

PARTNERING IMPACT ON CHANGE ORDERS FOR MID SIZE COMMERCIAL CONSTRUCTION PROJECTS

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ABSTRACT

Partnering, when used in execution of construction projects, generally leads to better control of over all cost growth. The study carried out determined the impact of partnering on the number and cost of change orders in mid sized construction projects. The study's focus is on projects with a contract value of less than five million dollars. In this study, Small contractors executed, essentially, all projects. Small contractors, for this study purposes, are those with an annual turnover ranging between 20 million to 50 million dollars. Both partnered and non-partnered projects of similar nature and contract value were analyzed and compared. Results from this study indicate that partnered projects have a relatively higher number of change orders but cost growth is less when compared to non-partnered projects. Lessons learned from this study would be particularly beneficial to owners, small general contractors, and professionals involved in mid sized projects.

KEYWORDS

Partnering, Change Order, Cost Growth, Dispute Avoidance, Contracts

1. INTRODUCTION

Partnering is a method of avoiding and resolving conflicts at the project level. Partnering reduces adversarial relationships and construction claims by reducing the cost of change orders. It's an agreement whereby two or more parties agree to cooperate to achieve separate but complementary objectives (Michael, 1994). This study was used to determine the impact of partnering on the number and cost of change orders in construction projects. The study targets projects executed by small contractors with an annual turnover of 20M 20 million to 50M 50 million dollars with each project's contract value less than five million dollars. Both partnered and non-partnered projects were analyzed and compared. Non-resolution of change orders lead to adversarial relationships and impacts the schedule and cost. If a change order is not settled then it becomes a claim (Gransberg, 1999). The claims could be settled mutually or they may require invoking of contract clauses such as mediation, arbitration, and ultimately the courts of law.

The aim of this study is to demonstrate the effectiveness of partnering as a dispute avoidance strategy for relatively smaller projects, which have a contract value of less than five million dollars. The study was used to identify the benefits of partnering in controlling the over all cost growth.

Partnered One major conclusion from this study is that partnered projects tend to have a higher number of change orders (COs) and lower project completion cost as compared to non-partnered projects of similar size.

2. BACKGROUND

Partnering has been found to have a positive impact on a construction project (Grajek, 1995). Past research performed by Douglas Gransberg in Department of Transportation (DOT) Projects concluded that partnering reduces the number of contract disputes, claims, and litigation. From his findings one would argue that issues that could have been litigated were resolved through change orders. The number and cost of change orders, scope variations, differing site conditions, and schedule delays are critical factors, for a contractor, in a project with a tight schedule (Pinnell, 1999). Since the literature contains very few references on the impact of partnering based on above-mentioned critical factors, the authors strongly believe that success of partnering could be measured through quantifiable factors in comparable projects. Therefore, current study was carried out to evaluate effects of partnering on number and cost of change orders. The number and cost of change orders can be easily measured, at least for all completed projects. The other factors such as scope changes, schedule delays, and differing site conditions in a project have not been considered in this study.

A study completed in 1992, which focused on Texas DOT projects, demonstrated that partnering reduced the mean cost growth of partnered projects by over twenty five percent (Erik, 1997). Another study, led by the same researchers in 1996, showed a seventy percent difference in cost growth relative to non-partnered projects of comparable size. Findings from an Ohio DOT study turned out to be in close agreement with the 1996 results, which also showed nearly seventy five percent difference in cost growth (Drexler, 1997). However, these DOT studies did not examine or relate the impact of partnering on the number and cost of change orders. Since most of the previous studies were focused on DOT projects worth more than five million dollars, this study focused on projects having a total contract value of less than five million dollars.

3. RESEARCH METHOD

Quantitative research method was used in this study to determine the impacts of partnering on number and value of change orders. Measurable parameters, namely number and value of change orders, were collected in this study from Georgia DOT contracts and utility construction contracts. The measurable parameters also included the original contract value for determining the cost growth for each project. In this study the projects were the independent variables and the number and value of change orders were the dependent variables.

4. ASSUMPTIONS, DEFINITIONS AND DATA COLLECTION

The data collection effort included identifying at least thirty-one completed partnered and non-partnered projects, where each project had a contract value of less than five million dollars. Non-partnered projects essentially comprised the control group for the experiment. Following five assumptions were made for this study:

1. External factors (such as weather, government regulations, inflation) did not have an effect effect on the number and cost of COs.
2. Design-build method did not influence the number and cost of COs.
3. All project team members had sufficient experience to relate to and understand the problems of contractors and owner's field personnel.
4. Reasonable time for regular follow-up was available in each project, in order to identify problems before they metastasize.
5. Each project had a fixed original cost or value contained in the contract agreement and any additional amount was a result of COs.

