

# **A Survey of Satisfaction with Job-Order-Contracting as a Project Delivery Method by Large or Multi-Facility Owners**

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Large public and private facility owners are in constant need of small and routine construction projects. Facility owners had previously maintained their own forces to do some of this work, but, when projects become too large or too numerous it is more cost effective to employ outside vendors for the work. Many facility owners are now employing Job Order Contracting (JOC) as a project delivery method. JOC, developed by the U. S. Army was specifically designed to deal with small and routine projects. While JOC has been used since the 1980s, there has been very little research into the issues of who is using JOC and what issues of JOC affect owner satisfaction. This research found that owners using JOC are satisfied with the results being produced, especially when compared to the traditional design-bid-build project delivery method. Owners generally cite the ability of this project delivery method to meet their need for timely project delivery as the primary reason for selecting this method.

**Keywords:** Job Order Contracting, JOC, Owner Satisfaction

## **Background**

Job-order-contracting (JOC) was developed by the U. S. Army in the early 1980's as a means of keeping up with the need for small and routine maintenance/construction projects at their facilities in Europe (Williams, 1994). The Army desired a project delivery system that was responsive to their need for quality construction provided in a timely manner and that tied contractors into a long term contract with the government. This new project delivery method provided incentives to the contractor to provide higher levels of customer service, since any future work under the JOC was dependent on the owner's satisfaction with the previous work completed by the contractor. JOC is a project delivery system specifically designed to meet the needs of large and/or multi-facility owners. JOC has spread to private enterprise and other branches of government, including state and local agencies.

## **Introduction**

Job Order Contracting (JOC) is an indefinite delivery, indefinite quantity (IDIQ) project delivery system (Aller, 2002). Under JOC, the owner contracts with a provider (the JOC contractor) for a broad scope of work over an extended period of time. JOC contracts typically contain provisions to extend the time frame and scope of services if the owner continues to be satisfied with the contractor's performance.

Under JOC delivery an individual project/task need is identified by the owner, the previously selected contractor is notified and requested to provide a job-order proposal (Aller, 2002). The contractor, following the receipt of the proposal, will meet with the owner and the JOC's subcontractors to refine the scope and agree to a price for the work. If the owner agrees with the contractor's proposal, the work can begin as soon as the owner issues a simplified work order. If the owner does not agree to the contractor's proposal, the owner and contractor can negotiate within the scope of the work until an acceptable cost can be reached. In any event, the owner is free to procure the work outside of the job-order contract. Since the contractor's profit is tied to the volume of work completed, the contractor has a strong incentive to provide higher levels of customer service, thus procuring more work, than would be expected in traditional design-bid-build project delivery. Owner satisfaction is an important component to the contractor's strategy for success under JOC.

While there are a number of differences and similarities between JOC and other project delivery methods, the most notable distinguishing features of JOC are:

- Indefinite delivery – indefinite quantity: Job-order-contracting is a type of IDIQ contract. This means at the time when the JOC contract is agreed to, there is no certainty with respect to what projects will be completed, and there is no certainty with respect to the volume of work that will be required.
- Unit price book: Under the original form of job-order-contracting, the bulk of the pricing for work under the contract is based upon a unit price book.

In most other respects, JOC is very similar to other project delivery methods. The construction work is completed by means and methods indistinguishable from other project delivery methods.

### **Previous Research**

Many of the recent project delivery satisfaction studies have focused exclusively on cost, schedule and quality of large projects, or on building projects at the exclusion of smaller routine projects, including civil and infrastructure projects. JOC, has been overlooked as a viable alternative for these types of projects. One study of project delivery methods was completed by Konchar and Sanvido in 1998 comparing projects using the design-bid-build, design-build, and construction-management-at-risk project delivery methods on the basis of:

- Unit costs ( $\$/m^2$ ),
- Cost growth (%),
- Schedule growth (%),
- Construction speed ( $m^2/month$ ),
- Delivery speed ( $m^2/month$ ),
- Intensity ( $\$/m^2/month$ ).

