintain engineering expertise and professionalism, (4) maintain outsourcing process and contracts, and (5) maintain career growth opportunities in the department.

The first core competency is directly drawn from LaDOTD's sole responsibility, given to it by the state legislature, to provide adequate, safe, and efficient transportation facilities and services for the movement of people and goods at reasonable cost. This competency is interrelated with its other core competencies. The second core competency, service to government, pertains to LaDOTD's responsibility to respond to inquiries from the state legislature, the governor's office, national and other state agencies, and public interest groups.

Since much of the combined capital projects and operating budget of LaDOTD is competitively contracted, two core competencies are related to managing LaDOTD's outsourced functions. First, LaDOTD must manage the outsourcing process and associated contracts with private vendors in an effective manner; hence, contract management (negotiation and monitoring) is a necessary competency to oversee the outsourcing process (competency 4). Second, in order to manage the outsourced and insourced functions LaDOTD must retain sufficient skills and knowledge in house to be able to effectively evaluate contractor performance, negotiate new contracts, conduct benchmarking studies, diagnose problems and opportunities, maximize the use of technological advancements in the field, and evaluate in-house cost reduction or service improvement strategies (competency 3). Finally, LaDOTD must provide working conditions that will attract and retain staff (e.g., salary, opportunities for training, working on challenging projects, opportunities for advancement). Hence, competency 3 and 5 interact such that competency 3 provides the conditions in which competency 5 can be realized.

Types of Privatization Arrangements

There are three basic forms of privatization: outsourcing, franchising, and divestiture. As depicted in Figure 3, each form of privatization is driven by the environment in which DOT's currently operate. Four driving forces help to characterize this environment. First, there has been an ideological shift wherein organizations identify and focus on their core competencies rather than attempting to be the sole provider of transportation related activities and services. Second, limited fiscal resources constrain Department of Transportation (DOT) capacity for new capital investments. Privatization can offer an alternative approach to develop capital intensive projects (e.g., toll roads) since it provides a mechanism to finance, construct and operate new infrastructure without using state funds. Third, increasing capital intensity for site-specific,

custom designed infrastructure further exacerbates government ability to fund new large projects (e.g., 180 foot pilings for Interstate 10 across the Atchafalaya swamp *[4]*) . Fourth, technological advancements, like automatic vehicle identification, have reduced the cost of charging users for services such as toll roads, thereby increasing the viability of certain privatization options *[5]*.

Competitive Contracting (Outsourcing). Contracting out is one of the most common

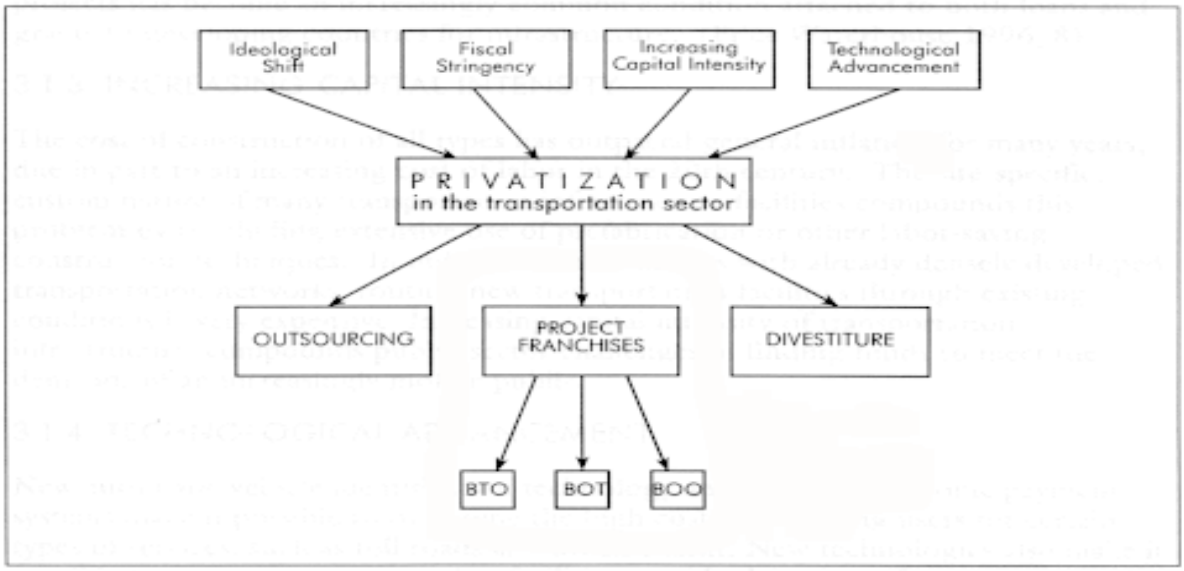

Figure 3
Transportation privatization environment
(Source: Kopp, 1997)

forms of privatization. In this arrangement the government authorizes private sector organizations to produce goods and services for citizens. Savas *[6, p. 68]* defines the government's role in competitive contracting as (1) an articulator of the demand for the goods and services, (2) a skillful purchasing agent, (3) a sophisticated inspector of the goods and services delivered, (4) an efficient collector of taxes and fees, and (5) a disburser of proper and timely payments to the contractor. Savas *[6, p. 109]* also points out that contracting is most feasible when the following conditions exist: (1) the work to be done is specified unambiguously, (2) multiple potential producers of the service are available and willing to compete for the services, (3) the government has the resources and expertise to monitor the contractor's performance, and (4) the contract has performance standards that can be enforced by the government.

Competitive contracting is common among state and local governments. A 1982 survey of local governments, for instance, revealed a wide array of services outsourced to private contractors *[7, p. 132]*. Examples of contracting out rates found in the 1982 survey include streetlight operations (30 percent), street repairs (24.9 percent), and traffic signal maintenance (22.9 percent). Just ten years earlier a similar survey found much lower rates of contracting out for many of the same services (e.g., merely 3 percent of street repairs were competitively contracted). All evidence points to this trend continuing.

Franchising: Public–Private Partnerships. Contracting out activities is different from partnering–also known as "franchising"–activities. Contracting involves supplementing department work forces in workloads in an owner–contractor relationship. Common examples of outsourcing include: engineering design services, highway mowing, and highway striping. In contrast, partnering is a cooperative venture whereby both the public agency and the contractor are co-owners (i.e., partners) in the public-use infrastructure *[8, p. 25]*. Partnering has long been a method to develop new infrastructure in Third World countries. Although industrialized countries, like the United States, have been slow to adopt partnering, it is gaining in popularity *[5]*. There are several structural model forms for partnering which are described in the sections that follow.

Build–Own–Operate (BOO). The private entity finances and builds the facility with the public agency helping by granting right-of-ways and permits. The private entity then owns, operates, and maintains the facility. These relationships are usually for an unlimited time.

Build–Operate–Transfer (BOT). This relationship is similar to BOO expect that there is a time limit after which the facility is transferred to the public agency free of charge. This form of partnership has been used to build toll roads. In Missouri, a corporation built an $18 million bridge over the Lake of the Ozarks which it will own, operate, and maintain as a toll bridge until bonds are retired in 30 years. The bridge will be transferred to the state highway system once the debt is retired *[8, p. 30]*.

Build–Transfer–Operate (BTO). Under this model the private entity finances and builds the facility but then transfers it to the public agency immediately after construction is finished. The private entity then leases the facility from the public agency, operates, maintains, and collects revenues from those using the facility–toll roads again being an example. In California, Caltrans entered into an agreement for express-high-occupancy toll (HOT) lanes to be built in the median of the Riverside Freeway (SR91). A private entity financed and built a 10-mile toll road which was then transferred to Caltrans. The contractor then leased the road from Caltrans and now operates it. The contractor's primary advantage from this form of relationship is limited legal liability *[8, p. 29]*.

The three foregoing types of franchising (BTO, BOT, BOO) are the most commonly used. The differences between these methods are depicted in Figure 4 *[5]*. The three life-cycle phases are defined as the planning phase (Pi), the construction phase (Co), and the operating phase (Op) in the figure. The planning phase includes all activities that occur prior to groundbreaking, including planning, design, engineering, permitting, and financing.

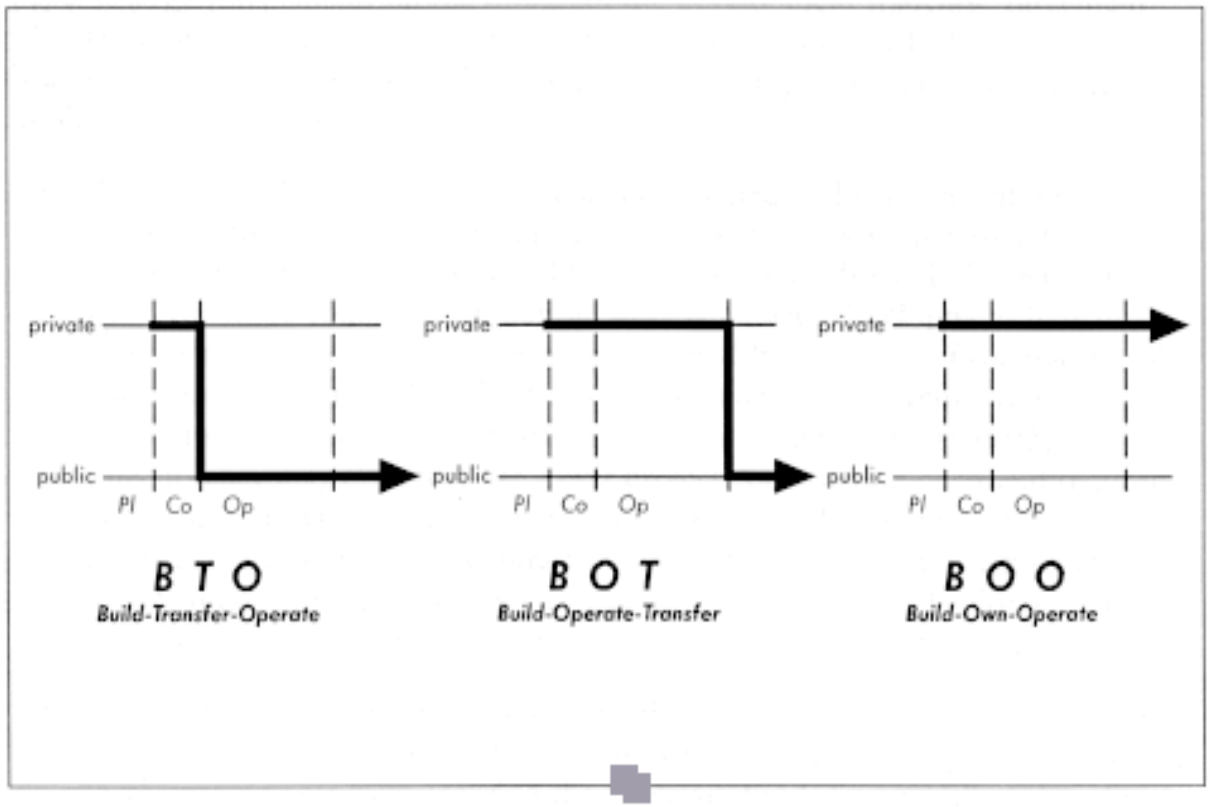

Figure 4
Three common types of franchises
(Source: Kopp, 1997)

Typical Concerns about Privatization and Outsourcing. Two main concerns tend to arise with the use of outsourcing. First is the concern that contractor performance may be poor or fail to meet established time schedules. Second is the burdens on in-house DOT staff resulting from the outsourcing process (i.e., letting, coordinating, and monitoring activities). Outsourcing can also lead to an erosion of in-house expertise to the point where the DOT eventually loses both "bargaining power" and the ability to effectively monitor such activities. Hence, it is important to retain some base level of expertise in-house. This need for in-house expertise explains why it is rare for activities to be 100 percent contracted out *[8]*.

Conclusions. Privatization takes three main forms: outsourcing, franchising, and divestiture. Of these methods, outsourcing is the most common method used by DOTs to provide transportation-related services. Outsourcing's popularity is based more on easing DOT staff work conditions than on cost or quality issues. In an era of mandated staff reductions and tight budgets, outsourcing allows DOTs to push work to contractors during peak workloads and it facilitates the timely completion of important projects. Determining what to outsource and what to retain in-house is a central issue in the contracting decision. A systematic analysis of outsourcing opportunities should include both cost (i.e., quantitative) and noncost (i.e., qualitative) attributes of the function targeted for outsourcing. Noncost considerations include the quality of service, timeliness, public safety, risk, effect on employees, legal and political considerations, and so on. These are important attributes to consider. Making proper cost comparisons is another important aspect when approaching an outsourcing decision. These two topics will be discussed in turn in the following sections.

