

Application of a Risk Management Structure to Minimize Schedule Deviations Under a Commodities Contract

Jake Smithwick, M.S. and Kenneth Sullivan, Ph.D., M.B.A.
Arizona State University
Tempe, Arizona

Buyer organizations may inaccurately perceive that certain services are "commodity," meaning that price is a sufficient differentiating factor. However, by not considering other factors in addition to cost, buyers many unintentionally expose their organization to risk. This paper addresses the application of a risk management structure for a service that is typically considered a commodity: furnishing services for a large university system. The previous services contract had performance problems in terms of communication between trades (general construction, design, owner, furniture) and lack of verifiable performance metrics. The researchers use a combined case study and survey research methodology to address the problem. The results show that there are significant schedule performance differentials between suppliers, and therefore suggests that certain non-cost factors should also be considered in the selection of commodity suppliers. The researchers propose that public organizations and universities can use the structure to minimize risk on commodity contracts.

Key Words: Risk Management, Commodities, Best Value, Performance Measurements

Introduction

Background and Problem

Organizations continually strive to deliver a high quality product that customers will buy. However, a Purchasing department, together with Facilities Management (FM), may not have a systematic approach to managing and minimizing the risk of nonperformance from service providers. This is especially true when the buyer's organization perceives that the products or services they are procuring have minimal distinguishing characteristics. In other words, they may use price as the sole distinguishing trait for a good, and perceive that all other attributes are equal (the good is a "commodity") (Rayburn, 2010; Reimann, Schilke, & Thomas, 2010; Rushkoff, 2005). However, when an individual assumes that price alone is a sufficient decision making factor, they may expose their organization to additional risk that could have otherwise been minimized by considering additional information (Gransberg, 1996; Kashiwagi & Savicky, 2003). The researchers define this as having a "commodity mentality" (Smithwick, 2012).

If price is used as the primary distinguishing trait, then logic leads to the conclusion that all other factors relating to performance (or capability) have little value in effectively choosing a supplier. A second inference is that performance measurements would not be necessary of suppliers who are selected on the basis of low price. If an agency considered on-time performance important, for example, they may analyze past performance of a supplier, or perhaps request the supplier's plan to minimize delays on the project. Evidence that commodity mentalities exist are lack of performance measurements (of suppliers, materials, projects, etc.), low customer satisfaction, or inconsistent project performance (Gransberg, 1996; Kashiwagi & Savicky, 2003).

High levels of efficiency may be difficult to achieve, especially in larger organizations, due to their bureaucratic nature (Snyder & Morris, 1984). Like many organizations, a Facilities Management department has established rules, a defined chain-of-command, and many of its members have specialized functions (EN15221 – EuroFM, 2011; Payant & Lewis, 2007). It follows then that FM groups are also be susceptible to the negative characteristics of bureaucracy, and sometimes lack effective communication tools (den Otter & Emmitt, 2007).

Research Scope and Variable

The Arizona Tri-University Furniture contract was established by the Arizona Board of Regents (ABOR) to standardize the furniture delivery process , increase the level of performance, and receive larger price discounts (PUR 401–08: Furnishings, Flooring, and Window Coverings, 2007). In July 2008, executive staff from Arizona's three largest public Universities approached the researchers and requested assistance to improve the quality of the Tri-U Contract. Specifically, they identified the following issues:

- Performance metrics in terms of cost, schedule, and customer satisfaction do not exist
- Manufacturer design expertise is not fully utilized
- Buyers do not always receive what was expected
- A lack of coordination between trades on large capital construction projects

The researchers surmise that the University buyers, as a whole, perceived furnishing services as a commodity. The scope of this paper focuses on the new risk management tools employed by the suppliers, and the schedule deviation variable is used to qualify the research results. Cost is not an appropriate variable, as it is a fixed list price and does not fluctuate. Therefore, schedule performance is largely dependent on the individual supplier's capability, and large differentials would show that non-cost factors are important to consider for supplier selection (instead of the low-cost approach).

