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To Achieve Goal Alignment by Inter-Organizational Incentives: A Case Study of a Hydropower Project

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Abstract: Although the use of incentives has been widely recognized as an effective project management tool, its application still needs specific exploration. Existing research on incentives mainly focuses on intra-organizational incentives, lacking systematic research with empirical evidence from the perspective of the inter-organizational level. To fill this research gap, this study conducted an in-depth investigation into the application and impacts of inter-organizational incentives by studying a typical case of a hydropower project. In this case, a series of innovative inter-organizational incentives, involving a multiple contractual incentive scheme concerning schedule, quality, safety, as well as environmental performance, is applied. Using a mixed methodology that included a document review, a questionnaire survey, and interviews, this case study revealed that inter-organizational incentives could effectively help promote goal alignment, stimulate cooperative inter-organizational relationships, and improve project performance. This research developed a novel classification of inter-organizational incentives and emphasized the importance of non-contractual and informal incentives, which were ignored in previous research. The results further highlight that while incentivized organizations generally value incentives according to their monetary intensity, their prioritization of goals is determined by various factors. Therefore, to achieve project goal alignment, the optimization of incentive schemes should comprehensively consider a variety of influencing factors rather than merely focusing on monetary intensity. These findings will help both academic researchers and industrial practitioners design and execute effective inter-organizational incentives for superior project performance, especially for those projects that pursue high sustainable performance with safety and environmental performance included.

Keywords: inter-organizational incentive; inter-organizational relationship; multiple incentive; motivation; goal alignment; relational contracting; contractual incentive; environment incentive; environment performance; project performance

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1. Introduction

Faced with the challenging and uncertain business climate, construction organizations are increasingly abandoning traditional paradigms of inter-organizational relationships to embrace cooperative business strategies and to collaborate more with other organizations, sometimes even with competitors. In other words, to foster superior project outcomes, organizations are increasingly transforming traditional adversarial relationships among project parties—caused by conflicts of goals and interests—into trust-based cooperative relationships. Industry leaders adopt a variety of approaches to achieve this, such as relational contracting, alliance building, partnering, and integrated project delivery (IPD) [1–5]. Commonly recognized as an effective management technique, the use of incentives plays a vital role in the successful application of these approaches [6,7]. This study aims to establish

a new classification framework for inter-organizational incentive mechanisms and explore the important role of non-contractual and informal incentives.

Inadequate inter-organizational incentives can lead to a lack of motivation for participants to improve their performance. The existing literature on the use of incentives mainly focuses on addressing their significance [7–10] and explaining how they can be designed theoretically [11,12], lacking systematic research with empirical evidence from the perspective of the inter-organizational level. Few studies have specifically investigated the application of inter-organizational incentives with respect to how they contribute to goal alignment and improved project performance. To bridge this knowledge gap, this research conducted an in-depth investigation of the application and impacts of inter-organizational incentives by studying a typical case of a hydropower project. In the sample case, a series of innovative inter-organizational incentives, including a multiple contractual incentive scheme, is applied. By combining both qualitative and quantitative research methods in the case study, this study provides a context-rich and in-depth understanding of the application and impacts of inter-organizational incentives. The findings will help both academic researchers and industrial practitioners design and practice effective inter-organizational incentives to improve project performance.

The rest of this study is structured as follows. Section 2 reviews the theoretical background of inter-organizational incentives. Section 3 illustrates the research methodology. Section 4 addresses the analysis and results. Section 5 provides a detailed discussion. Section 6 summarizes this study.

2. Theoretical Background

2.1. Classification of Interorganizational Incentives

Incentives largely fall into two categories: intra-organizational incentives and inter-organizational incentives. Intra-organizational incentives have frequently been used to design compensation schedules as a way to improve productivity, generate higher job satisfaction, achieve optimal performance, and avoid project risks. Since employee and employer interests are not always aligned, various psychologists and economists have recommended intra-organizational incentives to motivate employees to work toward company goals [13–16]. The use of inter-organizational incentives is a managerial technique adopted by one organization to motivate another organization to achieve certain business goals. For example, some companies sign revenue-sharing contracts with their suppliers to improve the efficiency of their supply chains [17]. The revenue-sharing formula in such a contract is a kind of inter-organizational incentive.

Interorganizational incentives differ from intra-organizational incentives in two contexts. First, organizations have more predictable rationality than individuals, which means that inter-organizational incentive design requires more rational and economic consideration [18,19]. In other words, while individuals have limited rationality and make decisions from complicated intrinsic motivations, commercial organizations typically follow the rational principle of maximizing their economic utility [20]. The economic utility in this context can refer either to short-term business profits or the long-term benefits of such intangible goods as reputation, social responsibility, and cooperative relationships [5]. Second, organizations have less control over the behavior of other organizations than they have over their own employees since their authority formally ends at the organizational boundary [20]. Such differences between inter-organizational and intra-organizational settings necessitate different incentive approaches and, thus, different application principles. Acknowledging these distinctions, this study focuses on inter-organizational incentives by adapting a structure designed to distinguish inter-organizational incentives from intra-organizational incentives (See below).

This study classifies inter-organizational incentives in terms of contractual versus non-contractual and formal versus informal. Contractual incentives are provisions arranged explicitly in a contract [21], while non-contractual incentives are not mentioned in a contract. Formal incentives are distributed according to assessable performance against principles

predefined in written documents [8]. On the one hand, if the written documents include a contract, such incentives are both formal and contractual. On the other hand, if incentive distribution principles are defined not in a contract but in other written documents (e.g., memos), such formal incentives are non-contractual. Lastly, informal incentives are neither predefined nor recorded in written documents. Thus, all informal incentives are essentially non-contractual. Figure 1 outlines this classification matrix, the cells of which are explained further below.