Outsourcing Models Used in Practice

Although privatization (and outsourcing) has been popular for a long time, there are few examples of a comprehensive model in use to aid the contracting decision. A recent study conducted by the research bureau of the New Mexico State Highway and Transportation Department illustrates this point *[9]*. The New Mexico study identified ten "key states" that have formally evaluated their outsourcing practices: Arizona, Connecticut, Florida, Idaho, Maryland, Michigan, North Carolina, Utah, Virginia, and Washington *[9, pp. 12-20]*. The types of evaluations conducted in each of these states is summarized in Table 1. Only Arizona was found to use a comprehensive, systematic approach toward all of its outsourcing decisions. Florida also has a comprehensive model but it is used only for maintenance activities. The rest of the states evaluate outsourcing either on a needs basis (Connecticut, Maryland, North Carolina), *ex post* after the outsourcing decision (Idaho and Michigan), or not at all (Utah, Virginia, Washington).

Table 1
Methods used to evaluate outsourcing
(Source: adapted from Albright, 1998)

State	Type of Analysis	Discussion
Arizona	Comprehensive	Statewide Competitive Government Handbook requires both qualitative and quantitative comparisons
Connecticut	*Ad hoc*	On-going evaluations of outsourcing opportunities by function on and *ad hoc* basis rather than a single comprehensive model approach
Florida	Comprehensive (but limited in use)	FDOT developed a comprehensive model to evaluate outsourcing but it is applied only to maintenance activities
Idaho	*Ex post*	Does cost comparisons after the outsourcing decision is made
Maryland	*Ad hoc*	Performs evaluations on a case-by-case basis specific to the activity being evaluation for outsourcing
Michigan	*Ex post*	Conducted an *ex post* study of design work outsourcing
North Carolina	*Ad hoc*	A pilot project was developed to investigate cost comparisons of outsourcing of heavy equipment rental & mowing
Utah	None	Old data system prevented accurate cost comparisons
Virginia	None	Outsourcing takes place before cost analysis, an effort is underway to develop a "make or buy" model
Washington	None	Design cost comparison study made by Legislative Auditors considered unreliable because it was based on estimated costs supplied by the DOT with auditor review

Virginia's outsourcing experience is interesting. Based on interviews with Virginia Department of Transportation (VDOT) personnel the New Mexico study states: "The decision to outsource followed the policy commitment to reduce state government and privatize. Outsourcing took place before adequate cost analysis. The decision was more or less made. The decision was made to privatize as much as possible. As time passes, we are looking at cost analysis" *[9, p. 19]*. Based on these findings, the New Mexico study concluded that the Arizona model was the most relevant for its purposes.

A 1997 National Cooperative Highway Research Program (NCHRP) survey of

outsourcing by state highway departments identified Florida and Pennsylvania, in addition to Arizona, as having formal outsourcing assessment procedures *[8]*. Pennsylvania incorporates qualitative factors in its analysis while the Florida model focuses primarily on cost. More recently, a study was conducted for the Texas DOT to develop a comprehensive qualitative model *[10]*. In the following discussion the qualitative models developed in Arizona, Pennsylvania, and Texas will be described. These models were the foundation for the qualitative model created in this project.

Qualitative (Noncost) Models

Arizona Outsourcing Model. The Arizona Legislature created a statewide Competitive Government Program in 1996. The Office of Excellence in Government (OEG) was created by the Governor to implement and manage the program. Working with state agencies, the OEG identified functions that are appropriate for outsourcing. As a part of this process, OEG created a handbook to document the systematic approach toward outsourcing to be used throughout all state agencies. The handbook includes a description of two analytical models. First, a "profile summary matrix" is used to rank qualitative aspects of a function considered to have outsourcing potential. Second, targeted functions deemed good candidates for outsourcing are subjected to a detailed cost analysis model. Each of these models will be discussed in the following two sections.

Arizona Model: Qualitative Assessments. Arizona's OEG defines target functions as those services, programs, or functions which may benefit from competition (e.g., outsourcing). Five attributes of target functions listed in the Competitive Government Handbook are as follows *[11]*:

1. not central to the agency mission,
2. private sector provider interest exists,
3. high level of customer dissatisfaction,
4. history of successful privatization by other government entities, and
5. cost and/or quality problems.

The presence of one or more of these attributes helps an agency to identify an initial list of outsourcing opportunities.

After the initial target functions are identified, a qualitative analysis is performed to evaluate further their outsourcing potential. This analysis consists of ranking eight environmental profile factors that could affect the agency's ability to outsource. The eight profiles (and some associated qualitative criteria questions) are as follows:

1. Strength of competitive market – availability, ability, number of private contractors

a. Are there multiple capable contractors available in the public sector?
b. Is size of the project acceptable to potential contractors?
c. Will contracting out result in a private sector monopoly?
d. Are current state wages in this area lower than private sector or other state jobs thereby causing high personnel turnover?

2. Quality of service – impact of potential outsourcing on effectiveness, timeliness, and thoroughness of service
   a. Will quality decrease as a result of outsourcing?
   b. Will contracting out compromise public trust, safety, or welfare?
   c. Will contracting out decrease accountability and responsiveness by the government?
   d. Can well-defined quality objectives be included in a contract?
3. Control – ability of agency to oversee delivery of service
   a. Is it important for the agency to control delivery of the function?
   b. Can the government develop and maintain control mechanisms if the function is privatized?
   c. Is the quality and quantity of the function easy to measure?
4. Risk – exposure to additional risks by contracting out
   a. What are the chances that the contractor will fail to complete the contract?
   b. Will service interruptions cause major problems?
   c. Will legal exposure increase as a result of contracting out?
   d. Will there be an increased risk of corruption as a result of contracting out?
   e. Can the contractor indemnify the state?
   f. Who is responsible for cost overruns?
5. Legal barriers – effect of laws, statutes, ordinances on outsourcing option
   a. Do any laws, statues, or ordinances mandate the mode of service delivery (government or private sector)?
   b. Must laws, statutes, or rules be changed to permit contracting out?
   c. Is contracting out compatible with legislative, commission, or council intent?
6. Political resistance – political support and interest in the function
   a. Are concerned citizens, users of the function, interest groups, or elected officials resistant to contracting out?
   b. Does the function have low or high political support?
   c. Is the function currently having problems with in-house delivery?
7. Impact on public employees – number of employees affected (where a low number of

impacted employees favors outsourcing and a high number favors insourcing)

a. Will contracting out negatively affect public employees?
b. Will a large number of public employees be affected?
c. Will contractors be required to hire displaced public employees?
d. Will any public employees choose a buy-out option?
e. Will any public employees be involuntarily terminated?
f. Will civil service policies be weakened or violated as a result of contracting out?

8. Resources – expertise, facilities, equipment, time, and budget.
   a. Does the private sector have access to needed expertise that the government does not?
   b. Does the private sector possess needed facilities or equipment that the government does not?
   c. Are there other resource advantages that the private sector has that the government does not?
   d. Do time constraints exist that preclude in-house delivery?
   e. Will contracting out reduce completion times?

The evaluator provides two types of numerical scores to complete the assessment. First, after considering the qualitative questions associated with each profile, a subjective rank is assigned for each of eight environmental profiles to indicate the potential for outsourcing. The rankings range from minus 3 to plus 3 using a matrix similar to the one shown in Figure 5. Positive (negative) ratings indicate high (low) potential for outsourcing. Second, since some profiles may be more important than others, each profile has a weight assigned to it. The rating given to each factor is multiplied by the factors weight to create a weighted score for each profile. Referring to the example in Figure 5, the "strength of competitive market" profile was evaluated to have a high potential for outsourcing and ranked +3. The importance of this profile was somewhat low with a weight of "2" assigned. The weighted score for this profile was +6, the multiple of the ranking (+3) and the weight (2). The individual weighted scores are summed to create a total weighted score. In figure 5 the total weighted score is +6. The higher (lower) the total weighted score the more (less) beneficial outsourcing appears. Using this scheme, a variety of functions can be compared for their potential for outsourcing by comparing the total weighted score for each. Moreover, the total weighted score can be used to compare multiple independent evaluations of the same function (i.e., to determine the level of consensus).

Profile	Low Potential (Pro Government)	High Potential (Pro Private)	Weight (1=low, 4=high)	Weighted Score

Strength of Competitive Market	-3	-2	-1		+1	+2	**+3**		2	+6
Quality of Service	-3	-2	-1		**+1**	+2	+3		3	+3
Control	-3	-2	**-1**		+1	+2	+3		2	-2
Risk	-3	-2	-1		+1	**+2**	+3		1	+2
Legal Barriers	-3	-2	-1		+1	+2	**+3**		1	+3
Political Resistance	-3	-2	**-1**		+1	+2	**+3**		4	-4
Impact on Employees	-3	**-2**	-1		+1	+2	**+3**		3	-6
Resources	-3	-2	-1		+1	**+2**	+3		2	+4
								TOTAL WEIGHTED SCORE		+6

Figure 5
Profile summary matrix (example)
(Source, Arizona Governor's Office, 1999, pp. 10 & 61)

Mecklenburg County government in North Carolina uses a scoring form based on the Arizona profile summary matrix. They added a ninth factor "cost efficiency" to capture the expected cost of outsourcing. The scoring approach is identical to the Arizona model *[12]*.

Pennsylvania Contractibility Model. The Pennsylvania DOT (PennDOT) developed a contractibility ratings systems (CONTRAS) to use to rate routine maintenance activities for contracting out potential. The model contains the following eight decision criteria and scoring schemes:

1. Unit cost comparison (multiplier weight=5)
   a. 0 = State cost is less
   b. 1 = no cost difference
   c. 2 = Private contractors are 0.01 to 9.99% less
   d. 3 = Private contractors are at least 10% less
2. Degree of labor intensity (multiplier weight=4)
   a. 1 = Less than 40% of the cost is labor
   b. 2 = 40 to 59.99% of the cost is labor related
   c. 3 = At least 60% of the cost is labor related
3. Existence of critical time constraints (multiplier weight=2)
   a. 1 = Time constraints are not critical
   b. 2 = Time constraints are critical
4. Contractor availability (multiplier weight=2)

a. 1 = Low or no available private contractors
b. 2 = Good availability of contractors

5. Work volume (multiplier weight=3)
   a. 1 = $0 to $99,999 contract size
   b. 2 = $100,000 or more contract size
6. Planning difficulty levels (multiplier weight=1)
   a. 1 = Not easily planned
   b. 2 = Easily planned
7. Requirements for special equipment or skills (multiplier weight=4)
   a. 1 = None required
   b. 2 = Required
8. Amount of inspection required (multiplier weight=1)
   a. 1 = High inspection required
   b. 2 = Low inspection required

Each of the factors has a predetermined weighting multiplier assigned to it ranging from five (cost comparison) to one (inspection) as shown in the listing above. To complete the model, each of the eight are scored by the evaluator according to the scales provided in the instrument. The scores vary from factor to factor. Cost comparison, for example, has four possible scores–0, 1, 2, or 3–while Inspection has two possible scores–1 or 2. The total CONTRAS score can range from a minimum of 17 to a maximum of 53, with higher scores indicating more potential for contracting out than lower scores. Compared to the Arizona qualitative model, the PennDOT model appears to have several advantages. First, the PennDot model incorporates a cost comparison factor that was absent in the Arizona qualitative model. Second, since the weights were predetermined, the evaluator's task is simplified to focus solely on scoring the individual factors for contracting potential. Third, the CONTRAS model is easier to explain to users.

Texas Outsourcing Assessment Instrument. In late 1999 the results of the study for the Texas DOT (TxDOT) on outsourcing was completed *[10]*. The purpose of the study was to compare TxDOT's in-house capabilities to those of the private sector in order to determine which sourcing arrangement was most beneficial. The study was motivated by recent Texas Legislature mandates calling for TxDOT to increase its use of contracted services. Although TxDOT has a lengthy history of contracting out, the department frequently lacks sufficient information to determine the effectiveness of outsourced functions or to decide what best to outsource in the future. Hence, the study to evaluate the outsourcing potential of nine separate TxDOT functions was initiated. The nine functions evaluated in the study were as follows:

1. Base-in-place repair,

2. Paint-and-bead striping,
3. Information systems,
4. Right-of-way acquisition,
5. Facilities management and maintenance,
6. Training, quality, and development,
7. Recruiting,
8. Benefits processing, and
9. Partnering/quality facilitation.

The researchers surveyed TxDOT officials on each of the nine functions and asked them to evaluate each function on a set of six independent factors. Those factors are as follows:

1. External mandates and influences (e.g., political aspects),
2. Strategic and organization effectiveness (e.g., core competencies),
3. Organization systems and operations (e.g., logistics & control),
4. Cost and cost efficiency,
5. Human resources and organization culture (e.g., employees), and
6. Vendors (e.g., contractor market).

