

S2-4**STRATEGIC ALLIANCE IMPLEMENTATION STATUS AND IMPACT ON PROJECT PERFORMANCE****Bon-Gang Hwang¹, and Young-Ki Huh²**¹ Assistant Professor, Dept. of Building, School of Design and Environment, National University of Singapore, Singapore² Assistant Professor, School of Architecture, Pusan National University, Busan, KoreaCorrespond to bdghbg@nus.edu.sg

ABSTRACT: Strategic alliance is a proactive management process that integrates and optimizes value-added services of each party to best achieve business objectives of all parties within the relationship. Under the current competitive global environment, strategic alliance can produce a “Win-Win” situation and thus change paradigm that has resided in the construction industry. While many studies revealed the significance of alliance relationship in the industry, its impact on project performance has rarely been analyzed. Using the data obtained from 661 construction projects in the Construction Industry Institute database (359 projects from 38 owners and 302 projects from 29 contractors), this study first diagnoses the implementation status of strategic alliance at both project and company levels. Then, its impact on project performance is quantified and discussed. The descriptive analysis performed in this study revealed that an average of 79% of owner companies and 69% of contractor companies have ever implemented strategic alliance into at least one of their projects. However, both owner and contractor companies did not always use the strategy for all or their projects. Only 33% and 30% of projects reported by owners and contractors have been completed under alliance relationship, respectively. Analyzing the alliance impact on project performance, this study also establishes that strategic alliance positively affects project performance of both owners and contractors while owners should consider and control the level of its use for their projects. Recognizing and understanding the benefits from strategic alliance will be a starting point to produce mutual success among project participants, ultimately allowing the construction industry to go forward to a sustainable industry that transfers success from one project to the other.

Keywords: Strategic Alliance; Project Performance; Project Management; Construction Industry

1. INTRODUCTION

Under the current economic crisis and highly competitive global economy, organizations are required to adopt business strategies that bring value to their facility delivery programs. Strategic alliance has been widely accepted as one of the strategies producing “Win-Win” situations among project participants, ultimately changing paradigm that has resided in the construction industry. Strategic alliance can be defined as a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant’s resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based on trust, dedication to common goals, and an understanding of each other’s individual expectations and values (CII, 1991). Organizations within the relationship make effort to widely share resources, mitigate risks, minimize binding resolution and litigation, and to pursue common business objectives.

Strategic alliance belongs to a particular nature of processes that have four basic inter-related steps: (1) goals definition; (2) implementation; (3) performance;

and (4) feedback (Cheung et al., 2003). The first step is to identify overall project goals. It is then followed by developing strategies that direct efforts to achieve the goals. After that, performance is monitored and measured so as to assess progress. Thus, measurement of performance from the alliance relationship should be reflective of the project goals, as each alliance project requires a unique set of measures. An alliance project cannot be successful if any one of the four elements is missing.

Barriers against the strategic alliance can be caused by many different sources such as lack of win-win thinking of top management, distrust, previous negative experiences, difficulties in sharing risks, uneven commitment, miscommunications, failure to invest time and resources, or sense of losing low bid opportunities (Barlow 1997; Bresnen and Marshall 2000; Ng et al. 2002). According to Wood and Ellis (2004), the early optimism at the beginning of an alliance relationship is seldom sustained throughout the long term commitment or even during a single project lifecycle. Research by Green (1999), Taylor (1999), and Ng et al. (2002) suggest that owners end up feeling uncomfortable with losing the low bid opportunity and hence regarding alliance as a tangible investment only for contractors. In some other

cases, human nature, team building, team changes, or a sense of lost of freedom by one of the partners may cause the alliance performance to end up out of its original goals.

