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MAPPING PUBLICATIONS ON VALUE CREATION IN CONSTRUCTION PROJECT SETTINGS: A MIXED BIBLIOGRAPHIC AND BIBLIOMETRIC ANALYSIS

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Abstract. The worldwide interest on value creation has triggered an increasing number of articles, especially after a new paradigm named service-dominant logic was announced in 2004. However, limited research exists on the whole picture of value creation in the field of construction projects. Therefore, the current study is expected to reveal the status and future directions of value creation studies under construction projects. A number of 63 journal articles between 2004 and 2022 were analysed via a combined bibliographic and bibliometric approach, which covers annual publication, institutional and regional contribution, author contribution and keyword analyses. Results indicated that most published articles were based on the developed economies, such as the United Kingdom, Finland and Norway. Keywords such as megaproject, governance, social value and co-creation are emphasised, as analysed using CiteSpace software. Three implications, namely, value creation in developing areas, megaproject value creation, and perceived value perspective, are highlighted. The better understanding of the relevant literature could largely benefit academic peer researchers on value creation. Moreover, the holistic review of the literature body efficiently identifies the knowledge gaps and outlines avenues for following scholars and facilitating high-quality development of the construction engineering industry.

Keywords: project value, construction engineering and management, service-dominant logic, CiteSpace software, literature review.

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1. Introduction

As an important strategic tool, a construction project is an important engine to promote high-quality economic and social development. As a fundamental way of social change, the success of one project does not depend on whether the results are delivered. It is about the value perception and value recognition of the deliverables by the relevant parties and the value that the deliverables create for the organisation and society after operation (Gil, 2021). However, many of the potential values of projects, such as great changes in health and safety behaviour, were not clearly understood and quantified at an early stage, resulting in insufficient budgets, increases in rework and claims, public distrust and a vicious circle of value destruction (Gil & Fu, 2022). Therefore, the topic of 'value creation' has been concerned by the leading institutions of project management and scholars worldwide. For example, Li et al. (2024) conducted a theoretical framework of megaproject stakeholder value network to reveal how megaproject value is created within stakeholders. Hjelmbrekke et al. (2017) outlined a new governance model that combines strategy and governance to described how value creation can be improved by project governance in construction projects. Based on the case study of Beijing Daxing international airport, Xu et al. (2022) explored how the project owner organization to realize value creation by governance strategies. Li et al. (2022) systematically identify the influencing factors of value creation of urban rail transit PPP projects in China. And three types of influencing factors, namely resources complementarity among stakeholders, cooperation environment, and partnership synergy were revealed.

The publications mentioned above can help researchers get a preliminary understanding of current research on value creation in the context of construction projects and contribute to an enhanced understanding of this top-

ic. However, previous articles only focused on a specific topic within value creation, and a holistic review on this target theme remains lacking. A comprehensive review could help researchers to capture the status quo and future trends of chosen topics, which may facilitate the following scholars not to repeat work already done, but to build on the work of others (Tsai & Wen, 2005).

Therefore, conducting a critical literature review specific to value creation within the context of construction projects is of great value to offer insights into how to deliver projects successfully, especially after the service-dominant logic was introduced in 2004. This logic has changed the research directions and narratives within service-related studies and affected management literature. Against this backdrop, the current study investigates the status quo and research implications of value creation in construction project settings from 2004 to 2022 with a combined bibliographic and bibliometric method. Specifically, three sub-objectives are addressed:

(1) To identify the publication trend of target topics during the selected period;
(2) To reveal the main contributors to these studies and their countries or regions;
(3) To illustrate keyword characteristics and research directions in chosen area.