For each project the following data points were collected included, original contract amount, number of change orders, cost of each change order, and the final contract amount. The data was then assembled into one single table.

A statistically significant sample size of both partnered and non-partnered project was identified and compared. Comparative analysis for cost and number of COs categories was carried out. Some important definitions of measurable parameters used in this study are defined below:

(a) Total Cost of Change Order was defined as the change in contract amount with respect to the original contract amount. It can be described by the following equation:

Total cost of a change orders = Final contract value – Original contract value

(b) Percentage Cost Growth was defined as the ratio of cost of change orders to the original contract value. This parameter can be described by the following equation:

$$\text{Percent Cost growth} = 100 \times (\text{Total cost of change order}) / (\text{Original contract value}).$$

(c) Average Percent cost per change order measures the incremental cost growth. It is described by the following equation:

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5. RESULTS AND INFERENCES

A total of thirty-one projects in partnered and non-partnered category were assayed. The results were then analyzed and the average of each range was calculated.

Figure 1 provides a relationship between the number of COs and percentage growth per CO for non and partnered projects. Visible trend in non-partnered projects is that as the number of change orders increased, the percent growth per change order in both partnered and non-partnered projects decreased. Figure 1 also shows that for the same number of change order, the percentage growth per change order for partnered projects was relatively less than that of non-partnered projects.

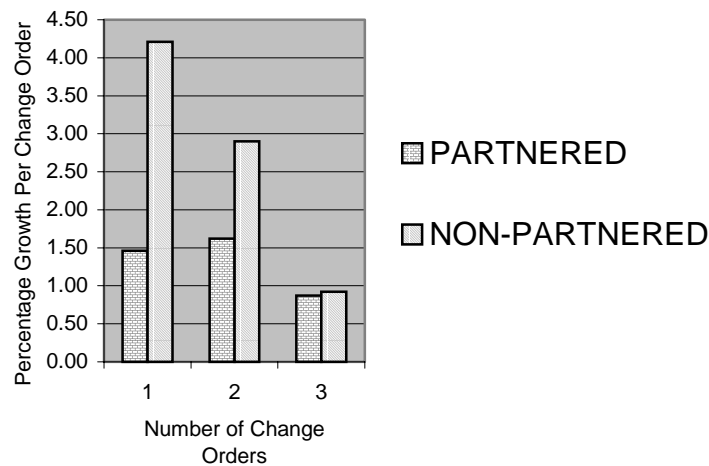


Figure 1: Number of Change Order Versus Percentage Growth Per Change

5.1 Order

Table 1 and Figure 2 clearly show that partnered projects had a lower percentage growth than non-partnered projects for the same number of COs. From Figure 3 it can be inferred that, final contract value for partnered projects, is significantly lower than non-partnered projects and is, therefore, advantageous from an owners perspective.

Considering the second and third tables and Figure 4, for projects for projects having the same range of original contract value, partnered projects were found to have more change orders than non-partnered projects.

The percentage growth of partnered projects is relatively lesser than that of non-partnered projects as can be seen from Figure 3.

Table1: Number of Change Orders and the Percentage Growth of the Change Orders

Number Of C.O. (A)	Average Percentage Growth		Ave. Percentage Growth Per C.O	
	Partnered Projects (B)	Non-Partnered Projects (C)	Partnered (B/A)	Non-Partnered (C/A)
1	1.46	4.21	1.46	4.21
2	3.25	5.8	1.62	2.90
3	2.63	2.76	0.87	0.92