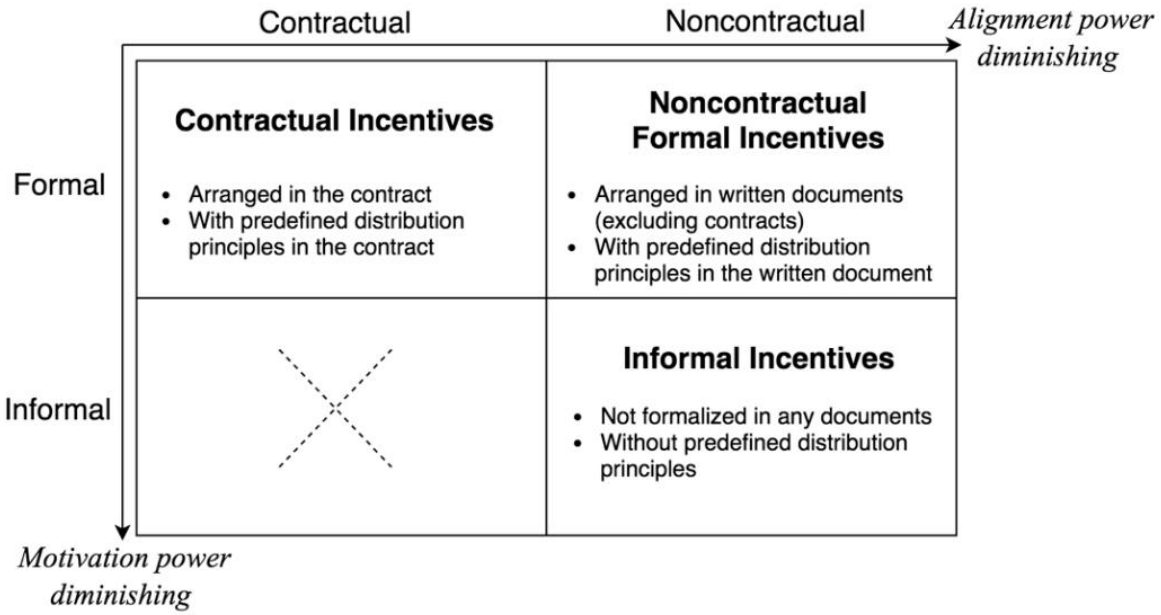


Figure 1. Classification of inter-organizational incentives.

2.1.1. Contractual Incentives

Contractual incentives are the most extensively identified and commonly applied inter-organizational motivational tools and can be categorized across various dimensions [10]. For example, contractual incentives can be categorized according to the project performance parameters they address, e.g., cost, schedule, quality, safety, operation, and design optimization, either singly or in combination [8]. Contractual incentives can also be categorized as usual performance or superior performance according to whether the predefined performance measurement principles are business-as-usual or business-beyond-usual. Usual performance incentives are distributed if the mandatory minimum requirements specified in the contract are realized, while superior performance incentives are offered when exceptional performance—higher than the minimum requirement—is achieved [22,23].

2.1.2. Non-Contractual Formal Incentives

If and when additional motivation is pursued after contract execution, non-contractual formal incentives can be applied. These incentives, while not set in a contract, are agreed upon by both business parties during the cooperation process and then formalized by written documents, e.g., statements or memoranda of understanding. Given the dynamic and uncertain business environment of the construction market, inter-organizational incentives are often deliberately arranged noncontractually to ensure a high degree of flexibility [24,25]. Non-contractual formal incentives are distributed in accordance with performance levels measured against principles predefined in formal, written documents [8]. For example, even with no contractually stipulated reward for top supplier performance, a client can follow company policy to offer a supplier additional bonuses for outperforming all other suppliers in the quarterly performance measurement. Non-contractual formal incentives have less legal force than contractual incentives and, thus, are less effective in terms of their power to align the client and the incentivized party (as represented on the x-axis in Figure 1).

2.1.3. Informal Incentives

While not formalized in any documents, informal incentives can also be used to motivate an organization [26]. For example, a client can offer empowerment and commendations to project participants and verbally promise future business opportunities to suppliers. In some cases, the chance to participate in an iconic project itself can serve as an important informal incentive since working on such projects deepens the experience and bolsters reputations. Thus, simply by expanding the significance and platform of the project, a client can motivate other prospective project participants. Since informal incentives work as a kind of relational governance mechanism [27], they have more flexibility but less motivation power than formal incentives (as represented on the y-axis in Figure 1). In addition, because they are not memorialized in formal documents, most informal incentives are nonfinancial.

2.2. Functions of Interorganizational Incentives

2.2.1. Benefit Sharing

The win–win philosophy underlying the use of inter-organizational incentives is evident in that any benefit gained from achieving incentive goals is shared among project participants [1,10]. Traditionally, because contracting approaches have focused on protecting clients against possible bad outcomes, they have generated detrimental adversarial relationships among contract parties [5,8,28]. However, alternative contracting approaches promote the use of incentives to reach project goals that, when met, generate benefits that clients are conditionally willing to share with the incentivized project parties [24]. Such benefit sharing indicates the client's proactive inclination to cooperate with other project participants to generate superior outcomes; this proactive stance, in turn, evokes the intrinsic motivation of the participants to cooperate and perform positively. Benefit sharing also entails a pool of financial resources available to participants to offset any costs incurred for performance improvement [29,30]. This financial support enables them to make extra efforts required for improved performance. As a result, every project participant can benefit from achieving incentive goals. Through the interplay of these factors and the effects of the benefit sharing inherent to inter-organizational incentives, alternative contracting approaches can transform an adversarial business environment into a win–win culture of cooperative relationships.

