Report No. 3

Investigation into the cost-effectiveness of using consultants versus in-house staff in providing professional engineering services for Louisiana's Department of Transportation and Development

Special Studies Planning Group
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LOUISIANA TRANSPORTATION RESEARCH CENTER

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by

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INTRODUCTION

Traditionally, state Departments of Transportation have designed and supervised the construction of roads in their state. Consultants performed some of the work but, beginning in the 1970's, the proportion of road contracts handled by consultants began to increase (Ward *et.al*., 1975, Fanning, 1992a). This resulted in a number of investigations being launched to determine the implications of this trend and whether it was desirable or not.

The Louisiana Department of Transportation and Development (DOTD) conducted a study into preconstruction highway management in the mid 1970's. At that stage, consultants performed approximately 50% of the states' professional engineering work in terms of construction costs (Roy Jorgensen and Associates, 1977). During this study, an informal investigation into the comparative costs of consultants versus in-house staff found that consultants cost approximately 100% more than in-house staff in performing these activities (Jack, 1994). In 1994, it was estimated that consultants performed between 70% and 80% of the professional engineering services in Louisiana's DOTD. At this stage, interest was again expressed by the DOTD to investigate the relative cost of conducting these activities by consultants and in-house staff (Davis, 1993). This report documents the initial findings of that investigation.

In reviewing the literature it became evident that many states had conducted similar studies in the past. Generally, their findings were consistent. Four out of five studies concluded that consultants were more expensive than in-house staff and most of the remaining studies could not distinguish a significant difference in cost. The studies also identified how difficult it was to make accurate cost comparisons. True comparisons can only be made if projects compared are identical in all respects other than that they are conducted by consultants or in-house staff. Cost comparison is also complicated by the difficulty of equating cost elements such as overhead, training and indemnity costs across consultant and state accounting systems (Ashley *et al.*, 1992). Cost comparison studies in the past have taken approximately one year to complete and usually involved detailed cost analysis. In one such detailed cost study, the study cost $155,346 (*Ibid.*).

Given the conditions above, it does not appear cost-effective to conduct another cost comparison study in Louisiana. Rather, it would seem more appropriate to accept that consultants are probably more expensive than in-house staff and direct attention to other factors that, together with cost, form the basis of a rational decision regarding the use of consultants in state government contracts.

This report, therefore, does not document the results of a cost comparison study but provides an initial review of the results of costs from other studies, lists the criteria we believe should feature in any decision on whether to use consultants or not and makes recommendations as to how the issue of deciding on the degree of use of consultants in Louisiana Department of Transportation and Development should be handled.

OBJECTIVES

The objective of the work reported in this document is to:

(i) review past studies of the cost-effectiveness of using consultants versus in-house staff in conducting professional engineering services for state Departments of Transportation,

(ii) report the findings of those studies,

(iii) identify all criteria relevant to the decision to use consultants or not in the Louisiana Department of Transportation and Development, and,

(iv) recommend a process by which the Louisiana Department of Transportation and Development may decide on the degree of use of consultants in state projects.

LITERATURE REVIEW

Private sector involvement in the delivery of public services in general has increased nationwide in the last 20 years (Allen et.al., 1989). The area in which privatization of government functions have been the most prevalent in the past is at the city- or parish government level (Finley, 1989). In a survey among 17 local governments in the U.S. it was found that from 1972 to 1987 the amount paid to private contractors for the provision of services traditionally handled by local government more than tripled (Dudek, 1988).

The type of work contracted out at local government level in the past typically involved routine activities such as garbage collection, janitorial services and park maintenance. However, more recent contracts included fire fighting, ambulance services, air traffic control, the operation of penitentiaries and even contracts involving city management. The newest trend is to contract out human services such as day care, public health centers, drug rehabilitation and legal aid to the poor (*Ibid.*).