The researchers developed a two-part survey to assess the outsourcing potential of the nine targeted functions. In all, 26 surveys were gathered on each of the nine functions–one from each of the 25 TxDOT district offices and one from the appropriate central administration office responsible for the function. In one part, a 30-item survey instrument was used to evaluate each of the nine functions targeted for potential outsourcing. The survey asked the respondents to assess their level of agreement with each of the 30 survey items using a five point scale (Strongly Agree = 5, Strongly Disagree = 1). The other part of the survey required the respondents to develop factor weight for each of the six common factors described earlier by allocating a 0.0 - 1.0 weight to each factor such that the sum of all the weights equals 1.0. This process was performed nine times by each district respondent–once for each of the nine functions.

The results of the six factor weights and the assessment of the 30-items was combined to produce a single composite score called the "Functional Sourcing Decision Index" or FSDI. Composite scores greater than 3.0 indicate that the function should remain in-house. Similarly, scores less than 3.0 indicate that the function should be considered for outsourcing. Each of the 30-item assessments is linked to one of the six common factors, but the link was not identified in the survey instrument. The computation is embedded in an Excel spreadsheet file. Table 2 lists the 30 items assessed by the evaluators using the five point scale. The factor numbers in the table refers to the list of six factors listed on the preceding page.

Table 2
TxDOT outsourcing assessment items

#	Statement	Factor
1	This function is a core competency of TxDOT and should not be contracted out.	2
2	This function is of high strategic importance and its performance in-house is critical to accomplishing the mission.	2
3	This function deals with confidential information. Revealing such information to outside vendors may have a detrimental effect.	2
4	There are regulations or laws that would prohibit TxDOT from outsourcing this function.	1
5	There are arrangements or contractual agreements with suppliers, customers, or other parties that make it difficult to outsource this function.	1
6	This function is interdependent with other functions. Outsourcing this function negatively impacts effective interaction with TxDOT.	3
7	Outsourcing this function negatively impacts the culture or organizational values of TxDOT.	5
8	Outsourcing this function negatively impacts the organization strategy, systems, and/or administrative procedures of TxDOT.	3
9	Outsourcing this function results in employee losing loyalty and faith in TxDOT.	5
10	Outsourcing this function results a negative reaction from the general public, customers, or other stakeholders.	2
11	Most of the employees who currently perform this function in-house have been retrained and relocated to other areas of TxDOT under conditions of outsourcing this function.	5
12	Contracting out this function negatively impacts the productivity or quantity of output of this function.	3
13	Contracting out this function negatively impacts the quality of output of this function.	2
14	Contracting out this function would result in significant capacity, volume, or scheduling problems.	3
15	Contracting out this function has a negative economic or social impact on our current employees.	5
16	All costs considered, insourcing this function costs less than outsourcing it.	4
17	This function should be performed in-house because the critical human resource skills in this activity cannot be matched by vendors.	2
18	Contracting out this function results in greater cost efficiencies to the company than does in-house performance of this activity.	4
19	The seasonal fluctuation of activity in this fluctuation makes it difficult to outsource this function.	3
20	There is a sufficient number of available, quality, and reliable private vendors of this function.	6
21	We anticipate no significant contract administration difficulties if this function is contracted out.	3
22	There are significant liability problems in contracting out this function.	1
23	Outsourcing this function results in inventory and procurement problems for the company.	3
24	Contracting out this function results in significant vendor relation problems.	6

#	Statement	Factor
25	Outside vendors can provide this activity at significant cost savings to TxDOT.	4
26	Outside vendors may raise their prices without cause after the initial contract period under conditions of outsourcing this function.	6
27	This function should not be outsourced because of the sizable capital investment we have in equipment and/or facilities allocated to this function.	4
28	Contracting out this function results in significant new tasks and responsibilities for TxDOT.	3
29	This function should be performed in-house because of critical technology we have in this activity that cannot be matched by vendors.	2
30	Contracting out this function makes it difficult to maintain control of this activity.	3

The TxDOT study could be considered as a combination of the strengths of the Arizona and Pennsylvania models. It allows evaluators to both rank and weight a number of qualitative aspects as seen in the Arizona model. The qualitative questions are simple direct statements to be ranked individually similar to the Pennsylvania model. Moreover, the TxDOT model considers more qualitative issues than either the Arizona or Pennsylvania models. All three approaches (i.e., Arizona, Pennsylvania, and Texas) require somewhat tedious manual computations or data entry which suggests that a computer software program to automate the process would be beneficial. The study group for this project decided to develop a computer software program using the TxDOT approach *[10]* as a base to develop the qualitative assessment. A cost comparison was integrated into the software program.

Quantitative (Cost) Comparison Models

Determining a proper cost comparison between the contractor and a public sector agency is one of the most difficult tasks related to the outsourcing decision. As noted in a report issued by the Office of the Legislative Auditor of Louisiana, "state governments are often not equipped to easily assess all the costs of delivering a state service" *[13, p. 25]*. Part of the problem lies in the budgeting practices that most governmental agencies must follow. Budgets are typically structured on functions and departments within each agency. Most services (or "programs"), however, are generated by work that incorporates several functional areas. One response to this problem is to develop "programmatic budgets." The State of Louisiana began an effort to develop programmatic budgets in 1989, but that system has been slow to evolve, and certain cost items, like overhead, remain elusive. As a result, cost comparisons are typically hampered by the availability of relevant data on the government side. The cost for the private sector contractor is much clearer. Without reliable government cost data, however, improper cost comparisons can occur. The discussion to follow describes the types of costs that are considered for both private

contractors and public sector agencies.

Most cost accumulation methodologies start by classifying all costs as either "direct" or "indirect." The difference between direct and indirect costs is the ease with which a cost can be traced to the service or product. Direct costs are those that can be easily traced and indirect costs are not easily traceable to the service. Categories of direct costs typically identified include: wages, small equipment and tools, materials and supplies, repair and maintenance, telecommunications, travel, and utilities and fuel *[14]*. Indirect costs, frequently called "overhead," include accounting, information systems, insurance, central administration, personnel, and support services *[14]*.

Public Sector Direct Costs. Direct costs are those cost items that can be easily traced and ultimately charged to a particular service. Engineering design costs charged to a particular project number for payroll is one example of a direct cost. Other direct cost items include the cost of supplies, materials, travel, printing, rent, utilities, and communications, provided that there is documentation that links the incurrence of each expenditure to a particular service (e.g., materials requisitions, travel authorizations, etc.). Some direct cost items that are frequently overlooked include the following: interest costs on capital items acquired with debt proceeds (e.g., bonds); depreciation of facility and capital equipment; and pension costs.

Public Sector Indirect Costs. Indirect costs, or overhead costs, are cost items that tend to benefit several projects and services simultaneously. These costs are commonly referred to as administrative and support costs. Examples include: salaries of supervisors including their fringe benefits, insurance, data processing, accounting, utilities, communications, supplies and materials, printing, travel, facilities and equipment depreciation, and other costs not directly traced to specific projects and services. Indirect costs are apportioned among government services, programs, and activities using an allocation scheme agreed upon by the agency. The most common allocation methods are "personnel costs," "total direct costs," "step-down method," and the "reciprocal method." The personnel cost method assumes that overhead costs are incurred proportional to the number of employees and, thus, overhead is allocated based on either the number of employees or employee payroll costs. The rate used to assign overhead on top of payroll costs is frequently called the "burden rate." The total direct cost method assumes that overhead is incurred proportionate to all direct service, project, and activity costs. The step-down method divides all departments into either production service (e.g., engineering design) or support (e.g., housekeeping, data processing, payroll, etc.) and allocates each support department's costs to the other departments with unique allocation bases for each support area (e.g., floor space for housekeeping, data processing minutes for data processing, number of employees for payroll). The step down method always ignores a considerable amount of cross-

utilization among the support departments (e.g., the payroll department's support of housekeeping). The difference between the reciprocal method and the step down method is that cross-utilization among production service and support departments is fully taken into account in the reciprocal method. This is accomplished by simultaneously solving a system of algebraic equations that represent the cost equation for each service and support department. Hence, the reciprocal method is also called the "algebraic method." Because of its computational complexity, use of the reciprocal method has not been widespread. It's use is on the increase, however, since enterprise resource planning systems (e.g., SAP®, PeopleSoft®) default to the reciprocal method.

The concept of relevant costs drives the determination of in-house costs. Relevant costs have the following characteristics: they are avoidable upon outsourcing, the entity plans to eliminate them if the service is outsourced, and they represent actual future cash outflows *[14, p. 93]*. Hence, relevant costs are those the entity believes it no longer will incur if the service is outsourced. Fuel cost for mowing equipment, for example, is a relevant cost for a decision to outsource highway mowing operations. Statewide overhead costs are not traceable to any particular service provided by an agency and, therefore, is an example of an irrelevant cost.

Two other aspects linked to the concept of relevant costs should be considered. First, some costs may be limited by outside constraints (e.g., politics, labor unions). Second, potential savings on an outsourced function may be diverted to other functions (e.g., staff relocation) thereby reducing the net savings to the agency from outsourcing. Clearly, careful analysis is required with these possibilities in mind before a function is committed to outsourcing. The outsourcing decision tool software program developed in this project is intended to aid managers in identifying functions that appear to be good candidates for outsourcing based on an array of qualitative and quantitative attributes. Additional analysis (including solicitation of contractor bids) should be conducted before making the final decision to outsource, however.

Contractor Service Costs. The total cost of contractor service is the sum of: (1) contractor costs paid by the public sector agency, (2) plus contract administration costs incurred by the governmental agency, (3) plus an allowance for conversion costs, and (4) minus off-setting revenues generated by outsourcing. Contract administration costs can easily be understated since their accuracy is tied to the sophistication of the agencies method of apportioning overhead costs (as described in the prior section). Contract administration includes costs of procurement, contract negotiations, contract award, processing amendments, change orders, resolution of disputes, invoice processing, contract monitoring, inspection, and evaluation *[15, p. 5]*.

Conversion costs are sometimes incurred when a service is outsourced for contractor

delivery. This is common when a service previously delivered in-house is to be contracted out entirely to the private sector. Conversion costs typically fall into three areas: (1) personnel-related costs, (2) material and equipment related costs, and (3) other costs. Personnel-related costs include retraining costs or severance (buy-out) costs. Material and equipment costs include costs associated with the transfer of any government property and equipment to the contractor. Other conversion costs include lease termination fees and the costs of unused facilities. Off-setting revenues include new revenue streams enhanced or created by the outsourcing arrangement. Examples include state and local sales and use taxes, user fees, and proceeds from equipment and material sales.

Cost Comparisons. In practice there are two general approaches to compare in-house to contractor costs. First, the fully allocated costs of both types of service delivery are compared. The fully allocated costs include all direct and indirect costs without regard to the availability and relevance of each cost item to a potential outsourcing decision. Rather, the reason to compare fully allocated costs is to identify in-house services that can be targeted for either cost reduction or outsourcing. A rule of thumb is that any in-house service that costs more than 110 percent of prevailing private-sector market price should be analyzed to determine if the in-house process can be streamlined. Alternatively, outsourcing options can be explored for the service.

A different cost comparison is necessary when outsourcing is under consideration**.** Fully allocated cost comparisons are inappropriate to estimate potential cost savings from outsourcing. A fully allocated cost of an in-house service that is 115 percent of prevailing market prices will never result in a 15 percent savings if outsourced. Any potential cost savings attributable to outsourcing arise from a comparison of avoidable costs. Avoidable costs are those costs that will not be incurred if the service is contracted out. It is not a simple task to determine avoidable costs. Generally, all direct costs of the service are avoidable. Determining avoidable overhead costs is more difficult as availability is influenced by three factors: (1) the ability to reallocate support area resources to other areas versus downsizing of support areas, (2) the extent of the outsourcing of service (e.g., 10 percent of highway mowing versus 100 percent of highway mowing), and (3) the time period (short term versus long term).

The difficulty in making adequate cost comparisons highlights the need for good accounting information systems that can provide project, program, service, and activity cost data. The reality, however, is that governments can rarely afford the cost to design and implement sophisticated cost accounting systems based on activity-based costing and activity-based management. As a practical matter, a common approach is to first compare total in-house costs to contractor costs with the idea that there are certainly no cost savings when contractor costs exceed total in-house costs. Additional cost analysis is warranted when contractor costs are less

than total in-house costs. Total in-house direct costs can be compared to contractor costs, for instance, to develop another perspective as to potential cost savings from outsourcing.