2.2.2. Goal Alignment

The goal alignment function of inter-organizational incentives entails the specification of client goals to the incentivized parties [8,10,31]. Although different project participants may share some common business goals, they usually have different priorities [5,8,10], which leads to misalignment. For example, a client typically pursues an optimal combination of cost, time, and quality performance, while a contractor organization may simply focus on maximizing its business profits [5,21]. By setting incentive goals in formal incentive schemes, the client organization conveys its specific project goals (e.g., superior quality or timely delivery) to other participants. In these formal specifications, the goals are linked to project performance measurement metrics and incentive payments [32,33]. Such incentive schemes reward the project participants financially [8,10,22,34] for achieving the client's goals; conversely, these formal incentives may entail financial penalties if performance falls short of the incentive goals. As a consequence, the specification of incentive goals can reduce goal misalignment and establish mutual goals between the client and other project participants.

3. Research Methodology

This research adopted a case study as a major research strategy. The case study is a preferred research strategy because it provides a context-rich and in-depth understanding of a phenomenon [35,36]. Project A mainly applies contract incentives to improve project performance but also adopts some innovative informal incentive methods, which is a

cutting-edge typical case. To investigate the case in detail, interviews and a questionnaire survey were conducted. The interview method helps produce useful and crucial information about what people perceive and how they interpret their perceptions and thus gives access to revealing the underlying knowledge [37]. The questionnaire survey—one of the most frequently used methods of data collection in management research—is particularly useful for generating quantitative data for testing research questions and hypotheses [38]. This study mainly uses empirical research methods to verify the impact of proposed inter-organizational incentives, while exploring the effects of some informal incentives that have not been considered. This combination of qualitative and quantitative research methods enabled the researchers to investigate the application and impacts of inter-organizational incentives scientifically and systematically.

3.1. Characteristics of Sample Project

This study was initially developed to investigate Project A, a mega-scale hydropower project in China contracted with the Engineering–Procurement–Construction (EPC) delivery method. The management team of Project A designed and applied a series of innovative inter-organizational incentives. The client is an energy investment company, the EPC contractor is a joint venture formed by a construction company and a design firm, and the consultant is a joint venture constituted by two different consultant companies with expertise in different domains—one specializing in design consulting and the other in construction consulting. The client signed fixed-price contracts with the contractor and the consultant, with contract values of USD 420M and USD 14M, respectively. This indicates that the owner bore nearly little cost under-run/over-run risk. The total project duration is 95 months, and at the time of publication, the project is about 60 percent complete and making timely progress. This project has drawn broad attention from the government, the media, and the public due to its significant promise of optimizing the energy supply structure in China. To achieve superior project outcomes, the client designed comprehensive contractual incentives for both the contractor and the consultant before the contract signing and has extensively applied other inter-organizational incentives as project management tools during project implementation, as summarized in Figure 2 and explained in this section.

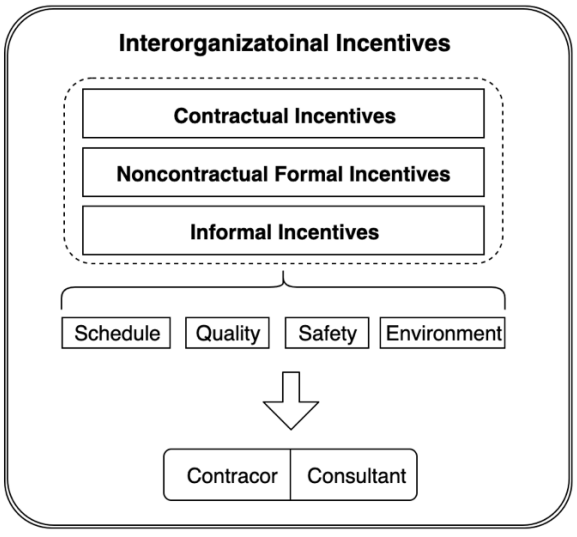


Figure 2. Features of the inter-organizational incentives as applied in Project A.

The owner adopted contractual incentive packages, including both bonuses and penalties, to promote better project performance in terms of schedule, quality, safety, and environment. In the contracts, these incentives are distributed according to performance measures assessable against predefined principles, entailing both usual performance and superior performance criteria. For example, in terms of the safety performance incentive,

if the contractor organization scores over 90 points in its quarterly safety performance measurement—reflecting superior performance—it will be awarded a bonus of USD 7000. However, if the quarterly safety performance measurement falls below 80 points—reflecting below-usual performance—the contractor will incur a penalty of USD 14,000. In addition, non-contractual formal incentives and informal inter-organizational incentives were also adopted during project implementation to further reinforce the motivational effects. All combined, these inter-organizational incentives were designed to play a vital role in promoting cooperative inter-organizational relationships and improving project performance on Project A.

3.2. Data Collection

The research team conducted the data collection for this case study in three phases: project document review, exploratory interviews, and a survey. First, to construct a survey framework prior to a field visit, the team collected and reviewed the documents of Project A, including tender documents, contracts, and performance measurement reports. Second, to refine the survey framework and to collect perceptions of the impacts of applied inter-organizational incentives, the team conducted semi-structured face-to-face interviews with the senior managers from the project's client, contractor, and consultant organizations during the field visit. Finally, the team developed a three-part structured survey questionnaire. The respondents independently filled out the questionnaire.

