*buildings*

MDPI

*Article*

# Using Bibliometrics and Grounded Theory in Investigating Factors Influencing Profit Distribution in Integrated Project Delivery Projects

**Shuwen Guo [1,*], Huaping Xiong [1], Jinhua Chen [2] and Kai Hu [3]**

[1] School of Management, Wuhan University of Science and Technology, Wuhan 430065, China; xionghuaping@wust.edu.cn
[2] Wuhan Technical College of Communications, Wuhan 430065, China; goldflower990@163.com
[3] School of Civil Engineering and Architecture, Wuhan University of Technology, Wuhan 430070, China; hu5555@163.com
* Correspondence: guoshuwen@wust.edu.cn; Tel.: +86-13618609858

**Abstract:** Integrated project delivery (IPD) has gained significant attention as an effective alternative to traditional project delivery models. Profit distribution is a crucial aspect of IPD projects, influencing their overall success. This study aims to investigate the key factors impacting profit distribution to offer strategic guidance for project management practices. The study employs a comprehensive bibliometric analysis to establish an updated research framework in this domain. Through this analysis, 24 articles with highly relevant and extensively cited sources are identified for further examination. Grounded theory is subsequently applied to distill the findings. This process yields a foundational theoretical framework that delineates the factors influencing profit distribution in IPD projects, namely, contribution, resource-based input, effort level, and risk sharing. Additionally, a textual analysis of ten burst words is conducted to discern research trends and identify future areas of study. This research contributes to the existing literature by addressing gaps and providing a roadmap for future IPD investigations. A theoretical framework of influencing factors in profit distribution in IPD projects is developed based on the literature. The findings not only enhance understanding of profit distribution dynamics in IPD projects but also guide the implementation and optimization of IPD practices.

**Keywords:** integrated project delivery; profit distribution; bibliometric analysis; grounded theory; CiteSpace



**Citation:** Guo, S.; Xiong, H.; Chen, J.; Hu, K. Using Bibliometrics and Grounded Theory in Investigating Factors Influencing Profit Distribution in Integrated Project Delivery Projects. *Buildings* **2024**, *14*, 1418. https://doi.org/10.3390/buildings14051418

Academic Editor: Yasser Mohamed

Received: 11 March 2024
Revised: 26 April 2024
Accepted: 8 May 2024
Published: 14 May 2024



## 1. Introduction

Traditional project delivery models in the construction industry are encountering many challenges, including low productivity, cost, schedule overruns, and extensive project changes. To address these issues, the integrated project delivery (IPD) mode has emerged and been successfully implemented in several countries, aiming to minimize inefficiencies and waste in the current design and construction practices [1]. According to NASFA et al. [2], the emergence of IPD is a result of the convergence of three recent technical and organizational advances in the industry: building information modeling (BIM), lean principles, and sustainability. IPD involves formal collaboration throughout the design, planning, and execution phases of a project [3]. The IPD mode stresses effective collaboration among the participants, with each ally having their own interests. Determining the factors affecting profit distribution within the cooperative alliance and formulating a fair profit scheme are the key factors for the smooth implementation of IPD mode and the success of the project, which has also become the focus of researchers' research. Azhar et al. [4] underscored the importance of an equitable revenue-sharing mechanism for the success of IPD projects. Similarly, Lee et al. [5] highlighted the necessity of incorporating

an "incentive compensation" framework into the design of the benefit distribution plan at the outset to ensure fair risk allocation and benefit recompense.

While there exists a foundational body of theoretical research and some notable successes in employing IPD, a comprehensive understanding of the factors influencing its adoption within the construction industry is essential for its effective promotion and implementation. Advocates of IPD are actively engaged in analyzing the drivers for its successful and widespread adoption. Whang et al. [6] have identified critical success factors for the implementation of IPD systems, while Aslam et al. [7] have explored essential factors for integrating lean construction principles to achieve rapid progress in construction projects. However, these overarching success factors often overlook the nuanced impact on the profit distribution strategy of IPD projects at the micro level. The complex nature of IPD implementation presents challenges that hinder the construction industry from achieving immediate success.

To optimize project operations, it is essential to establish an effective profit distribution mechanism in IPD projects and analyze its influencing factors. This research is designed to systematically review the extensive literature on the determinants of IPD project profit distribution. The study seeks to address the following questions:

(1) What are the primary sources of profit in IPD projects?
(2) What are the key factors that primarily impact profit distribution in IPD projects?
(3) What constitutes the intrinsic components of the factors affecting profit distribution in IPD projects?

As a contribution to the body of knowledge, the primary purpose of this study is to present the primary influences on profit distribution in IPD projects. To achieve this, a systematic review and analysis of relevant literature on profit distribution studies are conducted. This analysis is supported by the utilization of CiteSpace software (v.6.1. R3) and the application of the grounded theory (GT) approach through text mining.

The remainder of the paper is organized as follows: Following the introduction, the literature review is presented in Section 2. Section 3 is the preliminaries. Section 4 outlines the methodology, including details on the analysis tools and analysis framework. In Section 5, the screened literature is bibliometrically analyzed using CiteSpace software (v.6.1. R3). GT is then employed for text mining. Section 6 describes the research trend of this field and the significance of this paper. Section 7 contains some conclusions plus some ideas for further work.

## 2. Literature Review

In recent years, the issue of how to distribute profits in alliances has attracted the attention of scholars and practitioners. Numerous scholars have studied the imputation of logistics alliances and virtual enterprises. The influence of profit distribution is the foundation for profit distribution strategies. Different research works have examined various factors that contribute to profit distribution.

Known as a collaborative process, IPD relies on cohesive interactions between project stakeholders such as owners, design teams, contractors, subcontractors, and suppliers [8–10]. While there is limited research specifically on IPD profit distribution, it shares some similarities with profit distribution in alliances. Therefore, it is possible to derive valuable insights from existing research in these domains. Some studies have investigated the factors that influence profit distribution in the IPD model, expanding the literature review to include profit distribution in alliances, logistics alliances, and virtual enterprises.

Certain countries have made significant contributions in these fields, leading to more consistent findings. The influencing factors of profit distribution can be summarized into the nine types and the main representative literature presented in Table 1.

**Table 1.** Representative literature of influencing factors.

| Factors | Representative Literature |
| --- | --- |
| Input | [3,9,11–13] |
| Contributions | [3,9,11,14–20] |
| Effort | [3,10,13,21,22] |
| Risk | [3,9–11,13,14,18,23,24] |
| Contract execution degree | [12,25] |
| Emergency contribution degree | [26] |
| Satisfaction | [11,23,27] |
| Fairness and equality | [28,29] |
| Market competition | [13] |

Concurrently, the body of research addressing the determinants of profit distribution in IPD projects is relatively sparse, and the existing studies in this area are still in the early stages. Teng et al. [30] examined the distribution of profit in IPD projects and adjusted the Shapley value by considering risk factors. Wang and Yuan [27] built a multi-objective profit distribution model that comprehensively considered factors such as effort level, risk sharing, contribution coefficient, and others in IPD projects. Yan [31] established an optimal profit distribution model between owners and architects by analyzing the relationship between owners' best efforts and architects' equity concern coefficient. Zhang [32] investigated how the levels of optimal effort and the ratios of optimal profit allocation are affected when risk preference and fair concern theory are integrated into the framework of IPD projects. Xu and Wang [33] established the effort coefficient and analyzed the impact of effort on the profit distribution of IPD projects using the fuzzy analytic hierarchy process. Guo et al. [10] discussed how he degree of involvement influences the profit allocation among players in IPD projects. Eissa et al. [34] developed a conceptual framework that utilized Shapley values to address the marginal contribution of participants in IPD projects, going beyond just investors. Guo et al. [10] calculated the distribution coefficient by analyzing the effort level of each participant to maximize the benefits of the IPD project.

Profit distribution in IPD projects is influenced by a range of factors, making it a crucial area of study. However, the existing research on the factors affecting profit distribution lacks systematic and comprehensive analysis. Additionally, there is a lack of literature specifically dedicated to profit distribution in IPD projects, highlighting the need for further investigation. Moreover, the researchers hold diverse perspectives on the factors affecting the profit distribution in IPD projects, with different expressions and connotations for the same influential factor.

Furthermore, a limited number of studies have utilized bibliometrics to analyze the current state of profit distribution in IPD projects. Rankohi et al. [35] conducted two aspects of integration in IPD literature using a grounded theory. Karasu et al. [36] indicated the interplay of IPD and BIM through a systematic literature review. Bibliometrics is a quantitative analysis approach applied to scientific and technical literature. It aids in describing the growth, structure, interrelationships, and productivity of scientific activities. It plays a major role in developing knowledge frameworks, scientific norms, and science and technology policies.

To address this gap, this study adopts a qualitative research approach to conduct systematic text mining and investigate the elements influencing profit distribution. The goal is to enrich a new theoretical framework for analyzing profit distribution in IPD projects. Knowledge discovery in database technology and knowledge graph theory in the CiteSpace software is employed to visually analyze the factors that influence IPD projects' profit distribution. The study encompasses three aspects of these fund structures. Firstly, a combination of topics and keywords is used to search for relevant literature in the Web of Science (WoS) database. Secondly, the retrieved literature is screened and selected based on the search results. The retrieved literature is then systematically counted and sorted.