The driving force behind privatization of local government functions is the potential to reduce costs, access specialized skills, accommodate peak demands, provide clients with a choice of provider and serve the ideology that “less government is better” (Allen *et.al.*, 1989). In local government cost reduction is a necessary component in the circumstances governing the decision to contract out services. Review of past privatization of local government functions shows that cost saving originates from essentially two sources; reduced benefits to workers (in the form of lower wages but, particularly, in reduced fringe benefits) and increased productivity (*Ibid.*). From surveys, total employment does not appear to be affected by privatization although the location of the jobs or the occupational distribution of the workforce was found to not necessarily remain stable following privatization (*Ibid.*).
Within state government, the cost criterion does not appear to have the overriding influence it has

in local government (Allen *et.al.*, 1989, Cook, 1985). However, cost has featured as the main criterion in the studies conducted to determine the desirability of using consultants or in-house staff in providing engineering design and supervision services to state Departments of Transportation. Of fifteen studies traced in the literature addressing the use of consultants or in-house staff in performing professional engineering services for state Departments of Transportation, thirteen conducted detailed cost assessments as either the sole or major part of their analysis. Some studies included a simultaneous assessment of the quality of work produced by consultants and in-house staff while only a few discussed any of the other factors relevant to a decision on the appropriate degree of use of consultants.

Of the thirteen studies identified in the literature as analyzing the comparative cost of consultants versus in-house staff in providing professional engineering services to state Departments of Transportation, ten found consultants to be more expensive, two could not identify a significant difference and one found consultants to be cheaper. Among those that found consultants to be more expensive, one included a survey among 10 states (Missouri Highway and Transportation Department, 1993). Another involved a survey among 13 states conducted by the Western Association of State Highway and Transportation Officials (Blanning, 1992). Among these total 23 states appearing in both surveys, 19 were of the opinion that consultants were more expensive and the remaining 4 said costs were similar.

The two studies that reported that they could not distinguish a clear difference in the cost of services provided by consultants and in-house staff, also provided reason to expect their assessments to show consultants more expensive if conditions were different. In the case of the study by the Wisconsin Legislative Audit Bureau (1990), they suggested that consultants conducted simpler projects than in-house staff and that the Department had not managed its own projects as efficiently as it can manage them. In the case of the study by University of California, Berkeley, costs incurred by CalTrans staff in announcing, supervising, reviewing and approving project work conducted by consultants was omitted from the calculations. In addition, overhead rates for in-house staff were possibly overinflated (Blanning, 1992).

Work conducted by Fanning of the Professional Services Management Journal (PSMJ) found that the cost of professional engineering services as a proportion of construction cost progressively reduced as the proportion of work conducted by consultants increased (Fanning, 1992a and 1992b). Using data collected by Federal Highways Administration from all fifty states for the period 1979-1989, he showed that states which contracted out less than 10% of their engineering work had an average ratio of engineering cost to construction cost of 0.21 while states which contracted out between 50% and 70% of their engineering work had an average ratio of only 0.11. No relationship to topography, size of highway system, size of construction program or any other characteristic of the state could be established to explain the relationship except proportion of engineering work conducted by consultants (Fanning, 1992b). The relationship, indicating almost 100% reduction in cost with increased use of consultants, is so contrary to the findings of other studies that it is difficult to rationalize. Two points are worthy of mention in this regard. Firstly, most other studies give ratios of engineering cost to

construction cost much lower than those quoted by Fanning. For example, the Missouri Highway and Transportation Department study gave ratios for consultant and in-house staff of 0.096 and 0.073, the TTI study gave values of 0.049 and 0.028, the Ernst and Whinney study of 0.052 and 0.047 and University of California, Berkeley study of 0.155 and 0.178 respectively. With the exception of the UC Berkeley study, the PSMJ study had considerabily higher ratios of engineering cost to construction cost. Secondly, the PSMJ report also includes the following statement: "Is it ever more cost effective for an owner to hire in-house staff? Our study says yes it is, but only when there is sufficient work to keep staff busy all year, year in and year out" (*Ibid.*). Thus, the conclusion of lower costs with consultants is evidently based on the assumption that in-house staff could not keep themselves fully occupied if they conducted all their own work. The argument supporting this position is that consultants, not being limited to performing tasks for a single state Department of Transportation, can viably support specializations and maintain a flow of work in a variety of areas that individual state DOT's cannot. However, the degree to which this could be true is difficult to assess and it is an assumption not made in any of the other studies reviewed.