The first part of the questionnaire was designed to collect the personal profiles of respondents, including gender, age, education, affiliation, position on the project, and work experience in the construction industry. The second section asked for respondents' perceptions of the importance of contractual incentives and the priority of project goals. The last part asked for respondents' views on the extent of inter-organizational incentive applications, the state of inter-organizational relationships, and project performance levels. The questions about inter-organizational relationships and project performance were based on measurement scales already validated in prior studies [5,39–41]. Meanwhile, the measurement of the application of inter-organizational incentives was developed based on the novel classification proposed in this study, with values for contractual incentives, non-contractual formal incentives, and informal incentives. All questions were based on a five-point Likert scale.

A total of 123 hard-copy surveys were handed out to project management board members during a field visit to the project site. Seventy valid responses were returned (excluding eight with missing values), representing an acceptable response rate of 63.41 percent. Table 1 shows the profile of the respondents.

Table 1. Profile of respondents.

Category	Respondent Number	Percentage of Respondents	Total Board Member	Percentage of Board Member
Owner team	22	31.43%	80	27.50%
Contractor team	25	35.71%	88	28.41%
Consultant team	23	32.86%	78	29.49%
Total	70	100%	246	28.45%

Given the relatively limited total number of members engaged in the project management board, the collected data can largely represent each party in the surveyed project. On average, the respondents had 9.95 years of related work experience in the construction industry. The distribution of the researched group meets the requirements. Table 2 shows the distribution information of the respondents.

Table 2. Distribution information of respondents.

	Basic Information	Number of Respondents	Percentage
Gender	Male	63	90.00%
	Female	7	10.00%
Age	21–30 years old	27	38.57%
	31–40 years old	20	28.57%
	41–50 years old	16	22.86%
	51–60 years old	7	10.00%
Working years	1–5 years	24	34.29%
	6–10 years	21	30.00%
	11–15 years	10	14.29%
	16–20 years	6	8.57%
	21–25 years	4	5.71%
	over 25 years	5	7.14%
Project experience	1–5	27	38.57%
	6–10	28	40.00%
	Over 10	15	21.43%

3.3. Data Analysis Techniques

The research team employed the Statistical Package for Social Science (SPSS) software (version 22.0) to analyze the collected data. The following data analysis techniques were performed: (1) estimations of the sample mean, (2) standard deviations, (3) linear regression, (4) ranking cases, and (5) Spearman rank correlations.

4. Analysis and Results

4.1. Impacts of the Surveyed Incentives

Based on the project document review and exploratory interviews, this section discusses the application and impacts of the inter-organizational incentives in Project A.

4.1.1. Contractual Incentives

The client of Project A incorporated a multiple incentive scheme with several bonus packages into the project contracts (See Table 3).

First, the schedule bonus package, which included milestone bonuses and an early completion bonus, was designed to promote on-time completion (usual performance) and early completion (superior performance). The milestone bonuses are fixed-fee incentives comprising five milestones with different corresponding completion bonus amounts specified in the contracts. Once a milestone is successfully achieved, corresponding bonuses are awarded to the contractor and the consultant. However, if the final deadline is not met, the preceding milestone bonuses awarded will be forfeited. The early completion bonus is a fixed sharing formula incentive with a maximum fee limitation. If the project is completed ahead of the set deadline, a predefined amount of money—calculated by the number of days saved—will be paid to the contractor (with an upper limit of USD 1.4M) and to the consultant (with an upper limit of USD 0.35M).

In addition, other performance incentives are also prudently designed for construction quality, safety, and environment, as well as for equipment installation and operation (See Table 3). For example, the project designed an excellence reward, wherein the project successfully wins China's National Quality Engineering Award (CNQE Award), the contractor will be awarded USD 1.4M, and the consultant will receive USD 0.7M. A safety and environment bonus and a quality bonus, both worth USD 0.84M, are offered to the contractor on the basis of a quarterly performance measurement. For the consultant, the bonuses for safety, environment, and quality performance are combined into one incentive package worth a total of USD 1.05M, all gauged by a quarterly performance measurement mechanism. Furthermore, an installation bonus, focused on the quality of equipment

installation, and an operation bonus, addressing the long-term reliability of equipment operation, are also provided to the contractor and the consultant. The contractor can receive USD 0.28M from the installation bonus and USD 0.7M from the operation bonus, while the consultant can receive USD 14,000 from the installation bonus and USD 0.35M from the operation bonus.

Table 3. Contractual incentive scheme of Project A.

Incentives	For Contractor (PTIV [a] | PTCV [b])	For Consultant (PTIV | PTCV)	Performance Measurement Basis
Milestone Schedule Bonus	USD 3,360,000 (38.10% | 0.80%)	USD 168,000 (9.96% | 1.20%)	Process-output oriented
Early Completion Schedule Bonus	USD 1,400,000 (15.87% | 0.33%)	USD 350,000 (20.75% | 2.50%)	Final-output oriented
Excellence Reward	USD 1,400,000 (15.87% | 0.33%)	USD 70,000 (4.15% | 0.50%)	Final-output oriented
Quality Bonus	USD 840,000 (9.52% | 0.20%)	USD 1,050,000 (62.24% | 7.50%)	Process-output oriented
Safety and Environment Bonus	USD 840,000 (9.52% | 0.20%)		
Operation Bonus	USD 700,000 (7.94% | 0.17%)	USD 35,000 (2.07% | 0.25%)	Final-output oriented
Installation Bonus	USD 280,000 (3.17% | 0.07%)	USD 14,000 (0.83% | 0.10%)	Final-output oriented
Total Incentive Value	USD 8,820,000 (100% | 2.10%)	USD 1,687,000 (100% | 12.05%)	-
Total Contract Value	USD 420,000,000 (- | 100%)	USD 14,000,000 (- | 100%)	-

Note: [a] PTIV denotes percentage in total incentive value; [b] PTCV denotes percentage in total contract value.