2. Status quo of value creation in project settings

2.1. Concept of value in project settings

Value can be viewed as the 'benefit' of a project or its deliverables, relating to the direct output of the project, the subsequent results and the willingness of the client to pay for the deliverables (Bowman & Ambrosini, 2000). Pitelis (2009) defined value as 'the activities, products, and services generated by a project and required by potential beneficiaries'. Project value is the result of investment and the income generated from the cost invested in project management (Zhai et al., 2009). It can also refer to the implicit and explicit functions of the project, that is, the implicit and explicit functions that can satisfy stakeholders (Morris, 2013). Meanwhile, project value has two main characteristics; one is being multidimensional (Zhai et al., 2009). The value of a project is the result of the coordination and integration of the different values of many stakeholders. The other is being dynamic, that is, the value needs of the project stakeholders are not manifested at the same time. Along with the progress of project, the original requirements of certain participants may also change (Pitelis, 2009). Previous studies on project value were often limited to economic or financial analysis, but its connotation is constantly evolving, mainly in two aspects. Firstly, in addition to economic factors, it can also include broader aspects, such as business value, social benefits and technological development (Martinsuo et al., 2019). Secondly, publications have been concerned on a specific kind of projects, such as megaprojects. For example, Eweje et al. (2012) identified four types of strategic values of major oil and gas projects, namely, the value of participating parties, the achievement of HSE goal, the economic profitability of assets and significant socioeconomic contributions. Ojuri et al. (2023) explored social value for sustainable water supply projects and determined that social value, service ecosystems and value co-creation should be considered in sustainable construction projects. In summary, the concept of value in project context has been constantly evolving, expanding from the previous mainly focus on economic evaluation to multi-dimensional measurement.

2.2. Analysis of value creation in project settings

Over past decades, scholars have understood value creation from different aspects such as project success, benefit management, and value (engineering) management. For example, Morris (2013) indicated that project success included three pillars, of the first one is value. Previous scholars mainly considered project success indicators from short-term perspectives, such as meeting 'Iron Triangle' (time/cost/quality) criteria. However, recent research has made a consensus on the importance of the project front end for creating value (Ika, 2009). Project success is multidimensional and has a wide range of success indicators (Wang et al., 2022), which needs a complementary perspective, especially long-term perspectives. For example, the Sydney Opera House project, which contributes to a large sum of the tourism value of Australia, has now been regarded as a success in the long term.

Comparatively, research on benefit management has been more concerned regarding the measurement and performance of value outputs (Serra & Kunc, 2015). Research of benefit management primarily investigates the value outputs in the long term, which nevertheless ignored the implications of project value outcomes (Smyth, 2018). Another key section in literature is value (engineering) management. Whilst it generally considers the functionality of value inputs and outputs, it also emphasises achieving cost reduction (Smyth, 2015). Figure 1 illustrates briefly the differences and connections between outcomes, benefits and values in a typical project value chain.

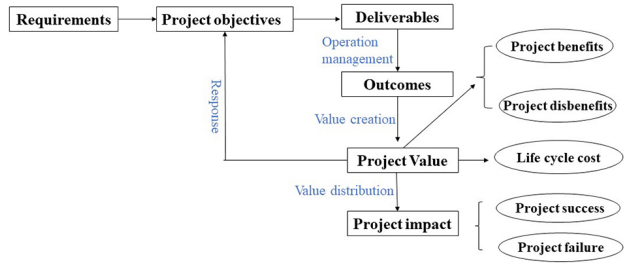


Figure 1. Brief illustration of project value chain in construction settings

2.3. Analysis of value creation under service-dominant logic

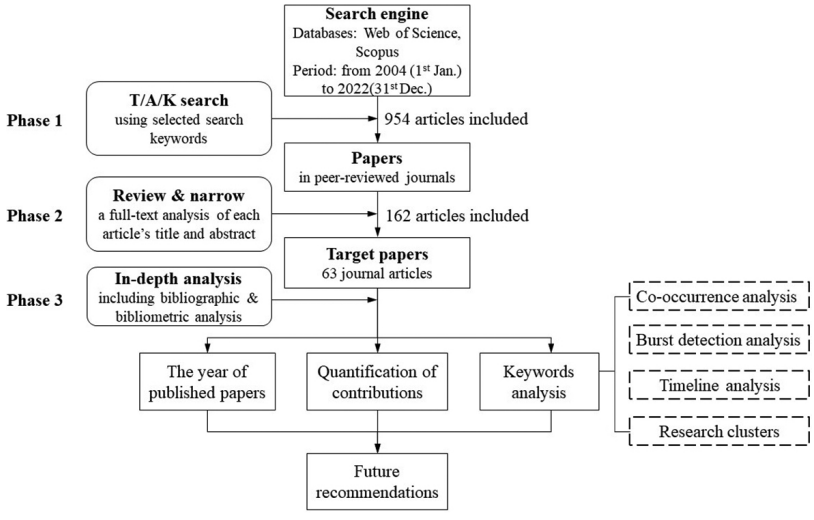
The new generation of information technology, represented by 'Internet of Things, cloud computing, artificial intelligence and big data', is driving great changes in the industry of construction and engineering management (Yang et al., 2023). One of the most important changes is that the construction industry is gradually shifting from goods-dominant logic (product-centric) to service-dominant logic (service-centric) (Vargo & Lusch, 2011). A paradigm was announced with the introduction of service-dominant logic, which was first published in 2004 by Vargo and Lusch (2004). In service-dominant logic, people and their skills and knowledge are considered the main sources of strategic value (Vargo & Lusch, 2016). Meanwhile, organisations pay considerable attention to the service-oriented evolution of resources, capabilities, collaborative development and value creation at the macro level (Lehtinen et al., 2019). The application of new technology transfers construction projects from the physical site to a space where virtual space and real world are integrated, expanding projects into a more open 'engineer–market–society' ecosystem (Yang et al., 2023). Under this circumstance, the role, status and resources of the client occupy an important position; thus, the ways and mechanisms of client participation have undergone subversive changes (Vuorinen, 2019). That is, the client has been transformed from an initial end user (consumer of value) to a co-participant in a network of value creation under service-dominant logic (Vargo & Lusch, 2004). For example, Chi et al. (2022) investigated the relationship between shared vision and value co-creation, and the critical factors that moderate it from the views of clients and main contractors in megaprojects. Liu et al. (2019) explored how client and market partners contribute to the co-creation of value at the front end of infrastructure development program. To date, research based on service-related literature gains momentum in project value research (Fuentes et al., 2019).

