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AN ANALYSIS OF POTENTIAL MISALIGNMENTS OF COMMERCIAL INCENTIVES IN INTEGRATED PROJECT DELIVERY AND TARGET VALUE DESIGN

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ABSTRACT

The misalignment of commercial incentives of a project delivery system can lead to client dissatisfaction, litigation, cost overruns, and adversarial relationships amongst project participants. Started in 2005, the goal of Integrated Project Delivery (IPD) is to better align the commercial incentives of project participants in the AEC industry. Started in 2004, the goal of Target Value Design (TVD) is to steer the design and construction of the project to maximize customer value within project constraints.

Recently, IPD and TVD have become more widely used in the United States' AEC industry. In this paper, we ask the following question: What are the misalignments of commercial incentives that can occur with IPD and TVD? We identified misalignments on 6 IPD/TVD projects. Additionally, we used a creative brainstorming exercise to propose possible misalignments, which were not reported in the case studies. For AEC practitioners and owners, understanding the potential misalignments may help them avoid these problems on their projects.

KEYWORDS

Target value design, integrated project delivery, relational contract, incentives

INTRODUCTION

The misalignment of commercial incentives within the AEC industry can lead to client dissatisfaction, low productivity, litigation, cost overruns, and adversarial relationships amongst project participant (Latham, 1994; Egan, 1998; Thomsen, et al., 2009). Several scholars and industry practitioners have cited misalignments of incentives of Design-Bid-Build (DBB) and CM at Risk (Thomsen, et al., 2009;

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Schöttle and Gehbauer, 2012). Design-Build (DB) attempts to overcome some of the misalignment problems of DBB and CM at Risk by having a single entity responsible for both the design and construction (Beard, 2003; Gransberg, Koch and Molennar, 2006). Even though DB has been cited to have less alignment issues than DBB and CM at Risk (Gransberg, Koch and Molennar, 2006), there are still reports of misalignment of commercial incentives with the DB project delivery system (Ling and Poh, 2007). Started in 2005, the goal of Integrated Project Delivery (IPD) is to better align the commercial incentives of project participants in the AEC industry (Matthews and Howell, 2005). Started in 2004, the practice of Target Value Design (TVD) steers the design and construction of the project to maximize customer value within project constraints (Ballard and Reiser, 2004; Ballard, 2011). Together IPD and TVD form a new project delivery system, which is often referred to as Lean Integrated Project Delivery (LIPD), IPD/TVD, or just Integrated Project Delivery (IPD). All three terms have been used synonymously by practitioners and scholars and for the purpose of this paper we will the term IPD/TVD to make a distinction that we are referring to projects in which both IPD and TVD are used together. Although TVD and IPD have often been used together (Denerolle, 2013; Ashcraft, 2010), not all TVD projects have used IPD principles and vice versa. In fact, the earliest TVD projects were undertaken under Design-Build GMP contract and the first IPD project made no mention of the practice of TVD (Ballard and Reiser, 2004; Matthews and Howell, 2005; Cohen, 2010).

Several scholars have reported that IPD/TVD is a better alignment of commercial incentives than more traditional project delivery systems (Lichtig, 2005; Thomsen, et al., 2009; Darrington and Lichtig, 2010). The successful results from IPD/TVD application have been attributed to collaboration and better alignment of incentives (Ziminia, Ballard and Pasquire, 2012). However, within the literature, there has been limited discussion about the misalignment of incentives with regards to IPD/TVD. Thomsen, et al. (2009) mentioned three misalignments of incentives: (1) members outside the risk pool may not be as incentivized to cooperative as members inside the risk pool, (2) IPD/TVD teams may pad their contingencies to increase their profit, and (3) there may be temptation from the IPD/TVD team to compromise quality and scope if the owner agrees to a fixed price early in design. Besides Thomsen, et al.'s (2009) report, we could not find any other scholarly article on the subject matter. The lack of reported knowledge on this topic may lead owners and AEC practitioners to believe that there are no problems with regards to misalignments of incentives with IPD/TVD.

