Sole-Source or Competitive Procurement in APM System Replacements

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ABSTRACT

As Automated People Mover (APM) systems age or there is a change in the configuration of the fixed facilities that they serve, the owners of such systems are faced with the decision to upgrade using the current APM supplier or to replace the existing system with another technology. Influencing the decision-making process is the fact that most contracting regulations dictate that "sole-source" awards of contracts to contractors or suppliers are prohibited unless the current supplier's technology overwhelmingly meets the owner's criteria for a system upgrade or replacement when compared to other alternative upgrades or replacements. Thus, owners who must make such decisions will have to employ a methodical approach to determine if the correct choice is the sole-source award of this work to the original supplier or to competitively procure the upgrade or replacement of the existing system. Such a methodical approach was developed and successfully implemented on a recent airport APM replacement project. This paper will discuss the approach used for that project and provide insight as to how other owners may employ similar techniques in their decision-making process if they are faced with the question to sole-source award or competitively procure an APM replacement.

APPROACH

The methodology used for the determination process is divided into two steps: determination criteria are first identified and then those criteria are evaluated.

Criteria Identification

In the development of a strategy for determination of type of contract award, identification of criteria to be considered in determining if a replacement technology is a viable option must be established. For such studies the following criteria are used:

1. Is there a major change in the fixed facility, either at a station or in the guideway?

2. Can a replacement technology be installed within the confines of the existing fixed facilities?

3. Is the maintenance area common to other operating system legs and its configuration readily adaptable to a replacement technology?

4. Can the same or better level of passenger service be provided by the replacement technology?

5. Does a supplier of replacement technology have the wherewithal to complete the replacement within the project time and budget limits?

6. Can the sum of estimated capital and Operations & Maintenance (O&M) costs of a competing replacement technology compare favorably to the capital costs of the existing technology plus the cost of expanding the current O&M staff and spare parts inventory?

7. Are there additional site-specific requirements that a candidate technology may not be able to satisfy?

Each of the above criteria is discussed in detail in the sections that follow.

1. <u>Modified Fixed Facilities</u>

This first criterion is examined in terms of the magnitude of the modification to the existing fixed facilities. On a recent project where the methodology of this paper was applied, approximately one-half of the guideway was to be demolished and certain structural support columns were reduced in height to allow for a new change in grade. Of the guideway that remained, numerous sections of the running surface had extensive wear and tear and required removal. The remaining guideway structure also required strengthening to extend its useful life and allow for operation of two-car trains, up from the previous single-car train. Thus, there was opportunity for a competing technology to replace much of the existing guideway and adapt its structure/running surface. Therefore, if the modification of the existing fixed facilities is extensive, then the application of a differing technology becomes more of an option.

2. <u>Space and Structural Accommodations At Existing Facilities</u>

In the past much of the fixed facilities, such as station platforms and tunnels, have been designed and installed for the particular technology. Based upon the original technology installation, the available space and the existing guideway/running surface support structure must be adequate to allow for installation of a competing technology. While many of the larger APM technologies are similar in height, width and length, adapting a smaller scale technology while maintaining the system passenger-carrying capacity may be problematic. Another point to consider is that some of the larger APM technologies have differing passenger door configurations. For example, one of the larger cable-drawn technologies uses three vehicle passenger doors per side. If this technology were considered in lieu of an existing vehicle with two passenger doors, then the replacement technology may not fit due to insufficient space or significant modification to the existing station door support structure. When examining the application of a cable-drawn system, adequate space at or under the stations is required to allow for the necessary dynamic cable adjustment machinery. In the case of systems (including cable-drawn) equipped with terminus end buffers, examination of structure is also necessary to judge the adequacy of the system to accept the physical mounting of another technology's end-of-line device and determine any differing vehicle-buffer impact loads.

Stations and guideway are not the only subsystems that must be considered. Most APM applications have Central Control facilities. If there is more than one operating APM system controlled from the facility, the installation of a differing technology's equipment into that facility may not be possible.

If the guideway, station and other fixed facility space and structure are adequate, then application of a replacement technology becomes a more viable alternative.

3. Maintenance Facilities (MF)

How and where a potential replacement technology is maintained is another factor in the decision making process. At a major airport that operates multiple APM systems, a common maintenance area serves two of the four different legs. An identical maintenance facility serves the other legs. While not impossible, maintaining two differing technologies within the same service area could lead to problems. However, if there is adequate space to segregate one system from the other by installing isolating walls, then the maintenance facility loses its common area and two separate maintenance areas are created. Multiple APM legs served by separate maintenance facilities make the replacement of the existing system with another technology more feasible.