3. Research methods

This work used a structured method, which was suggested by He et al. (2019), to select and assess peer-reviewed journal articles on value creation in construction project settings published between the year of 2004 and 2022. As shown in Figure 2, the research process can be divided into three phases.

3.1. Selection of target academic papers

The authors conducted a comprehensive exploration in the field of construction projects via two commonly used databases, namely, Web of Science and Scopus which are typically adopted within construction management studies (He et al., 2022), because both two databases offer extensive bibliographic data and research material (Marzi et al., 2024). For selection in the two mentioned databases, the authors adopted the search keywords 'value creation' AND project OR projects, 'value create' AND project OR projects and 'value creating' AND project OR projects in the Title/Abstract/Keyword of the selected databases. The following three criteria were considered for target articles. Firstly, papers that are not directly related to construction projects, such as those on IT projects, were excluded. Secondly, we filtered articles published as editorial, book review, forum, discussion/closure, letter to editor, introduction, conference paper, comment, report and article in press. Thirdly, the content should focus on value creation. Afterwards, the authors got 954 articles after phase 1 in Figure 2, and by reading each article's title and abstract (directly related to value creation in projects), we got 162 articles after phase 2. Eventually, after reading full-length content (must directly focus on construction projects area), 63 target articles obtained. To cross-validate the reliability of data extraction, one of our co-authors who were not responsible for data collection and export is invited double check included and excluded by performing the same search process.



**Note*: T/A/K – Title/Abstract/Keywords.

Figure 2. Research framework

3.2. Contribution assessment

Analysing the major authors and academic institutes allows subsequent researchers to know whose articles to follow. A formula (shown in Eqn (1)) established by Howard et al. (1987) was widely used to quantify the contributions of authors from different countries (or regions) and institutes (or universities) in a multi-authored paper. In this study, we calculated author scores on the basis of author-list orders to quantify the contributions of authors and their institutes. Meanwhile, if one author with two or more origins, then the contribution scores were divided equally, which is a common way of dealing with such a problem (Wang et al., 2022).

$$\text{Score} = \frac{1.5^{n-i}}{\sum_{i=1}^{n} 1.5^{n-i}}, \quad (1)$$

where n is the number of authors in the article, and i is the order of a particular author. Table 1 shows the details of the scoring matrix for multi-authored articles.

3.3. Keyword analysis

Bibliometrics is a useful tool for exploring and visualising how keywords in a particular field of study are connected (Kamalski & Kirby, 2012). In this study, the CiteSpace 6.1.R6 software was adopted. Specifically, the authors calculated the frequency of a selected keyword and then ranked all keywords on the basis of their frequency. The detailed steps are as follows:

1. The authors imported 63 target articles into CiteSpace 6.1.R6 software for de-reprocessing.
2. The authors initially extracted a total of 362 keywords, of which the top 20 are shown in Table 2. Then, the authors carried out keyword co-occurrence analysis and selected time zone and threshold. The value of year per slice was set to 1, and the threshold was selected as top 50. The literature from 2004 to 2022 was analysed year by year in accordance with the time development order.
3. The authors ran the keyword co-occurrence analysis, burst detection and timeline analysis and generated the relevant figures.
4. The authors analysed the keyword co-occurrence network, burst detection list and timeline figure.