In the interviews, the senior managers of Project A emphasized how much the contractual incentive scheme contributed to the improvement of inter-organizational relationships, as well as project performance. This outcome seemed to reflect the client's design of the contractual incentives to raise awareness of possible performance improvement and mutual benefits not only within the contractor organization but also within the consultant firm. The client managers indicated that the incentives helped reduce conflicts and disputes, effectively fostered cooperative relationships, and stimulated joint efforts to improve project performance. Moreover, it notes how the comprehensive incentive scheme covered a broad range of performance criteria (including schedule, construction quality, safety, environment, as well as equipment installation and operation performance) and comments on how it linked these specific performance incentives to corresponding performance goals and metrics; the interviewees from both the contractor and the consultant emphasized that the resources these incentives provided—especially the financial resources—enabled their achievement of the incentive goals. When asked about how this project's unique incentive scheme went beyond the simple traditional use of final outputs as performance measurements and used both final and process outputs, one interviewee from the client team explained that because the scheme was designed for early detection of performance deviations from the contract criteria, it enabled the client to ensure an acceptable final project outcome.

4.1.2. Non-Contractual Formal Incentives and Informal Incentives

Although non-contractual formal incentives and informal incentives may have less power to motivate and align project participants than contractual incentives, they can still

play a vital role in promoting cooperative inter-organizational relationships and improving project performance.

Project A limited its use of non-contractual formal incentives because its contractual incentive scheme was already so comprehensive before contract signing. Nevertheless, the client and the contractor formulated a non-contractual incentive mechanism during project execution. This mechanism focused on the distribution of the contractual bonuses intra-organizationally—regulating how to award them to individual members of the contractor team, especially those engaged in site activities. In other words, the non-contractual incentive mechanism arranged the distribution of individual rewards across organizational boundaries, which could classify them as individual inter-organizational incentives. The principle of awarding contractual bonuses to project members who are directly involved in site activities was stipulated in the contract explicitly by the client, but the detailed practical policies were purposely left to be developed within a non-contractual mechanism. This allowed the contractor to be actively involved in the incentive design process so that the design could better suit the on-site project implementation. The non-contractual mechanism made incentives available for field personnel and motivated those on the ground [1], encouraging an all-around effort at performance improvement.

Additionally, informal incentives were designed to further strengthen the motivational effects of inter-organizational incentives. The informal incentives of Project A are mainly grounded in the project characteristics in the following two contexts. First, Project A is only one within a portfolio of future similar projects planned by the client. Interviewees from the contractor and the consultant organizations stated that they would like to increase their chances of securing the contracts on these future projects by improving their performance in this project. Second, since Project A is an iconic project, its successful execution would give participating team members valuable experience and bolster their reputations, which would translate into more business opportunities in the future. The prospect of these future benefits also motivated them to cooperate to improve project performance.

4.2. Regression Analysis

To quantitively investigate the direct and indirect impact of inter-organizational incentives, data is collected from a questionnaire survey and analyzed using linear regression in SPSS. The analysis of sample means reflects respondents' overall judgment of the project's condition. The regression analysis indicates the strength and positivity of the relationship between the two variables. Descriptive statistics of the data shown in Table 4 highlight the following three features, with mean ranging from 1 = lowest level of implementation to 5 = highest level of implementation: (1) the level of contractual incentives applied on Project A was high (mean = 4.321) whereas the levels of non-contractual formal incentives (mean = 3.814) and informal incentives (mean = 3.614) were relatively lower; (2) the project had a high degree of inter-organizational relationship (all means above 4.000), with mutual goals scoring the highest (mean = 4.143); and (3) project performance was perceived as satisfactory at the time of the survey, with all mean values larger than 4.200.

Table 5 summarizes the results of regression, including the standardized coefficients (β), p-values, and adjusted square multiple correlations (R^2). All coefficients are positive and significant at $p < 0.05$. Interorganizational incentive was positively related to inter-organizational relationships ($\beta = 0.426$, $p = 0.000$), and both inter-organizational incentive ($\beta = 0.261$, $p = 0.021$) and inter-organizational relationship ($\beta = 0.417$, $p = 0.000$) appear to be significant facilitators for project performance. The regression results revealed that the inter-organizational incentives in Project A are positively correlated with good inter-organizational relationships, as well as improved project performance.

Table 4. Descriptive statistics.

Measurement	Mean	SD
Application of inter-organizational incentives		
Contractual Incentives	4.321	0.747
Non-contractual Formal Incentives	3.814	1.150
Informal Incentives	3.614	1.312
Degree of inter-organizational relationship		
Mutual goals	4.143	0.780
Timely response	4.114	0.708
Communication	4.071	0.724
Problem resolution	4.043	0.685
Teamworking	4.043	0.745
Trust	4.029	0.878
Level of project performance		
Safety	4.414	0.643
Quality	4.357	0.737
Schedule	4.329	0.712
Environment	4.300	0.662
Cost	4.214	0.715

Note: SD = Standard deviation.

Table 5. Results of regression.

Step	Dependent Variable	Predictor	β	p-Values	Adjusted R^2
1	Inter-organizational relationship	Inter-organizational incentives	0.426	0.000	0.169
2	Project performance	Inter-organizational incentives	0.528	0.000	0.269
3	Project performance	Inter-organizational incentives	0.261	0.021	0.315
		Inter-organizational relationship	0.417	0.000	

4.3. Ranking Analysis

This section presents the ranking analysis results of the questionnaire survey data on the importance of contractual incentives and the priority of project goals (from the client, contractor, and consultant perspectives). The method of ranking analysis can visually display the differences in importance and priority.