Finally, a list of factors influencing IPD project profit distribution is derived and a summary and expansion of these factors is provided.

## 3. Preliminaries

### 3.1. The Definition of Profit

The concept of profit in alliances is of utmost importance, as participants strive to maximize their financial gain. Smith [37] defines profit as an increase in wealth, encompassing both economic and accounting perspectives. In economics, profit represents the monetary gain from selling products, while accounting views profit as the difference between revenue and corresponding expenses. Essentially, profit serves as a means of compensating for costs. In practice, profit distribution represents the continuation of the production or exchange process, involving resource exchange and economic activities among stakeholders. This study adopts the definition of IPD project profit based on the characteristics of alliance and contract terms outlined by the American Institute of Architects (AIA). Specifically, IPD project profit pertains to the additional profit generated by the alliance and the incentive compensation received by project participants during the IPD project implementation.

### 3.2. Source of Profit Distribution

Regarding the source of profit distribution, Kent and Becerik-Gerber [38] identified three common incentive compensation methods in IPD projects: performance bonuses, value bonuses, and incentive funds. Performance bonuses incentivize project teams based on project performance. Value bonuses motivate project teams by providing bonuses tied to the value added to the project. Incentive funds allocate a portion of the team's profits and expenses to motivate their efforts. According to the AIA [39], incentive compensation in IPD projects can be categorized into two prevalent methods: goal achievement and actual cost below target cost. Goal achievement bonuses align with performance bonuses and are given to members who successfully achieve the project goals stated in the agreement. Additionally, incentive compensation is provided to participants who achieve actual costs lower than the target cost.

There are three conditions for all participants to receive the profit distribution in an IPD contract.

Firstly, reasonable compensation should be provided for the work confirmed by the owner, fostering participants' enthusiasm and dedication. Secondly, participants should be compensated for the costs incurred during their efforts to maximize project benefits, thereby enhancing construction production efficiency and stimulating creativity. Lastly, rewards and contingency cost balances should be allocated upon the achievement of various project objectives.

Therefore, the profit distribution system in IPD projects consists of two primary components. Firstly, it involves cost compensation for the services or labor provided by each IPD participant, encompassing both direct and indirect costs. Secondly, it entails the bonus distribution related to IPD goals, which includes goal achievement awards and incentive awards for innovation and outstanding performance ([9,29]). This profit distribution system constitutes the focal point of the present study. IPD team members share both benefits and risks. Following the agreed distribution scheme, cooperative alliance members share the output from the final total profit of the alliance and receive their respective benefits.

## 4. Methodology

This study utilized bibliometrics analysis and grounded theory (GT) as an analytical framework to accomplish three research objectives: investigating the profit distribution mode of IPD projects, exploring the influencing factors of profit distribution, and conducting a comprehensive conceptual analysis.

### *4.1. Bibliometric Analysis*

A bibliometric analysis was employed in this study to examine a substantial body of research publications and construct a comprehensive framework elucidating the influencing factors in profit distribution within IPD projects. Bibliometric analysis is widely recognized for its popularity and methodological rigor, and facilitates the exploration and analysis of extensive scientific datasets. By employing various bibliometric indicators, including citation count, keyword co-occurrence analysis, keyword clustering graph analysis, literature co-citation analysis, and text mining, this methodology provides quantitative measures to evaluate research output and its impact. It enables the identification of trends, patterns, and collaborations in scientific research, as well as the determination of influential publications and researchers within a field. By incorporating bibliometric analysis, this research contributes to our understanding of academic dynamics, aids in the assessment of academic outcomes and quality, identifies research hotspots and trends, and supports scientific management and decision-making processes.

In recent years, researchers have developed several bibliometric analysis tools such as CiteSpace, VOSViewer, Bibexcel, SATI, SCIMAT, and Ucinet [40]. VOSViewer, utilizing visualization of similarities (VOS) mapping and VOS clustering technology, offers particularly valuable capabilities in analyzing large datasets and constructing complex networks [41]. Bibexcel and SATI are specialized literature analysis software that enable statistical analysis of literature, primarily serving as preparatory tools for subsequent visualization maps. SCIMAT excels in its robust preprocessing module designed to cleanse raw document data. Ucinet, an increasingly popular social network analysis software, currently integrates various visualization software such as Pajek, Netdraw, and Mage [42]. It is necessary to import the data into this visualization software to analyze and display the relationship between knowledge. Similarly, SCIMAT, VOSviewer, and CiteSpace can not only process the data but also present the results effectively.

The primary research methodology employed in this study is grounded theory (GT), with CiteSpace v.6.1.R3 used for bibliometrics, The CiteSpace software (v. 6.1. R3) developed by Dr. Chao-Mei Chen at the College of Information Science and Technology, Drexel University, Philadelphia, PA, USA. CiteSpace software is a citation analysis tool developed by Dr. Chen in 2004 based on co-citation network theory. It objectively analyzes patterns and underlying knowledge embedded within the scientific literature, allowing for multivariate, time-slice, and dynamic complex network analysis [43].

Compared to other bibliometric analysis software, CiteSpace offers distinct advantages. It automates cluster labeling, reducing the subjectivity associated with manual searches. This feature enables the creation of comprehensive scientific knowledge maps, facilitating a deep understanding of knowledge structure and trends in a specific research field. Furthermore, CiteSpace provides a range of visualization options and parameter adjustments, which further enhance the depth of analysis. The software has an intuitive interface, ensuring a user-friendly experience and enabling quick utilization of valuable insights. CiteSpace is widely applicable in diverse academic fields, including natural and social sciences, and is extensively employed in literature reviews within domains such as medicine, demography, sociology, geography, and sewage treatment.

In this study, citation visualization is used to analyze the clustering and distribution of knowledge within the citation space, as well as the contribution between knowledge units in the context of bibliometric data and information visualization. Moreover, it facilitates the identification of knowledge structure hotspots and development trends in the research field through keyword co-occurrence and clustering, thereby enabling the mapping of knowledge domains.

### *4.2. Grounded Theory*

In this study, we chose the GT approach as our analytical framework. This approach excels in the induction of theories from empirical data, making it ideal for exploratory research and for achieving a profound understanding of complex social phenomena. Case

studies and comparative methods are viable alternatives. They each have their own merits: Case study allows for in-depth analysis of specific cases, while the comparative method enables cross-case examination. However, grounded theory aligns best with our research objectives.

GT, originally proposed by Glaser and Strauss [44], is a well-known exploratory analysis method in qualitative research. Since its emergence, it has garnered attention and recognition from the academic community and has been widely applied in various research fields such as pedagogy, sociology, psychology, and medicine. In 1990, Strauss and Corbin [45] further developed the canonical model of "causal conditions—phenomenon—context—mediating conditions—action/interaction strategy—results" to enhance the analysis of conceptual relationships and exploration of their interconnections.

GT simplifies the application by examining unclear or debated theoretical concepts, synthesizing theories from empirical phenomena, and establishing comprehensive and contextually relevant theories. It provides an emic perspective into a phenomenon, identifying factors affecting a research problem while ensuring purposiveness and completeness [46]. The main idea involves analyzing original qualitative data, starting with observation, conceptualizing and categorizing interview data or literature, constructing concepts through induction and qualitative coding, and drawing research conclusions through analysis of conceptual categories. It consists of four main steps: generating research questions, collecting information, coding, and constructing theories [45]. The specific flow chart of GT is depicted in Figure 1.

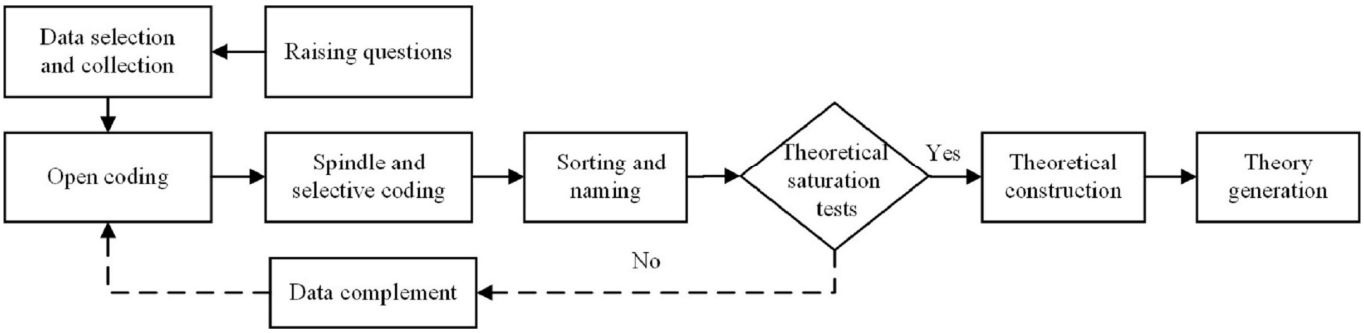


**Figure 1.** Flow chart of a GT study.

The GT method was selected for this study due to its suitability for theoretical exploration and development in social science research. GT aims to generate theories directly from empirical data, facilitating the identification of new concepts, relationships, and exploration of complex phenomena.

### *4.3. Analysis Framework*

To accomplish the objectives of this study, a comprehensive and sequential methodology was employed, depicted in Figure 2.