A careful examination of the space available and the configuration of the facility is paramount. If lifts, pits, cranes, track-space, stand-by power and other features of the facility cannot be readily and economically modified, then replacing the existing technology becomes less attractive.

4. Service Levels

While consideration of this factor may be intuitively obvious, the passenger capacity of the replacement technology needs to be considered. A replacement technology may fit and be maintained within the confines of the existing fixed facilities, but a reduction in usable space for passengers within a vehicle or train, may affect the system's ability to meet the passenger demand. Any replacement technology must be tested in operational simulation to ascertain if it has the required passenger-carrying capacity. Replacement technologies that can meet or exceed the capacity of the existing technology can be considered as feasible alternatives.

5. Supplier Capabilities

It is important to examine a potential supplier's capability of providing a system on time. Several factors are reviewed including, but not limited to, a supplier's current workload and past history of installations.

6. Replacement Costs

An additional criterion to be evaluated is cost. Costs may be divided between the capital costs and the cost to operate and maintain the system. Capital costs are examined and estimates for the system are completed as part of the evaluation process. When addressing operation and maintenance of the system, different considerations must be accounted for if there are multiple legs. If such a multi-leg system is maintained by the APM supplier, then the increased cost of adding another leg to the existing operations and maintenance contract may be less than creating a new contract for a replacement technology. To create a more fair environment, a separate operations and maintenance contract may be considered for the separate leg under study. However, during the evaluation, an assumption may be made that the existing supplier or operator/maintainer will merely increase its staff to meet the needs of the additional leg. If there is only one leg or system to be maintained, then this factor need not be considered.

7. Additional Factors

There may be factors that are specific to each site that must be accounted for in the evaluation of candidate technology. For example, the length and curvature of the existing system may preclude the use of certain technologies, as may be the case with certain cable-drawn technologies.

Evaluation Methods

The study of potential replacement technologies of an existing system is based upon the identification of a number of suppliers of potential competing technologies and then evaluating those suppliers based upon the previously discussed criteria. Using this criteria and weighting factors, a quantitative score for each of the competing technologies may be derived. If the existing technology clearly outscores any competing technologies, then a sole-source award should be considered. However, if no technology shows itself as clearly having a much higher score, then all of the alternatives under study should be allowed to compete for the work.

CASE STUDY

To provide a example of the determination process, the following case study is provided. The study involved the replacement of the Airside E APM system located at the Tampa International Airport. This airport currently has four APM systems serving airside and landside terminals, as well as a system that transports passengers from parking facilities to the main terminal. The airside/landside systems and parking garage systems were installed and are maintained by different APM suppliers.

In keeping with its Master Plan, the Hillsborough County Aviation Authority (the Authority) is in the process of demolishing, redesigning and rebuilding the Airside Terminal E or Airside E. This terminal was served by an APM system installed in the early 1970s, but operations ceased in approximately 1995 due to closure of the airside terminal building. Because the configuration of the previous building led to certain passenger vertical circulation problems, the APM platform at the new building would be located on or about the height of the departures level. To accommodate this, the existing guideway would need to be modified to allow for a new grade. Since the ridership of the replacement APM system was to be increased, the capacity of the system required was increased from single-car to two-car trains. This meant that the existing landside station would require modification for expansion.

Test and Evaluation

Given that the airside building was to be replaced, the guideway was to be modified to meet the new grade and the landside station was to be modified to meet the expansion, an identified criterion of the approach, Modified Fixed Facilities, was tested and met. An additional criterion described in Maintenance Facilities above, was also met as a new single MF servicing only the Airside E APM would be located in the airside building.

To continue the evaluation process, four (4) candidate replacement technologies were identified. Of these, at least one was of the cable-drawn type. After identification each technology was evaluated for its ability to be installed within the confines of the existing fixed facilities and also to judge whether certain required roadway clearances could be maintained using the identified technology's guideway structure. It was determined that all candidate technologies could indeed meet the fixed facility test and thus, all were considered viable alternatives.

The final steps in the decision process involved determination of the particular technology's passenger-carrying capacity, estimation of its capital and O&M costs and an evaluation of its project management and manufacturing capabilities.

Each technology was assigned a ranking for each of the criterion analyzed with the ranking weighted by an importance factor as determined by the Authority and Lea+Elliott. The ranking multiplied by the importance factor provided the score for each criteria analyzed and then the sum of the weighted rankings provided the particular technology's overall score. If the existing technology's overall score was significantly higher than any of the other candidate technologies, then the recommendation would be to "sole-source" negotiate with the existing technology supplier. If all scores were sufficiently close, then the recommendation would be to "competitively procure" the replacement of the Airside E system.