4.3.1. Importance of Contractual Incentives

As a way to investigate the perceptions of different parties on the contractual incentives of Project A, the client, contractor, and consultant were asked to rate the importance of the listed contractual incentives on a five-point scale, with values ranging from 1 = not important to 5 = very important. Table 6 presents these results.

Table 6 indicates that respondents' opinions varied on the importance of contractual incentives. The client viewed the excellence reward as the most important incentive (rank = 1), for which a total of USD 1.47M monetary reward had been allocated. Next in the ranking came the quality-related incentives: the equipment installation bonus (rank = 2), the operation bonus (rank = 3), and the construction quality bonus (rank = 4). It is noteworthy that the equipment installation bonus and the operation bonus, both of which concern long-term operational reliability, mattered more to the client than the construction quality bonus. The safety bonus was tied for the fourth rank with the quality bonus, and these were followed by the environment bonus (rank = 6). Surprisingly, the schedule bonus ranked the lowest in importance from the client's perspective.

For the contractor, the ranking of the incentives fell in line approximately with the order of their monetary value (See Table 6). The schedule bonus, with an incentive package worth USD 4.76M, came in first, while the excellence reward, worth USD 1.4M, placed second in the ranking. Following them were the quality bonus (rank = 3), environment bonus (rank = 3), and safety bonus (rank = 5). The quality bonus package and the environment and safety bonus package each constituted a possible award of USD 0.84M to the contractor. The

operation bonus ranked sixth, followed by the installation bonus ranking lowest (rank = 7). The incentive intensities for these two bonuses were USD 0.7M and USD 0.28M, respectively.

Table 6. Importance of contractual incentives.

Incentives	Client		Contractor		Consultant		Overall	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Excellence Reward	4.59	1	4.36	2	4.26	6	4.40	2
Installation Bonus	4.50	2	4.04	7	4.30	5	4.27	6
Operation Bonus	4.45	3	4.12	6	4.13	7	4.23	7
Quality Bonus	4.41	4	4.32	3	4.57	1	4.43	1
Safety Bonus	4.41	4	4.28	5	4.39	3	4.36	4
Environment Bonus	4.23	6	4.32	3	4.39	3	4.31	5
Schedule Bonus	4.14	7	4.52	1	4.43	2	4.37	3

Note: The same color means the same ranking.

For the consultant, the ranking of incentives was also almost aligned with the order of their monetary value (See Table 6). The quality bonus ranked first, while the safety and environment bonuses tied for the third-place ranking. These three bonuses are included within the same incentive package, which is worth a possible USD 1.05M to the consultant. The schedule bonus ranked second, with a value of USD 0.35M. The installation bonus (valued at USD 0.14M) and operation bonus (valued at USD 0.35M) ranked fifth and seventh, respectively. The excellence reward, valued at USD 70,000 for the consultant, received the sixth ranking.

Spearman rank correlation coefficients were calculated to determine whether there was a consensus among the client, contractor, and consultant respondents on their rankings of the incentives. No statistically correlated relationship was found among the rankings ($p > 0.05$), confirming that the three groups diverged from each other on the importance of different incentives. (See Table 7.)

Table 7. Spearman correlation on the ranking of incentives.

	Client	Contractor	Consultant
Client	1 -	- -	- -
Contractor	−0.427 0.339	1 -	- -
Consultant	−0.718 0.069	0.445 0.317	1 -

4.3.2. Priority of Project Goals

To investigate the different project parties' prioritization of project goals on Project A, the respondents from the client, contractor, and consultant organizations were asked to score the priority of project goals on a five-point scale, with values ranging from 1 = lowest priority to 5 = highest priority. Table 8 presents these results.

Table 8. Priority of project goals.

Project Goals	Client		Contractor		Consultant		Overall	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Safety	4.95	1	4.84	1	4.65	1	4.81	1
Quality	4.91	2	4.72	2	4.61	2	4.74	2
Environment	4.59	3	4.68	3	4.57	3	4.61	3
Cost	4.55	4	4.60	4	4.22	4	4.46	4
Schedule	4.27	5	4.60	4	4.09	5	4.33	5

Note: The same color means the same ranking.

Broadly speaking, the client, contractor, and consultant representatives prioritized the project goals almost identically (See Table 8). They all gave top priority to the safety goal (rank = 1), which means that all three parties recognized the essential role of ensuring worker safety during project implementation. The rising common insistence on the value of human life in China has brought about strong governmental regulation on occupational safety and increasing cost of injury compensation. As an iconic mega-project that has drawn broad public attention, the Project A client not only offered the contractor and the consultant a safety bonus in the contract but also imposed safety penalties on them. The quality goal ranked second, demonstrating that all project parties were jointly pursuing a high-quality project (See Table 8). This result is consistent with the previous findings [10] that the client, contractor, and consultant all prioritize the quality goal over the schedule and cost goals. Because of the significance of project quality to the client team, it introduced a series of quality-related incentives into the contracts, including a quality bonus based on process output, an equipment installation and operation bonus based on final output, as well as a special monetary reward for winning the CNQE Award. These incentives conveyed the client's desire for an exemplary project with excellent quality to the contractor and the consultant, provided resources for achieving superior quality, and contributed largely to goal alignment. In addition to the emphases on safety and quality of the project, the fact that the environment goal was ranked higher in priority (rank = 3) than the cost and schedule goals indicates that the environmental impacts of this project are also among the emphases of all participants during the project's development process.