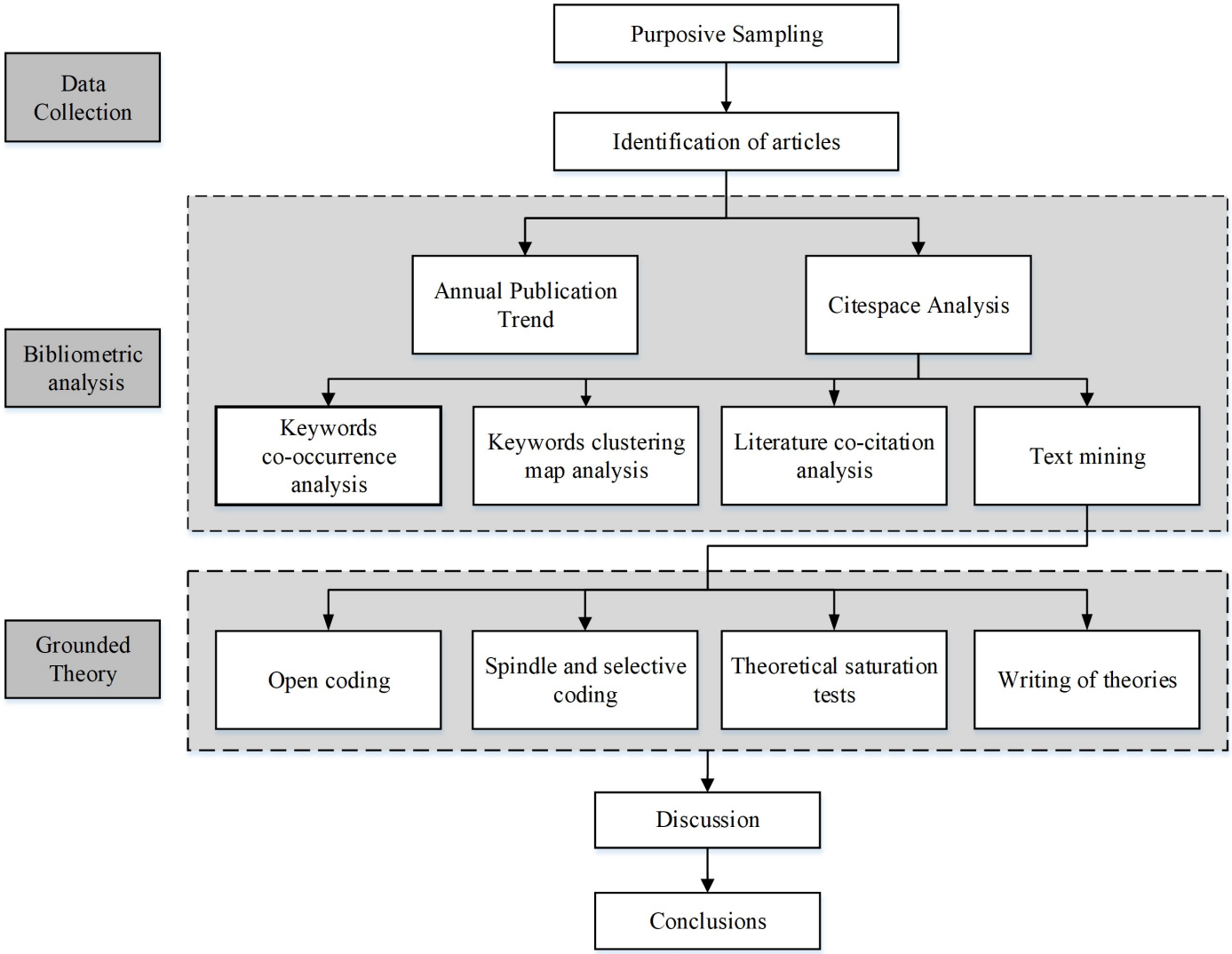


**Figure 2.** Research design framework.

## 5. Results

### *5.1. Selection of the Database and Identification of Literature*

The selection of a suitable database constitutes the initial step in conducting quantitative analysis. Scholars typically utilize databases including Web of Science (WoS), Scopus, Google Scholar, Microsoft Academic, and Dimensions, which are the most commonly used in scientific research. In the engineering field, WoS exhibits greater coverage of literature, comprising 37% more journals than Scopus [47]. Notably, WoS is a pivotal peer-to-peer literature source, featuring extensive citations and abstracts [48]. Therefore, Wos was selected as the database for investigating the factors influencing profit distribution in IPD projects in this study.

This study utilized the WoS database to conduct research. The selected time frame spanned from January 2000 to December 2022. The search query encompassed terms such as "income distribution", "distribution of income", "profit distribution", "benefit distribution", and "division of earning". Initially, a total of 48,289 articles were retrieved. Subsequently, duplicate entries and fields weakly correlated to the research topic, including marine biology, forestry, nursing, medicine, and entomology, among others, were excluded. This refinement process yielded a final set of 6934 articles for analysis.

Further refining the search, the authors introduced the first qualifier, including terms like "integrated project delivery", "IPD", "integrated form of agreement", "IFOA", "lean

project delivery", and "LPD". As a result, the search results were reduced to 1239 articles. Finally, the second qualifier, including "influence factors", "affecting factors", and "contributing factors", was added to narrow down the search further, resulting in a final set of 834 documents, regarded as representative samples for this study. A flow diagram for the bibliometric analysis is shown in Figure 3.

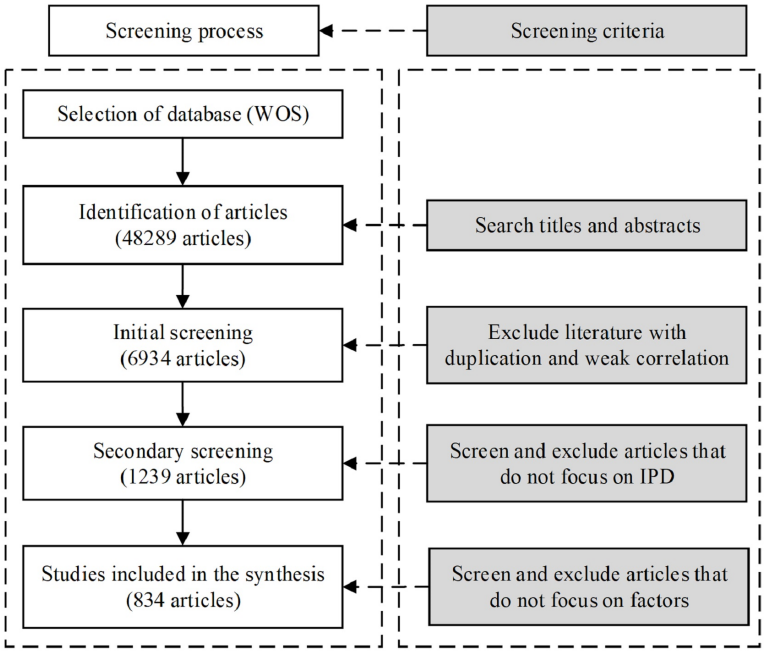


**Figure 3.** A flow diagram for the bibliometric analysis.

### *5.2. Implication of Bibliometric*

#### 5.2.1. Statistical Analysis of Annual Publications

The collected literature, comprising 834 annual publications, underwent statistical analysis. Figure 4 illustrates the temporal fluctuations in the popularity of research on profit distribution. In general, from 2000 to 2005, there was almost no literature. From 2006 to 2022, there was a consistent upward trend in the number of journal publications in the field of income distribution (profit distribution). Notably, the years 2014 to 2022 witnessed a phase of rapid growth, characterized by an annual growth rate peaking at 168 percent in 2021. While there was a slight decline in the growth rate of published papers in 2018, the overall number of publications remained fairly stable and high in subsequent years.

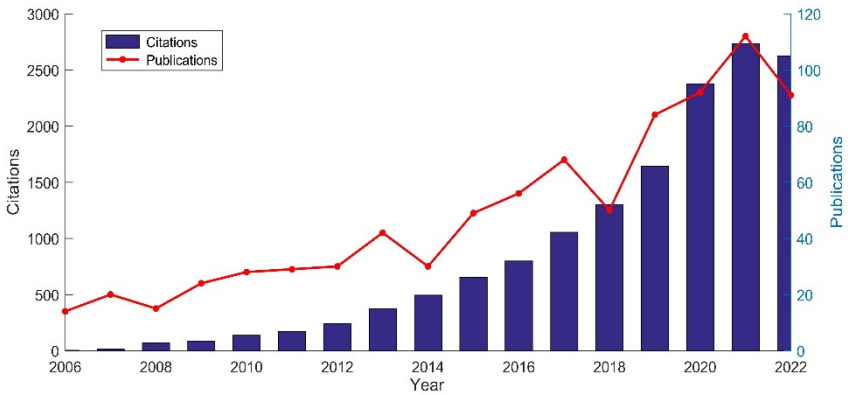


**Figure 4.** Annual publication statistics.

5.2.2. Keyword Co-Occurrence Analysis

Keywords are descriptive words that briefly reflect the topic, method, and content of a paper. The analysis of keyword co-occurrence provides insights into the connections and relationships between research topics in a particular subject field. The co-occurrence frequency of keywords can reveal the internal logical relations of several knowledge points in this subject field. Table 2 presents the co-occurrence frequency and centrality of keywords, with the highest values found for "construction project management" and "building information modeling".