In this paper, we play the role of a devil's advocate by asking the following question: "What are the misalignments of commercial incentives that can occur with IPD/TVD?" We interviewed 28 participants from 6 IPD/TVD projects to identify misalignments and problems that occurred as a result of them. We also used a creative brainstorming exercise to come up with possible misalignments, which have not been observed in the case studies. By understanding the potential pitfalls of IPD/TVD, owners and AEC practitioners may be able to avoid these problems on their own projects.While the term "alignment of commercial incentives" can be defined in many different ways, in this paper we will define it as: "actions by a project participant which benefits their firm financially would also benefit the owner, the project, and other participants". Under this definition, if a project participant's

action benefits his or her firm financially but is detrimental to the team, the project, or the owner; then there is a misalignment of incentive. Having an alignment of commercial incentives is important in ensuring that everyone is working towards a common goal. We also acknowledge that while commercial incentives are important for a project, they are not the only type of incentives that exist. Participants undertake a project for a variety personal, social (e.g., recognition from winning a design award), and other types of incentives. And although the alignment of these incentives can be as important for a project's success as the commercial incentives, their discussion is beyond the scope of this paper. Our contribution to knowledge includes: (1) documenting examples of misalignments of incentives that occurred on IPD/TVD projects and (2) developing scenarios of possible misalignment of incentives. These empirical observations may help future scholars develop theories about IPD and TVD.

INTEGRATED PROJECT DELIVERY

The goal of IPD is to address four systemic problems of traditional contractual approaches: (1) good ideas are held back, (2) contracting limits the cooperation and innovation, (3) inability to coordinate, and (4) pressure for local optimization (Matthews and Howell, 2005). Under the motto of the three musketeers: "all for one and one for all", the original guiding principles for the IPD team were: (1) to have the IPD members responsible for the provisions of the prime contract with the client and (2) have the IPD members share in the risk and the profits of the project which is based on project performance (Matthews and Howell, 2005). Since its introduction in 2005, IPD has been gaining in popularly within the United States AEC industry with support from major organizations including the Lean Construction Institute, the American Institute of Architects, and the Associated General Contractors.

TARGET VALUE DESIGN

Target Value Design (TVD) is a management practice in which the design and construction is steered towards the project constraints while maximizing customer value (Ballard, 2011). TVD was adopted from Target Costing (TC), a management practicethat has been widely used in the new product development and manufacturing industries to ensure predictable profit planning (Cooper and Slagmulder, 1997; Feil, Yook and Kim, 2004). Under this approach, cost is view as an input in the design stage rather than an outcome of it.

PARTNERING AND PROJECT ALLIANCING

IPD/TVD is part of a larger, global movement towards more collaborative and relational contracting practices (Lahdenperä, 2012). Around the world, such practices as partnering and project alliancing are also gaining popularity (Abrahams and Cullen, 1998; Ross, 2003). The analysis of the misalignment of incentives of these project delivery systems is beyond the scope of this study. However, since project alliancing, partnering, and IPD share many common principles and practices, the findings from this research may help illuminate some of the misalignment of incentives of these project delivery systems as well.

RESEARCH METHODS

Eisenhardt (1989) defines a case study as "a research strategy that focuses on understanding the dynamics of single setting". According to Yin (2009), the case study method is appropriate when: asking "why" and "how" questions of contemporary phenomenon within real-life context where the researcher has little control in the experiment. As a relatively new project delivery system, the case study method allows us to collect in-depth data and insights of IPD/TVD. The case study method is especially appropriate for this research because our goal is to explore possibilities. One of the limitations of empirical research, especially the case study method, is that we can never be certain that we have observed all possible occurrences of a phenomenon. To overcome some of these limitations, we augmented our empirical research with theoretical investigation by brainstorming possible misalignments of incentives, which have not been observed in the cases.