4. Results and discussions

4.1. Number of papers published annually

Figure 3 illustrates the annual number of publications related to value creation in construction projects, for a total of 63 peer-reviewed journal papers. An increasing trend generally occurred from 2004 to 2022, with the largest number in 2022 (12).

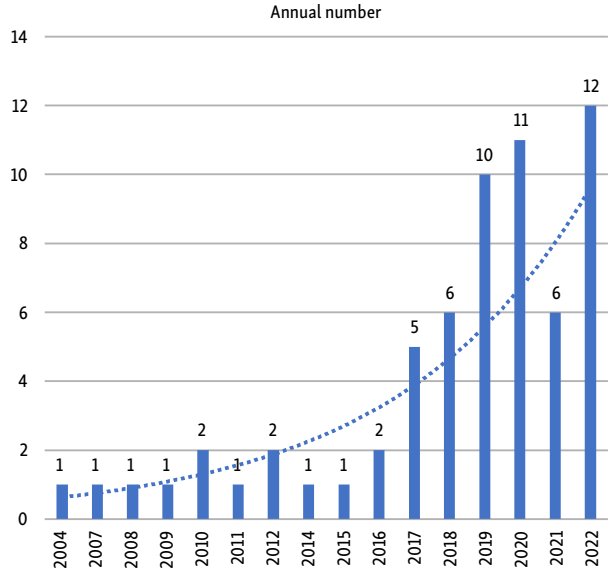
Table 3 shows a total of 30 different journals for published value creation articles within the context of construction projects. The listed journals with more than three

Table 1. Scoring matrix for multi-authored articles

	Order of specific authors				
Number of authors	1	2	3	4	5
1	1.00	–	–	–	–
2	0.60	0.40	–	–	–
3	0.47	0.32	0.21	–	–
4	0.42	0.28	0.18	0.12	–
5	0.38	0.26	0.17	0.11	0.08

Table 2. Identified high-frequency keywords (top 20)

Keywords	Frequency	Keywords	Frequency
value creation	20	infrastructure	5
management	15	social value	5
framework	11	strategy	5
model	11	success	5
project management	9	value management	5
construction industry	8	business	4
project	8	co creation	4
governance	6	impact	4
collaboration	5	information technology	4
construction project	5	stakeholder	4



Note: Data for 2022 were up to 31st December.

Figure 3. Annual publications in journal articles on value creation in construction project settings

target publications were *International Journal of Project Management* (11), *International Journal of Managing Projects in Business* (5), *Construction Innovation* (5), *Sustainability* (4), *Construction Management and Economics* (4), *Journal of Management in Engineering* (3) and *Built Environment Project and Asset Management* (3), which rep-

Table 3. Journals for published value creation articles in the construction project context

No	Journal	Total number	Percentage
1	*International Journal of Project Management*	11	17.46%
2	*International Journal of Managing Projects in Business*	5	7.94%
3	*Construction Innovation*	5	7.94%
4	*Sustainability*	4	6.35%
5	*Construction Management and Economics*	4	6.35%
6	*Journal of Management in Engineering*	3	4.76%
7	*Built Environment Project and Asset Management*	3	4.76%
8	*Project Management Journal*	2	3.17%
9	*Facilities*	2	3.17%
10	*Buildings*	2	3.17%
11	*Architectural Engineering and Design Management*	2	3.17%
12	*Automation in Construction*	2	3.17%
13	*Research in Transportation Economics*	1	1.59%
14	*Management, Procurement and Law*	1	1.59%
15	*Journal of the Knowledge Economy*	1	1.59%
16	*Journal of Environmental Management*	1	1.59%
17	*Journal of Engineering, Design and Technology*	1	1.59%
18	*Journal of Construction in Developing Countries*	1	1.59%
19	*Journal of Cleaner Production*	1	1.59%
20	*Journal of Construction Engineering and Management*	1	1.59%
21	*International Journal of Construction Supply Chain Management*	1	1.59%
22	*Industrial Marketing Management*	1	1.59%
23	*Engineering Sustainability*	1	1.59%
24	*Engineering Management Journal*	1	1.59%
25	*Energy Policy*	1	1.59%
26	*Engineering, Construction and Architectural Management*	1	1.59%
27	*Business Systems Research*	1	1.59%
28	*Applied Sciences*	1	1.59%
29	*Advanced Engineering Informatics*	1	1.59%
30	*Academy of Management Discoveries*	1	1.59%