Reviewing the data used in the PSMJ study gives rise to additional concerns regarding the findings of this study. For example, it is reported that the California Department of Transportation (CalTrans) had a ratio of engineering costs to construction costs over the period 1979-1989 of 0.45 (Fanning, 1992a). In fact, the reported ratios among the fifty states varied from 0.45 to 0.06 suggesting a radical difference in reporting among the states. Federal officials reported their doubt of the completeness of the submitted data (Fanning, 1992a). Interestingly too, within the category in which the ratio of engineering cost to construction cost was the highest (i.e. the states in which less than 10% of project costs involved projects conducted by consultants) the two states with the highest individual value (0.45, California) and the lowest individual value (0.06, Alabama) were both present.

Another concern related to the findings of the PSMJ study is the data used to categorize states according to the proportion of work conducted by consultants. PSMJ conducted a survey among all fifty states in 1991 asking them to state what proportion of their work was conducted by consultants (*Ibid.*). Using this information in contrast to the 1979-1989 reported values in the FHWA data, reduces the ratio of engineering cost to construction cost from 0.21 to 0.13. Of the eleven states in the category in the 1979-1989 data, only five reappear among the seven falling into that category from the survey data. Noticeably absent is California with its high 0.45 value.

The average ratio of engineering to construction cost was calculated in the PSMJ study by adding together engineering costs for all projects in a category and dividing by the sum of the construction costs. If, alternatively, the engineering to construction cost ratio is calculated for all projects in a state and the average of the state values taken as the representative value for the category, different results emerge. This is shown in table 1 where the "category average" values are those reported in the PSMJ study while the right-hand column values are state averages. Clearly, the clear progression evident among the PSMJ values is disrupted among the values in the right-hand column.

CATEGORY (% done by consultants)	(Engg. Cost)/(Constr. Cost) Ratio	
	category average	ave. of state values
<10%	20.8	17.1
$10%, <20%	19.4	20.2
$20%, <50%	14.6	15.6
$50%, <70%	11.2	11.9
$70%	13.9	19.1

TABLE 1

RESULTS FROM PSMJ STUDY USING DIFFERENT AVERAGING PROCEDURES

Another countrywide survey among state Departments of Transportation was conducted by the Transportation Research Board in 1984 (Cook, 1985). More than 40 states responded to this survey and more than two-thirds of them indicated that they do not use, or only occasionally use, cost comparison as a factor in deciding on the level of contracted out work. The two main reasons given for this state of affairs was "...(a) cost is not a major factor in contracting out and (b) the cost data for internal operations, especially overhead charges, are not sufficiently accurate to make meaningful comparisons." (*Ibid.*). At the same time, respondents to the survey were skeptical that contracting out services would be cheaper given the added tasks that accompanied contracting out such as bid management, supervision of progress and approval of plans.

All thirteen studies referred to above were conducted either by state authorities or conducted on their behalf by independent research teams. In addition, the surveys were conducted among state officials only and did not include responses from the private sector. Subsequently, it can be argued that the results are biased in favor of the public sector by these circumstances. However, the most comprehensive of the cost comparison studies have been conducted by university research teams and have had input from the private sector in the process of conducting their investigation (e.g. Ashley *et al.*, 1992, Burke *et al.*, 1987, Ward *et al.*, 1987). Subsequently, there has been a concerted effort to obtain an objective view of the situation. In one case (the University of California study), considerable criticism was levelled at the study team for not coming to the conclusion that consultants are more expensive (Blanning, 1992). However, in their opinion the analysis did not show significant difference and they refused to alter their findings although they did print the dissenting comments in the study report.

One of the landmark investigations in the matter of the comparative cost of engineering services in state Departments of Transportation was the three parallel studies commissioned by the State

Department of Highways and Public Transportation in Texas. The three studies were conducted independently and concurrently to establish whether similar results would emerge and thus prove that study results were not dependent on the study team. Two were conducted by university research teams (Texas Transportation Institute at Texas A&M and the Center for Transportation Research at University of Texas, Austin) and the other by an international accounting firm (Ernst and Whinney). All three came to the same conclusion - consultants are more expensive.