Arizona Cost Accumulation Model. The Arizona cost comparison model is used when the profile summary matrix model identifies good outsourcing potential for a targeted function. The cost analysis process involves the following five steps *[11, p. 22]*:

- Gather total direct costs and determine those relevant to the decision.
- Determine indirect costs related to the function and distinguish costs that will be discontinued if the service is shifted to a contractor.
- Accumulate the total costs attributed to obtaining the service from the contractor.
- Compare the relevant state costs to the total cost to contract out.
- Determine which alternative will provide the most efficient use of state resources.

The purpose of the first two steps is to determine the in-house cost to provide the service. Once the in-house cost is accumulated, it is time to determine the cost to outsource. Naturally, the contract price bid by the contractor is an important component of the cost to outsource cost, but it is not the only one. Other costs include revenue decreases as a result of transferring the service to the contractor. Part of the cost to outsource LaDOTD's recent transfer of its highway logo sign operations to a private contractor, for example, includes the fee LaDOTD assessed companies to place their logo on the highway exit signs. Contractor support and contract monitoring and administration are other costs of outsourcing. After the cost to outsource is known it is compared to the in-house cost. Arizona considers outsourcing to be cost effective whenever outsourcing is at least 10 percent less than in-house cost *[14]*. This ten percent benchmark is also used by the federal government, the state of Texas, and the City of Cincinnati, Ohio *[15]*.

DISCUSSION & ANALYSIS

LaDOTD Pilot Test of Arizona Qualitative Model

On August 28, 2000, the Arizona qualitative outsourcing model was pilot tested with a group of LaDOTD district managers and headquarters officials. The purpose of the pilot test was to elicit feedback on the usability of qualitative models in general and on the Arizona qualitative profile model specifically. Prior to administering the pilot test, the project study team described the purpose of the project, the difference between qualitative and quantitative issues, and the mechanics of the Arizona qualitative model. Following the discussion the participants were asked to complete the Arizona qualitative profile matrix using highway striping as the "targeted"

function for outsourcing. Highway striping was chosen because of its familiarity to all the participants. Figure 6 presents the results of the pilot test for the highway striping function. The numbers in the table are the weighted scores for each of the eight qualitative profiles for each of the thirteen participants. The total scores given for the function ranged from minus 1 (participant # 13) to positive 48 (participant # 1). The average score was 22. A graph of the individual scores assigned to each qualitative profile (shown in Figure 7) reveals a wide range of responses on each of the eight profiles. A discussion of the model ensued after the completion of the pilot test. The consensus view was that although the qualitative factors included in the model are important to consider, the model is vague and somewhat complicated. The project team was encouraged to develop an assessment tool that would be more self-explanatory.

Survey Respondent	1	2	3	4	5	6	7	8	9	10	11	12	13	Avg.
Profile:														
Market	6	6	3	6	8	4	6	0	-6	-4	2	2	2	3
Quality	12	12	3	6	3	12	12	-4	3	9	8	9	-2	6
Control	6	-8	-1	3	6	12	4	2	-2	3	6	4	1	3
Risk	6	0	2	6	4	4	4	6	0	4	4	4	1	3
Legal	12	4	3	6	4	-3	6	3	0	9	3	6	2	4
Political	0	2	12	9	-1	6	6	3	-1	2	2	2	-2	3
Employees	0	-9	-4	0	-9	1	-3	-6	0	-4	6	8	-4	-2
Resources	6	-6	-1	2	8	1	8	-3	6	-2	-8	6	1	1
Total Weighted Score	48	1	17	38	23	37	43	1	0	17	23	41	-1	22

Figure 6

Pilot test scores - Arizona qualitative model

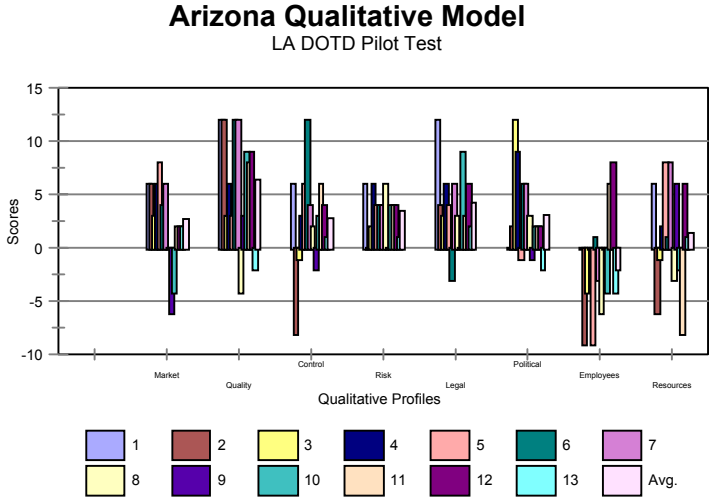

Figure 7
Graphical display of pilot test scores - Arizona qualitative model

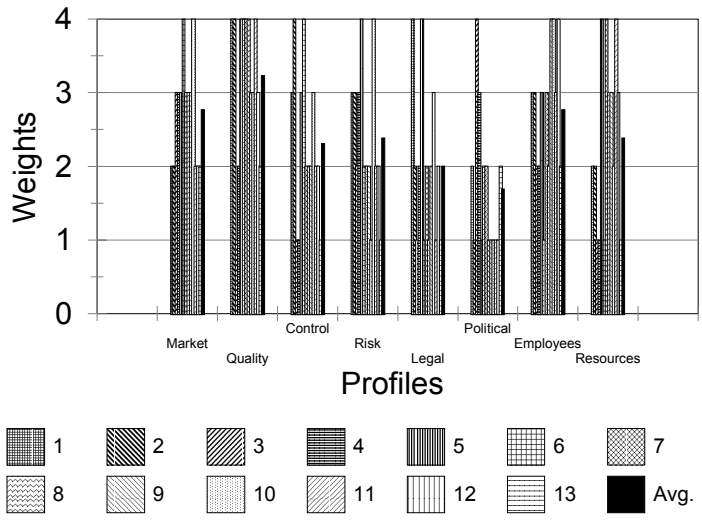

Figure 8
Weight assignment

Since the composite scores presented in Figure 6 and Figure 7 are derived from the separate assessments of importance ("weight") and the evaluator's assessment of the potential for outsourcing of the activity under review, it is interesting to observe the individual components of the scores separately. In figures 8 and 9, the weights and ratings are shown separately. As can be seen, the participant's ratings of the potential to outsource highway striping were more divergent than the weights assigned to each of the eight factors.

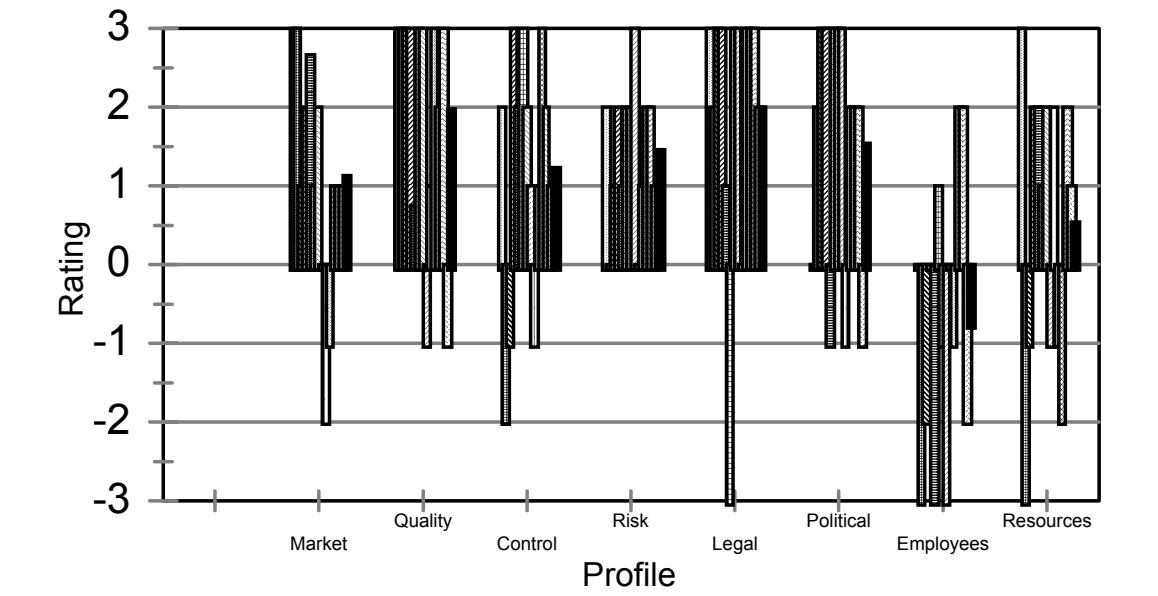

Figure 9
Ratings

LaDOTD Pilot Test of Pennsylvania Model

tested using LaDOTD district managers and headquarters officials on August 28, 2000. This was the same session that evaluated the Arizona qualitative model. As was the case with the initial pilot test, highway striping was used as the function targeted for contracting out potential. The results of the test appear in Figure 10. As shown in the figure, the evaluations were quite similar. The average evaluation was a total score of 36. The scores ranged from a low of 31 to a high of 48. Compared to the Arizona model pilot test, a

The PennDOT CONTRAS model was pilot

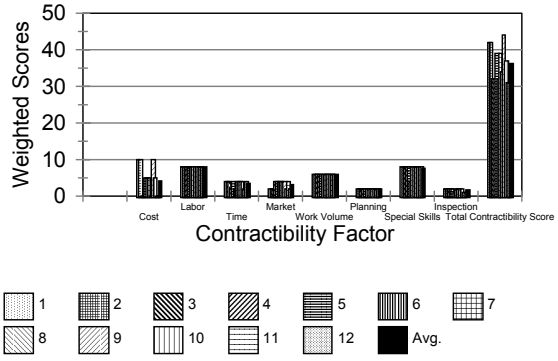

Figure 10
Application of the PennDOT CONTRAS model

consensus to outsource highway striping was much more evident. Of course, since fewer ranking choices are available in the PennDOT model than the AzDOT model higher consensus should be expected in the PennDOT model. Moreover, the participants indicated that the PennDOT model was easier to understand and more straightforward in use and interpretation. Nonetheless, a few commented that the PennDOT CONTRAS model omits important qualitative considerations found in the Arizona model. Based on these discussions the project team concluded that a model incorporating the strengths of the Arizona and PennDOT models was needed. That is, a model was needed that considers relevant qualitative factors but is easy to understand and use. In addition, it was decided that the assessment model should be personal computer (PC) based to eliminate the mathematical tasksm thereby allowing the user to focus on analysis and results of the model.

Development of the Qualitative Model

A computer-based model was developed for ease of use. An initial version of the program was developed and presented to the program review committee (PRC) for comments and suggestions and was pilot tested on three functions: (1) rest area maintenance, (2) highway markers, and (3) highway striping. Modifications to the program were made based on comments and experience in using it. The initial model is discussed in the following section. The changes made to create the second version of the program are discussed in a later section of the report. The opening page of the program is shown in Figure 11.

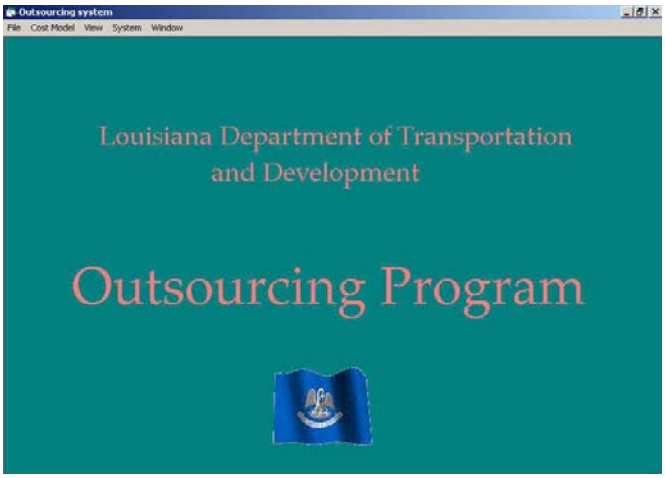

Figure 11
Title screen of LA DOTD outsourcing program (version 1)

The first step to develop the qualitative model was to examine the propensity of use of individual qualitative assessment statements in practice. Besides Arizona, Pennsylvania, and Texas, models used in five other states (Virginia, Georgia, Illinois, Michigan, and Maryland) were included in this analysis. Though the models in these five states were not specific to transportation, they were included to judge the generalizability of individual assessment statements. The result of this process is a list of twenty-five assessment statements judged appropriate for the qualitative model.

The individual assessment statements are listed in Table 3. Following the Arizona and Texas model approaches, the assessment statements are categorized under broad factors (or characteristics) to which they relate. The factors used are the same as those used in the Texas study; namely, (1) external mandates and influences, (2) strategic and organizational effectiveness, (3) organizational systems and operations, (4) cost and cost efficiency, (5) human resources and organizational culture, and (6) the vendor market.