In general, the results of this study indicate that the projects completed using the design-build project delivery system had the lowest cost and highest schedule productivity when compared to

similar projects using the construction-management-at-risk or design-bid-build project delivery systems (Konchar & Sanvido, 1998).

In a related study, Songer and Molenaar (1996) published findings on the factors that influence owner attitudes with respect to the selection of design-build as the project delivery method of choice. The factors considered in their study included:

- the establishment of cost,
- the reduction of cost,
- establishment of schedule,
- reduction of schedule,
- reduction of claims,
- large project size and complexity,
- constructability/innovation.

The researchers found that owner attitudes toward the selection of design-build as the project delivery method of choice is influenced to a large extent by the owner's desire for shorter project durations (reduced schedule). Public owners were more inclined to cite the reduction of claims as a factor in their decision to select design-build compared to what private owners would cite (Songer & Molenaar, 1996).

Mulcahy (2000) published the results of a survey of 35 organizations on the effectiveness of partnering and source selection on: 1) construction performance, 2) administrative support, 3) owner-contractor relationships, and 4) participant satisfaction. The researcher concluded that the combination JOC using partnering coupled with best value source selection resulted in better construction performance, the need for less administrative support, better owner-contractor relationships, and higher participant satisfaction when compared to JOC when this combination of partnering and source selection were used (Mulcahy, 2000).

In another JOC study, Henry and Brothers (2001) examined the cost and time aspects of the U.S Air Force's Simplified Acquisition of Base Engineering Requirements (SABER) projects in comparison to similar projects completed using the design-bid-build delivery method. The researchers collected data on unit costs and activity durations for 31 SABER projects and 15 design-bid-build projects at a number of Air Force Bases throughout the U. S. The researchers concluded from that the SABER projects had lower unit cost (\$/m<sup>2</sup>) and time growth (%) when compared to similar projects using the design-bid-build project delivery method. The researchers also noted that the sample size was too small to make sweeping conclusions on the basis of the results obtained (Henry & Brothers, 2001).

In 2002, Kashiwagi published the results of a 5-year study of JOC performance indicators. (Kashiwagi, 2002). Kashiwagi collected data from job-order-contracting users and compared this data over a five-year time period. Kashiwagi compared contract durations, number of delivery orders, the quality of drawings and other similar data. The results indicated that owners were becoming comfortable with job-order-contracting as demonstrated by extended contract durations and the numbers of delivery orders being completed.

## Survey Instrument

With one of the defined purposes of this study to determine the satisfaction of job-order-contracting users, the study group decided to use a written survey instrument as the primary data collection device. A portion of the survey focused on learning more about the users of job-order-contracting services.

The relevant portion of the survey for the focus of this paper, asked the respondents to compare JOC to the project delivery method they identified as the most likely alternative (MLA) to JOC. The study group assumed that the perceptions expressed would be influenced by the alternatives used in the comparison.

### *Elements of Owner Satisfaction*

The following general areas provided the questions for participants in the context of the most likely alternative (MLA) identified in the characteristics portion of the survey. Thus, if a participant indicated design-build was the most likely alternative to job-order-contracting, then all of the comparison questions would be asked in the context of comparing JOC to DB.

- *Cost*
- *Time*
- *Quality, Warranty issues*
- *Safety, Number of Accidents*
- *Claims*
- *Ease of use*
- *Overall owner satisfaction*

### *Data Collection*

After developing and testing the survey instrument, the apparatus was posted to the Internet by the Institute for Social Science Research at Arizona State University. Following the posting, invitations were sent via e-mail to users of job-order-contracting services through the e-mailing lists of the Center for Job Order Contracting Excellence (CJE) membership. Each e-mail invitation contained a unique URL address that linked the recipient of the e-mail to the survey instrument. Once a URL was utilized by one of the respondents, that specific URL would be deactivated. As result, each recipient of the e-mail invitation would only be allowed one chance to respond to the survey.