A question which is closely related to cost is the quality of work produced. Cost and quality are, to a certain extent, interchangeable and measuring one without measuring the other may lead to erroneous conclusions. Not all of the studies investigating costs have included comparison of quality but among those who have, it appears as if quality is similar among the two groups (Ernst and Whinney, 1987, Burke *et al.*, 1987, Wisconsin Legislative Audit Bureau, 1990) . Where consultant work has been found to be inferior it usually is the result of poor communication or inadequate management (Ward *et al.*, 1987). Overall, the studies concluded that where quality was not comparable it was a temporary condition that could be remedied.

A matter which is not explicitly mentioned in the studies investigating the use of consultants in state projects but which is implied by the actions and some of the responses in the investigations, is the resentment that exists among some state employees when consultants are employed to do state work. To the extent that privatization of local government functions has preceded those in state government, it is interesting to note the attitude that has prevailed among local government employees regarding privatization. It appears that when the jobs of government employees have been threatened by privatization in the past, they were usually hostile to the proposition (Dudek, 1988). Where organized labor has been the strongest, the least degree of privatization has been achieved, suggesting that workers will effectively oppose privatization if they have the power to do so (*Ibid.*). On the other hand, opposition to privatization has been reduced considerably where proposed changes have been accompanied by gaurentees that workers would not forfeit their jobs but be transferred to other departments or assured a job with the private company providing the service (Dudek, 1988, Allen *et.al.*, 1989).

At the state level, similar concern seems to be present. The most overt evidence of this is the case of Caltrans where increased use of consultants coupled with a hiring freeze on state engineers led to a lawsuit being filed by the Professional Engineers in California Government (PECG) to counter that action (Blanning, 1992). The PECG were successful in their court action and hiring was reinstituted. Consultant participation in Caltrans reduced from a reported 15% of the contracts before the court injunction to 10% by 1992 (LSPECS, 1993). If experience in local government privatization can be used as a precursor to events in state government, then it would seem that addressing and accommodating the concerns of state employees is necessary to prevent development of adversarial relationships within the engineering profession. If contracting out threatens the standard of employment of state employees then they can be expected to legitimately oppose the action leading to that state of affairs.
Other more subtle evidence of the concern felt within state Departments of Transportation over the increased use of consultants is the number of studies launched to investigate the matter of

using consultants. Within the literature, documentation of studies conducted by 10 different states in the last twenty years were identified. This paralled the increased use of consultants by state Departments of Transportation.

One of the consequences of increased use of consultants in state Departments of Transportation is the tension that is introduced between consultant and state employees. This affects communication and trust between consultants and state employees. Consultants need to become familiar with Department procedures and requirements, and state employees need to establish management systems that ensure timely delivery of products of adequate quality. Experience shows that establishing this mutual familiarity and trust improves efficiency but it takes time and effort to establish and requires that at least the main core of consultants are used on a continuing basis and not only to serve peak demands (Ernst and Whinney, 1987).

MAJOR FINDINGS OF PAST STUDIES

The major findings of the studies reviewed in this study are summarized in table 2 below. In this summary only findings on cost and quality are shown since these are the criteria which received the most attention. However, other criteria were also mentioned and these are reviewed in subsequent paragraphs. The additional factors that should be considered are the impact the use of consultants have on in-house service conditions, the extent to which consultants are used to relieve peak demands only, the ability of the state organization to meet deadlines without consultants and the development of a strong consulting engineering base as a resource for the state. The items are discussed below.

(i) *Finding on cost:*

As can be seen in table 2, most studies have found that consultants are more expensive than in-house staff for the same tasks. However, there is considerable difference among the studies as to the degree to which consultants are more expensive since these vary from 31% to 240% in the table. The lower figure is encountered among more studies and is logically the more representative value. The results are contentious and have been hotly debated in certain cases. However, a great deal of effort has been expended in obtaining these results and they are the product of "objective" studies conducted by knowledgeable officials, auditors and independent research teams. It is suggested that greater clarity will not be obtained by reopening the debate or conducting another detailed cost study.