CASE STUDIES SELECTION

This research is part of a larger 5-year research effort conducted by the University of California, Berkeley's Project Production Systems Laboratory (P2SL) in collaboration with our industry sponsors. For this research, we have collected data from 6 case study projects. The cases are within the Californian AEC industry. In total, the cases include (3) different owners, (3) different contractors, (4) different architects, (5) different structural engineering firms, and over a dozen different MEP trade partners. All 6 projects are with private owners and there were no regulatory restrictions with regards to procurement practices. The projects are all large-scale, complex projects ranging from $150 million to over $1 billion. Project C and Project E were the only projects in which there was a tri-party agreement between the owner, architect, and general contractor. On Project C and Project E, specialty contractors and designers held Lump Sum or GMP contracts with either the architect or the contractor. All of the other projects had between 7 and 13 parties in the risk pool. Projects D and F were joint ventures between 2 general contractors. Projects A, B, C, and E were all designed and constructed for the same owner (Owner 1). Projects D and F were designed and constructed for two different owners: Owner 2 and Owner 3 respectively. Having a wide variety of actors allows us to look at the problem with regards to misalignment of incentives from a systemic/industry perspective rather than just investigating problems from one firm or one particular project.

MISALIGNMENT OF COMMERCIAL INCENTIVES

MISALIGNMENT 1: IMBALANCE OF OVERHEAD AND PROFIT

Within an IPD/TVD project there are negotiated rates for: profit, contingency, and fees (i.e., cost of work[4] and overhead). The owner typically reimburses the IPD/TVD participants for their cost of work including a percentage markup to cover office overhead. The goal is to have the reimbursable rate equal to the firm's cost of running their business at 0 profit so that firms can only earn profit from the risk pool. When a

[4] The costs of work include material, equipment, salary, retirement, healthcare, and other benefits.

firm has a higher markup on their overhead than on their profit or when their reimbursable rate is greater than their cost of running their business, they can make more profit by billing additional hours to the project.

On Project E, the architect's negotiated fee (cost of work and overhead) was much higher than the fee that they normally charge on a similar project. For them spending more money meant that their company earned more profit at the expense of the team. By the end of the project, the architect had billed $2 million more than their initial estimates, which was taken out of the risk pool.

Table 1: Case Study Description

Project Labels	Description	Interviews
A	Hospital Project in Northern California	8
B	Hospital Project in Northern California	7
C	Medical Office Building in Northern California	3
D	Hospital Project in Southern California	6
E	Hospital Project in Northern California	2
F	Commercial Construction in Northern California	2

MISALIGNMENT 2:NOT ALL PROFITS ARE AT RISK.

On Project C, the IPD/TVD participants each placed 15% to 20% of their profits into the risk pool. Since the designers (engineers and architects) only had a small portion of the profit pool, they had limited upside from it. They did not truly have skin in the game and were not financially incentivized to go the extra mile to pursue cost saving designs that benefitted the whole project.

MISALIGNMENT 3:DIFFICULTY OF BUDGET AND SCOPE TO MOVE BETWEEN CLUSTER GROUPS.

On several projects, the cost savings from one cluster group through the TVD process was held tightly within that particular cluster. The cluster group with the savings kept it within their group as a contingency and hoarded the money instead of allowing it to move across boundaries. On Project E, the design team held a sizeable design contingency even after the sustainable amount to the design was already completed. They knew that they would not need to use it but were reluctant to let the funds free. At the same time, another cluster group was over budget and had to make less than optimal compromises to hit their Target Costs. This resulted in a non-optimal allocation of capital that could have been invested for value added scope or to allow other clusters to meet their targets.

MISALIGNMENT 4:PAYMENT BY REIMBURSABLE DOES NOT REFLECT THE PROGRESS OF THE PROJECT.

On Project A and Project B, the IPD/TVD team did not share their labor productivity rates with each other. From the owner's perspective, there was no way for them to compare the billing rate with the rate of installation to make sure that contractors were on schedule. From the team's perspective, they were relying on the word of their partners and did not have data to verify the statements. On Project A, one trade partner inside the risk pool ended up depleting a sizeable portion of the profits. Since the team was not actively tracking and sharing labor rates (i.e., projected vs. actual

man-hours), the issue was not revealed until near the end of the project at which point there was little that could be done to ameliorate the problem.

MISALIGNMENT 5: UNTIMELY DISPERSION OF PROFITS.