To further clarify the process, an example of a typical ranking method is provided below.

Example of Range Ranking

Assume that there are five alternatives providing the same level of service, but having various estimated capital costs. The alternatives under consideration are as follows (please note that the amounts shown are arbitrary and are for example purposes only):

Alternative 1	$21,535,000
Alternative 2	$18,950,000
Alternative 3	$19,990,000
Alternative 4	$26,550,000

If the costs alone were considered, then the ranking of the alternatives would be 2, 3, 1 and 4. However, the capital costs are only estimates and as such, alternatives 2 and 3 are sufficiently close whereby that the ranking could unnecessarily skew the results of other criteria. Therefore, it is better to create a range of costs with assigned ranks and then score the alternatives.

An acceptable range of costs for the alternatives is $18,000,000 to $27,000,000 or a difference of $9,000,000. Dividing the difference by an arbitrary number (in this case 4) provides for an incremental amount that will provide a range of ranks. Below is the revised range ranking:

Highest Rank	=	$18,000,000 to $20,250,000
2nd Highest Rank	=	$20,250,001 to $22,500,000
3rd Highest Rank	=	$22,500,001 to $24,750,000
Lowest Rank	=	$24,750,001 to $27,000,000

In the new ranking, Alternatives 2 and 3 would receive the same highest rank, while Alternative 1 would have the second highest rank. Alternative 4 would have the lowest rank.

Risk that a supplier would not be able to complete the project on time and within budget requires another range ranking. For this example, the assigned range is:

4	=	very low to low risk
3	=	above low risk to moderate risk
2	=	above moderate to high risk
1	=	high risk
0	=	very high risk

System capacity is examined. For this example, the assigned range is:

4	=	8001 to 9000 passengers/hour/direction (pphpd)
3	=	7001 to 8000 pphpd
2	=	6001 to 7000 pphpd
1	=	5000 to 6000 pphpd

As in the previous criteria, the stated values are arbitrary.

Assume for this example that Central Control additions are determined to be an important site-specific criterion. Because it is assumed that the equipment would easily fit or there would be need to extensively modify the facility, the rank is 2 for no modifications and 1 for modifications needed. For this example additional guideway clearance over the roadway was determined to be a desirable site-specific factor. A technology that provided for more clearance was assigned a rank of 1, while a technology that would not provide additional clearance was assigned a 0 rank.

Importance Factors

Each individual criterion must be evaluated as to its importance. For example, a system owner may dictate that the risk of completing the project on time is more important than cost or that the capacity of the technology is less important than the cost of the project. Therefore, weights are assigned to the criteria. The selection of the value for the weighting is arbitrary; however, assigning too high of a weighting factor can unfairly portray one technology as being much more desirable than another. For this example the following weighting factors are selected:

Costs	40
Technical Risk	50
Passenger Capacity	30
Central Control Additions	10
Additional Roadway Clearance	10

Using the range rankings and importance/weighting factors described above, a typical scoring matrix for four (4) alternatives as shown below.

Alternative Rankings
Based Upon Different Weighting

Criteria and Weighting	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Costs 4 = highest, 1 = lowest, 40 weighting	120	160	160	40
Risk of Completion 4 = least, 0 = very high, 50 weighting	200	150	150	150
Capacity 4 = highest, 1 = lowest, 30 weighting	90	90	120	60
Central Control Additions 2 = no additions necessary, 1 = equipment additions necessary, 10 weighting	20	20	10	10
Roadway Clearance 1 = Potential for additional clearance, 0 = no additional clearance, 10 weighting	0	10	10	10
Totals	**430**	**430**	**450**	**270**

To achieve the score for each criteria, the rank is multiplied by the weight and then the individual scores are summed.

From the example, it can be shown that no alternative under study clearly outscored any other alternative. Therefore, the recommendation would be to competitively procure the system. A similar approach was used in the determination of the procurement for Airside E replacement and it was determined that the project should be competitively procured.

Conclusion

With many state and local statutes prohibiting the award of sole-source contracts, except where it can be shown that one and only one alternative can meet the owner's requirements, methods and means must be applied to determine if such awards are justified. The methodology described above has been successfully employed on at least one project where the question of the best procurement approach was asked. It is suggested that this methodology may be used by others faced with the same type of decision.