STUDY	ITEM REVIEWED:	
	COST	QUALITY

Roy Jorgensen and Associates, 1977	Consultants 100% more expensive.	N/A
Western Association of State Highway and Transportation Officials, 1979.	11 states (83%) said consultants are more expensive. 2 (17%) said costs are the same.	8 states (62%) said consultant's quality of work inferior to in-house staff. 5 (38%) said quality the same.
Maryland Department of Transportation, 1981.	Consultants 80% to 120% more expensive.	N/A
Transportation Research Board, 1984	Consultants are not cheaper.	N/A
Vermont Department of Transportation, 1986.	Consultant 16% to 240% more expensive.	N/A
Center for Transportation Research, University of Texas, Austin, 1986.	Consultants more expensive.	Quality the same.
Texas Transportation Institute, Texas A&M University, 1986.	Consultants more expensive	Quality the same.
Ernst and Whinney, 1986.	Consultants generally more expensive.	Quality the same.
Alabama Department of Transportation, 1989.	Consultants 69% to 100% more expensive.	N/A
Professional Services Management Journal, 1990?	Consultants cheaper than in-house staff.	N/A
North Carolina Department of Transportation, 1990.	Consultants more expensive.	N/A
Wisconsin Legislative Audit Bureau, 1990.	Cost the same.	Quality the same.
Michigan Department of Transportation, 1991.	Consultants 33% more expensive.	N/A
University of California, Berkeley, 1992.	Cost the same.	N/A
Legislative Analyst, California, 1993	Consultants more expensive.	N/A
Missouri Highway and Transportation Department 1993.	Consultants 31% more expensive. In survey of 10 states, 8 said consultants more expensive and 2 said costs were the same.	N/A

N/A - Not available because not included in analysis.

TABLE 1: SUMMARY OF PAST STUDY FINDINGS

(ii) *Finding on quality*

Among those studies that investigated quality of work there appears to be agreement that

the standard of work is similar among consultants and in-house staff. Among the surveys there was a tendency to indicate that in-house quality of work was superior to consultants on some occasions. However, since the survey was conducted among state officials only this is interpreted as an understandable bias among state employees that would have reflected in the opposite direction if the surveys had been conducted among consultants.

(iii) *Impact on in-house service conditions:*

The use of consultants in state Departments of Transportation has usually been justified under the notion that they service peak demands in the department or provide specialized services that the department could not justify maintaining on a continuous basis. These conditions are clearly exceeded in several cases. For example, from its survey among ten states the Wisconsin Legislative Audit Bureau Study (1990) found that the estimated percent of total highway engineering contracts prepared by consultants as a percentage of all contracts let by the highway departments were:

Arizona		80%
Indiana	80%	
Pennsylvania		75%
Florida	74%	
Illinois	50%	
Wisconsin		35%
Michigan		15%
California		15%
Iowa		<10%
Minnesota		<10%

In Louisiana, the level was reportedly 70%-80% in 1994 (Jack, 1994). Clearly, in many states consultants are not only handling peak demand or specialized contracts - they are conducting work traditionally conducted by in-house staff.

These conditions have generated resentment among in-house staff prompted by a fear that their organizations would be reduced in stature, prestige and influence. In addition, there is concern that conditions of service in the department would be impacted by a reduced variety of work and fewer opportunities for career advancement. It would seem totally appropriate that this concern feature in the development of policy regarding the appointment of consulting engineers.

(iv) *Accommodating peak demand by using consultants*

It has been suggested that consultants can more easily accommodate fluctuating demand

than state department because of their more flexible hiring and firing policy and their ability to function nationally and even internationally. Collectively, consultants are a large resource that can move to address needs across the nation as they arise. State departments are, obviously, statebound.

It was when increased federal and state user taxes flowed into state highway departments that consultant involvement in state highway contracts increased (Burke, et.al., 1987). For example, Texas Department of Highways and Public Transportation reported a fourfold increase in payments to consultants for engineering services during the period 1980 to 1986 (*Ibid*.) while Wisconsin reported a tenfold increase for the same services during the period 1982 to 1989 (Wisconsin Legislative Audit Bureau, 1990). The consulting industry appears to have demonstrated that it can accommodate fluctuations in demand quite well. It is not clear how state departments could have handled demand increases such as those cited above given the implications this has with regard to hiring and training new staff, accommodating and equipping them, establishing the necessary support staff, providing an organizational structure in which to operate and reducing staff when the demand decreases.