On Project C, a participant remarked that the profits were not dispersed in a timely manner. The project had already been completed for close to 3 months but the final profits were not released to the team. Because there is a time value to money, owners may want to keep the money for as long as possible in order to earn an interest on it. Untimely dispersion of profits can also make it difficult for AEC companies to manage their cash flow.

MISALIGNMENT 6:MEMBERS THAT HAVE A MAJOR IMPACT ON THE PROJECT'S SCHEDULE AND COST WERE NOT IN THE RISK POOL.

On Project B, a member outside the risk pool had a scope of work that was critical to the success of the project. By not having this subcontractor inside the risk pool, the IPD/TVD had little influence over their actions. The subcontractor did not attend the big room meetings and it was difficult to communicate/coordinate with them. And as a result of this and several other issues, the project ended up behind schedule and over budget. Members who are outside of the risk pool may be motivated to work in a manner that is most efficient for them but not efficient for the project. This local optimization comes at the expense of the team's profitability and the project's outcome.

MISALIGNMENT 7: MEMBERS OUTSIDE THE RISK POOL DID NOT ATTEND COORDINATION MEETINGS.

On several projects, some members outside the risk pool did not attend the coordination meetings. The designers and subcontractors outside the risk pool were procured under either a Lump Sum or GMP contract and their estimates reflected a more traditional project delivery system where they were "in and out" without much interaction with other parties. Within their estimates, they did not budget enough money for attending the big room meeting. For these parties, each coordination meeting that they attend reduces their profits and is a lost opportunity for making profit on another project.

MISALIGNMENT 8: THE TARGET COST WAS SET BASED ON PRICE RATHER THAN WORTH AND IS NOT SHARED WITH THE TEAM.

On several of the case study projects, participants have reported that the Target Cost was handed to them by the owner rather than developed as a team. Some of the IPD/TVD participants did not know how the Target Cost and the Target program was set. The fact that the team was not involved in the development of a Target Cost and did not validate it base on the owner's business case meant that the Target Cost might have been was set based on price rather than worth. It may be tempting for owners to ratchet the Target Cost from project to project without consideration of whether or not the Target Cost is actually achievable. In doing so, projects may be undertaken which are destined to fail because there was never an alignment between the ends, means, and constraints.

MISALIGNMENT 9: OWNERS WHO WANT THE BENEFITS OF TVD/IPD BUT WERE NOT WILLING TO DO THE WORK.

Project F involved an owner who does not engage in construction projects on a regular basis. The owner wanted to try IPD/TVD on their projects because they heard about the benefits of the process. However, the owner was not actively involved in many of the decision-making sessions. After an extensive amount of the design was already completed, the owner wanted to make several changes that were costly and difficult to integrated into the existing plans.

MISALIGNMENT 10: OWNERS FORCING THE TEAM TO CUT THEIR PROFITS.

The IPD/TVD contract is typically signed after a sustainable amount of the design has already been completed. This usually occurred either during the Design Documentation (DD) or the Construction Documentation (CD) stage. Prior to signing the IPD/TVD contract, the designers and contractors are typically paid by a GMP design-assist contract. By the time the IPD/TVD contract is ready to be signed, the IPD/TVD team had already invested a significant amount of effort, energy, and prided into the project. It is in the team's best interest to move the project into the construction phase. The contractor and trade partners typically spend more upfront money in the preconstruction phase than they are compensated for. As a result, they can only recouped their investments if they also participate in the construction phase.

Due to a downturn in the economy, several projects in the case study sample had owners who recalculated their Target Cost to reflect the change in the economy. From the owner organization's perspective, they can get a better deal by putting the project up for bid in the market. In order to remain on the project, the IPD/TVD team had to lower their negotiated fees, profits, and contingency percentages on these projects. This action had a profoundly negative impact on the team's morale and eroded trust between the team and the owner.

Table 2: Observed Misalignments of Commercial Incentives

Labels	A	B	C	D	E	F
M1	X	X			X	
M2					X	
M3	X		X		X	X
M4	X	X				
M5			X			
M6		X				
M7	X	X		X	X	
M8		X				X
M9						X
M10		X			X	

CREATIVE BRAINSTORMING EXCERCISE

In this section, we list some of the misalignments of commercial incentives that were not observed on the case study projects but may be possible with IPD/TVD.