Between October 2005 and the end of February 2006, the survey was posted to the Internet and e-mail invitations sent to a list of 7,599 job-order-contracting users. Two-hundred and forty-seven (247) responses (3.4% return rate) were received and reviewed. Fifty-seven (57) of the respondents failed to significantly complete the owner satisfaction portion of the survey and this data was removed from the analysis leaving a final response rate of 2.5%.

## Findings

Participants were asked to compare and rate the elements of owner satisfaction on an ordered scale from JOC being much better, to JOC being much worse than the most likely alternative (MLA). Table 1. presents a summary of the responses to the questions of the elements of using JOC in comparison to the elements of most likely alternative project delivery method.

**Table 1 – Comparison of the perceptions of JOC to the MLA on the basis of cost, time, quality safety, claims, ease of use, and overall satisfaction.**

<b>Element of Owner Satisfaction</b>	<b>JOC costs more than the MLA</b>	<b>JOC is about the same cost as the MLA</b>	<b>JOC costs less than the MLA</b>	<b>Other or Do Not Know</b>
Cost of design	24.5%	25.5%	44.3%	5.7%
Cost of procurement	26.4%	27.4%	41.5%	4.7%
Cost of construction	47.2%	24.5%	24.5%	3.8%
Cost of change orders	24.5%	23.6%	47.2%	4.7%
Cost of project administration	22.6%	29.2%	44.3%	3.8%
Cost of claims	13.2%	15.1%	45.3%	26.4%
<b>Element of Owner Satisfaction</b>	<b>JOC more time than MLA</b>	<b>JOC about the same time as MLA</b>	<b>JOC less time than MLA</b>	<b>Other or Do Not Know</b>
Time to start-up project	11.3%	14.2%	74.5%	0.0%
Time to design project	10.4%	26.4%	56.6%	0.0%
Time to construct project	10.4%	40.6%	48.1%	0.9%
Time to closeout project	11.3%	21.7%	63.2%	3.8%
<b>Element of Owner Satisfaction</b>	<b>JOC provides better quality or fewer warranty issues than the MLA</b>	<b>JOC is about the same as the MLA</b>	<b>JOC provides worse quality or more warranty issues than the MLA</b>	<b>Other or Do Not Know</b>
Quality of the work	32.1%	55.7%	9.4%	1.9%
Number of Warranty Issues	29.2%	57.1%	9.4%	2.9%
<b>Element of Owner Satisfaction</b>	<b>JOC provides better safety or fewer accidents than the MLA</b>	<b>JOC is about the same as the MLA</b>	<b>JOC provides worse safety or more accidents than the MLA</b>	<b>Other or Do Not Know</b>
Project Safety	17.9%	68.9%	7.5%	4.7%
Number of Accidents	15.1%	71.7%	2.8%	8.5%
<b>Element of Satisfaction</b>	<b>JOC provides fewer claims than the MLA</b>	<b>JOC is about the same as the MLA</b>	<b>JOC provides more claims than the MLA</b>	<b>Other or Do Not Know</b>
Number of Claims	48.1%	37.7%	5.7%	7.5%
<b>Element of Satisfaction</b>	<b>JOC is more easy to use than the MLA</b>	<b>JOC is about the same as the MLA</b>	<b>JOC is less easy to use than the MLA</b>	<b>Other or Do Not Know</b>
Ease of Use	70.8%	9.4%	16.0%	3.8%
<b>Element of Satisfaction</b>	<b>JOC provides more</b>	<b>JOC is about the same as</b>	<b>JOC provides less</b>	<b>Other or Do Not Know</b>

	<b>satisfaction than the MLA</b>	<b>the MLA</b>	<b>satisfaction than the MLA</b>	
Overall Owner Satisfaction	60.0%	25.7%	12.4%	1.9%

The comparison of the perceptions of JOC to the MLA on the basis of overall satisfaction indicates that overall owner satisfaction is positively influenced by the use of job-order-contracting when compared to the most likely alternative.

One of the basic assumptions of most comparative studies on owner satisfaction relative to the construction industry assume that low cost, less time, better quality, fewer accidents, fewer claims, and ease of project delivery use all have a positive correlation to owner satisfaction. To check the validity of that assumption, researchers in this study cross tabulated each of these elements with the response to the question of overall satisfaction. It was hypothesized that if these assumptions were correct, there would be a strong correlation between the responses to the elements of owner satisfaction and overall owner satisfaction.