Certain activities are added to the duties of in-house staff when consultants are appointed. These typically are the preparation of contracts with consultants, the selection process, management of progress and payment, review of designs and approval of work produced. In certain cases when the consultant is unfamiliar with the procedures and policies of a particular department, additional time by department staff is required to provide the necessary information. Some state departments report that consultants sometimes do not have the necessary experience and this places extra demands on the review and approval process. Clearly, however, familiarity with procedures and experience in performing engineering tasks are related to consultants being involved more with state work and not less. If consultants are not performing engineering tasks for the state on an ongoing basis and if mechanisms are not in place and functioning within the state organization to handle consultant involvement, then consultants may not be able to handle peak demands when they arise. This matter is recognized in state government (Davis, 1993) but needs to feature as a factor in deciding on the appropriate level of use of consultants.

(v) *The ability to meet deadlines*

Following on from the issue of using consultants during periods of peak demand is the matter of meeting demands timeously. As stated by one of the Steering Committee members of the study conducted by the University of California, Berkeley for Caltrans, “There is no dispute as to whether it is more or less costly to use consultants. The issue is what resources are required and whether they be in-house staff or consultant staff for on-time delivery of the Capital Outlay Program” (Ashley, et.al., 1992, p.289).

The investigations conducted so far seem to indicate that productivity of in-house and

consultant staff is comparable but if state departments do not have the reservoir of manpower resources to draw upon as do the consultants, then delays may result from the lack of manpower rather than productivity of staff. Appointment of state employees is often dictated by general economic and political conditions rather than specific demands in individual departments. It is suggested that consultants are more sensitive to meeting deadlines than in-house staff since their appointment to future projects may depend on being able to deliver on time and it will be the responsibility of staff within the state organization to ensure that the consultants meet their deadlines. Thus, overall, we expect more timely delivery of services from consultants than from in-house staff. Whether this will be achieved at the expense of the quality of the product is open to debate. Another question is "what is the value of producing engineering designs on time, or, what is the cost of producing them late?".

It has been suggested that the use of experienced consultants has been essential to maintaining the desired construction program in some state Departments of Transportation (Ernst and Whinney, 1987, p.IV-I). That is, demand has fluctuated in such a manner or deadlines have been such that it would not have been possible to deliver the engineering designs in time without recourse to consultants.

It is difficult to quantify the value of having consultants to provide services when they are needed and ensure that they are produced on time. However, it is clearly an important issue that needs to feature in the decision on the degree to which consulting engineers should be used in state Departments of Transportation..

(vi) *Consultants as a resource for the state*

Some studies have suggested that a strong consulting engineering base within a state was a resources to be nurtured since it can generate economic activity through winning contracts from outside the states borders and reduce the flow of funds out of the state to consulting firms beyond the states borders (Ward, et.al., 1987, p.59). A strong preference for the use of local consultants is expressed by most state officials but if the local consultant base is not sufficiently strong to accommodate the demand, out-of-state consultants will have to be used for tasks the department cannot conduct internally.

CONCLUSIONS

The objective of this study was to determine the relative cost of professional engineering services by consultants and in-house staff. In conducting this study, a review of available literature revealed that numerous studies with the same objective had been conducted in the past. Noteworthy among the findings of these studies was that the majority had come to the same conclusion; it costs more to do the same tasks with consultants than it does with in-house staff. In addition, the results were fairly consistent, suggesting that the same answer would be obtained

under a variety of conditions and, therefore, in a variety of states.

Another consistent finding among the studies was how difficult it was to make accurate cost comparisons between consultants and in-house staff. Accounting systems differ between the private and public sector and conditions relating to matters such as indemnity insurance, taxation and training costs are difficult to quantify in an equitable manner between the two groups. Characteristics such as quality of work, productivity and timely production are difficult to quantify and evaluate. We concluded from experiences related in the literature that it is probably impossible to make a cost comparison that is so comprehensive and equitable in its interpretation of the assignment of cost items tha an incontestable answer can be developed.