Literature Review

Risk is defined as anything that affects time (schedule delays), cost, or customer satisfaction (Kashiwagi, 2002). Risk is also anything that may hinder an organization's financial operations, and management of this risk is the act of attempting to mitigate these issues from occurring (Kraman & Hamm, 1999). While these definitions of risk are easily measured when applied to a project that has defined a cost and duration, understanding risk in a Facilities Management functions requires a different perspective. Risk for a facilities manager is therefore anything that would impede their organizational objectives, with respect to these definitions of risk.

Facility Management literature identifies a broad approach to risk mitigation. Tucker and Pitt (2009) suggest that Facility Managers should consider metrics that reflect multiple facets of the profession (operations, maintenance, etc.). Dave Cotts (2010) explains that while many people may not like to be measured, it is necessary tool that companies must utilize to improve. Organizations should also be proactive in identifying and planning responses to risk (Alexander, 1992; Boehm, 1991).

There are also other reasons companies do not utilize performance information (PI):

- PI is not viewed by executive leadership as an important part of day-to-day operations (Bekefi & Epstein, 2007).
- PI requires tremendous resources (time, money) to develop and sustain (Quesada & Gazo, 2007).
- PI is not defined by a standard so companies do not usually have a starting point (Tucker & Pitt, 2009)
- PI is not always tied to financial gains, and thus management does not have incentive to expend resources to monitor performance (Tucker & Pitt, 2009).

The researchers utilized a best value selection approach called the Performance Information Procurement System (Kashiwagi, 2012). The approach selects vendors based on a combination of their ability to identify and minimize risk, capability, past performance, and cost. It has been used on construction and the delivery of services.

Research Methodology

The researchers proposed that the Universities utilize a best value selection process and continuous risk management structure to minimize the issues they were encountering. The research methodology was divided into three phases: evaluation of current conditions, implementation of the selection process, and development of the risk management structure. The researchers first implemented a change to the procurement process, and formed a case study analyzing the results. The researchers also conducted a survey of the buyers to measure satisfaction.

Phase One – Evaluation of Current Conditions

The researchers first quantified the current level of buyer satisfaction in the existing Tri-U Furniture environment. A senior University official provided the researchers with buyer contacts from various departments. In turn, the researchers solicited responses and set this as the baseline customer satisfaction metric.

The researchers also documented the existing furniture acquisition process, and found that it did not have any formal risk management or performance measurement components. As illustrated in Figure 1 below, the previous procurement process was as follows:

- The buyer had some sort of need for furniture. This could range from a simple office remodel to furnishing a new building.
- If the buyer was not matching the existing furniture in an office, they used the Primary Award contract (or Budget Award contract if they had very limited funds).
- The supplier provided a price quote based on the buyer's needs, requirements, and contract type utilized (Primary or Budget).
- If the total furniture cost was more than $250,000, the buyer had the option to publically solicit for bids or use the Tri-U contract. For projects less than, or equal to, $250,000, the buyer was required to use the Tri-U contract.
- After the supplier was selected, they finalized the quote and design, and installed the new furniture.