Nevertheless, going over the barriers, strategic alliance can give benefits to the parties involved. The benefits can basically be grouped into two main categories. One would include common performance indicators (cost, quality, schedule, safety, etc.) while the other would include minimization of claims and disputes costs. The latter is sometimes regarded as a main driver for an alliance relationship. According to (Kubal, 1994) the growth of strategic alliance is directly correlated with the growth in claims and litigation regarding construction contracts. This indicates that strategic alliance is being implemented as a means to avoid disputes and consequently, reduces the ultimate cost of construction projects. The U.S. Army Corp of Engineers, for example, has been using partnering to avoid disputes since the late 1980s (Gransberg et al., 1999). Voyton and Siddiqi (2004) present the results of a survey with general contractors in Georgia and the Southeastern United States, which indicate that all non-allianced projects had claims, whereas only 29% of allianced projects had claims. Detailed benefits from strategic alliance can be summarized such as effective cost control, reduction in time execution, improved quality and safety, effective utilization of project resources, increased technical competence and opportunity for innovation, risk mitigation, or reduction in claims and disputes (CII 1996; Chan et al. 2003; Voyton and Siddiqi 2004).

The relationship between alliance and project success may vary depending upon size, scope, and complexity of projects. Applicability of strategic alliance was regarded as non-beneficial in small construction projects that may not have sufficient funding to enable them to organize a formal alliance effort (Conley and Gregory, 1999). Gransberg et al. (1999) asserted that strategic alliance between private companies have an advantage over their counterparts in the public sector in that they are free of regulation on the form and substance of their internal operational activities and contractual relationships, since public agencies may have to answer to lawmakers, regulators, and the public alike.

While the studies reviewed above revealed the significance of alliance relationship in the construction industry, its impact on project performance has rarely been analyzed. Among the few studies, the Texas Department of Transportation (TxDOT) developed thirteen internal performance measures to evaluate alliance benefits at project level. Those measures were such as the Cost Growth, Average Cost per Change Order, Average Total Change Orders per Project, Time Growth, Average of Liquidated Damage Days as Percentage of Total Time, Dispute or Claim Costs as Percentage of Original Cost. Using these measures, TxDOT could build a database containing the results of project performances when alliance was implemented. They identified that allianced projects had slightly less cost growth, less change order cost, less time growth, fewer liquidated

damages as well as fewer costs associated with claims and disputes when compared to non-allianced projects (Gransberg et al., 1999). However, this study was limited to public projects only and thus different perspectives of private owners and contractors in strategic alliance could not be captured. Furthermore, the study did not report the implementation status of strategic alliance.

As a result, using the data obtained from 661 construction projects in the Construction Industry Institute (CII) database (359 projects from 38 owners and 302 projects from 29 contractors), this paper aims: (1) to diagnose the implementation status of strategic alliance at both project and company levels; and (2) to identify the impact of strategic alliance on project performance. Recognizing and understanding the benefits from strategic alliance will be a starting point to produce mutual success among project participants, ultimately allowing the construction industry to go forward to a sustainable industry that transfers success from one project to the other.

2. DATA COLLECTION & PRESENTATION

The CII Benchmarking and Metrics (BM&M) program collects capital project data. At the time of this study, CII BM&M has 90 member companies (45 from owners and 45 from contractors) and its database has the data from 1247 project (697 projects from 45 owners and 550 projects from 38 contractors). By checking the existence of strategic alliance data for each project, 661 projects (359 projects from 38 owners and 302 projects from 29 contractors) were finally selected to perform data analysis. Depending on project characteristics, the data were categorized by industry group, nature, size, and location. The number of companies and projects by each category is presented in Table 1. Due to the companies that submitted data for multiple projects classified into different project characteristic categories, the sum of the number of the companies in each category is not equal to the total number of owner (38) and contractor (29) companies.