The past studies also revealed another significant feature. Several studies demonstrated that while cost is an important factor in determining whether consultants should be used or not, or the degree to which they should be used, several other factors were also significant in this decision. Some people felt that some of these additional factors could even override cost considerations in certain circumstances. These additional factors were issues such as the ability to accommodate peak demands, meet deadlines, the quality of work produced and the states contribution to a healthy consulting industry in the state.

Given the findings from past studies related above (i.e. the consistency with which consultants have been found to be more expensive, the difficulty of producing more discerning results on cost than is currently available and the importance of other factors beyond cost), we concluded that it would be more appropriate to accept the likelihood that consultants are more expensive than in-house staff in Louisiana and concentrate on trying to include the other factors in an assessment process. Thus, we recommend that a cost comparison study **not** be conducted but, rather, effort be dedicated toward developing a process that provides guidance to decisionmakers on the appropriate level of use of consultants depending on the conditions in the area.

We suggest that the following factors (as identified in the literature review) form the basis of a process in which their values determine a recommended level of consultant use:

- The cost of using consultants relative to the cost of using in-house staff.
- The quality of work performed by consultants relative to that of in-house staff.
- The frequency and magnitude of peaks in work load that exceed in-house capacity.
- The extent to which contracting out work is affecting career development of in-house staff in terms of the type of work performed (i.e. nature, variety and complexity of work that generates experience and marketable skills) and opportunities for promotion.
- The state's ability and desire to expand or reduce its staff.
- The state's desire to increase, or decrease, support to the local consulting industry.

Some of these factors are interdependent. For example, adequate quality probably implies some

minimum cost and improved quality can probably be bought by increasing cost. Similarly, the state's desire to expand its own operations will usually, but not always, be accompanied by a reduced desire to support the local consulting industry.

The manner in which these factors are assessed in each situation and then combined to produce a recommendation on the appropriate level of use of consultants, is an activity which is discussed in the next section. Developing such a process will take considerable effort and would constitute a second phase of this study.

RECOMMENDATIONS FOR FUTURE RESEARCH

(i) *General approach*

We suggest that there are two alternative approaches to developing a process which will provide guidance to a state department on whether to increase their use of consultants or to reduce it. The first approach is a rating-and-weighting process which weights the factors identified in the previous section and rates specific applications. The second approach uses responses from a survey to develop a model which relates conditions in an area to the desirability of increasing or decreasing the use of consultants.

(ii) *Establishing a weighting-and-rating process*

Establishing a rating-and-weighting procedure to assess each situation and make recommendations as to the appropriate level of use of consultants would involve the following activities:

- establish weights that reflect the relative importance of the individual factors contributing to the need to change the current level of consultant use,
- establish rating scales for each factor that relate how conditions on a factor will translate into a rating value,
- develop the procedure by which ratings and weightings will be combined to establish a single overall rating value, and,
- develop a scale which translates the overall rating value into recommended actions regarding the increased or decreased use of consultants in the tested area.

The individual factors used in the process would be the factors listed in the previous section. Their weighting would be established by surveying an appropriate group and using psychometric scaling or any other appropriate procedure to determine representative

values reflecting the relative importance of each factor.

Rating scales would allow translation of conditions in an area to a rating value. An example of what a possible rating scale would look like for the factor of cost is shown in figure 1.

Cost condition	Rating value
In-house costs more expensive	+1
Same.	0
Consultants #50% more expensive.	-1
Consultants >50% more expensive.	-2

Figure 1

Cost rating scale

A common means of combining the impact of individual factors into a single value in rating-and-weighting procedures is to multiply each rating and weighting value of an individual factor and sum over the factors. Such a process assumes no interaction among factors so that each factors contribution to the level of consultant use is independent of the value of the other factors. The actual form of the function by which the values of the individual factors will be combined into a final single value will have to be established following investigation of the relationship between the factors as well as the choice of how the model is required to operate. For example, if we wanted the model to suggest consultant use only if demand exceeded the capacity of in-house staff, this could be engineered by placing the value of the factor which measures excess demand in a multiplicative role in the model. This would allow the impact of other factors to contribute to the final rating value of the model only if demand exceeded capacity.