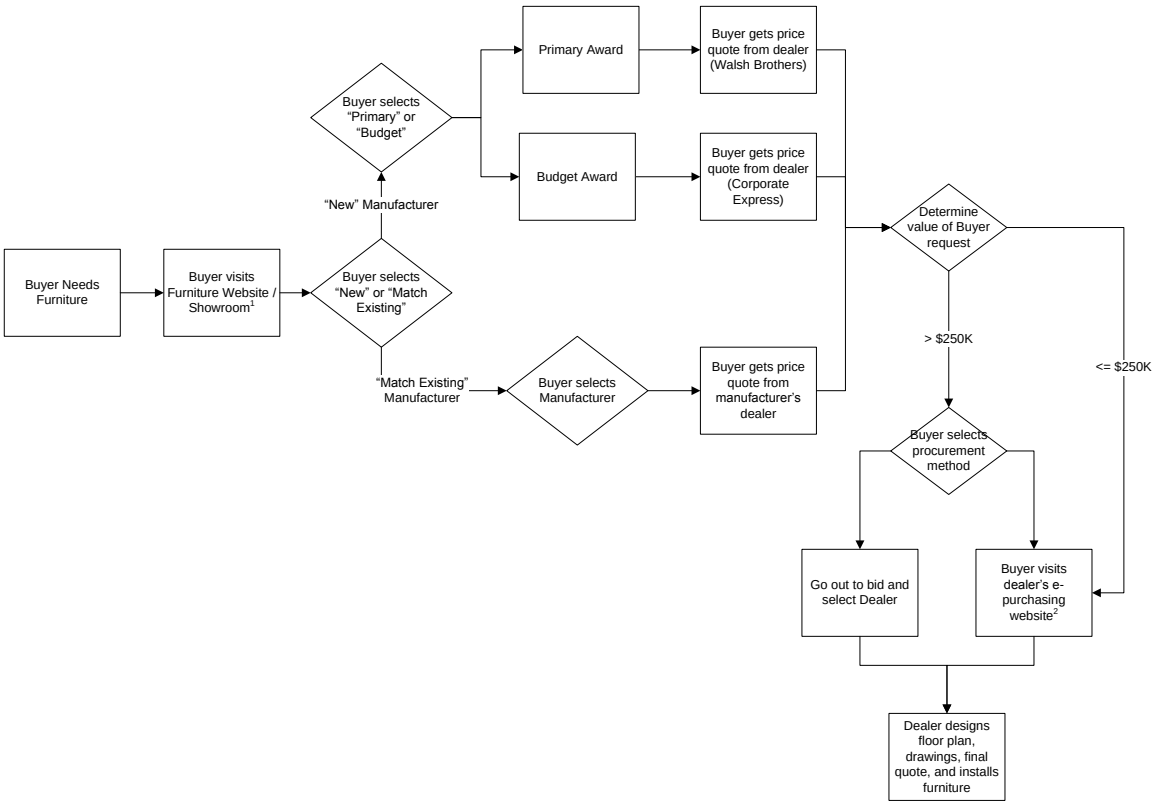

Figure 1: Previous Tri-University furniture Supplier Celection process

Phase Two – Implementation of a Selection Process

The Universities utilized a best value selection system (Kashiwagi, 2012) that evaluated the following criteria:

- Financial Proposal – cost information for typical office installations

- Interview –individual interviews of key personnel from each shortlisted proposer
- Risk Assessment and Value Added Plan (RAVA) – proposer's plan to minimize risk, and identification of scope modification proposals
- Service Proposal – how the proposer would deliver their services
- Past Performance Information (PPI) – surveys from a proposer's past client

The Interview, RAVA, and Service Proposal were evaluated by key staff from each of the three Universities. Each evaluator assigned a 1 – 10 score, with 10 being the "best." The proposers' score for each criterion was determined by (1) averaging the evaluators' rating, (2) averaging the PPI surveys, and (3) summing the price proposals. The researchers used a linear relation model that assigned points based on each criteria's weight, and each proposer's relative distance from the "best" (in each criteria). Once all of the information was compiled, the Universities invited three suppliers to the Pre-Award Phase.

Phase Three –Development of Risk Management Structure

The final component of the best value system is Pre-Award. The three highest-ranked suppliers (from the selection phase) identified and addressed any potential issues in the delivery of furniture services. A supplier repeats this process each time they are awarded a project with an expected cost of more than $100,000.

Pre-Award

Prior to making an official contract award, the Universities required each supplier to preplan their service in detail, compile a Pre-Award Document, and define the risk management structure to measure deviations from the baseline expectation. The Pre-Award is unique because it allows the suppliers unencumbered access to the client so that they may attempt to plan for, or even resolve, potential risks in the delivery of furnishing services. The Pre-Award Document contains three main components:

- Risk Management Plan (RMP) – list of all potential risks that the supplier does not control and a plan to minimize each of these risks,
- Scope of services – summary of what the supplier is providing under the contract
- Client action items list – specific actions that specific University staff must complete in order to ensure that the supplier can successfully perform under the contract

With assistance from the researchers, the suppliers also defined a risk management structure to measure performance in terms of deviation from the supplier's baseline expectations.

Risk Management Tools

The Universities' used the best value selection and contract management process for two reasons: (1) improve the coordination between the furniture supplier and other trades and (2) easily identify the suppliers' performance. The resultant furniture acquisition process and risk management approach is shown in Figure 2 below. The shaded areas are the key points where risk management and performance measurement are injected into the acquisition process.