Table 1. Summary of Dataset

Project Characteristics		Owner		Contractor	
		No. of Com. (N = 38)	No. of Proj. (N = 359)	No. of Com. (N = 29)	No. of Proj. (N = 302)
Industry Group	Buildings	18	81	6	13
	Heavy Industrial	29	201	26	244
	Light Industrial	9	52	11	30
	Infrastructure	10	25	8	15
Project Nature	Addition	29	105	25	109
	Grass roots	31	133	18	136
	Modernization	34	121	20	57
Project Size (million)	< \$15	31	141	23	89
	\$15 ~ \$50	35	125	22	113
	\$50 ~ \$100	20	52	18	39
	> \$100	15	41	16	61
Project Location	Domestic	35	245	28	225
	International	15	114	10	77

3. DATA ANALYSIS

Using the data presented in the previous section, two major analyses were conducted to identify the level of the strategic alliance use at company and project level and to

reveal the impact of strategic alliance on project performance. First, the implementation status is reported in this section, followed by the impact analysis results.

Table 2. Strategic Alliance Implementation Status

Project Characteristics		Strategic Alliance?	Owner				Contractor			
			Company Level		Project Level		Company Level		Project Level	
			No. of Com.	%	No. of Proj.	%	No. of Com.	%	No. of Proj.	%
All		Yes	30	79%	117	33%	20	69%	90	30%
		No	8	21%	242	67%	9	31%	212	70%
Industry Group	Buildings	Yes	9	50%	16	20%	2	33%	2	15%
		No	9	50%	65	80%	4	67%	11	85%
	Heavy Industrial	Yes	21	72%	79	39%	19	73%	76	31%
		No	8	28%	122	61%	7	27%	168	69%
	Light Industrial	Yes	4	44%	16	31%	6	55%	8	27%
		No	5	56%	36	69%	5	45%	22	73%
	Infrastructure	Yes	4	40%	6	24%	4	50%	4	27%
		No	6	60%	19	76%	4	50%	11	73%
Project Nature	Addition	Yes	18	62%	38	36%	16	64%	39	36%
		No	11	38%	67	64%	9	36%	70	64%
	Grass roots	Yes	17	55%	26	20%	11	61%	29	21%
		No	14	45%	107	80%	7	39%	107	79%
	Modernization	Yes	20	59%	53	44%	10	50%	22	39%
		No	14	41%	68	56%	10	50%	35	61%
Project Size (million)	< \$15	Yes	22	71%	55	39%	13	57%	32	36%
		No	9	29%	86	61%	10	43%	57	64%
	\$15 ~ \$50	Yes	18	51%	35	28%	10	45%	30	27%
		No	17	49%	90	72%	12	55%	83	73%
	\$50 ~ \$100	Yes	15	75%	20	38%	11	61%	17	44%
		No	5	25%	32	62%	7	39%	22	56%
	> \$100	Yes	6	40%	7	17%	9	56%	11	18%
		No	9	60%	34	83%	7	44%	50	82%
Project Location	Domestic	Yes	27	77%	98	40%	17	61%	77	34%
		No	8	23%	147	60%	11	39%	148	66%
	International	Yes	8	53%	19	17%	5	50%	13	17%
		No	7	47%	95	83%	5	50%	64	83%

3.2 Strategic Alliance at Project Level

3.1 Strategic Alliance at Company Level

The number of companies that have ever implemented strategic alliance into at least one of their projects is summarized in Table 2 by project characteristics. The result of this descriptive analysis shows that in general, the number of companies implementing strategic alliance is greater than those who do not. 30 out of 38 owner companies (79%) established alliance relationships with contractors to perform their projects. In case of contractor companies, 20 out of 29 companies (69%) employed strategic alliance when delivering their projects for owners. However, with consideration of project characteristics, less use of strategic alliance at the company level is reported in the categories of light industrial (44% vs. 56%), infrastructure (40% vs. 60%), and the projects costing greater than \$100 million (40% vs. 60%) for owner companies, and buildings (33% vs. 67%) and the project cost between \$15 million and \$50 million (45% vs. 55%) for contractor companies. This implies that use or implementation of strategic alliance at the company level depends on project characteristics.