Table 3
Qualitative Model

Assessment Statement (Note: Unless noted otherwise all assessments are value on a continuous scale ranging from Disagree = 1 to Agree = 5. * (reverse coding) indicates a scale with Disagree = 5 to Agree = 1).		
External Mandates & Influences		
Stmt #	Assessment Statement	States Using
1	Outsourcing this activity is consistent with State laws, Rules and Regulations. * (reverse coding)	AZ, TX, MD
2	The contract provides for the protection of the welfare and public safety of citizens in case of default by the private contractor. * (reverse code)	AZ, VA, MD
3	The function or activity has low overall political support. * (reverse coding)	AZ
4	Citizens, users of the activity, interest groups, or public officials want the function provided in-house.	AZ
Strategic & Organizational Effectiveness		
5	This function is of high strategic importance (e.g., a core competency) to LaDOTD and its performance in-house is critical to accomplishing the mission of LaDOTD.	TX, GA, MI
6	This function deals with confidential information. Revealing such information to outside vendors may have a detrimental effect on LaDOTD.	AZ, TX, GA, MI
7	Contracting out this function negatively impacts (would negatively impact) the quality of output of this function.	AZ, TX
8	This function should be performed in-house because the critical human resource skills in this activity cannot be matched by vendors.	AZ, TX, PA

9	This function should be performed in-house because of critical technology and equipment we have in this activity that cannot be matched by vendors.	AZ, TX, PA
Organizational Systems & Operations		
10	This function is interdependent with other functions performed by LaDOTD. And outsourcing this function negatively impacts effective execution of those other functions.	TX
11	Contracting out this function makes it difficult for LaDOTD to maintain control of this activity.	AZ, TX, IL, MD
12	The activity can be subdivided (especially geographically) so that a portion can be contracted out as a "pilot" test. * (reverse coding)	GA, MI
13	It will be difficult to monitor (or requires a high level of inspection of) the private contractor's performance.	GA, IL, MD, MI, MS, PA
14	The activity requires large crew sizes (is labor intensive) and may tie up in-house resources to perform routine functions or to respond quickly to special situations. * (reverse coding)	PA
Cost & Cost Efficiency		
15	Outside vendors can provide this activity at significant cost savings to LaDOTD. * (reverse coding)	TX
16	This function should not be outsourced because of the sizable capital investment we have in equipment and/or facilities allocated to this function.	TX
17	Economic delivery (i.e. low cost) of the activity is more important than control and/or accountability. * (reverse code)	AZ, VA, MD, MI
18	The private sector can implement and deliver the activity quicker. * (reverse coding)	AZ, MD, PA
Human Resources & Organizational Culture		
19	Outsourcing this function negatively impacts the culture or organizational values of LaDOTD.	AZ, TX, IL
20	Outsourcing this function results in employee losing loyalty and faith in LaDOTD.	TX
21	Most of the employees who currently perform this function in-house have been retrained and relocated to other areas of LaDOTD under conditions of outsourcing this function. * (reverse coding)	AZ, TX. MD, MI
Vendors Market		
22	There is a sufficient number of available, qualified, and reliable private vendors of this function.* (reverse coding)	AZ,TX, GA, IL, MD, MI, MS, PA
23	Vendors may raise their prices without cause after the initial contract period under conditions of outsourcing this function.	TX
24	This service has been successfully contracted out in the past by this or other public sector entities. * (reverse coding)	VA, GA, IL, MI
25	The private contractor can be replaced relatively easily. * (reverse coding)	VA, IL, MD, MI

Key:

AZ: State of Arizona Competitive Government Handbook

TX: Johnson & Ponthieu. 1999. The Long–term Impact and Cost-Effectiveness of Outsourcing. Transportation Research Center.

VA: Public/Private Performance Analysis, Commonwealth Competition Council, Commonwealth of Virginia.

PA: Pennsylvania DOT Maintenance Contractibility Manual.

GA: Governor's Commission on Effectiveness and Economy in Government, "Analytical Model for Consideration of Privatization Decisions: Non-Quantitative Factors."

IL: Private Enterprise Review and Advisory Board. Evaluation Protocol for Privatization Proposals.

MI: Privatization in Michigan: Guidelines for Privatization.

MD: State of Maryland: Governor's Advisory Council on Privatization. Methodology to Evaluate Privatization Opportunities.

Assigning Weights to Broad Noncost Factors. Similar to Texas and Arizona's systems, the qualitative computer model allows the user to apply sets of weights to assorted qualitative issues. As suggested by Wilmot, the qualitative assessment involves a combination of two separate evaluations by the program user *[16]*. First, the user weights the importance of each of the six broad qualitative factor areas. The user moves a scroll bar next to each factor to assign weight from low importance to high importance to that factor as shown in Figure 12. It should be noted that these weights are neutral with regard to in-house versus contract out. A pie chart at the bottom of the screen provides the user with a graphical representation of the relative importance of each factor to the other five factors. Computationally, the program allocates a total weight of 1.0 among the six factors according to the importance weights assigned by the program user.

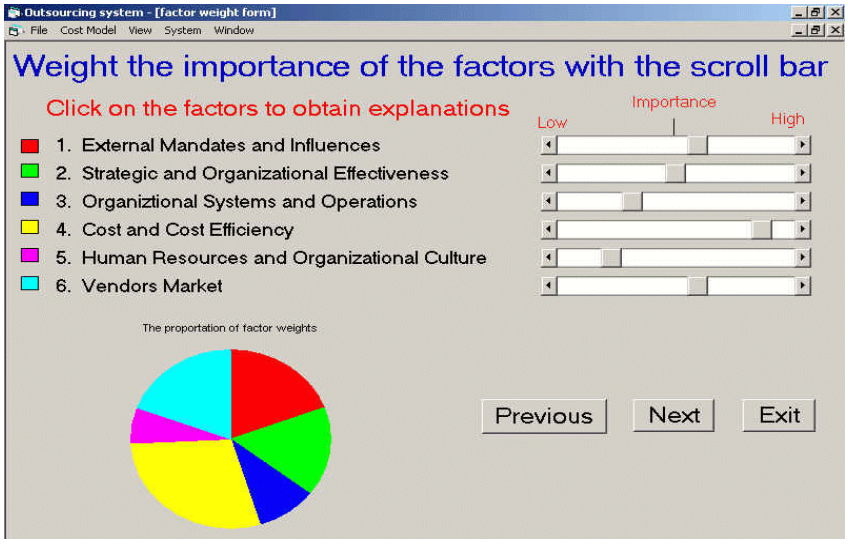

Figure 12
Weighting the factors

After the program user has completed weighting the importance of the six broad factor categories, the activity being considered for outsourcing is rated on the individual assessment criteria. In this phase the user rates the activity based on their level of agreement with the assessment statement ranging from "disagree" to "agree" with the midpoint being "undecided." A rating window is shown in Figure 13.

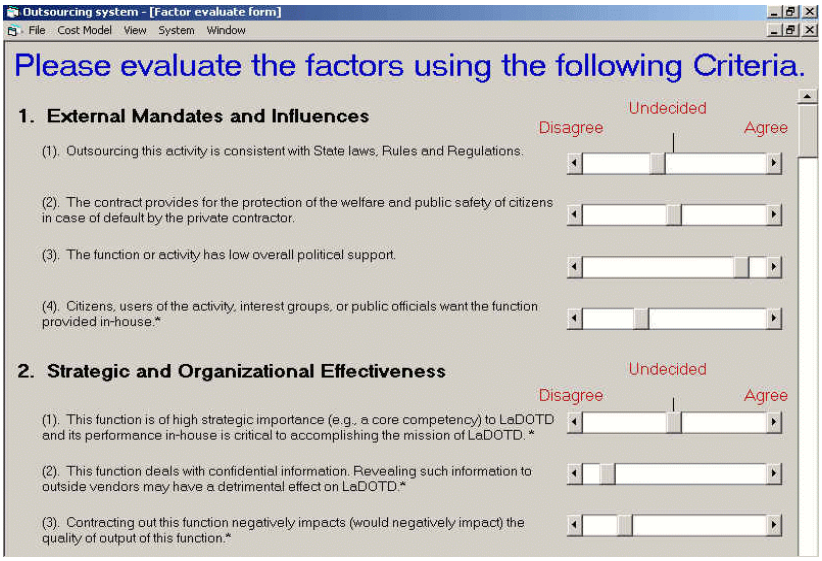

Figure 13
Rating window

Computationally, the rating values range from 1 to 5. For about half the statements, disagree receives a score of "1" and agree a score of "5." The reverse occurs for the other half of the statements. This second set of weights indicates whether or not outsourcing is viable given the particular issue addressed in the assessment statement. Unlike the factor weighting in the first phase, rating values are independent of one another (i.e., the rating of one assessment statement does not effect the rating of any other statement). A composite index is developed from the weights and rates. Basically, the composite index is the product of the factor importance weight in the first phase and the average ratings in the second phase for the assessment statements under that factor category. A composite index score around 3.0 is decision neutral. Index scores progressively less than 3.0 indicate in-house provision is preferable. Conversely, index scores progressively more than 3.0 indicate greater potential for outsourcing. The computation for the composite index is as follows:

$$Index = \sum_{i}^{I} w_i \frac{\sum_{j}^{J_i} r_{ij}}{J_i} \quad \text{. . . . . (1)}$$

where,

w_i = weight of factor i,

r_{ij} = rating of assessment criteria statement j in factor i,
I = number of factors (usually 6),
J = number of criteria in factor i.

The results of this qualitative assessment are shown graphically in the program as "QL" on the colored tool bar as shown in Figure 14. The red area of the toolbar indicates that insourcing is recommended. The green area of the tool bar indicates that outsourcing is recommended. The grey area indicates indifference between insourcing and outsourcing based on noncost factors. Barring unusual circumstances, cost comparisons should normally be reserved just for those functions where outsourcing is recommended by the qualitative assessment. "QT" indicated on the scroll bar refers to the cost model (i.e., quantitative analysis). Since the cost analysis has not yet been done, "QT" should be ignored at this point.

Development of the Cost Comparison Model

The cost model built into the computer model is based on the cost model used by Arizona and New Mexico. Since the scope of the project was to develop the model using current accounting schemes and information resources, activity-based costing and related methods were not incorporated into the model since the current accounting and information systems processes

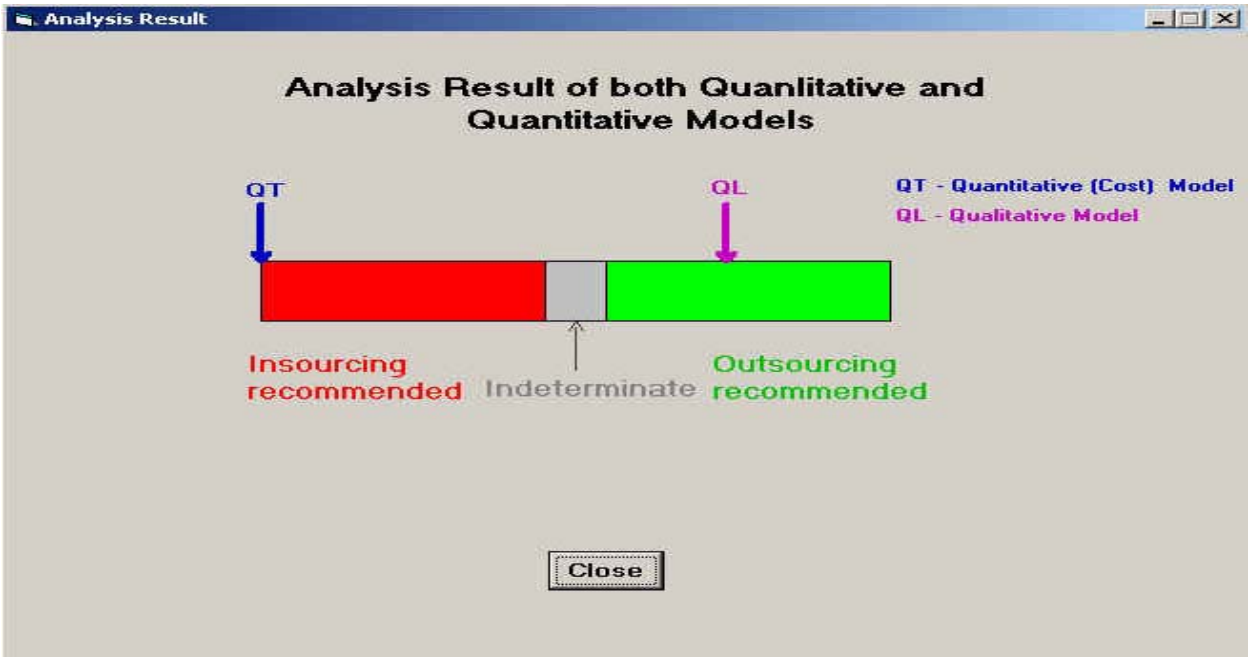

Figure 14
Results window

are not conducive to those methods. Rather, a comprehensive and systematic model was developed that works with available resources. The cost model is accessed from the pull-down menus on the programs opening page as shown in Figure 15.