**Table 2.** Keyword co-occurrence frequency.

| Number | Keywords | Counts | Centrality |
|---|---|---|---|
| 1 | Construction project management | 240 | 0.12 |
| 2 | Building information modeling | 133 | 0.22 |
| 3 | Alternative project delivery method | 117 | 0.23 |
| 4 | Building design management | 64 | 0.21 |
| 5 | Construction system | 48 | 0.18 |
| 6 | Risk management | 44 | 0.14 |
| 7 | Decision framework | 42 | 0.16 |
| 8 | Integrated project delivery | 31 | 0.07 |
| 9 | System selection | 27 | 0.06 |
| 10 | Information technology | 27 | 0.11 |
| 11 | Critical success factor | 25 | 0.05 |
| 12 | Cross impact analysis | 24 | 0.06 |
| 13 | Construction cost | 24 | 0.08 |
| 14 | Supply chain management | 22 | 0.03 |
| 15 | Genetic algorithm | 22 | 0.07 |

The keyword co-occurrence map, generated through the analysis of keywords in the literature collection, helps to visualize the relationships and correlations between keywords and topics. The co-occurrence map graphically represents keywords as nodes, with the size of the nodes indicating the frequency of occurrence, and the edges representing connections between keywords. The color of the edges corresponds to the year depicted in the figure, enabling identification of the main keywords for each year. By observing the co-occurrence map, we can discern the relationships between keywords and identify pertinent themes for further exploration and research.

The CiteSpace software was used to draw the co-occurrence map of the profit distribution keywords, as shown in Figure 5. The knowledge map focuses on examining the closeness between these keywords to analyze the underlying topic. The size of the dots corresponds to the word frequency of high-frequency keywords, with larger dots representing higher frequencies. Figure 5 reveals that the genetic algorithm has been extensively applied in addressing the issue of profit distribution in multi-player cooperation alliances. Scholars studying the factors influencing profit distribution have also considered technical factors, labor and personnel issues, corporate income, level of effort, bilateral moral hazard, and risk management, among others. In addition, the present forms of cooperative arrangements involving profit distribution are reflected in keywords such as virtual enterprise, supply chain management, coordination strategy, fuzzy alliance, and public–private partnership.

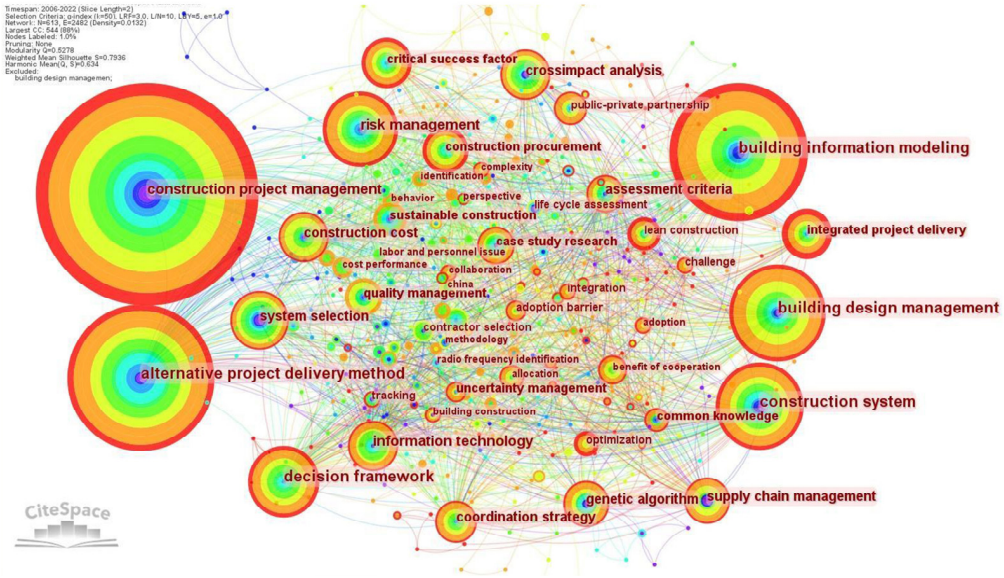


**Figure 5.** Keyword co-occurrence map of profit distribution research.

5.2.3. Keyword Clustering Map Analysis

This section analyzes previous studies on profit distribution in the construction industry using the authors' keywords represented in Figure 6. Keywords play a crucial role in bibliometrics, as they can identify emerging research areas through keyword network analyses and clustering.

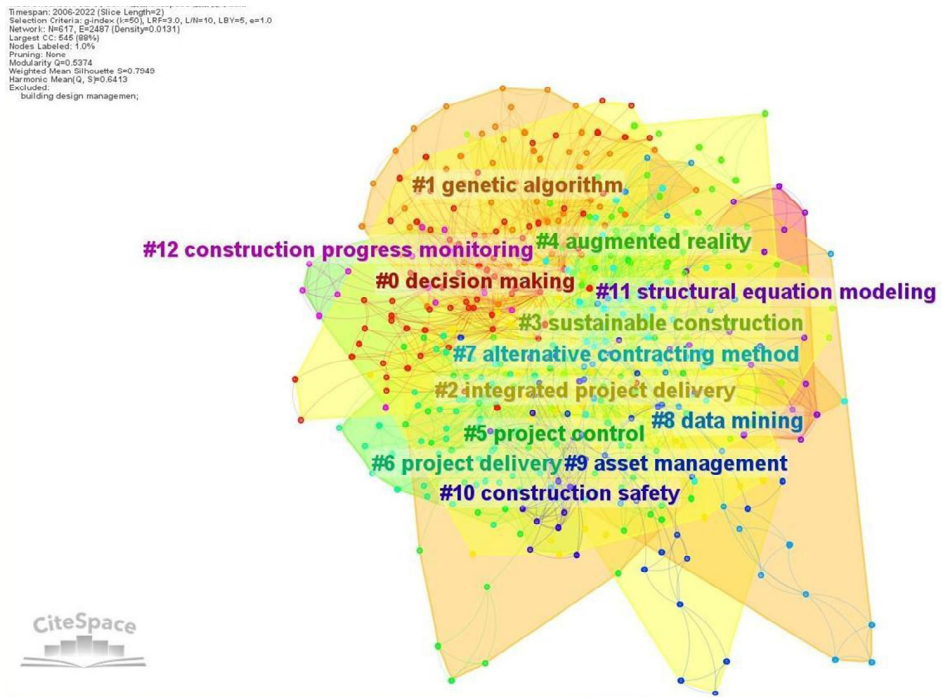


**Figure 6.** Keyword clustering map.

CiteSpace is used to generate a co-occurrence map of keywords, which is then subjected to automatic clustering using three algorithms: light semantic index (LSI), log-likelihood rate (LLR), and mutual information (MI). This study adopted the widely employed LLR method for calculating semantic correlation in keyword cluster analysis due to its minimizing of word repetition in labeling. Based on the network structure and the clarity of clustering, CiteSpace provides two indicators, namely, the clustering module value (Q

value) and the clustering average contour value (S value), to represent the quality of the clustering effect. Generally, a higher *Q* value indicates a significant clustering structure, while a higher S value reflects greater similarity among cluster members. Q > 0.3 means that the clustering structure is significant. S > 0.5 means that the clustering is reasonable. S > 0.7 means that the clustering is convincing. The *S* value is an index to measure the homogeneity of members of the whole cluster. A larger *S* value indicates a higher level of similarity among the members of the cluster. In the examined sample, the values of Q and S were 0.5374 and 0.7949, respectively. Therefore, the data results presented in this study are regarded as reasonable.

Figure 6, generated using CiteSpace, presents a keyword clustering map with 13 clusters and labeled clusters numbered from 0 to 12. Table 3 provides a summary of these clusters, with the cluster labels reflecting their representative keywords. The order of the label number indicates the number of keywords within each cluster, with smaller labels indicating clusters with a greater number of keywords.

**Table 3.** Summary of clusters.

| Cluster ID | Size | Silhouette | Mean (Year) | Label (LLR) |
|---|---|---|---|---|
| 0 | 73 | 0.750 | 2015 | Decision-making |
| 1 | 62 | 0.802 | 2016 | genetic algorithm |
| 2 | 59 | 0.684 | 2015 | Integrated project delivery |
| 3 | 56 | 0.750 | 2016 | Sustainable construction |
| 4 | 55 | 0.774 | 2014 | Augmented reality |
| 5 | 50 | 0.849 | 2014 | Project control |
| 6 | 48 | 0.775 | 2010 | Project delivery |
| 7 | 41 | 0.803 | 2016 | Alternative contracting method |
| 8 | 27 | 0.903 | 2018 | Data mining |
| 9 | 24 | 0.848 | 2017 | Asset management |
| 10 | 18 | 0.937 | 2016 | Construction safety |
| 11 | 17 | 0.958 | 2020 | Structural equation modeling |
| 12 | 15 | 0.892 | 2015 | Construction progress monitoring |

The most extensive cluster, labeled as cluster 0, centers around the keyword "decision-making" and holds significant importance. This cluster encompasses topics such as project delivery, simulation, selection criteria, and RFID (radio frequency identification). This cluster showcases the utilization of simulation methods to make informed decisions regarding project delivery mode, considering selection criteria and various factors. As a non-contact identification technology, RFID has been widely used in the construction industry with the development of the Internet of Things.