Based on the same categories used for the analysis at the company level, Table 2 also shows how many of projects were completed under alliance relationships. In case of owner projects, multiple contractors involve a project. Some of the contractors work in alliance with the project owner and the others do not. For this study, projects performed under strategic alliance relationship between an owner and at least one contractor were considered "Yes", which indicates that the projects were completed with strategic alliance. The result of this descriptive analysis at the project level shows that the number of projects not using strategic alliance is much greater than that of projects implementing it, over all of the project characteristic categories. Strategic alliance was applied to a total of 117 out of 359 owner projects (33%) and 90 out of 302 contractor projects (30%). This less use of strategic alliance at the project level tends to exist without regard to project characteristics. As shown in Table 2, for both owners and contractors, the number of projects under "Yes" is always smaller than that under "No" for all categories in the Industry Group, Project

Nature, Size, and Location. This implies that strategic alliance is not frequently applied at the project level. Considering the analysis result from the company level that the number of companies using strategic alliance is greater than those who do not, it can be concluded that even though many companies adopt strategic alliance as one of the strategies delivering their construction projects, they do not always implement strategic alliance to all of projects they perform.

3.3 Strategic Alliance Impact on Project Performance

Following the descriptive analysis, the impact of strategic alliance on project performance was identified. To do so, owner projects were categorized into three groups; alliance, partial alliance, and non-alliance. Due to multiple contractors involving a project, there can be more than one strategic alliance relationships between the project owner and the contractors participating in the project. In the case that all contractors have alliance relationships with the owner, the owner project was categorized as “Alliance”. On the other hand, when strategic alliance was not used for any contractors in a project, it was classified into the “Non-Alliance” category. If strategic alliance was not fully used, but partially used, the project was categorized as “Partial Alliance”. For contractor projects, there is no relationship called “Partial Alliance” since in general, a contractor provides their service for an owner on the basis of “Alliance” or “Non-Alliance”. With the same data set used for the descriptive analysis that identified the status of strategic alliance use, the impact of strategic alliance on project cost, schedule, and safety performances were analyzed and the analysis results are discussed in this section. The results elaborate actual benefits from strategic alliance, and thus may enhance its implementation.

In order to identify how the level of strategic alliance affects project performance, Project Cost Growth and Project Budget Factor for cost performance, Project Schedule Growth and Project Schedule Factor for schedule performance, and Recordable Incidence Rate for safety performance were employed. These performance metrics are defined such that lower numbers are more favorable. The formula for Project Cost Growth is:

$$\text{Project Cost Growth} = \frac{\text{Actual Total Project Cost} - \text{Initial Predicted Project Cost}}{\text{Initial Predicted Project Cost}}$$

The actual total project cost is the total installed cost at project turnover, excluding the cost of land, and the initial predicted cost means the budget at the time of authorization. A zero Project Cost Growth score means “on budget”, and numbers below zero or over zero indicate “under budget” or “over budget”, respectively. This metric is primarily viewed as an owner metric as contractors generally are less able to control project change orders. Due to this reason, the Project Budget Factor adjusting approved changes to the initial predicted budget was used for contractor cost performance analysis. The definition of the Project Budget Factor is as follows:

$$\text{Project Budget Factor} = \frac{\text{Actual Total Project Cost}}{\text{Initial Predicted Project Cost} + \text{Approved Changes}}$$

A budget factor score less than one indicates that the contractor performed efficiently and was able to deliver the contract for less cost. If the work is delivered at a cost higher than the planned cost plus approved changes, the budget factor is greater than one.

Based on the planned vs. actual project duration, the Project Schedule Growth metric indicates if a project is completed “on schedule (equal to 0)”, “ahead of schedule (less than 0)”, or “behind schedule (greater than 0)”. The formula is as follows:

$$\text{Project Schedule Growth} = \frac{\text{Actual Overall Proj. Duration} - \text{Initial Predicted Proj. Duration}}{\text{Initial Predicted Proj. Duration}}$$

The initial predicted project duration is the predicted duration at the time of authorization. For contractors, the Project Schedule Factor is employed due to the same reason for the Project Budget Factor. The formula is defined as follows:

$$\text{Project Schedule Factor} = \frac{\text{Actual Overall Project Duration}}{\text{Initial Predicted Project Duration} + \text{Approved Changes}}$$