The model requires data entry by a manager knowledgeable with the function being assessed for outsourcing. Certain information is already incorporated into the model: median salaries for each civil service rank (from Human Resources), payroll additive rate for fringe benefits (from Accounting Services), capitalization and depreciation policies, and support services overhead rate (from Audit Section). The program user proceeds through a series of screens to enter estimates of in-house and contractor cost. The user can choose whether to enter

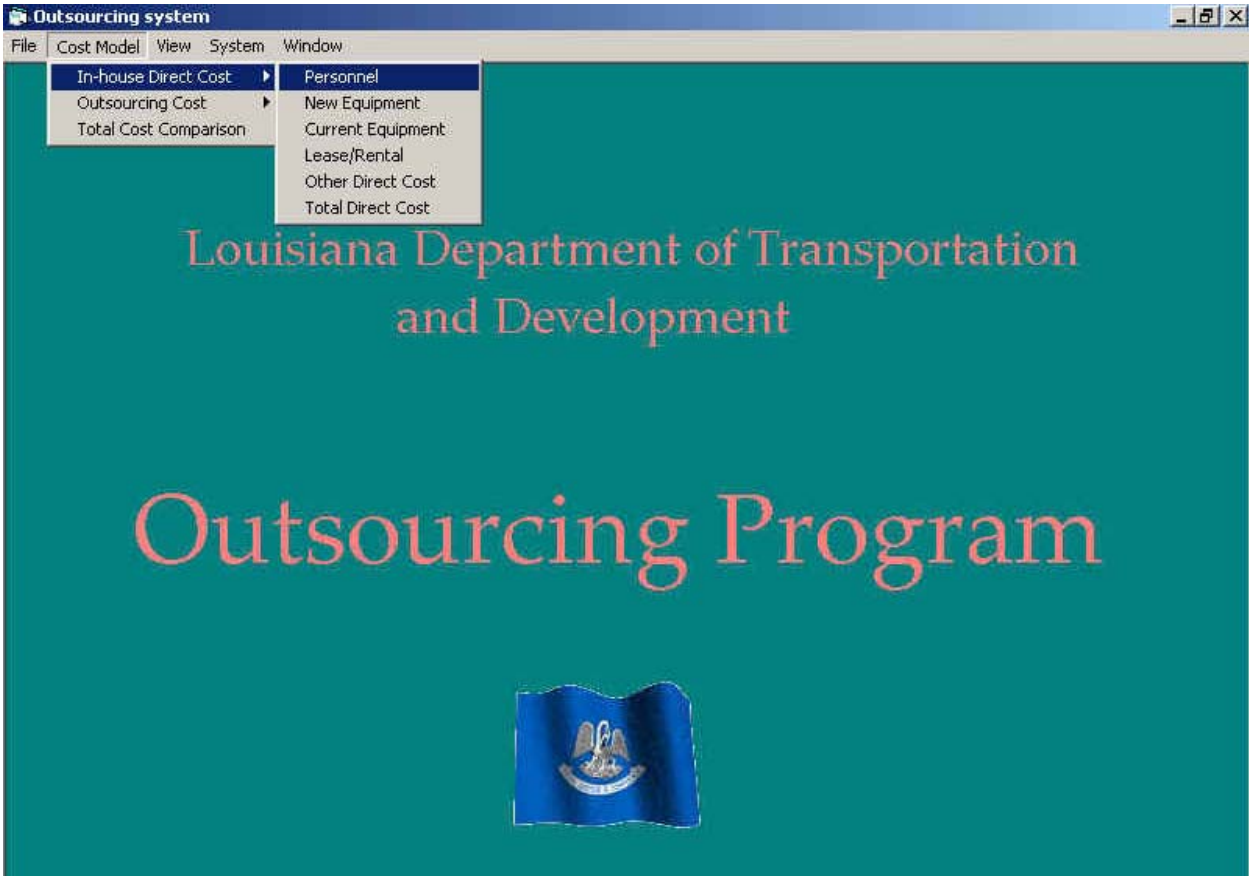

Figure 15
Accessing the cost model

in-house cost or outsource costs using the "cost model" menu item. The in-house cost model takes the user through a series of templates to enter data on personnel requirements, equipment usage, rental, and other costs. The Personnel Cost entry sheet is shown in Figure 16. Some of the data entered interacts with the information already loaded into the model. In the personnel cost

template, for instance, the user enters the number (FTE) of personnel by civil service rank. The program automatically calculates the personnel cost using the median salary rates and payroll additive rate. Similarly, after listing the new and current equipment requirements, depreciation and expense amounts are calculated by the program in light of the agency's capitalization and depreciation policies. A summary of the total in-house cost is provided at the end of the data entry. Another series of templates prompts the program user to enter the cost of outsourcing. Besides the contract cost to the outside contractor, the user is asked to assess whether any revenues or losses are generated by the contract. Additionally, the program requests that contract monitoring and supervision costs be added.

A comparison of in-house to outsource costs is provided at the end of this process. Two cost comparison ratios are calculated: (1) in-house direct costs to outsource costs and (2) full in-house costs to outsource costs. Essentially, direct costs are either avoidable or can easily be redeployed elsewhere. Full cost include all direct and indirect costs and can never be completely avoided, recaptured, or eliminated should outsourcing occur. For analysis, a cost comparison ratio equal to 1.0 indicates no cost savings accruing to either option. Ratios greater than 1.0

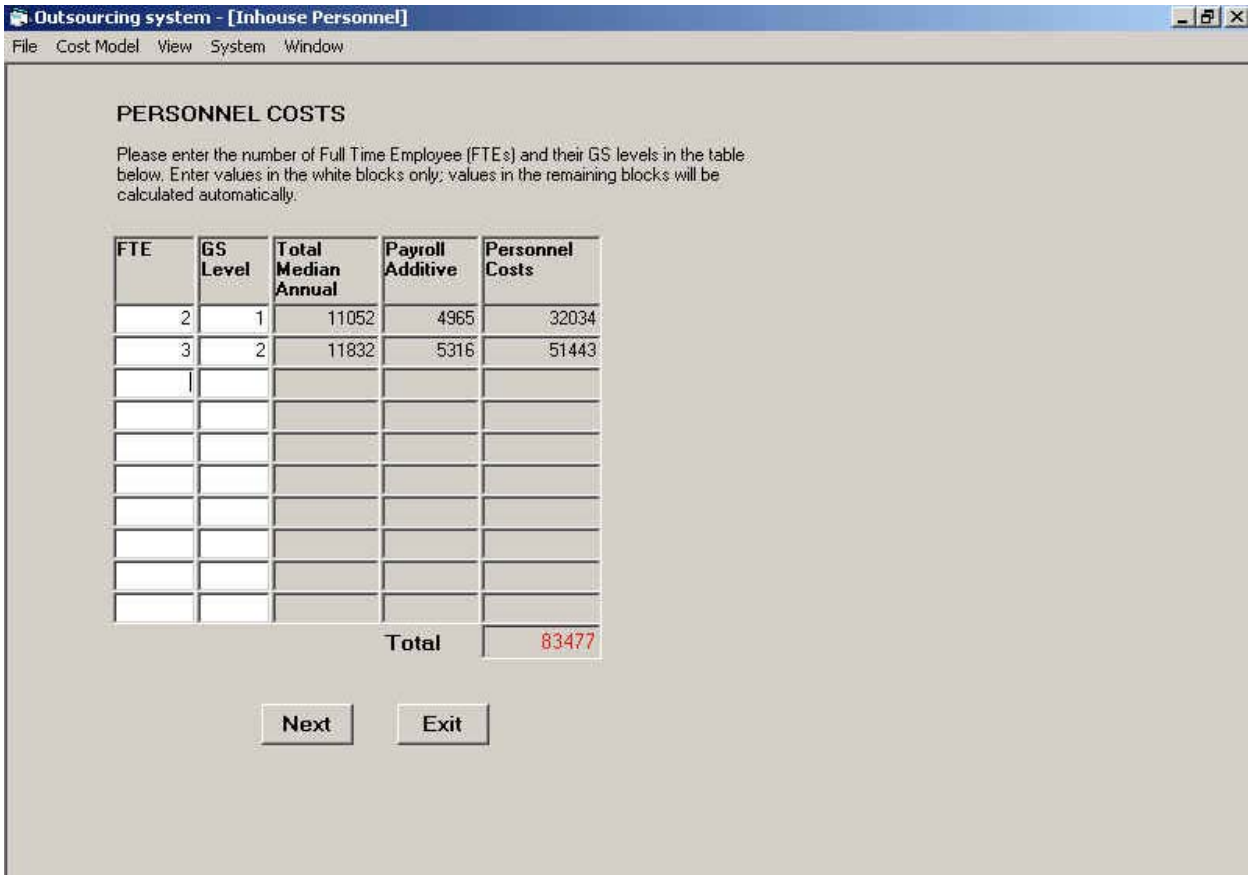

Figure 16
Personnel cost entry sheet

indicate that outsourcing may produce cost savings. Ratios less than 1.0 indicate that outsourcing may cost more (but may be necessary nonetheless due to in-house constraints on available staff time).

The results of the cost comparison are also shown graphically on the toolbar with the qualitative model results as shown in Figure 18. When both the qualitative and quantitative results recommend outsourcing, a more detailed in-house cost analysis and request for outside contractor bids is recommended. Inconsistent results (e.g, outsourcing recommended by the qualitative model but not by the cost model) should be examined closely to determine the accuracy of the inputs into the model. In such instances, evaluation by additional users is a good idea.