resents nearly 55.56% of all selected papers. They were followed by five journals, namely, *Project Management Journal*, *Facilities*, *Buildings*, *Architectural Engineering and Design Management* and *Automation in Construction*, with two published articles. Others only had one publication in each journal.

4.2. Contributions of countries/ regions and authors

Analyses of the countries' or regions' contributions is of great importance to get a understanding of recent development of industrial practices that are confined to limited number of areas (Hong et al., 2012), given that the number of academic publications in a country or region can reflect which industrial practices in academic areas are progressing (He et al., 2019). Thus, the authors quantified contributions according to each author's contributions. Specifically, Eqn (1) was employed in the section of Research methods to quantify the scores and sum the final values of all researchers involved in selected publications.

Table 4 lists the research institutions with a final score greater than 1. This table shows the origins of publications as well as the information of institutions, researchers, involved articles and final scores. The Aalto University in Finland was the greatest contributor to target papers, with a score of 4 for nine researchers and four publications between the selected periods. By contrast, the University of Salford in the United Kingdom ranked last, with a score of only 1.21 for two researchers and one article. The research institutions listed in this table were from four countries and one region, namely, the United Kingdom (4), Finland (2), mainland China (2), Norway (1) and Hong Kong (1). Only one developing country, China, with two research institutions and six target articles, was identified in Table 4. This finding could indicate that the topic of value creation remains underexplored in developing countries compared with that in developed countries, such as the United Kingdom and Finland. Considering developing areas are emerging markets for huge investments in infrastructure (He et al., 2021), these regions should strengthen their research efforts in value creation.

Table 4. Research origins of published papers (with scores over 1)

No	Institutions	Countries/Regions	Researchers	Articles	Scores
1	Aalto University	Finland	9	4	4
2	University of Manchester	United Kingdom	4	4	3.21
3	Norwegian University of Science and Technology	Norway	7	3	3
4	Tongji University	Mainland China	8	4	2.09
5	University of Leeds	United Kingdom	8	2	1.84
6	The University of Hong Kong	Hong Kong	7	2	1.79
7	Shanghai Jiao Tong University	Mainland China	4	2	1.63
8	University College London	United Kingdom	2	2	1.6
9	University of Oulu	Finland	3	2	1.4
10	University of Salford	United Kingdom	2	1	1.21

Additionally, the authors analysed the research contributors of the selected articles, as shown in Table 5. By using Eqn (1), we calculated the score of each research and listed the top 10 in the table. Nuno Gil from the University of Manchester obtained the highest score of 1.6 with two publications during the study period, followed by Watts Greg, Hemanta Doloi, Markus Laursen, Fatih Eren and Marcos E.G. Fuentes, who received the same score of 1. These 10 researchers are all from developed countries. This could reflect the development imbalance between developing and developed regions.

4.3. Keyword analysis

(1) Co-occurrence analysis

Keywords are used as indicative proxy of studies that convey their research themes. Therefore, co-occurring keywords should be analysed to reflect the hottest research issues in one certain field. Thus, the authors developed a network of high-frequency keywords by CiteSpace software (Figure 4). A total of 229 nodes, 824 linkages and 0.0316 network density were obtained through co-occurring keywords. The high-frequency keywords generally presented a tight network structure. The node size represents keyword occurrence frequency, the lines represent the co-occurrence relationship between keywords, and the colours represent the year of occurrence (Chen, 2006). As presented in Figure 4, the keywords value creation, management, performance, model and framework occurred frequently. Amongst them, value creation, as the keyword with the highest frequency, had received continuous attention since 2016 (Lehtinen et al., 2019). Additionally, the pink ring outside the node represents the centrality of the corresponding keyword. The keywords value creation, model, design, construction and innovation have high centrality. These results would indicate that target articles discussed value creation often from design phase, construction innovation and so on forth. For instance, Jin et al. (2022) explored the latent mechanism underlying the relationship between knowledge input and output quality, and how create and appropriate value through innovation.