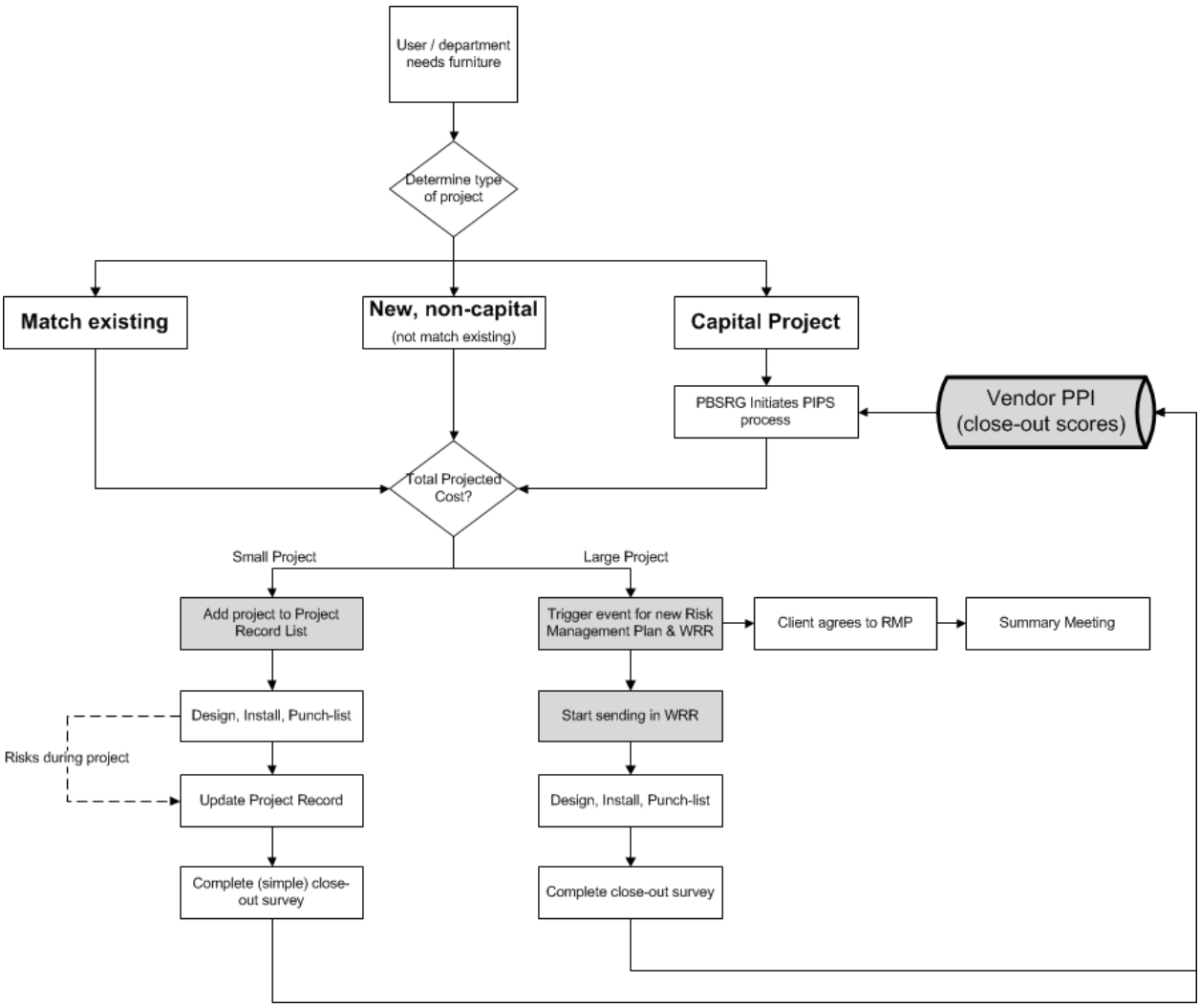

Figure 2: Best Value Selection and Risk Management Process

The suppliers identified two types of projects:

- Small Projects – total estimated cost is less than, or equal to, $100,000
- Large Projects – total estimated is more than $100,000

The suppliers maintain a separate Project Record List (PRL) MS Excel file for each University. The PRL lists all Small Projects and tracks cost, schedule, client contact information, and any project deviations. The PRL is submitted by the supplier to the respective University on the first Friday of each month.