Cluster 1 is labeled with the keyword "genetic algorithm" and encompasses keywords such as "crashing", "acceleration", and "DSM" (demand-side management). This cluster represents the application of the genetic algorithm as the primary research method for optimizing construction project organization, particularly in cases where project crashing results in accelerated construction. DSM serves as an effective approach to conserving energy, reducing emissions, enhancing the environment, and addressing the health consequences of global climate change. It is also a crucial strategic decision for achieving sustainable development at a national level. By employing DSM and energy-trading strategies, building users can effectively reduce electricity costs. Multiple algorithms are employed in their implementation.

In cluster two, the label word is "integrated project delivery", bringing together keywords such as "risk management", "industrial projects", "profit distribution", and "Chinese contractors". This cluster focuses on two major research directions of IPD: risk management and profit distribution. The essence of risk management in an IPD project lies in encompassing all the processes of risk management, achieving the goal of project management, and systematically managing all the risk factors throughout the life cycle of a construction project. Profit distribution is a crucial concern for all enterprise alliances. Thus

far, China has gained global recognition as a leading country in infrastructure development. China's infrastructure development has continually held a prominent position, promoting a sustained rapid pace of infrastructure construction in the foreseeable future. Consequently, numerous scholars have dedicated their efforts to studying the experiences gained from China's infrastructure projects.

Cluster three is characterized by the label "sustainable construction", encompassing keywords such as "life cycles", "information management", "construction and demolition waste", and "lean construction". These terms reflect the focus on sustainable development within the construction industry, which has seen a notable increase in scholarly attention. According to the International Energy Agency, the construction and operation of buildings account for 39 percent of global energy use and 36 percent of energy-related emissions of carbon dioxide [49]. The construction industry, known for its energy-intensive and polluting nature, necessitates consideration of sustainable practices within the building sector. Achieving sustainable construction entails employing advanced project management theories and methodologies, such as integrated management theory and information technology, to minimize natural resource consumption, enhance productivity, and foster collaborative work during the expansion process [15]. Strategies such as life cycle management, wastewater management, lean construction, and BIM technology offer promising avenues for enhancing construction processes within the sustainable construction framework.

A fair and reasonable profit distribution mechanism serves as a vital pillar for fostering effective cooperation within enterprise alliances. Analyzing the game of interests among alliance members and designing a feasible profit distribution mechanism can incentivize all parties to align their actions with the collective interests of the enterprise alliance. This ensures the rationalization and systematization of profit distribution within the alliance while upholding its durability and stability.

#### 5.2.4. Literature Co-Citation Analysis and Text Mining

By utilizing literature co-citation analysis, it is feasible to pinpoint significant literature with high citation rates, thus shedding light on the prevailing knowledge framework and developmental trends within the field. Notably, by employing CiteSpace software, a cogent visualization of co-cited keywords can be attained, enabling a comprehensive exploration of the various factors that influence profit distribution. The subsequent analysis yielded the data presented in Table 4.

**Table 4.** Collation information of highly cited literature.

| ID | Literature | Concept Extraction |
|---|---|---|
| 1 | [3] | Risk, investment, contribution |
| 2 | [10] | Effort level |
| 3 | [12] | Degree of player participation |
| 4 | [13] | Risk |
| 5 | [14] | Risk taking, market competitiveness, investment amount |
| 6 | [15] | Fairness, contracts, long-term relationships, risk |
| 7 | [16] | Contribution |
| 8 | [17] | Asymmetric contributions |
| 9 | [18] | Marginal contribution |
| 10 | [19] | Participation |
| 11 | [20] | Contributions |
| 12 | [21] | Effort |
| 13 | [24] | Risk sharing, effort |
| 14 | [27] | Risk, satisfaction |
| 15 | [29] | Level of effort, fairness, and equality |
| 16 | [30] | Risk level, marginal contribution |
| 17 | [34] | Marginal contribution |
| 18 | [50] | Risk, investment |
| 19 | [51] | Risk |

**Table 4.** *Cont.*

| ID | Literature | Concept Extraction |
|---|---|---|
| 20 | [52] | Input, work achievements, risk |
| 21 | [53] | Risk perception |
| 22 | [54] | Risk, effort |
| 23 | [55] | Contribution, shared risk |
| 24 | [56] | Effort |

Presently, academia lacks a consensus on the determinants of profit distribution, with scholars often employing divergent terminologies to address the same underlying factor. Unquestionably, disparities emerge in the influencing factors of profit distribution across different research domains. To exemplify this, within the realm of supply chain management, the selection of partners emerges as a pivotal influence factor, while its importance in the construction industry pales in comparison to its prominence within the supply chain domain. Hence, it becomes imperative to undertake further organization and clarification of the various factors that contribute to profit distribution.

### *5.3. Implication of GT*

Drawing on the qualitative textual data derived from the aforementioned influencing factors of profit distribution, the grounded theory method is employed to further refine and construct a theory based on the qualitative data. This enables a comprehensive integration of the influencing factors of profit distribution. In the process of the grounded coding process, operations are strictly carried out according to the grounded coding technique procedures proposed by Strauss and Corbin [45], ensuring the reliability and validity of the research. This procedure is mainly divided into open coding, axial coding, and selective coding stages. Moreover, to mitigate the coder's subjective biases and enhance the objectivity and scientific rigor of the coding, this study incorporates group discussions and expert consultations during the coding process.

The involvement of experts in the group discussion and negotiation is paramount, given their extensive experience in the construction field. Their professional acumen is crucial for validating the coding process and ensuring the credibility of the identified influencing factors.

A survey methodology was used to select 28 experts with substantial work experience and advanced theoretical knowledge from different representative enterprises for survey questionnaire analysis. The essential information about them is outlined in Figure 7 below. As depicted in Figure 7, 28 experts demonstrated a high level of professionalism, fulfilled the criteria outlined in the questionnaire, and yielded highly reliable results.

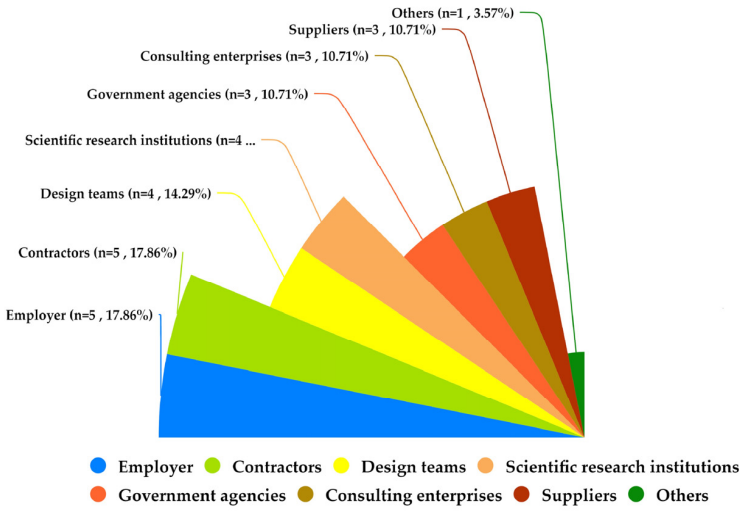


**Figure 7.** Essential information statistics of experts.

#### 5.3.1. Open Coding

The initial step in employing the GT approach to data analysis is using open coding. At this stage, researchers conduct a preliminary analysis of the data to identify, label, and categorize phenomena to establish classifications. In this study, 17 samples were randomly selected from the 24 items in Table 3 to compare and analyze the original statements of the influencing factors. Additionally, six samples were utilized for theoretical saturation tests to complete the extraction of the initial concepts. On this basis, the 24 initial concepts were further categorized and summarized into four categories, namely, contribution degree, resource-based input, effort level, and risk sharing. This categorization is elucidated in Table 5.

**Table 5.** Open coding process.

| Literature | Statements | Concept Extraction | Categorization |
|---|---|---|---|
| [9] | "The paper also discussed the influence of the change in the degree of players' participation on the distributable profits of the entitled alliance and the profit distribution of each participant." | Degree of player participation | Contribution |
| [14] | "This study improved the traditional Shapley value by taking three factors (i.e., risk taking, market competitiveness, and investment amounts) into consideration, thus establishing a more rational profit allocation scheme." | Risk taking, market competitiveness, investment amount | Risk, input |
| [15] | "Key factors influencing the selection of a sharing ratio included perceptions of fairness, knowledge of target cost contracts, long-term relationships, and the perceived level of risk." | Fairness, risk contracts, relationships | Effort, risk |
| [16] | "Shapley value has been applied to the profit allocation due to its good properties of balance and fairness." | Contribution | Contribution |
| [17] | "This study set up an alternative allocation rule based on the weighted Shapley value by considering the asymmetric contributions of partners in cooperation." | Asymmetric contributions | Contribution |
| [21] | "Subjects' effort choices are highly sensitive to their own reward." | Effort | Effort |
| [24] | "Shared risk and reward can help improve project performance. As the degree of unequal distribution goes up, the project experiences both a decline in team effort and an increase in actual cost." | Risk sharing, effort | Risk sharing, effort |
| [29] | "Profit and loss are linked to "real" risk and benefits that impact the value of the project to the client/owner. Perceptions of equity and fairness in the distribution of risk/reward may be assumed to play a role in behaviors." | Level of effort, fairness, and equality | Effort |
| [30] | "The profit distribution model is more efficient as it considers both the marginal contribution and the risk level of each stakeholder." | Risk level, marginal contribution | Marginal contribution, risk |
| [34] | "This paper presents a conceptual framework for alternative profit allocations based on the marginal contribution of each party rather than on investment- or scope-based approaches." | Marginal contribution | Contribution |
| [50] | "Both partners are risk takers and therefore share the profit/loss proportional to their risk. In the following expression, we share the profit between the partners with respect to their investment." | Risk, investment | Risk, input |
| [51] | "Profits are at risk related to the total project." | Risk | Risk |
| [52] | "We take enterprises' input factors, work achievements, and risk factors into consideration to design the profit distribution mechanism for software outsourcing alliances." | Input, work achievements, risk | Input, effort, risk |