(2) Burst detection

Burst detection can excavate 'Citation Bursts' in the research field, that is, keywords that are used with a sudden increase in frequency in a certain period, indicating that the keyword is highly valued by researchers in that period. This analysis is used to detect emerging dynamic concepts and potential research questions, apply emerging trends and abrupt changes in the field of exploration and reflect active or frontier research nodes (Kleinberg, 2003). In this study, as shown in Figure 5, the five keywords with the highest burst intensity were 'social value', 'construction operation', 'stakeholder', 'value' and 'context', which reflected the sudden increase in researchers' interest in these keywords. The emergence time of 'value' was 2009,

Table 5. Top 10 researchers contributing to publications

Researchers	Articles	Scores	Affiliation	Location
Nuno Gil	2	1.6	The University of Manchester	The United Kingdom
Watts Greg	1	1	University of Salford	The United Kingdom
Hemanta Doloi	1	1	University of Melbourne	Australia
Markus Laursen	1	1	Aarhus University	Denmark
Fatih Eren	1	1	Konya Technical University	Turkey
Marcos E.G. Fuentes	1	1	University College London	The United Kingdom
Karlos Artto	3	0.96	Aalto University	Finland
Cara Mulhollanda	2	0.89	The University of Manchester	The United Kingdom
Hallgrim Hjelmbrekke	2	0.89	Norwegian University of Science and Technology	Norway
Antti Peltokorpi	3	0.82	Aalto University	Finland