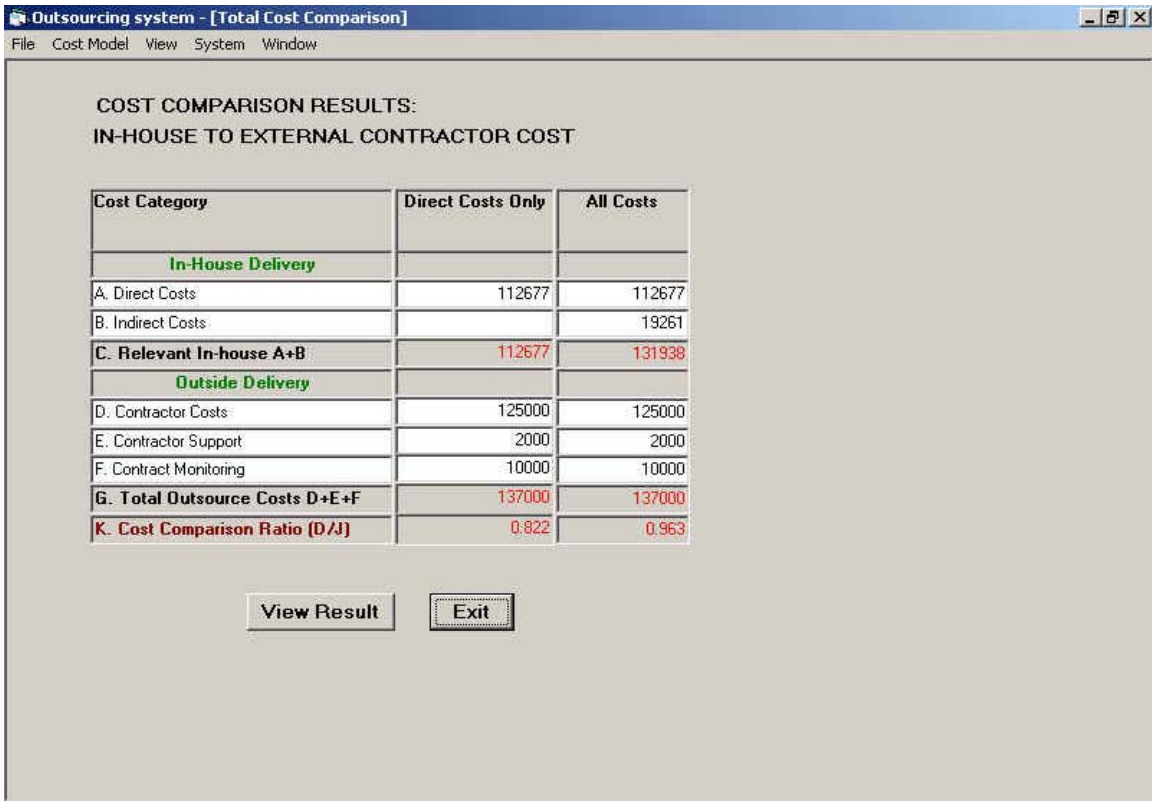

Figure 17
Cost comparison results

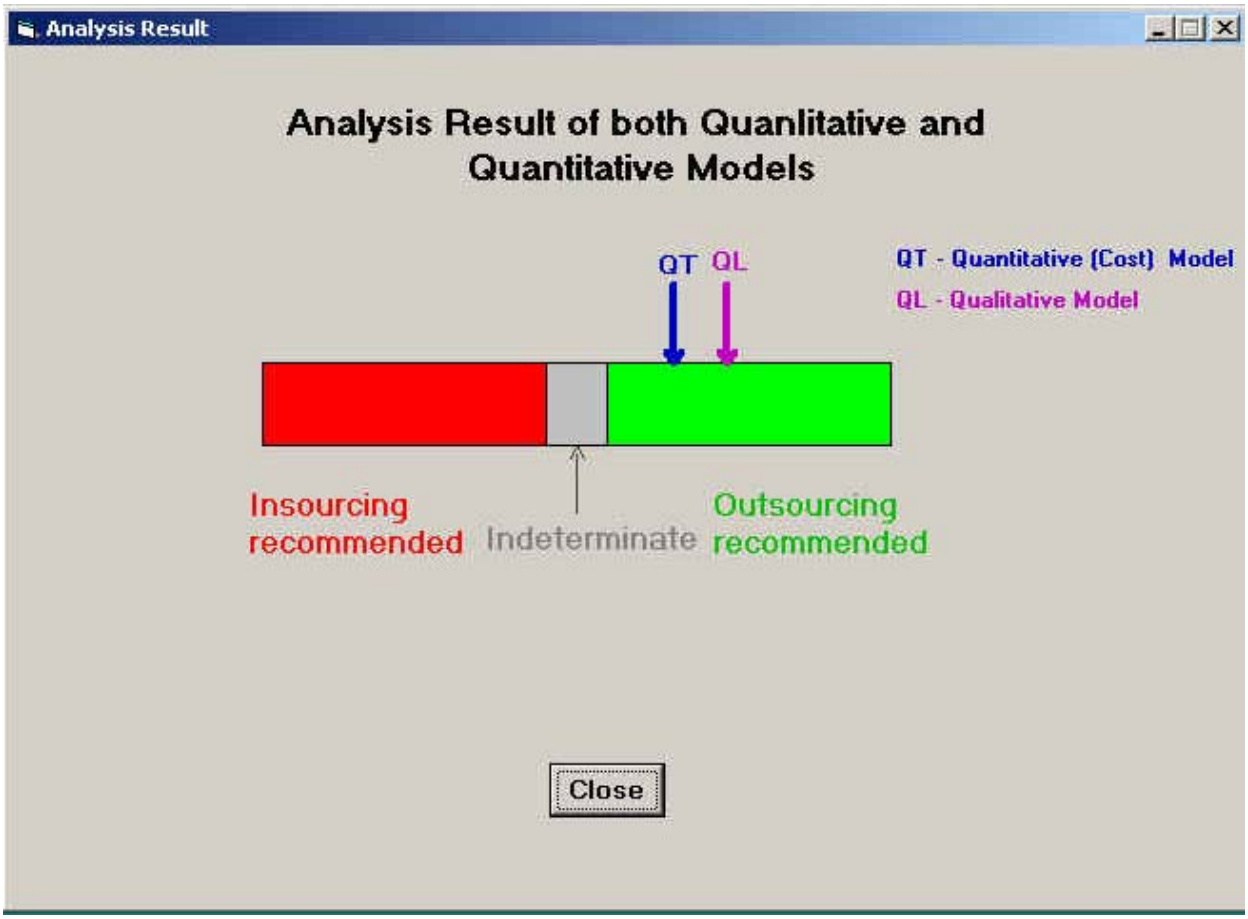

Figure 18
Graphical results of qualitative and quantitative assessment

Feedback on Version 1 of the Model

Version 1 of the computer model was demonstrated at a meeting of the PRC in Fall 2001 at LaDOTD and at a meeting of the undersecretaries of all state agencies at the division of administration offices. Also in Fall 2001, the program was pilot tested on the following three functions deemed appropriate by the PRC: (1) rest area maintenance, (2) highway markers, and (3) highway striping. Based on the feedback from these meetings and tests, a number of significant changes were made to the program that will be described later in this report. The pilot test results are summarized in Table 4.

Table 4
Pilot test results of version 1 of the outsourcing model

Function	Qualitative Model Result Favors:	Cost Model Result Favors:
Rest Area Maintenance	Outsourcing	Outsourcing
Highway Markers	Outsourcing	Insourcing
Highway Striping	Outsourcing	Insourcing

As shown in Table 4, outsourcing of rest area maintenance was suggested by both the qualitative and quantitative (cost) analysis in the model. In contrast, the conclusions for highway markers and highway striping conflict. In each case, outsourcing is favored in the qualitative analysis but not by the cost analysis. Both of these functions have been outsourced in the past primarily for reasons related to timeliness of service delivery, ease of quality monitoring, ease of contracting, and so on.

Based on pilot tests, meetings with the PRC and undersecretaries, and individual comments from users of Version 1 of the program, the following issues were identified:

- Some factors were difficult to understand.
- Some of the criteria assessments seemed to be misplaced under the main factors.
- Cut down the number of criteria assessments.
- Numerical scores were not shown for the weights and assessments made.
- The composite index scores for the qualitative and cost models were not shown.
- Users should be allowed to assess both the level of agreement and the importance of each criteria under each factor.
- Recommendations to enhance the visual appearance of the program were received (e.g., buttons, menus, windows, colors, fonts).
- The cost model should allow the user to specify the potential contract time period rather than being fixed at one year.

As result of these comments and others the program was modified in the following manner:

- Factors were renamed (as “perspectives”) to make them and their descriptions more intuitive.
- Some criteria assessments were moved to more logical perspective categories.
- The number of criteria assessments was reduced from 30 to 25.
- Numerical scores are shown along the way for every assessment made by the user.
- Users conduct a two-fold evaluation individual criteria statements in terms of

their level of agreement with the statement and they assign a weight of importance to each statement.

- The composite index scores for the qualitative and cost model are normalized so that they both range between 0 and 1 and the scores are displayed on the graph to view the model result.
- A number of visual changes were made to the program as suggested by test users.
- The cost model requires the user to input the number of months of the contract. Annual in-house cost data is input and is automatically converted to project costs using the number months already in the program.
- System maintenance within the program was expanded to allow changes to the salary scales by GS level, the payroll additive rate, support services rate, and the uncertainty rate (which specifies the percentage of indifference for each of the composite index scores).

Renaming Factors to Perspectives

The first version of the program adopted the six categories of "factors" advocated by the TxDOT study *[10]*. Users found that some of these factor names were confusing, however. For the revised model the project team decided to borrow categories from a qualitative instrument in business known as the "balanced scorecard approach" *[17]*. Using this approach, the six factors became "perspectives" as shown in Table 5.

Table 5
Converting factors to perspectives

Factor (Model Version 1)	*Perspective (Model Version 2)*
External Mandates & Influences	Customer Perspective
Strategic & Organizational Effectiveness	Internal Business Perspective
Organizational Systems and Operations	Innovation and Control Perspective
Cost and Cost Efficiency	Financial (Cost) Perspective
Human Resources and Organizational Culture	Employee Perspective
Vendors Market	Contractor Market Perspective

The first four perspectives are drawn directly from the balanced scorecard approach popular in

business today. The last two, the employee and contractor market perspectives, capture unique aspects of the contracting/outsourcing decision facing public sector agencies. Table 6 lists each perspective and its description.

Table 6
Perspectives and their descriptions

Perspective	Description
Customer Perspective	Focus on the interests of citizens, legislators, public officials, and special interest groups, and the compliance with laws and regulations related to the function or activity under consideration.
Internal Business Perspective	Focus on agency core competencies, processes, technology capability, and technical expertise
Innovation and Control Perspective	Focus on agency need to monitor and control the function, ability to outsource on a limited basis, and effects on other agencies should outsourcing occur
Financial (Cost) Perspective	Focus on cost aspects, capital investment issues, and timeliness of function or activity under consideration
Employee Perspective	Focus on employee morale, retraining, and relocation
Contractor Market Perspective	Focus on availability of qualified private sector contractors, potential of establishing a "monopoly," and the degree of prior outsourcing experience in the agency for the function or activity under consideration

The second version of the model is called the Outsourcing Decision Assistance Model (ODAM) The user manual accompanying the ODAM software explains how to run the qualitative model in some detail. Highlights are described in this report. The user is asked to make three evaluations related to the qualitative aspects of the function or activity being considered for outsourcing. First, as was the case in version one of the model, the user assigns a weight of importance to each of the six perspectives (i.e., customer, internal business, etc.). Each weight ranges from 0 (low) to 1 (high). The weights are assigned independent of one another. A pie chart in the window depicts the relative weights assigned to each perspective and the raw numerical weight is displayed to the right of the toolbar. An example appears in Figure 19.

The second and third evaluations made by the user pertain to a series of criteria assessment statements associated with each of the six perspectives. Each criteria is evaluated for the user's level of agreement with the statement, from low (-1) to high (+1) followed by an evaluation of the importance of the statement also from low (0) to high (1). Again, the raw numerical scores for each evaluation is displayed to the right of each toolbar. An example appears in Figure 20.

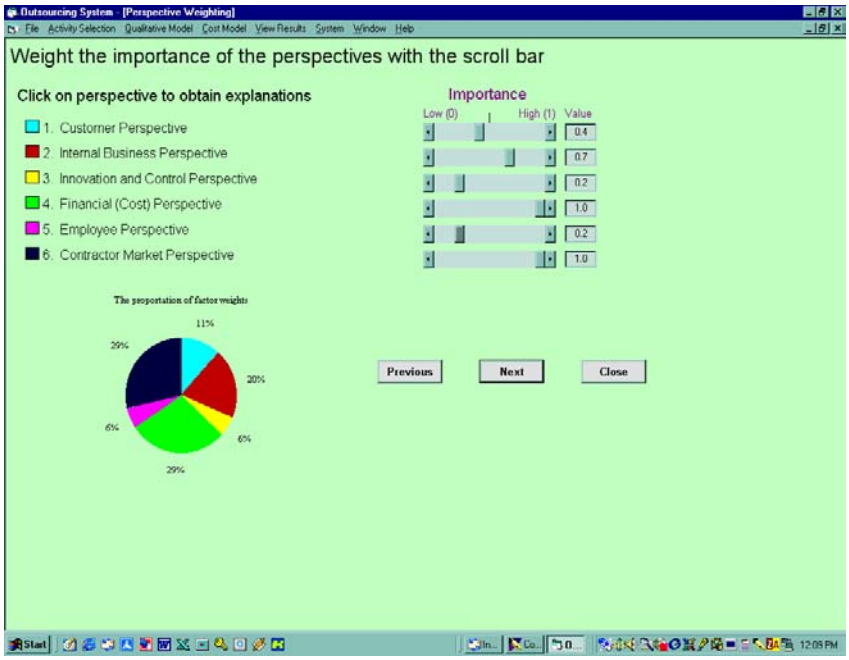

Figure 19
Assigning weights to perspectives

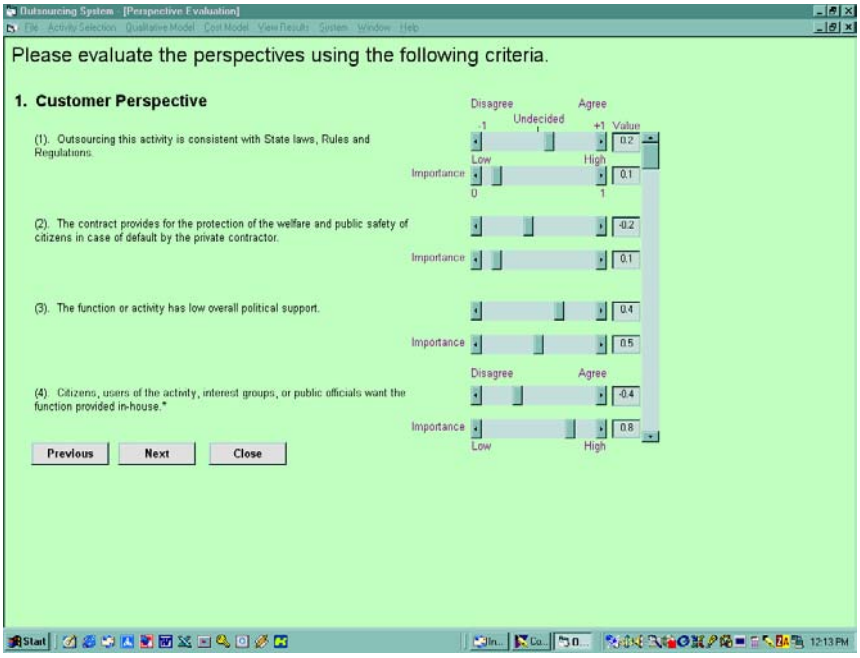

Figure 20
Two-fold evaluation of criteria assessment statements

Cost Model for Version 2

As alluded to earlier, the main change to the cost model in version 1 was to allow the user to stipulate the

length of project term (in months). Generally the cost model relies on the following background data to complete the analysis:

- average salaries by civil service grade
- payroll additive rate
- support services rate
- project term in months

The first three items can be modified when needed under the system menu of the program. The fourth item is input by the user for each analysis task.