**Table 5.** *Cont.*

| Literature | Statements | Concept Extraction | Categorization |
|---|---|---|---|
| [53] | "The study provides a risk-perception-based approach rather than actual risk-based approach to decide on risk/reward compensation for IPD." | Risk perception | Risk |
| [54] | "The retailer's risk decreases as his share of revenue decreases, but so does his incentive to exert revenue-enhancing effort. Revenue sharing induces the supplier to engage in such effort." | Risk, effort | Risk, effort |
| [55] | "Shared risk/reward initiates stronger communication between the designer and contractor. Their incentive or compensation shall be based on their contribution to the project." | Contribution, shared risk | Contribution, risk |
| [56] | "Team members need to consider the effort responses and incentives of their teammates while computing their own effort decisions. Incentives and efforts are interdependent." | Effort | Effort |

#### 5.3.2. Spindle and Selective Coding

Spindle coding consists of continuously aggregating and refining the scattered data in each category in open coding into one or two core categories, connecting them with obvious links. On the other hand, selective coding entails comparing and screening the codes formed after spindle coding to form codes directly addressing the research object. This further involves mining the core category from the main category, engaging in an in-depth examination of the relationship between the core categories and the categories, and ultimately forming theoretical models.

Combined with the characteristics of the construction industry, the above-extracted influencing factors are accurately processed by removing concepts with low correlation and frequency, such as cooperation willingness, status effect, additional subsidies, and contract execution. Subsequently, similar types of influencing factors are combined. The effects of profit distribution are then divided into four categories: resource-based input, contribution, risk sharing, and effort level, as presented in Table 6.

**Table 6.** Coding results of factors affecting profit distribution in IPD mode.

| Core Category | Category | Concept |
|---|---|---|
| Affecting factors in profit distribution | Resource-based input | Capital input |
| | | Direct project costs |
| | | Rates of participation |
| | | Investment proportion/ investment amount |
| | | Innovation cost |
| | | Operating cost |
| | | Investment amount |
| | | Technical resource investment |
| | | Cost input |
| | Contribution | Resource contribution |
| | | Degree of achievement |
| | | Degree of contribution |
| | | Work achievements |

**Table 6.** *Cont.*

| Core Category | Category | Concept |
| --- | --- | --- |
| Affecting factors in profit distribution | Effort level | Team effort |
| | | Innovation effort |
| | | Innovation ability |
| | | Degree of implementation |
| | Risk sharing | Environmental risk |
| | | Risk perception |
| | | Risk taking |
| | | Perceived performance risk |
| | | Perceived relational risk |
| | | Moral hazard |

#### 5.3.3. Theoretical Saturation Tests

The same coding and analysis procedure outlined above was applied to the remaining seven terms, followed by conducting saturation tests. The results indicate that the categories identified in the model were sufficiently developed, without any emergence of new categories or relationships. Importantly, no influencing factors closely associated with IPD project items that impact profit distribution were generated within the categories. Therefore, it can be argued that the concepts and categories of factors affecting the profit distribution in IPD projects, as constructed in this study, have theoretically reached saturation.

### *5.4. Clarifying Concepts*

The previous analysis identified resource-based input, contribution, risk sharing, and effort level as the primary factors influencing profit distribution in the IPD project model. However, there is a need for further clarification regarding the content embedded within these four concepts.

#### 5.4.1. Resource-Based Input

In examining relevant literature, it becomes evident that "input" as a factor impacting profit distribution encompasses a broad spectrum of meanings. This includes capital input, resource-based input, resource contribution, innovation cost, operating cost, technical resource investment, cost input, and investment ratio/investment [14]. Moreover, certain aspects such as technological resource investment and human capital input, which are emphasized in the research of innovative research and development industries, and land resource-based inputs studied in land profit distribution, were also excluded. In the context of IPD projects, resource-based inputs should encompass considerations of capital and other inputs. For instance, exclusive technology, the value derived from process innovation, innovative investment, incentive mechanisms adopted by each participant, and different behavioral characteristics of different groups are all resources injected into the operational process of IPD project partners.

#### 5.4.2. Contribution

Each participant in an IPD project forms a cooperative alliance and contributes to the project's construction. To ensure the realization of the objectives of the owner's project, they make sacrifices and contributions to maximize the ultimate benefits of the project [32]. Due to their different positions, roles, and capabilities within the project, participants contribute to the overall project's profit maximization in varying ways, leading to differences in their contribution to the realization of project value [57]. It is assumed that all participants in the cooperative alliance are "rational individuals" who adhere to the profit distribution principle of equal contribution and profit. By analyzing the marginal contribution of each

participant, the alliance can distribute overall profit in a reasonable proportion that satisfies all parties.

#### 5.4.3. Effort Level

Effort level refers to the degree to which an enterprise alliance is willing and capable of exerting efforts to enhance output efficiency within a given enterprise governance. It reflects the commitment of each alliance participant to fulfilling contractual obligations and undertaking proactive actions to maximize the project's overall profit, referred to as effort behavior. In situations characterized by asymmetric information, where the effort levels are the private knowledge held by individual participants, it becomes challenging for one participant to observe the effort exerted by others, and the effort levels of individual alliance members are generally unverifiable [58]. Improving effort levels is generally achieved through the implementation of supervision and incentive mechanisms. The level of effort is typically determined by both the internal factors, such as the human capital of the participants, and the external factors, such as environmental assimilation and incentives within the alliance [59]. Furthermore, it is also related to the professional competence of the participants' managers, the allocation of management resources, and the achieved effectiveness of management practices.

#### 5.4.4. Risk Sharing

Risk sharing and benefit sharing serves as the fundamental distribution principle in IPD projects and forms the basis for IPD project cooperation [3]. Without a fair and equitable risk-sharing mechanism, the implementation of IPD projects lacks stability [54]. Profit distribution schemes should fully consider the consistency and equivalence of risk sharing and profit distribution, thereby enhancing the initiative and enthusiasm of all participants. In an IPD project, each participant assumes a certain level of risk and anticipates corresponding benefits to offset the costs and expenses associated with the assumed risk [60]. The capacity to bear risk varies among participants due to the different strengths and characteristics of each participant. The rationalization of risk sharing can effectively reduce the cost of risk bearing and thus enhance the value of IPD projects. Identifying risks, establishing risk sets, and distinguishing shared risks provide a theoretical basis for adopting a scientific approach to carrying out risk sharing in IPD projects.

## 6. Discussion

### *6.1. Trend Analysis*

Using burst word detection techniques and algorithms within the CiteSpace software, we examined the temporal distribution of word frequencies to identify words exhibiting high-frequency changes across various significant topics. This process aided in discerning frontier domains and trends in profit distribution. Following econometric analysis, several primary research keywords were qualitatively summarized. Leveraging CiteSpace, we extracted the top 10 keywords displaying the most robust citation bursts, effectively delineating the evolving research frontiers over time, as depicted in Figure 8.

This analysis allowed for the identification of promising research avenues within IPD initiatives. Primarily, advancements in technology emerge as a focal area of investigation. It is imperative to remain abreast of technological innovations impacting project management, such as project management software, nD BIM [61], collaborative tools [62], Radio Frequency Interference (RFI), blockchain [63], and data analytics [64,65]. These technological advancements address the pain points of unidirectional data transfer and usage in traditional management models, enabling bidirectional data exchange and transparency throughout the entire life cycle of building projects, from planning and operation to maintenance. Consequently, the adoption of these technologies is poised to propel the advancement of the IPD mode [66]. Moreover, within the context of Industry 5.0, the integration of these technologies into the construction sector is anticipated to accelerate, expediting the digital transformation of the industry and fostering its progression.

**Top 10 Keywords with the Strongest Citation Bursts**

| Keywords | Year | Strength | Begin | End | 2006 – 2022 |
|---|---|---|---|---|---|
| radio frequency identification | 2007 | 2.21 | **2007** | 2013 | |
| supply chain management | 2006 | 1.79 | **2006** | 2009 | |
| quality control | 2006 | 1.74 | **2006** | 2015 | |
| sustainable construction | 2006 | 2.22 | **2010** | 2013 | |
| public-private partnership | 2011 | 1.87 | **2011** | 2013 | |
| labor and personnel issue | 2014 | 1.95 | **2014** | 2017 | |
| china | 2016 | 1.8 | **2016** | 2019 | |
| quality management | 2008 | 2.24 | **2018** | 2019 | |
| time | 2020 | 2.13 | **2020** | 2022 | |
| innovation | 2020 | 1.71 | **2020** | 2022 | |

**Figure 8.** Top 10 keywords with the strongest citation bursts.

Concurrently, scholars maintain a focus on traditional research domains encompassing project duration, quality management, human capital [67], innovation, and performance [68], all of which significantly influence the outcomes of IPD projects. This provides construction industry stakeholders and researchers with a comprehensive insight into intellectual landscapes and potential research frontiers on IPD endeavors.