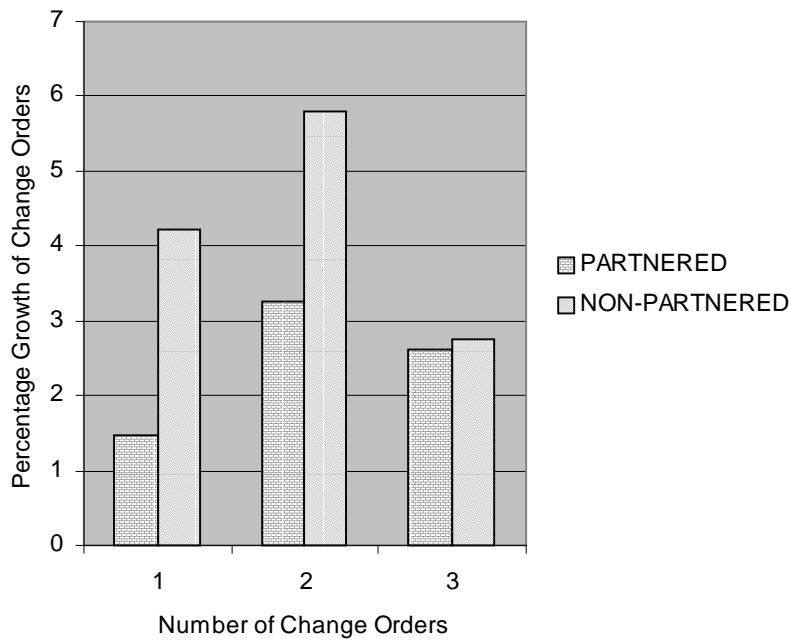


Figure 2: Number of Change Orders Versus Percentage Growth of Change

Table 2: Original Contract Value and Number of Change Orders

Contract Range	Contract Type	Avg. Original Contract Value	Avg. Amount Of C.O.	Avg. Number Of C.O.	Percentage Growth
Under 1M	Partnered	565,366.00	14,582.43	2.00	2.71
	Non-Partnered	708,304.80	32,630.20	1.80	4.56
1M-2M	Partnered	1,413,642.33	29,742.50	2.17	2.24
	Non-Partnered	1,415,150.93	59,804.20	1.40	4.32
Over 2M	Partnered	2,601,747.54	59,858.20	2.20	2.24
	Non-Partnered	3,286,325.25	143,125.50	2.50	4.26

Table 3: Original Contract Range, Average Number of Change Orders and the Percentage Growth

Contract Range	Ave. Number of C.O.		Percentage Growth of the C.O.	
	Partnered	Non-Partnered	Partnered	Non - Partnered
Under1 M	2.00	1.80	2.71	4.56
1M-2M	2.16	1.40	2.24	4.32
2M plus	2.20	2.50	2.24	4.26