As discussed earlier, it is expected that some costs underlying the payroll additive rate and the support services rate will not be relevant and avoidable costs. Essentially, federal grant rules drive the way in which these two rates are developed. These rates can be changed in the program to reflect the portion that is relevant and avoidable for outsourcing decisions, however. Hence, a follow-up analysis of the rates to parse out irrelevant and unavoidable costs could be conducted by those responsible for creating the rates. For example, pension costs in the payroll additive rate include both current pension costs earned by the worker and a portion of the statewide unfunded pension liability attributable to retirees and other past service. The unfunded liability should be extracted from the payroll additive for outsourcing analysis.

Similar to version 1 of the model, the user is lead through a series of windows to input cost data estimates for contracting out and for in-house delivery. At the culmination of the process the cost analysis is displayed in two ways. First, a ratio of contractor cost to in-house cost is presented using two definitions of in-house cost: (1) total direct and indirect costs and (2) total direct costs only. An example appears in Figure 21. As shown in Figure 21, the contractor cost to in-house direct cost ratio is 0.92 (98,086/106,683) and the contractor cost to total direct and indirect in-house cost is 1.08 (114,853/106,683). The cost ratio comparing total direct and indirect in-house costs to contractor costs are normalized such that the ratio ranges between 0 and 1 to facilitate graphical analysis of the cost model result beside the qualitative model result. The steps to normalize the cost and qualitative model results are explained in the next section.

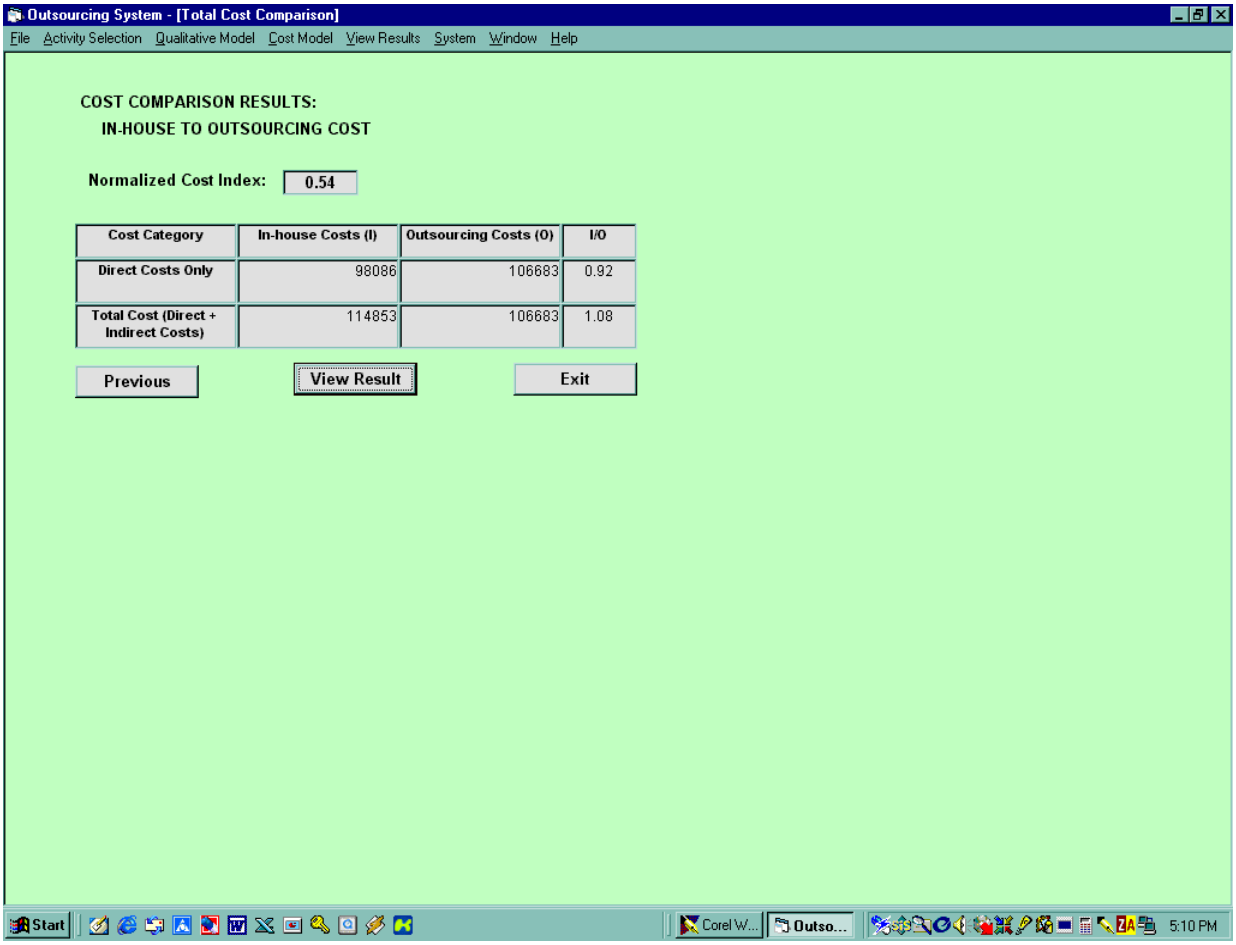

Figure 21
Cost ratios

Creating Normalized Composite Index Scores

Both the qualitative index (QI) and the cost index (CI) were normalized so they each range between 0 and 1. The techniques to develop the normalized index scores follow:

$$QI = \frac{1}{\sum_{k=1}^{K} I_k} \left[\sum_{k=1}^{K} I_k \cdot \frac{1}{2} \left\{ \frac{\sum_{j=1}^{J} (r_{jk} \cdot w_{jk})}{\sum_{j=1}^{J} w_{jk}} + 1 \right\} \right] \quad \text{. . . . . (2)}$$

where,

QI = Qualitative Index
I_k = Importance rating of the kth perspective
K = Number of perspectives
r_{jk} = rating on the jth criterion of the kth perspective

w_{jk} = weight of the j[th] criterion of the k[th] perspective
J_k = Number of criteria in the k[th] perspective

and,

$$CI = \begin{cases} 0.5\left(I/O\right) & when \quad I \le O, \quad and, \\ 1 - 0.5\left(O/I\right) & when \quad I > O \end{cases} \quad \text{(3)}$$

where,

CI = Cost Index
I = Total insourcing cost
O = Total outsourcing cost

Note:

- Values of criterion rating r_{jk} varies between -1 and +1.
- Values of criterion weighting w_{jk} and perspective weighting I_k range between 0 and 1.
- Values of QI and CI range between 0 and 1 and approach these values asymptotically.

Since the two composite scores are on the same 0 to 1 scale, they can easily be displayed on a graph. Figure 22 shows an illustration of a display of the two scores. The size of the gray area centered around 0.50, termed the "indifference point," can be altered in system maintenance.

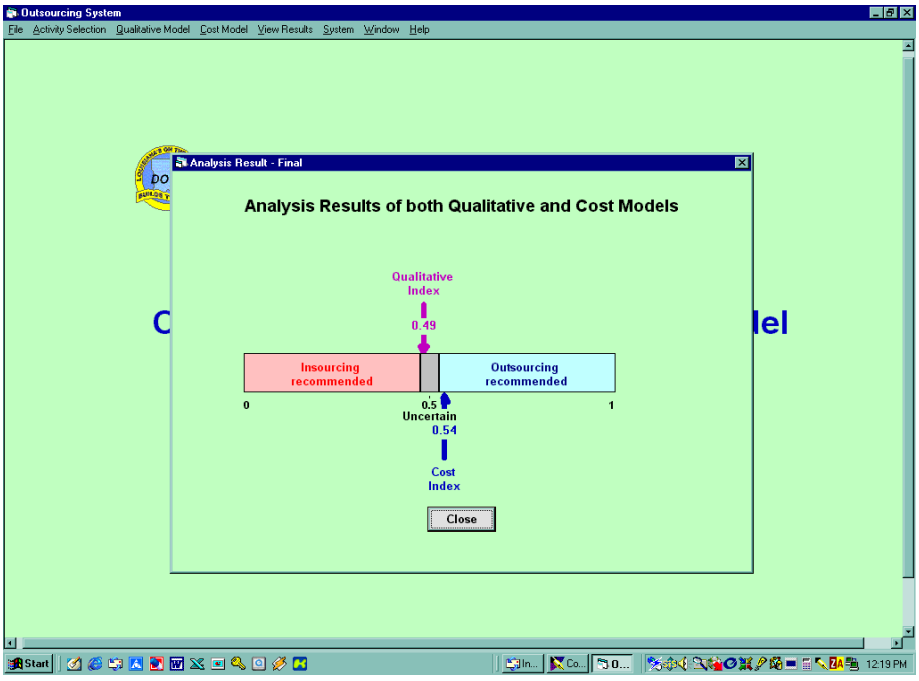

Figure 22
Graphical display of composite indexes

CONCLUSIONS

The purpose of this project was to design a generic, comprehensive model for outsourcing decision support. The model developed considers both cost and noncost factors. The qualitative model was developed from a review of models used in other states and from extensive interviews with LaDOTD personnel to elicit their experiences in noncost factors that have affected outsourcing decisions in the past and are likely to continue do so in the future. Following this phase, two qualitative models were pilot tested with LaDOTD district and headquarter managers: one based on Arizona's Statewide model and the other based on one used by Pennsylvania's DOT. Both models involve assigning weights (or ratings) to a series of noncost attributes (e.g., effect on timeliness of service). Although the Arizona model includes a broad range of intuitively appealing noncost factors it was found to be confusing in meaning and required tedious mathematical computations thereby leading to a lack of consensus among the managers. The Pennsylvania model was considered more straightforward and was somewhat easier to compute but it lacked the contextual richness of the Arizona model. Based on these findings it was decided that a computer-based model accentuating the use of graphics over numerical evaluations would, in essence, combine the strengths of the two models; that is, the breadth of coverage of the Arizona model with the computational ease of the Pennsylvania model.

A cost comparison model, based on that used by Arizona and New Mexico's DOT, was added as a second part of the computer model. The cost model compares estimated outsource costs to two versions of estimated in-house costs–(1) direct in-house costs only and (2) full in-house costs. Direct costs are, in theory, manageable in the short run, while full costs include noncontrollable costs. Hence, the two cost comparisons are made to gain a broad perspective of the likely benefits of outsourcing.

The final result of the computer model is a graphic display of both the qualitative and quantitative results of the evaluation in terms of three possible outcomes for each phase of the model as follows: (1) insourcing recommended, (2) outsourcing recommended, and (3) indeterminate. If both results (i.e., qualitative and quantitative) lead to the same conclusion then the recommended action should be pursued further. Inconsistent results, however, suggest that the model should be rerun, perhaps by additional users. When the analysis recommends outsourcing, a more in-depth analysis of in-house cost and a request for bids from contractors is in order.

RECOMMENDATIONS

It is recommended that the outsourcing model (ODAM) be used to evaluate the outsourcing potential for functions and activities that are currently under consideration for outsourcing. The testing should be done initially with a group of evaluators to determine whether a consensus can be reached and to provide a structure for discussing the qualitative and cost aspects of the function being evaluated. The model can also be used to evaluate alternative modes of service delivery by the same category of service provider (e.g., to compare two different contractors or two different approaches to provide the service in-house). To do so, Contractor A could be the in-house provider and Contractor B the private contractor.

It is recommended that an analysis be conducted on the payroll additive rate and the support services rate to isolate the costs in those rate that are relevant (avoidable) in regards to potential functions or activities for outsourcing.

This model provides a systematic approach to identify functions and activities that are viable candidates for outsourcing. The model is not intended to be the final analysis; rather, functions and activities identified for outsourcing by this model should be analyzed further prior to contracting out.

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