The Weekly Risk Report (WRR) tracks much more detailed information (as compared to the PRL) for a single Large Project. The WRR contains a project background summary, cost, schedule, and most importantly, a Risk Management Plan tailored to the specific project. The WRR is submitted to the University's Project Manager every Friday for the life of the project. The supplier also identifies project cost or schedule deviations as soon they occur, and documents the issue in the following format:

- Description of the risk
- Plan to minimize or resolve the risk
- Impact in terms of cost or schedule

- Source of the risk (Owner, Designer, Supplier, or Unforeseen)

The risk categories are defined as follows:

- Client – the entity directly purchasing the furniture (i.e., the department) or the some other group part of the entity's organization (i.e., university purchasing department)
- Designer – the architect / engineering firm. Designers are usually only present on large capital construction projects. This is different from the normal design services that a supplier would provide (deviations in this area would be under the 'Supplier' category).
- Supplier – the contracted Tri-U supplier or any of their supporting vendors and manufacturers.
- Unforeseen – site or project events that are reasonably expected to not be identified prior to starting the project (i.e., catastrophic event).

These tools collect a large amount of project data: one individual PRL report provides 51 different data points and the WRR contains 120 different data points. This data includes items such as cost and schedule information (baseline and reality), as well as customer satisfaction. The customer satisfaction data comes from surveys collected by the suppliers.

The suppliers modify their baseline Risk Management Plan (developed during the initial Pre-Award Phase) to address the actual conditions of the specific project they were awarded. The supplier's RMP and proposed schedule are reviewed with the owner, general contractor, and any other key trades before a furniture award is made. While the process does not always ensure that the furniture installer is involved early on during capital construction design projects, the structured process to identify and minimize risk has helped improve coordination between trades.

Results

Table 1 is a summary of all schedule deviations from a total of 1,115 Small and Large Projects. Schedule deviation is calculated by dividing the total number of days deviation for a particular risk category by the total project duration. The data comes from the Project Record List and Weekly Risk Report files.

Table 1

Small and Large Project Schedule Deviation Summary

Cost Deviation Source	**Supplier A**	**Supplier B**	**Supplier C**	**Overall**
Client	3.4%	0.0%	7.1%	3.4%
Designer	0.0%	0.0%	0.0%	0.0%
Supplier	1.6%	3.5%	24.8%	5.0%
Unforeseen	0.0%	1.9%	0.0%	0.3%
Overall	4.9%	5.5%	31.9%	8.6%
Total number of projects	684	76	355	1,115

Supplier A had the lowest overall schedule deviation at 1.6 percent, which was 8.4 percent less than the 10.0 percent average delay rate. Supplier C's supplier deviation rate is 23.2 percent higher than Supplier A's. Through content analysis, the researchers found that 67.1 percent of supplier-generated delays were related to manufacturing issues, such as late or damaged shipments. The remaining 32.9 percent supplier delays were caused by an incorrect order placed by the supplier to the manufacturer (wrong color or incorrect finish). The researchers also counted the number of projects that were delayed for any reason. 87.0 percent of Supplier A's projects were completed on-time, which was 27 percent higher than Suppliers' B and C 64 percent on-time average. Supplier A's schedule deviation rate is 8.4 percent less than the average delay rate, and 27 percent more of Supplier A's are completed on-time (as compared to Suppliers B and C).

The average overall customer satisfaction rating of the suppliers was 9.3 out of 10.0 (under the best value system). This is a 24.3 increase over the previous Tri-University contract, where satisfaction was rated 7.0 out of 10.0 (Smithwick, 2012).

Discussion

The results show that there is an important performance differential between the suppliers, as measured by schedule deviation. This result is further qualified by considering the project volume: Supplier A has maintained the higher levels of performance over the span of a large number of projects. Therefore, this evidence suggests that owners can benefit by considering non-cost factors during supplier selection. Furniture dealers can also benefit from the research by addressing the impact of manufacturing delays in their own internal risk management plans.

The risk management structure has helped to eliminate the negative effects a "commodity mentality", through the use of a required preplanning time on large capital construction projects, and the implementation of performance metrics. Utilizing these tools forces the buyer to consider factors outside of price, and thus, view furnishing services as a value-adding activity for the buyer's organization. The risk management structure has allowed the Universities to track performance in a measured and unbiased manner.