To measure project safety performance, Recordable Incidence Rate was used for both owner and contractor projects. This metric was defined by Occupational Safety and Health Administration (OSHA) as follows:

$$\text{Recordable Incidence Rate} = \frac{\text{Total Number of Recordable Cases} \times 200,000}{\text{Total Site Work Hours}}$$

A recordable case (incident) is a work-related illness and any injury causing loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment beyond first aid. The metric can be interpreted as the number of recordable incidents occurring annually among 100 full-time workers working 40 hours per week, 50 week per year (200,000 hours per job site per year).

Strategic Alliance Impact on Owner Project Performance

Figure 1 depicts cost, schedule, and safety performances for owner projects by the level of strategic alliance implementation. The results identify that the partial alliance group has the best cost and schedule performance when compared to the groups for both alliance and non-alliance. Especially for the cost performance, the partial alliance group (-0.077) outperformed the non-alliance group (-0.035). Although the difference of 4.2% between these two groups seems small, cost reduction by 4.2% of the total project cost must be a significant impact from strategic alliance implementation. It is of interest that the cost and schedule performances of the alliance group (-0.001 for cost performance; 0.072 for schedule performance) are even

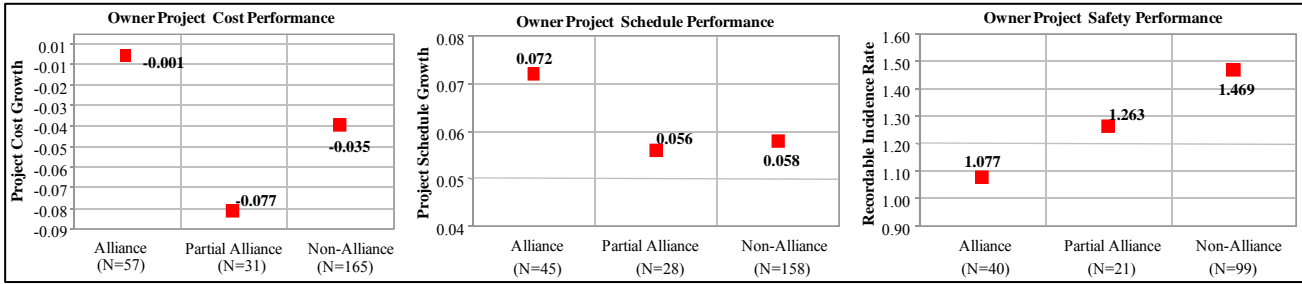


Figure1. Strategic Alliance Impact on Owner Project Performance

worse than the non-alliance group (-0.035 for cost performance; 0.058 for schedule performance). As mentioned before, one of the barriers implementing strategic alliance is the owners’ sense of losing the lowest bid opportunities. In other words, owners may consider strategic alliance for all contractors involving their projects for other positive aspects such as better quality or better communication. This indicates that cost or schedule reduction may be sacrificed due to other priorities. Furthermore, contractors under alliance relationship with owners may expect more compensation or easier acceptance of change orders that they issue, which result in higher project costs to owners. Another possible reason for the worse cost and schedule performances of the alliance group than the other groups, partial and non-alliance groups may be the limitation of the metrics employed to measure the performances. The Project Cost and Schedule Growth metrics compare actual performance with planned. As a result, if the original project cost and duration are set up at the very challenging level, assuming that full alliance gives more cost and schedule reductions, the final outcomes from the metrics may be lower than expected. In case of safety performance, the alliance group shows the lowest score of the Recordable Incidence Rate (1.077).

These analysis results implies that owners may not always appreciate cost and schedule benefits from full implementation of strategic alliance while strategic alliance effectively works for the reduction of on-site accidents, illness and any injury, which may be higher priority to owners.