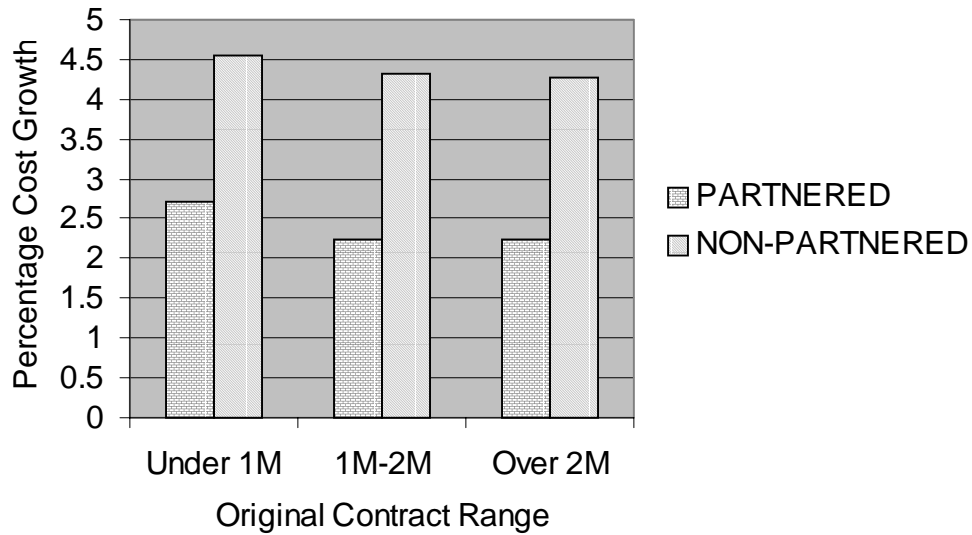


Figure 3: Percentage Cost Growth Versus Original Contract Range

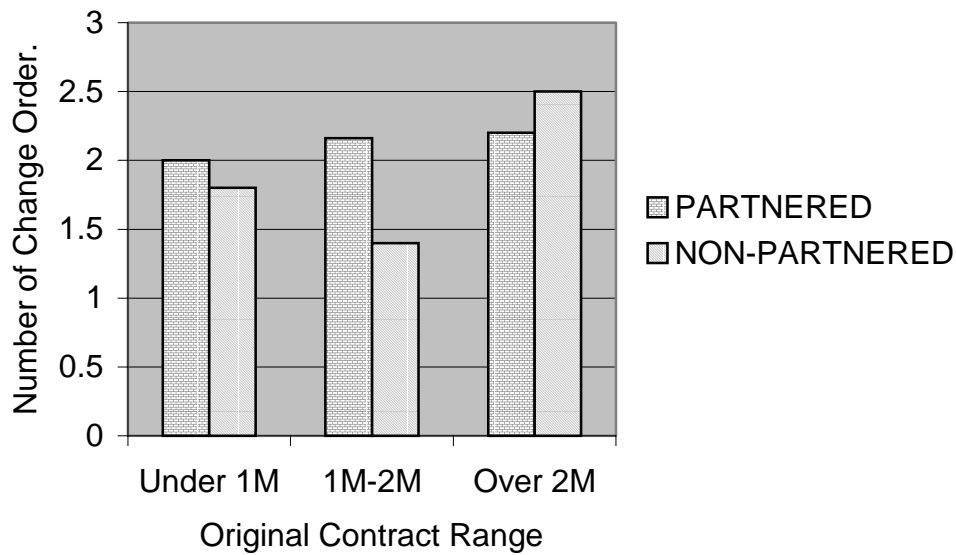


Figure 4: Original Contract Range Versus Number of Change Orders

The Above results could be attributed to indicate that due to partnering procedures, where the contractors were required to meet more frequently with the owners, but and the contractors responded more favorably by keeping the cost of change orders down relatively low. In non-partnered projects, as the number of change orders increased, the percent growth per change order was found to decrease. These results are in close agreement with an earlier research conducted by Texas DOT and , which displayed similar trends. This The study confirms the fact that when the contractors, owners, and key project team members become more involved committed to project goals through the application of partnering procedures. As a result, the percentage cost growth of COs decreases significantly in partnered projects.

6. CONCLUSIONS AND RECOMMENDATION

The study confirmed that partnered projects tend to have higher number of change orders (COs) and lower project completion cost as compared to non-partnered projects of similar size. Partnered projects out performed non-partnered projects in both categories, for the same number of change orders or for the same range of original contract value non-partnered projects had displayed relatively higher cost growth than the partnered projects. Essentially partnering leads to better project team building with better involvement and commitment by team players towards shared project goals and objectives. Lesser In formal institutional framework, and mechanisms provided by through partnering, through promotes higher and more frequent contacts among the concerned parties. Higher frequency of contacts on specific issues (COs) results in improved unambiguous and clear communication, which invariably facilitates a timely satisfactory resolution of issues through change orders with lower impacts on cost as compared to non-partnered projects.

This study also collaborates and supports conclusions drawn by earlier studies that partnering can be used as a tool to reduce disputes, claims, and litigations in construction projects. As mentioned pointed out earlier, partnering enhances communication and helps create a more conducive environment in which owner, contractor, and other key project team partners members work towards shared project goals. Future areas of study suggested by authors is to Areas of future studies, suggested by the authors, are to identify partnering impacts on project schedule, and quality of a project from different perspectives namely the owner, constructor, and Architect-Engineer.

7. ACKNOWLEDGEMENT

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9. APPENDIX

Projects Partnered (P) Non-P (N)	Type Utility (U) DOT (D)	Original Contract Value \$ A	Total Cost of Change Order \$ B	Number of Change Order	Final Contract Value \$ (A+B)
P	U	1,646,265.00	0.00	0	1. 1,646,265.00
P	D	930,113.20	0.00	0	930,113.20
P	D	391,760.00	4,535.00	1	396,295.00
P	D	2,723,878.00	48,050.00	1	2,771,928.00
P	U	756,316.00	33,719.00	2	790,035.00
P	D	2,865,814.55	94,879.00	2	2,960,693.55
P	U	338,185.00	8,185.00	2	346,370.00
P	U	1,110,011.00	43,668.00	2	1,153,679.00
P	U	2,716,566.00	90,720.00	2	2,807,286.00
P	U	1,297,000.00	27,065.00	2	1,324,065.00
P	D	2,338,750.00	20,000.00	3	2,358,750.00
P	D	1,519,293.00	51,293.00	3	1,570,586.00
P	D	2,363,729.15	45,642.00	3	2,409,371.15
P	U	542,189.00	15,147.00	3	557,336.00
P	U	511,998.00	20,000.00	3	531,998.00
P	D	1,348,085.00	39,343.00	3	1,387,428.00
P	U	487,001.10	20,491.00	3	507,492.10
P	U	1,561,200.00	17,086.00	3	1,578,286.00
N	U	165,080.00	0.00	0	165,080.00
N	U	1,077,100.00	0.00	0	1,077,100.00
N	U	822,996.50	75,250.00	1	898,246.50
N	D	897,324.00	21,030.00	1	918,354.00
N	D	1,916,600.39	21,965.00	1	1,938,565.39
N	U	3,450,523.00	212,013.00	2	3,662,536.00
N	U	1,399,572.24	114,653.00	2	1,514,225.24
N	U	532,503.00	30,137.00	2	562,640.00
N	U	610,360.00	15,430.00	2	625,790.00
N	U	1,073,430.00	70,655.00	2	1,144,085.00
N	D	1,609,052.00	91,748.00	2	1,700,800.00
N	D	3,122,127.50	74,238.00	3	3,196,365.50
N	U	678,340.50	21,304.00	3	699,644.50