Both the client and the consultant ranked the cost goal fourth and the schedule goal last (rank = 5), while the contractor similarly gave the lowest priority (ranking tied at 4) to the cost and schedule goals (See Table 8). Project A chose the EPC delivery approach with a lump sum contract price, so the client was not greatly concerned about the project cost. Table 8 indicates that the contractor and the consultant were also not as focused on cost-effectiveness as on the other goals, although they were contractually responsible for bearing the risk of any cost overruns.

Spearman rank correlation coefficients were calculated to confirm any consensus among the client, contractor, and consultant respondents on goal prioritization. Table 9 shows that the correlation coefficients are all above 0.975 ($p < 0.01$), indicating that these three groups were in significant agreement on the ranking of goal priorities. In other words, the results indicated that with the inter-organizational incentives in place, Project A achieved effective goal alignment among the project parties.

Table 9. Spearman correlation on the rank of goal priority.

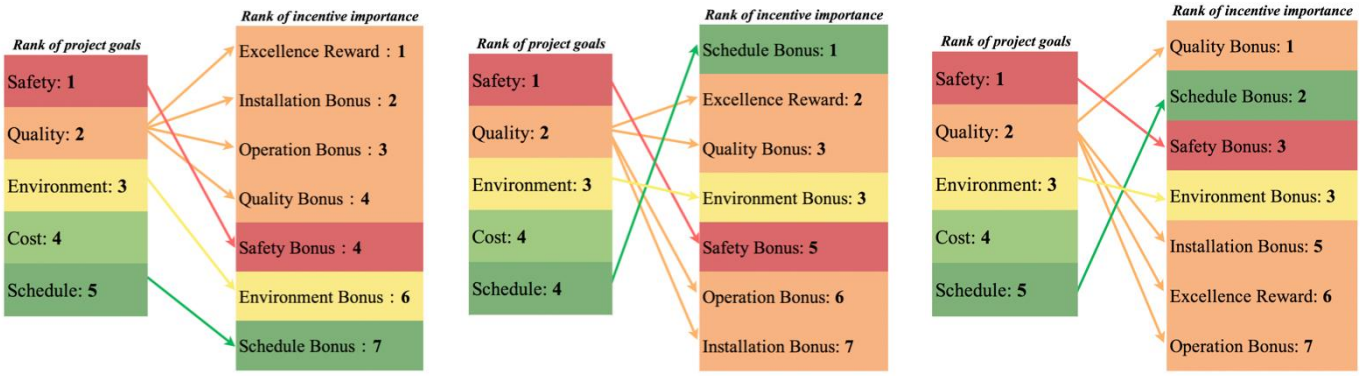
	Client	**Contractor**	**Consultant**
Client	1 -	- -	- -
Contractor	0.975 ** 0.005	1 -	- -
Consultant	1.000 *** 0.000	0.975 ** 0.005	1 -

Note: ** and *** denote the significance of correlation at the 0.01 and 0.001 levels (two-tailed), respectively.

4.3.3. Cross Analysis

Cross-analysis allows comparison of differences in the relationship between two variables in different subgroups. Figure 3 shows the results of a comparison of the rankings of the project goals and the incentives. Two important points should be noted about this comparison. First, the contractor and the consultant differ from the client on the importance of the equipment installation and operation bonuses. This difference may be due to the client ranking incentives according to goal priority, while the contractor and the consultant ranked incentives according to monetary intensity. Second, the client organization gave the

schedule goal the lowest priority (rank = 5), which was consistent with its lowest ranking of the schedule bonus (rank = 7). However, while the contractor and the consultant also gave the schedule goal the lowest priority, they put a high priority on the schedule bonus (ranks = 1 and 2, respectively), which had a high monetary value for them both. At the time the survey was conducted, the schedule goal of Project A had been effectively achieved. (Table 1 shows the high ranking of schedule performance (rank = 2, mean = 4.329)). Thus, because the schedule goal did not pose a challenge to the contractor and consultant, they felt no need to prioritize it over other project goals.



(**a**) Client. (**b**) Contractor. (**c**) Consultant.

Figure 3. Cross-analysis between the rankings of goal priority and incentive importance.

5. Discussion

The case study results uncovered the following three valuable insights into the application of inter-organizational incentives in Project A.

First, the regression analysis results in Table 5 show that inter-organizational incentives in Project A have a positive impact on inter-organizational relationships and project performance. These quantitative findings supported the qualitative results from the case study and interviews. Interorganizational incentives can contribute to project performance because using incentives raises contractor and consultant awareness of possible performance improvement, which leads to greater emphasis on project management processes and, in turn, fosters better performance [6]. Moreover, the benefit sharing implicit in incentive schemes provides financial resources to offset any costs these project parties incur for performance improvement. The study results also indicate that inter-organizational incentives can exert positive impacts on project performance through enhanced inter-organizational relationships. This is consistent with the previous survey findings [6] that incentives have an important influence on collaborative working relationships, which can provide a solid basis for performance excellence. The sharing of benefits built into incentive schemes helps create a fairer business environment based on a win-win philosophy, an approach that evokes project participants' intrinsic motivation to cooperate and perform positively [16,42].

Second, the incentive rankings of both the contractor and the consultant of Project A are largely in line with their monetary value, indicating the vital role financial gain plays in determining how the incentivized organizations perceive the incentives (See Table 6). They adjudge the importance of an incentive directly on the basis of how much financial benefit they can gain from achieving its target performance, which then further affects their level of effort. However, the incentive rankings are not always in line with those of the corresponding goal priorities. For example, the consultant ranked the safety goal highest among all goals but ranked the safety bonus third, while the contractor ranked the schedule goal lowest but ranked the schedule bonus highest (See Figure 3). This suggests that incentive importance, which is mainly determined by monetary value, is not the only factor affecting the prioritization of goals. Other factors will also influence an incentivized organization's final prioritization of goals, e.g., the measurability of performance, the effort required to realize the incentive target, and the potential loss due to failure to pursue an

incentive target. In other words, simply establishing the financial framework of incentives may not automatically occasion perfect goal alignment. The optimization of incentive schemes should comprehensively take other influential factors into account beyond a simple focus on monetary intensity [43–45].