### *6.2. Research Significance*

This research marks a pioneering endeavor in employing CiteSpace software (v.6.1. R3) and GT methodology for conducting bibliometric and visual analyses of literature about profit distribution within IPD contexts. By offering an intuitive elucidation of the factors influencing profit distribution, this study establishes a foundational framework for further investigations in this domain of IPD. It serves to empower IPD teams with enhanced comprehension and optimization capabilities regarding profit distribution mechanisms, thereby maximizing project benefits holistically. Additionally, this paper delineates research directions and strategies for subsequent studies focused on IPD profit distribution, with the overarching goal of augmenting project success rates and efficacy. The insights derived from this study hold considerable guidance and reference value for stakeholders engaged in IPD projects and the broader industry landscape.

## 7. Conclusions

This study presents a comprehensive and systematic review of the existing literature on factors influencing profit distribution in IPD projects and actively guides future research works into addressing research gaps and needs. The key outcomes of this investigation can be summarized as follows: (1) identification of the components constituting IPD profit, delineated into compensation for labor income, reimbursement for effort costs, and distribution of surplus from rewards and contingency funds; (2) recognition of the principal factors influencing the distribution of IPD profits, including the degree of contribution, resource-based input, risk sharing, and level of effort; and (3) systematic exploration of the nuanced structure underlying these four primary influencing factors. The research findings presented herein contribute to enriching the theoretical underpinnings governing the study of IPD profit distribution.

However, it is crucial to acknowledge several limitations in this study. Firstly, limitations arise from the data sources employed. This study exclusively relies on data obtained and processed from a single database, namely, WoS, thus excluding conference papers and gray literature. This selection approach may introduce potential bias into the results. Secondly, the choice of research method, specifically, GT, may be prone to researcher interpretation and subjective biases. Moreover, the method heavily relies on the researcher's expertise and subjective perspectives, potentially constraining the objective and comprehensive analysis of influencing factors. Lastly, inherent biases may exist in the selection and

exclusion of literature for this study. Depending solely on the analysis of specific literature, this approach may overlook other significant studies and perspectives. Notably, recently published high-quality papers with low citation counts could be omitted from the analysis results. Such limitations have the potential to impact the accuracy and comprehensiveness of the conclusions drawn in this paper. In forthcoming studies, leveraging new data analysis tools and machine learning could enhance the efficiency and precision of bibliometric analysis. Additionally, this paper's findings could inform practical strategies for optimizing partnership management and developing fairer profit distribution mechanisms within IPD projects.

**Author Contributions:** Conceptualization, S.G. and H.X.; methodology, S.G.; software, J.C.; formal analysis, S.G.; data curation, K.H.; writing—original draft preparation, S.G.; writing—review and editing, S.G. and H.X.; visualization, J.C. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Data Availability Statement:** Data availability does not apply to this article as no new data were created or analyzed in this study. The data used are derived from publicly available databases/literature, etc. Readers can access the relevant data by accessing the database/literature, etc.

**Acknowledgments:** We would like to thank the anonymous reviewers for their helpful remarks. We thank the associate editor and the reviewers for their useful feedback that improved this paper.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## References

1. Besklubova, S.; Zhang, X. Improving construction productivity by integrating the lean concept and the Clancey heuristic model. *Sustainability* **2019**, *11*, 4535. [CrossRef]
2. NASFA; COAA; APPA; AGC; AIA. Integrated Project Delivery for Public and Private Owners. 2010. Available online: https://www.agc.org/sites/default/files/Files/Programs%20&%20Industry%20Relations/IPD%20for%20Public%20and%20Private%20Owners_1.pdf (accessed on 20 March 2023).
3. The American Institute of Architects (AIA); California Council. *Integrated Project Delivery: A Guide*; AIA California: Sacramento, CA, USA, 2007.
4. Azhar, N.; Kang, Y. Factors influencing integrated project delivery in publicly owned construction projects: An information modelling perspective. *Procedia Eng.* **2014**, *77*, 213–221. [CrossRef]
5. Lee, C. Implementation of Integrated Project Delivery on Department of Navy Military Construction Projects. Master's Thesis, University of Nevada, Lag Vegas, NV, USA, 2013.
6. Whang, S.W.; Park, K.S.; Kim, S. Critical success factors for implementing integrated construction project delivery. *Eng. Constr. Archit. Manag.* **2019**, *26*, 2432–2446. [CrossRef]
7. Aslam, M.; Gao, Z.; Smith, G. Exploring factors for implementing lean construction for rapid initial successes in construction. *J. Clean. Prod.* **2020**, *277*, 123295. [CrossRef]
8. Chountalas, P.T.; Tepaskoualos, F.A. Selective integration of management systems: A case study in the construction industry. *TQM J.* **2019**, *31*, 12–27. [CrossRef]
9. Guo, S.; Wang, J.; Wu, H. Profit distribution of IPD projects using fuzzy alliance. *Eng. Constr. Archit. Manag.* **2021**, *28*, 2069–2089. [CrossRef]
10. Guo, S.; Wang, J.; Xiong, H. The influence of effort level on profit distribution strategies in IPD projects. *Eng. Constr. Archit. Manag.* **2023**, *30*, 4099–4119. [CrossRef]
11. Liu, Q.; Cheng, Z. Research on Profit Distribution of Construction Project Dynamic Alliance under Integrated Project Delivery Mode. *Value Eng.* **2020**, *39*, 58–61. [CrossRef]
12. Du, Y.; Fang, J.; Ke, Y.; Philbin, S.P.; Zhang, J. Developing a Revenue Sharing Method for an Operational Transfer-Operate-Transfer Project. *Sustainability* **2019**, *11*, 6436. [CrossRef]
13. Wang, X.; Jiang, L.; Shu, L. Profit Allocation in Fuzzy Cooperative Games in Manufacturing and Logistics Industry. *J. Ind. Eng. Manag.* **2014**, *7*, 448–460. [CrossRef]
14. Pishdad-Bozorgi, P.; Srivastava, D. Assessment of integrated project delivery (IPD) risk and reward sharing strategies from the standpoint of collaboration: A game theory approach. In *Construction Research Congress 2018*; ASCE: Reston, VA, USA, 2018; pp. 196–206.
15. Richard, C.H.; Paul, A.B. Sustainable construction: Principles and a framework for attainment. *Constr. Manag. Econ.* **1997**, *15*, 223–239. [CrossRef]
16. Shapley, L.S. A value for n-persons games. *Ann. Math. Stud.* **1953**, *28*, 307–318.