To test this hypothesis, each element of owner satisfaction was cross tabulated with overall owner satisfaction on an ordered scale to observe the number of responses. As an example, Table 2 is a cross tabulation between the responses to the questions: 1) Is JOC easier to use than the MLA, and 2) Does JOC provide higher levels of satisfaction when compared to the MLA?

**Table 2 – Cross tabulation of responses from the questions related to ease of use and overall owner satisfaction**

<b>Comparison of Overall Satisfaction</b>	<b>A lot easier than the MLA</b>	<b>A little easier than the MLA</b>	<b>About the same as the MLA</b>	<b>A little less easier than the MLA</b>	<b>A lot less easier than the MLA</b>	<b>Total</b>
Much more satisfied than the MLA	18%	3%	0%	2%	0%	23%
A little more satisfied than the MLA	11%	20%	2%	5%	0%	38%
About the same as the MLA	10%	9%	5%	2%	0%	26%
A little less satisfied than the MLA	0%	2%	1%	3%	1%	7%
A lot less satisfied than the MLA	0%	0%	2%	2%	2%	6%
<b>Total</b>	<b>39%</b>	<b>34%</b>	<b>10%</b>	<b>14%</b>	<b>3%</b>	<b>100%</b>

If the cells are totaled in a diagonal pattern from the upper left hand corner of the table to the lower right hand corner of the table (a direct relationship), the number of percentage of corresponding responses between ease of use and overall owner satisfaction total to 48%. In contrast, totaling the cells from the lower left hand corner of the table to the upper right hand corner (an inverse relationship) yields 12%.

Statistically, to determine if there is a relationship between the elements used in this study and overall owner satisfaction, a cross tabulation was created comparing the perceptions relating to each individual element to overall owner satisfaction. A Spearman Rank Order procedure was

performed with each of these cross tabulations to determine if there is a significant relationship between the assumed element of owner satisfaction and overall owner satisfaction. The results of the Spearman Rank Order procedures are tabulated in Table 3.

**Table 3 – Correlation of elements of owner satisfaction to overall owner satisfaction**

<b>Criteria</b>	<b>Spearman Rank Order</b>	<b>Absolute Value</b>	<b>Significance</b>
Cost of Claims	-0.524	0.524	0.000
Project Quality	0.512	0.512	0.000
Ease of Use	0.473	0.473	0.000
Project Safety	0.465	0.465	0.000
Number of Warranty Issues	0.450	0.450	0.000
Cost of Change Orders	-0.398	0.398	0.000
Cost of Project Administration	-0.385	0.385	0.000
Time to Closeout Project	-0.376	0.376	0.000
Number of Accidents	0.358	0.358	0.000
Number of Claims	0.346	0.346	0.001
Time to Construct	-0.316	0.316	0.001
Cost of Construction	-0.309	0.309	0.002
Cost of Contractor Procurement	-0.291	0.291	0.004
Time to Startup Project	-0.201	0.201	0.042
Time to Design Project	-0.168	0.168	0.100
Cost of Design	-0.038	0.038	0.714

Using an alpha level of 0.05, all but two of the elements of owner satisfaction show a significant relationship to overall owner satisfaction (the significance value is lower than the alpha value). Thus, lower cost, less time, better quality and safety, fewer warranty issues and accidents, fewer claims, and ease of use all correlate to higher levels of owner satisfaction.

Another item to note regarding the Spearman Rank Order results is that all of the cost and time elements have negative values. Thus higher cost and more time correlate to lower levels of owner satisfaction. These negative relationships were the result of how the questions were asked and are indicators of an inverse relationship (i.e. higher cost relate to lower satisfaction).

Another item considered in this research was the impact of the specific MLA considered in the comparison. All of the results shown above are displayed in terms that combine the results from the most likely alternatives considered in this study. When the participants in this study were actually asked these questions, the term “most likely alternative” was replaced with the name of a specific alternative.