Strategic Alliance Impact on Contractor Project Performance

For contractor projects, the cost, schedule, and safety performances of two groups, alliance and non-alliance, were compared as shown in Figure 2.

Since a contractor has single relationship with the project owner, there is no partial alliance group. The analysis result identifies that all of the cost (0.957), schedule (0.973), and safety (1.487) performances of the alliance group tend to be better than the non-alliance group (0.971 for cost performance; 0.981 for schedule performance; 1.709 for safety performance). This implies that contractors get cost, schedule, and safety benefits from strategic alliance. To contractors, alliance with owners can be considered as chances to avoid competitive biddings, maximizing their profit markups. Also, the higher acceptance rate of change orders may positively affect contractors’ cost and schedule performances measured by the Project Budget and Schedule Factors that adjust additional costs and durations caused by the change orders.

4. CONCLUSIONS & RECOMMENDATIONS

This study aimed to identify the implementation status of strategic alliance at both project and company levels and to quantify the impact of strategic alliance on project cost, schedule, and safety performances. Analyzing the data obtained from 661 construction projects (359 projects from 38 owners and 302 projects from 29 contractors), it can be concluded that on average, 79% of owner companies and 69% of contractors companies implement strategic alliance into at least one of their projects. However, both owners and contractors are not always employing strategic alliance as the project delivery strategy for their projects. On average, only 33% of projects from owners and 30% of projects from contractors were completed with the use of strategic alliance.

Furthermore, for owner projects, the cost and schedule performances of the partial alliance or non-alliance group tended to be better than those of the alliance group. This

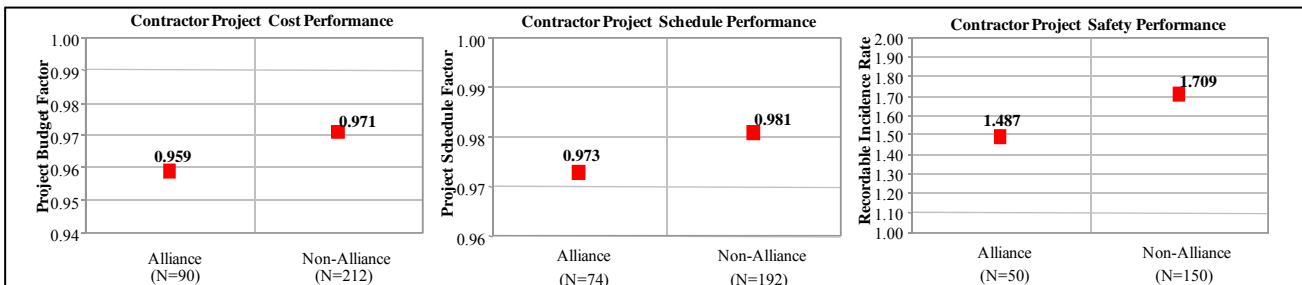


Figure2. Strategic Alliance Impact on Contractor Project Performance

can be interpreted that using strategic alliance for all contractors may not give much cost and schedule benefits to owners. However, its use for enhancing safety performance will be paid back. In case of contractor projects, strategic alliance contributed to better project outcomes in terms of cost, schedule and safety. Based on the results, it can be concluded that both owners and contractors can get benefits from strategic alliance while owners should consider and control the level of its use for a project since partial implementation of strategic alliance may generate more benefits.

This study was mainly focused on project characteristics to identify the level of strategic alliance use at company and project levels. It is, however, recommended to consider different project delivery methods (i.e., design-bid-build, design build, etc.) and different contract types (i.e., lump sum, cost reimbursable, etc.) since whether or not to go with strategic alliance for project deliveries would be determined by considering these specific project delivery strategies as well as project characteristics detailed in this study. The benefits from strategic alliance can be also identified by project characteristics, delivery methods, or contract type. Finally, impacts of strategic alliance are not limited to cost, schedule, and safety, and thus it is also recommended to identify other performance areas that can be improved by its implementation. Then, future studies may correlate project success with the level of strategic alliance implementation.

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