The scale which translates the single score from the weighting-and-rating process to a recommended action relating to the increased or decreased use of consultants could look like the scale shown in figure 2.

Maximum value

Increased use of consultants is highly recommended.

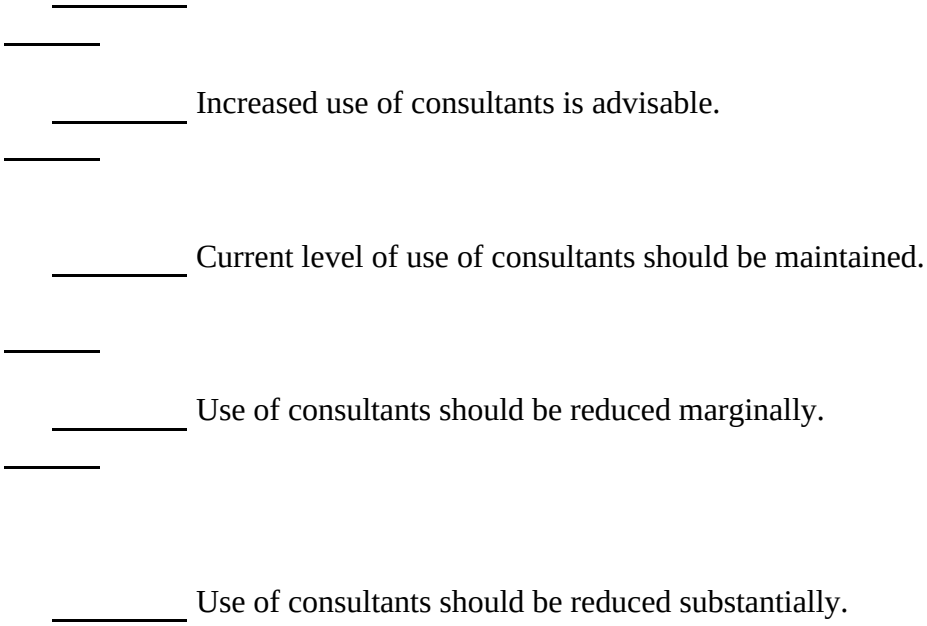

Figure 2

Example of decision table

The boundary values distinguishing the intervals in the table will need to be established to reflect reasonable values. This could be done by using a survey group and a categorical judgement psychometric scaling procedure.

(iii) *Stated preference model*

The second approach that could be employed would be to use Stated Preference techniques to elicit responses from a survey group regarding appropriate actions under a variety of conditions. Respondents would be asked to indicate the level of consultant involvement they felt appropriate for each set of circumstances presented in each question. Level of involvement would be expressed in terms of percentage of total contract costs involving contracts handled by consultants. The circumstances would be described in terms of the factors listed above.
The responses would be incorporated into a discrete choice model which had as its dependent variable the percentage of all contracts handled by consultants (in terms of contract costs). The independent variables would be descriptions of the conditions in a particular department in terms of the factors affecting the appropriate level of consultant

use. Once calibrated on the survey data, the model could be used to estimate appropriate levels of consultant use under current conditions and postulated alternative conditions.

(iv) *Concluding remarks*

Both assessment procedures above make use of a survey population to develop a decision model. Each will, therefore, reflect the values and preferences of the surveyed population. We know that on the subject of the appropriate level of use of consultants in state contracts, there is a wide diversity of opinion and, therefore, each procedure above is going to be very sensitive to the composition of the survey sample. This is an issue that will need to be addressed in this second phase of the study, if it is conducted. While it is a matter that requires careful consideration, it is not a new issue since it occurs in all forms of evaluation and priority-setting. Such situations also occur in government and we can also follow procedures used in that arena to simulate taking a vote to establish a decision (achieved by surveying a carefully selected random population) or to pursue concensus-seeking strategies among the parties with different views.

Because the subjective and political input to a decision on the use of consultants is so great, it is not appropriate to consider a model which purports to provide the final word on the matter. Rather, if a model is developed as suggested above, it should be used as an indication of what is appropriate with the understanding that the final decision always lies with the legislature. In this way, technical evaluation will assist in forming appropriate action but will not dictate it. Public opinion, through the elective process, will remain in control.

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