Conclusions

The researchers propose that buyers sometimes perceive the entire delivery of a commodity good as price-based. As a result, buyers may experience risk in the form of cost increases, schedule delays, or customer dissatisfaction. Through case study and survey research, the researchers found that a formal risk management structure can help to increase communication between trades on large capital construction projects, and at the same time, increase customer satisfaction. The researchers found significant schedule performance differential between the suppliers, which suggests that non-cost performance factors should be considered for commodity supplier selection. However, this study is limited to furnishing services at Arizona's three largest public universities. Further study is needed on the risk management structure's applicability in other commodity contracts. Testing at non-educational institutions would also serve to further validate the risk management approach.

References

Alexander, K. (1992). Facilities risk management. *Facilities, 10*(4), 14-14.

Bekefi, T., & Epstein, M. (2007; 2006). Risk - getting the whole picture. *CMA Magazine, 80*(8), 23-23-26.
Boehm, B. W. (1991). Software risk management: Principles and practices. *IEEE Software, 8*(1), 32-41. doi:10.1109/52.62930

Cotts, D. G. (2010). *The facility management handbook*. (3 ed.). New York: AMA.

den Otter, A., & Emmitt, S. (2007; 2007). Exploring effectiveness of team communication. *Engineering, Construction and Architectural Management, 14*(5), 408-408-419.

EN15221 - EuroFM. (2011). Retrieved December 12, 2011, from http://www.eurofm.org/knowledge/en15221/
Gransberg, D. D., & Ellicott, M. A. (1996). Best value contracting: Breaking the low-bid paradigm. *AACE International Transactions*, (15287106), VEC51-VEC56.

Kashiwagi, D. (2002). The movement of the federal government from "low-bid" award to "best value". *ASC Proceedings of the 38th Annual Conference*, Virginia Polytechnic Institute and State University - Blacksburg, Virginia. 273-274-280.

Kashiwagi, D., & Savicky, J. (2003). The cost of 'best value' construction. *Journal of Facilities Management, 2*(3), 285-295.

Kashiwagi, D. (2012). *Best value standard*. (pp. 3.7, 4.1-4.8, 5.29, 7.1-7.18). Mesa: Kashiwagi Solution Model (KSM).

Kraman, S. S. S., & Hamm, G. G. (1999; 1999). Risk management: Extreme honesty may be the best policy. *Annals of Internal Medicine, 131*(12), 963-963-967.

Payant, R., & Lewis, B. (2007). *Facility manager's maintenance handbook*. (2 ed.). The McGraw Hill Companies, Inc.: New York, NY.

PUR 401–08: Furnishings, flooring, and window coverings. (2007). Retrieved August, 28, 2010, from http://www.asu.edu/aad/manuals/pur/pur401-08.html

Quesada, H., & Gazo, R. (2007). Methodology for determining key internal business processes based on critical success factors. *Business Process Management Journal, 13*(1), 5-5. doi:10.1108/14637150710721104

Rayburn, D. (2010). Commoditization is not a dirty word. *Streaming Media Magazine,* (15598039), 88-88.

Reimann, M., Schilke, O., & Thomas, J. S. (2010). Toward an understanding of industry commoditization: Its nature and role in evolving marketing competition. *International Journal of Research in Marketing, 27*(2), 188-197. doi:10.1016/j.ijresmar.2009.10.001

Rushkoff, D. (2005). *Commodified vs. commoditized.* Retrieved January 18, 2011, from http://www.rushkoff.com/blog/2005/9/4/commodified-vs-commoditized.html

Smithwick, J., Sullivan, K., & Stone, B. (2012, September). *Risk management structure for value-based commodity contracts*. Paper presented at COBRA 2012 2012 rics cobra, Las Vegas, NV.

Snyder, R. A., & Morris, J. H. (1984). Organizational communication and performance. *Journal of Applied Psychology, 69*(3), 461-465. doi:10.1037/0021-9010.69.3.461

Tucker, M., & Pitt, M. (2009). Customer performance measurement in facilities management: A strategic approach. *International Journal of Productivity and Performance Management, 58*(5), 407-407-422. doi:10.1108/17410400910965698