17. Kalai, E.; Samet, D. On weighted Shapley values. *Int. J. Game Theory* **1987**, *16*, 205–222. [CrossRef]
18. Leng, M.; Parlar, M. Allocation of cost savings in a three-level supply chain with demand information sharing: A cooperative-game approach. *Oper. Res.* **2009**, *57*, 200–213. [CrossRef]
19. Borkotokey, S.; Neog, R. Allocating profit among rational players in a fuzzy coalition: A game theoretic model. *Group Decis. Negot.* **2012**, *21*, 439–459. [CrossRef]
20. Liu, J.C.; Sheu, J.B.; Li, D.F.; Dai, Y.W. Collaborative profit allocation schemes for logistics enterprise coalitions with incomplete information. *Omega* **2021**, *101*, 102237. [CrossRef]
21. Goerg, S.J.; Kube, S.; Zultan, R. Treating Equals Unequally: Incentives in Teams, Workers' Motivation, and Production Technology. *J. Labor Econ.* **2010**, *28*, 747–772. [CrossRef]
22. Kulkarni, A.U.; Salado, A.; Wernz, C.; Xu, P. Is verifying frequently an optimal strategy? A Belief-based model of verification. In Proceedings of the ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Saint Louis, MO, USA, 17–19 August 2020.
23. Choi, J.; Yun, S.; Leite, F.; Mulva, S.P. Team integration and owner satisfaction: Comparing integrated project delivery with construction management at risk in Health care projects. *J. Manag. Eng.* **2019**, *35*, 05018014. [CrossRef]
24. Su, G.; Hastak, M.; Deng, X.; Khallaf, R. Risk sharing strategies for IPD projects: Interactional analysis of participants' decision-making. *J. Manag. Eng.* **2021**, *37*, 04020101. [CrossRef]
25. Wang, Y.; Liu, J. Evaluation of the excess revenue sharing ratio in PPP projects using principal agent models. *Int. J. Proj. Manag.* **2015**, *33*, 1317–1324. [CrossRef]
26. Li, B.; Akintoye, A.; Edwards, P.J. The allocation of risk in PPP/PFI construction projects in the UK. *Int. J. Proj. Manag.* **2005**, *23*, 25–35. [CrossRef]
27. Wang, R.; Yuan, Z. Dynamic distribution of cooperative profit mechanism in EPC projects considering satisfaction of all parties. *J. Eng. Manag.* **2019**, *33*, 13–18. [CrossRef]
28. Badenfelt, U. The selection of sharing ratios in target cost contracts. *Eng. Constr. Archit. Manag.* **2008**, *15*, 54–65. [CrossRef]
29. Love, P.E.D.; Davis, P.R.; Chevis, R.; Edwards, D.J. Risk/reward compensation model for civil engineering infrastructure alliance projects. *J. Constr. Eng. Manag.* **2011**, *137*, 127–136. [CrossRef]
30. Teng, Y.; Li, X.; Wu, P.A.; Wang, X. Using Cooperative game theory to determine profit distribution in IPD projects. *Int. J. Constr. Manag.* **2017**, *19*, 32–45. [CrossRef]
31. Yan, L. Research on fair concern distribution between owners and designers of BIM projects. *Tech. Superv. Water Resour.* **2019**, *4*, 155–158.
32. Zhang, H. Profit distribution method for union EPC engineering general contracting. *Archit. Technol.* **2019**, *6*, 691–695.
33. Xu, Y.; Wang, R. Efforts to influence the distribution of interests in IPD. *J. Xi'an Univ. Archit. Technol. Nat. Sci. Ed.* **2018**, *4*, 602–608.
34. Eissa, R.; Eid, M.S.; Elbeltagi, E. Conceptual profit allocation framework for construction joint ventures: Shapley value approach. *J. Manag. Eng.* **2021**, *37*, 04021016. [CrossRef]
35. Rankohi, S.; Bourgault, M.; Iordanova, I. The concept of integration in an IPD context: A grounded theory review. *Eng. Constr. Archit. Manag.* **2024**, *31*, 48–72. [CrossRef]
36. Karasu, T.; Aaltonen, K.; Haapasalo, H. The interplay of IPD and BIM: A systematic literature review. *Constr. Innov.* **2023**, *23*, 640–664. [CrossRef]
37. Smith, A. An inquiry into the nature and causes of the wealth of nations. In *History of Economic Thought Books from McMaster University Archive for the History of Economic Thought*; Handle: RePEc: Hay: Hetboo: smith1776; University of Chicago Press: Chicago, IL, USA, 1776; p. smith1776.
38. Kent, C.D.; Becerik-Gerber, B. Understanding construction industry experience and attitudes toward integrated project delivery. *J. Constr. Eng. Manag.* **2010**, *136*, 815–825. [CrossRef]
39. American Institute of Architects. Document C191TM—2009: Standard Form Multi-Party Agreement for Integrated Project Delivery. 2009. Available online: http://www.aia.org/aiaucmp/groupslaia/documents/pdf/aiab081563.pdf (accessed on 20 September 2023).
40. Gu, D.; Yang, X.; Deng, S.; Liang, C.; Wang, X.; Wu, J.; Guo, J. Tracking Knowledge Evolution in Cloud Health Care Research: Knowledge Map and Common Word Analysis. *J. Med. Internet Res.* **2020**, *22*, e15142. [CrossRef]
41. Heersmink, R.; Hoven, J.; Eck, N.; Berg, J. Bibliometric mapping of computer and information ethics. *Ethics Inf. Technol.* **2011**, *13*, 241–253. [CrossRef]
42. Vijayalakshmi, R.; Dasari, R.; Nandagopal, D.; Subhiksha, R.; Cocks, B.; Dahal, N. Change detection and visualization of functional brain networks using EEG data. *Procedia Comput. Sci.* **2014**, *29*, 672–682. [CrossRef]
43. Jahangirian, M.; Eldabi, T.; Garg, L.; Jun, G.T.; Naseer, A.; Patel, B. A rapid review method for extremely large corpora of literature: Applications to the domains of modeling, simulation, and management. *Int. J. Inf. Manag.* **2011**, *31*, 234–243. [CrossRef]
44. Strauss, A.; Corbin, J. *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*; Sage: Thousand Oaks, CA, USA, 1990.
45. Glaser, B.G.; Strauss, A.L. *The Discovery of Grounded Theory: Strategies for Qualitative Research*; Aldine De Gruyter: New York, NY, USA, 1967.
46. Guan, H.; Zhang, Z.; Zhao, A.; Jia, J.; Guan, S. Research on Innovation Behavior and Performance of New Generation Entrepreneur Based on Grounded Theory. *Sustainability* **2019**, *11*, 2883. [CrossRef]

47. Martín-Martín, A.; Thelwall, M.; Orduna-Malea, E.; Delgado López-Cózar, E. Google Scholar, Microsoft Academic, Scopus, Dimensions, Web of Science, and Open Citations' COCI: A multidisciplinary comparison of coverage via citations. *Scientometrics* **2020**, *126*, 871–906. [CrossRef] [PubMed]
48. Bakkalbasi, N.; Bauer, K.; Glover, J.; Wang, L. Three options for citation tracking: Google Scholar, Scopus and Web of Science. *Biomed. Digit. Libr.* **2006**, *3*, 7. [CrossRef]
49. Michel-Kerjan, E.O.; Decker, D.K. Insure to assure: A new paradigm for nuclear nonproliferation and international security. *Innov. Technol. Gov. Glob.* **2009**, *4*, 139–155. [CrossRef]
50. Chauhan, S.S.; Proth, J. Analysis of a supply chain partnership with revenue sharing. *Int. J. Prod. Econ.* **2005**, *97*, 44–51. [CrossRef]
51. Parrott, B.C.; Bomba, M.B. Integrated project delivery and building information modeling: A new breed of contract. *PCI J.* **2010**, *55*, 147–153. [CrossRef]
52. Lv, X.; Zhao, S. Research on profit distribution of software outsourcing alliances based on the improved Shapley value model. *Cybern. Inf. Technol.* **2013**, *13*, 100–109. [CrossRef]
53. Zhang, L.; Li, F. Risk/Reward Compensation Model for Integrated Project Delivery. *Eng. Econ.* **2014**, *25*, 558–567. [CrossRef]
54. Cachon, G.P.; Lariviere, M.A. Supply Chain Coordination with Revenue-Sharing Contracts: Strengths and Limitations. *Manag. Sci.* **2005**, *51*, 30–44. [CrossRef]
55. Wang, Z.; Hu, H.; Zeng, Q.; Li, X. Profit sharing and the stability of shipping alliances based on game theory. *J. Transp. Econ. Policy* **2016**, *50*, 245–261.
56. Elghaish, F.; Abrishami, S.; Hosseini, M.R.; Abu-Samra, S.; Gaterell, M. Integrated project delivery with BIM: An automated EVM-based approach. *Autom. Constr.* **2019**, *106*, 102907. [CrossRef]
57. Yomna, E.; Mohamed, S.E.; Hesham, A.B. Division of Cost Deviations in Integrated Project Delivery Systems Using Cooperative Game Theory. In *Construction Research Congress 2024*; ASCE: Reston, VA, USA, 2024; pp. 31–41. [CrossRef]
58. Stephen, V. *Institutional Economics*; China Social Sciences Press: Beijing, China, 2016.
59. Song, J.; Li, F.; Wu, D.D.; Liang, L.; Dolgui, A. Supply chain coordination through integration of innovation effort and advertising support. *Appl. Math. Model* **2017**, *49*, 108–123. [CrossRef]
60. Hosseinian, S.M.; Carmichael, D.G. An optimal target cost contract with a risk neutral owner. *Eng. Constr. Archit. Manag.* **2014**, *21*, 586–604. [CrossRef]
61. Elghaish, F.; Abrishami, S. Developing a framework to revolutionise the 4D BIM process: IPD-based solution. *Constr. Innov.* **2020**, *20*, 401–420. [CrossRef]
62. Hamzeh, F.; Rached, F.; Hraoui, Y.; Karam, A.J.; Malaeb, Z.; El Asmar, M.; Abbas, Y. Integrated project delivery as an enabler for collaboration: A Middle East perspective. *Built Environ. Proj. Asset Manag.* **2019**, *9*, 334–347. [CrossRef]
63. Elghaish, F.; Abrishami, S.; Hosseini, M.R. Integrated project delivery with blockchain: An automated financial system. *Autom. Constr.* **2020**, *114*, 103182. [CrossRef]
64. Salehi, S.A.; Yitmen, I. Modelling and analysis of the impact of BIM-based field data capturing technologies on automated construction progress monitoring. *Int. J. Civ. Eng.* **2018**, *16*, 1669–1685. [CrossRef]
65. Haupt, T.C.; Akinlolu, M.T.; Raliile, M.T. Applications of Digital Technologies for Health and Safety Management in Construction. In Proceedings of the 8th World Construction Symposium, Colombo, Sri Lanka, 8–10 November 2019; Sandanayake, Y.G., Gunatilake, S., Waidyasekara, A., Eds.; pp. 88–97.
66. Ayotunde, B.; Shamsudeen, M.; Temisola, A.; Haupt, T.C. A bibliometric review of advances in building information modeling (BIM) research. *J. Eng. Des. Technol.* **2023**, *21*, 690–710. [CrossRef]
67. Mariam, A.T.; Olalusi, O.B.; Haupt, T.C. A scientometric review and meta-analysis of the health and safety of women in construction: Structure and research trends. *J. Eng. Des. Technol.* **2021**, *19*, 446–466. [CrossRef]
68. Han, J.; Rapoport, A.; Fong, P.S.W. Incentive structures in multi-partner project teams. *Eng. Constr. Archit. Manag.* **2020**, *27*, 49–65. [CrossRef]