Third, although the client, contractor, and consultant diverged from each other on the importance of different incentives, they have amazingly consistent rankings on the priority of project goals, which means that they have achieved effective goal alignment in Project A. The ranking analysis results shown in Tables 6 and 8 indicate that they came to a consensus on the prioritization of project goals. The highest score for mutual goals (mean = 4.143) in the survey of inter-organizational relationships also suggests their common recognition of the shared goals and mutual benefits possible on this project. (See Table 4.) The high level of goal alignment is largely attributable to the incorporation of inter-organizational incentives. However, despite the consistently low priority of the schedule goal, the project parties differed on the importance of the schedule incentive. (See Figure 3.) The client regarded the schedule incentive as the least important (rank = 7), while the contractor and the consultant ranked it first and second, respectively, indicating a misleading effect of the high schedule incentive. In fact, the client designed significant schedule incentive packages for the contractor and the consultant, valued at $4.76M and $0.518M, respectively. Since incentivized organizations generally recognize the importance of an incentive according to its monetary value [46], the large monetary values of the schedule incentive significantly preoccupied the contractor and the consultant, and, as a result, they were distracted from accurately grasping the goals of the client. Therefore, to achieve better goal alignment through incentives, the client organization should first accurately evaluate its goal priorities, assess the difficulty of achieving these goals, and then properly align the goals with the incentive arrangements. Reasonable institutional design is an important guarantee for achieving incentive goals [47,48].

These three major insights have significant practical implications for the use of inter-organizational incentives as a key facilitator of improved project performance. First, in addition to contractual incentives, incorporating proper non-contractual inter-organizational incentives can also contribute to improving project performance. For instance, the opportunity to participate in an iconic project can itself act as an important source of motivation. Another example is arranging non-contractual formal incentives by distributing individual rewards to those "on the ground" [1] across organizational boundaries. This kind of reward system can encourage all-around efforts to improve performance. Second, the client should prudently design the benefit-sharing mechanism of inter-organizational incentives to create a win-win business environment. The benefit sharing should provide enough resource support to offset the cost incurred for performance improvement. Moreover, the benefit sharing should be proportionate so as to reach a benefit-risk balance. Third, the optimization of incentive schemes requires comprehensive consideration of multiple influential factors rather than a simple focus on monetary intensity, as discussed above. Lastly, to achieve better goal alignment, the client organization should first accurately evaluate the priority of its goals and the difficulty of achieving them and then properly align the goals with the incentive arrangements.

6. Conclusions

Researchers and practitioners have investigated and acknowledged the use of incentives as effective management tools. However, virtually no studies have specifically investigated the application of inter-organizational incentives. To fill this knowledge gap, this study conducted an in-depth investigation into the application and impacts of inter-organizational incentives through a case study of an EPC hydropower project in China. In the sample project, a series of innovative inter-organizational incentives, including a special multiple contractual incentive scheme, is applied. By using a combination of both qualitative and quantitative research methods in the case study, the research team came to the following three major conclusions:

First, inter-organizational incentives can have a positive impact on both cooperative inter-organizational relationships and project performance. The benefit sharing of inter-organizational incentives helps create a fairer, win-win business environment, which evokes project participants' intrinsic motivation to cooperate and perform positively, which, in turn, increases the likelihood of superior performance.

Second, inter-organizational incentives can promote the effective alignment of the goals of different project parties through specified incentive goals and corresponding performance metrics. To achieve better goal alignment through incentives, the client should clearly specify its goals, assess the challenge of achieving these goals, and then properly align the goals with the incentive arrangements.

Third, while incentivized organizations generally rank incentives according to monetary value, their goal prioritization is determined by various factors rather than just monetary intensity. Thus, the design of an incentive scheme should match the need of project delivery by considering diverse influential factors. Otherwise, its effects can be compromised.

This study contributes to the body of knowledge on incentive theory in the following ways. First, the research team developed a novel classification of inter-organizational incentives (i.e., contractual incentives, non-contractual formal incentives, and informal incentives) and identified the main functions of inter-organizational incentives as benefit sharing and goal alignment. By addressing these concepts and explaining them in detail in the case study, this study emphasized the importance of non-contractual and informal incentives, which were ignored in previous research. Second, by taking a holistic perspective and conducting empirical validation, this research established interdisciplinary linkages among inter-organizational incentives, inter-organizational relationships, and project performance—connections that are largely missing from the existing literature. Third, this study shed light on the determinants of incentive ranking and goal prioritization by quantitively and comprehensively investigating the perceptions of the client, contractor, and consultant organizations.

The following limitations of this study are acknowledged. First, this study was developed as an in-depth empirical investigation of an innovative mega-project in China. Given the limitation associated with the data source, future research should validate the findings using more project data from more countries. Second, while the analytic results of this study revealed that various factors beyond mere monetary value affect the way incentivized organizations prioritize project goals, these potentially influential factors were not enumerated in this study. Thus, future research should also focus on identifying additional determinants of goal prioritization. Lastly, this study presented one innovative case of applying an incentive scheme on an EPC project. The application and impacts of inter-organizational incentives on projects using different project delivery methods (e.g., Build-Operation-Transfer (BOT), Public-Private-Partnership (PPP), and IPD) should also be further investigated.

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