MISALIGNMENT 11:CONTINGENCY DOES NOT TRULY REFLECT THE RISK INVOLVED AND MAY BE HIDDEN ELSEWHERE.

IPD/TVD projects typically have a contingency percentage that is significantly lower than the industry average (Do, et al., 2014). In the construction industry, some owners and IPD/TVD teams are "setting" the construction contingency at 0 percent (Ashcraft, 2014). The logic behind this is that since the people who designed the project are also the ones who are going to build it, they should not need any contingency. Unfortunately, uncertainty is a natural part of every complex system and prudent TVD/IPD team members will always have a contingency. Some members may try to hide this contingency by padding their estimates and while others may simply not include any contingency in their estimates. Both practices can become recipes for disaster. The first encourages deceptive behaviors that are contrary to the principles of IPD. The second results in greater financial risks for the participants.

MISALIGNMENT 12:EXPLOITATION BY OWNERS TO GET A PROJECT WITHOUT PAYING AEC PRACTITIONERS A PROFIT.

By setting a Target Cost at a rate that is unachievable, the owner may try to exploit the relational contract to pay the AEC professionals for their cost of work and 0 profit.

MISALIGNMENT 13:MEMBERS SIGNING ONTO AN IPD/TVD PROJECT WITH NO INTENTIONS OF ACHIEVING THE TARGET COST.

Contractors or designers may, in difficult financial times, join an IPD/TVD project with no intentions of hitting the Target Cost. For these firms, the IPD/TVD project is a temporary shelter for them to "park" some of their people and equipment since they are guaranteed their cost of work. Unfortunately, having an underperforming team member can hurt the morale of the IPD/TVD team. This problem is compounded if the IPD/TVD member is making "profit" from an imbalance of overhead and profit.

MISALIGNMENT 14:FIRMS DO NOT SEND THEIR BEST PEOPLE TO WORK ON TVD/IPD PROJECTS.

Some owners may set the profits percentage of an IPD/TVD project to be less than a more traditional project delivery systems due to a lower perceived risk of the project for AEC practitioners. In order to maximize profits, firms logically send their best people to work on projects where they can make the most money. If there is less upside with IPD/TVD, firms may not send their best people to work on them.

MISALIGNMENT 15: THERE IS A LACK OF COMPETITION SINCE THE CONSTRUCTION IS NOT COMPETITIVELY BID OUT.

One of the concerns that owners have with IPD/TVD is that since the construction phase is not competitively bid, how can owners know that they are getting the best price. On all of the 6 case studies, the owners used a variant of the best value selection process to select firms based on qualification and price. On Project D, the owner started the project with a design competition.

DISCUSSION

Many of the misalignments of incentives can be avoided if owners and IPD/TVD participants: (1) select only trusted and capable members, (2) educate each other about their business models and key performance metrics, (3) take the time to learn how IPD/TVD is different than more traditional project delivery systems, (4) make sure that everyone has adequate training in Lean Construction, and (5) have adequate resources for IPD/TVD. The IPD/TVD process makes the AEC practitioners more vulnerable to unscrupulous partners and owners. Likewise, owners can also be vulnerable to a bad IPD/TVD team. As a result, this project delivery system should only be used with trusted and capable partners.

In conclusion, the problems relating to the misalignment of incentives is not limited to one discipline or on one project. They were observed on all of the case study projects. Owners, architects, engineers, contractors, and trade partners are all susceptible to temptations and local optimization. The goal of this paper was to highlight some of the misalignments of commercial incentives within IPD/TVD so that owners and AEC practitioners can be aware of them and have a proactive strategy for them. IPD/TVD projects have been completed with exceptional quality, cost, and schedule results (Seed, 2014); however, there is still room for improvement. Armed with the knowledge from this paper, owners and AEC practitioners can improve their IPD/TVD implementation, leading to more successful project outcomes.

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