To address the influence of the specific alternatives considered when comparing JOC to the MLA, a Kruskal-Wallis test was performed. The Kruskal-Wallis test is a non-parametric alternative to the one-way analysis of variance (ANOVA) designed to determine if the results obtained from different groups in a population are significantly different. In this case the researchers wanted to know if the responses from the design-bid-build group, the design-build group, and the construction-management-at-risk group were significantly different.

Table 4 is a summary of the results from the Kruskal-Wallis test. In the process of performing this test an alpha value of 0.05 was used. The results indicate that four of the categories are significantly influenced by the specific MLA integrated in the comparison, including the question of overall owner satisfaction.

**Table 4 – Kruskal-Wallis test results**

<b>Criteria</b>	<b>Responsive</b>	<b>Chi-Square</b>	<b>df</b>	<b>Significance</b>
Startup Time	106	13.859	3	0.003
Number of Claims	97	12.678	3	0.005
Overall Owner Satisfaction	103	9.437	3	0.024
Design Time	99	7.940	3	0.047
Procurement Cost	101	7.686	3	0.053
Claims Cost	78	7.339	3	0.062
Design Cost	100	7.136	3	0.068
Ease of Use	102	7.125	3	0.068
Quality	103	6.760	3	0.080
Safety	100	5.944	3	0.114
Warranty	102	5.433	3	0.143
Change Order Cost	101	5.162	3	0.160
Closeout Time	102	4.046	3	0.257
Construction Time	105	4.033	3	0.258
Administration Cost	102	2.258	3	0.521
Accidents	95	1.439	3	0.696
Construction Cost	102	0.741	3	0.864

As tabulated in Table 5 job-order-contracting provides for the highest levels of owner satisfaction when the most likely alternative in the comparison is the design-bid-build project delivery method.

**Table 5 – Comparison of responses to the question of overall owner satisfaction on the basis of specific most likely alternatives**

<b>Most Likely Alternatives to JOC</b>	<b>JOC provides more satisfaction than the MLA</b>	<b>JOC is about the same as the MLA</b>	<b>JOC provides less satisfaction than the MLA</b>	<b>Other or Do Not Know</b>
Design-bid-build	69.0%	24.1%	5.2%	1.7%
Design-build	57.1%	23.8%	14.3%	4.8%
Construction-management-at-risk	50.0%	25.5%	25.0%	0.0%
Composite MLA (Table 10)	60.0%	25.7%	12.4%	1.9%

### **Summary**

Users of job-order-contracting indicated that they are generally satisfied with the JOC when compared to other project delivery methods. These users are most satisfied with the ease of use,



the amount of time required to complete projects, and the number of claims that result from the use of job-order-contracting. These same users appear to be of the opinion that the use of job-order-contracting has little or no influence on project quality or safety issues. The results with respect to costs were split with most users being satisfied with most of the aspects of project cost with the exception of construction cost. Most of the respondents to this survey indicated they were of the opinion that construction costs under JOC are generally higher than they would be if another project delivery method were being used.

## Conclusions

Although the response rate was low, we believe there is statistical relevance. The findings of this study indicate that the users of job-order-contracting are very satisfied with JOC as a project delivery method, especially when compared to the most likely alternative, design-bid-build. Fifty-six percent of the respondents reported that if they were required to use another project delivery method it would most likely be the traditional design-bid-build project delivery method. When JOC is compared to DBB on the basis of owner satisfaction, JOC provides greater levels of overall owner satisfaction for 69% of the respondents, while only 5% of the respondents indicate greater levels satisfaction with the tradition DBB project delivery method (26% of the respondents were neutral or had no opinion).

Job-order-contracting is a topic ripe for additional research. One of the best areas for additional research is the issue of facts versus perceptions. Can the owner perceptions regarding cost, schedule, quality, safety, and claims be supported by hard data, or is there a disconnect between perceptions and factual data? Other areas needing research include the development of case studies, looking at best practices, and examining legal constraints for public owners.

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