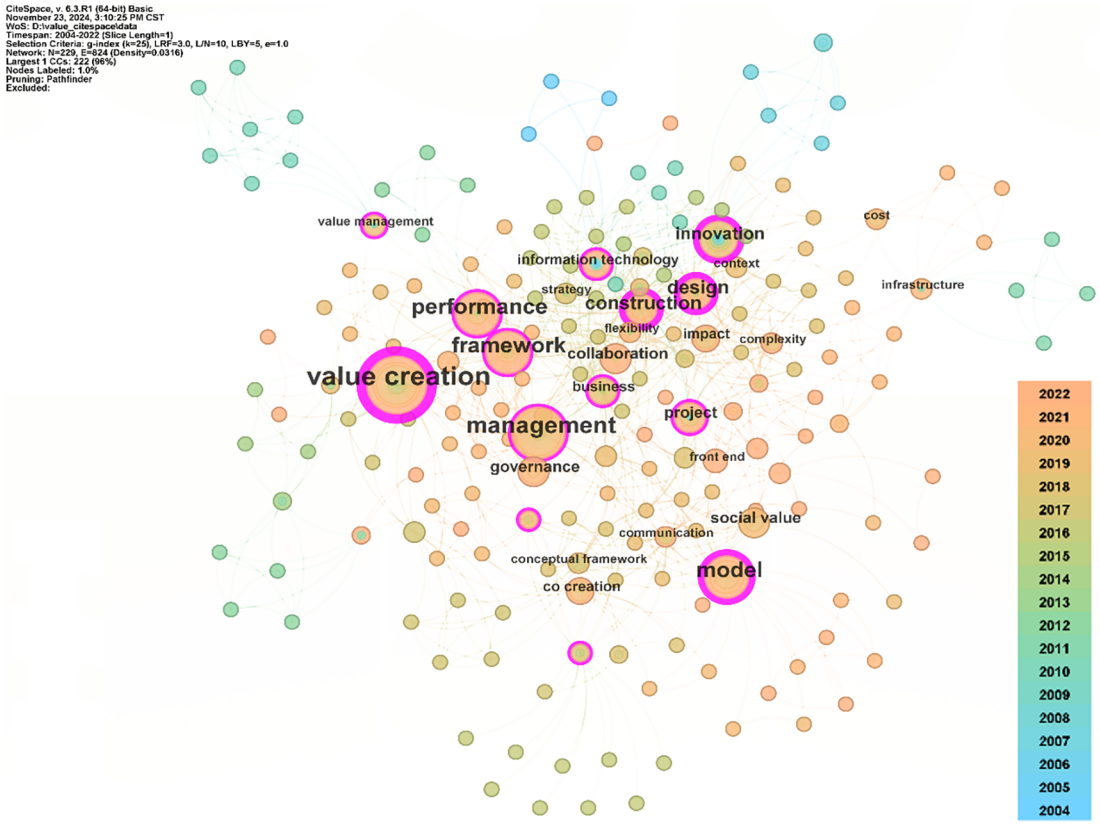


Figure 4. Analysis of co-occurring keywords

Top 20 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2004–2022
information technology	2004	1.04	2004	2010	
construction operation	2007	1.36	2007	2008	
value	2009	1.27	2009	2010	
stakeholder	2012	1.28	2012	2014	
business model	2014	0.97	2014	2017	
business	2016	1.21	2016	2019	
coordination	2016	0.97	2016	2018	
capability	2016	0.97	2016	2018	
corporate governance	2017	1.25	2017	2017	
conceptual framework	2017	1.17	2017	2017	
construction project management	2017	1.06	2017	2018	
information	2017	1.06	2017	2018	
context	2018	1.26	2018	2019	
project network	2018	1.2	2018	2018	
communication	2018	1.11	2018	2018	
impact	2018	0.98	2018	2019	
social value	2019	1.66	2019	2020	
nuclear decommissioning	2019	1.03	2019	2019	
governance	2019	1.03	2020	2022	
flexibility	2015	1.06	2021	2022	

Figure 5. Analysis of burst detection

and the emergence time of 'social value' was 2019 (Kristensen & Remmen, 2019), which represented the continuous research enthusiasm in the field of value and the continuous advancement and refinement of research focus. Additionally, in the past 5 years, the keywords 'social value', 'governance' and 'flexibility' (Ojuri et al., 2023) had emerged successively and become emerging research hotspots in the value creation research field. Taking the keyword of 'governance' as an example, Gil and Fu (2022) explored megaproject value creation from the perspective of organizational governance based on three cases. Ma et al. (2017) proposed a conceptual governance framework to reveal how to governance megaproject social responsibility effectively.

(3) Timeline analysis

To further clarify the development of the topic of value creation, the authors used the timeline function in CiteSpace software to analyse the time development trend of keyword clustering from 2004 to 2022. Figure 6 illustrates 10 lines of different sizes representing 10 keyword clusters. The nodes on the deep line represent prominent keywords in the development of the keyword cluster. The node size represents the frequency of keyword occurrence, and the connection line between nodes represents the co-occurrence relationship between different keywords. According to the timeline analysis, the development of research themes of value creation can be divided into three phases as follows.

Phase 1 (2004–2015): At this stage, the research keywords mainly included 'value creation', 'project', 'system', 'infrastructure', 'performance', 'stakeholder' and 'business model'. At this phase, scholars are more concerned about the relationships between value creation and performance, stakeholders and so on (Artto et al., 2016). However, except for the node of 'value creation', the other nodes were relatively small and sparsely distributed, indicating the initial exploration of the field of value creation by scholars.

Phase 2 (2015–2018): At this stage, several large nodes appeared, and the keywords ('management', 'project management', 'construction industry', 'collaboration network', 'framework') represented by these nodes appeared more frequently in studies. At this phase, scholars have shifted from focusing on the relationship between value creation and performance to exploring how project management methods can enhance value creation (Zheng et al., 2017). Moreover, researchers have also realized the network characteristics of value creation activities. Meanwhile, the node distribution in this stage was relatively dense, which reflected the importance and concentration of research in the field of value creation.

Phase 3 (2018–2022): The node size in this stage was smallest, mainly because the occurrence frequency of new keywords in the last 5 years was still small. These keywords included 'life cycle assessment', 'mega construction project' and 'mediating role'. At this stage, scholars began to explore value creation from the perspective of the entire life cycle, and also paid attention to the issue of value creation in megaprojects (Freelove & Gramatki, 2022).

(4) Analysis of main topics

In this study, the latent semantic indexing algorithm provided by CiteSpace was used for literature cluster analysis, and a keyword clustering map was generated. The value of modularity Q was 0.789, which was greater than the threshold of 0.3, indicating that the keyword clustering structure was significant and that the clustering effect was good. Additionally, the value of mean silhouette of 0.9273 was larger than the threshold of 0.5, demonstrating the good homogeneity of the clustering results (Li et al., 2017). As shown in Figure 7, the analysis obtained a total of 16 clusters, namely, value creation, social network analysis, public sector, information technology, system life cycle, stakeholder management, client communication, project stakeholder management, value opportunities, subcontracting, dysfunctional competition, outsourcing, ground-

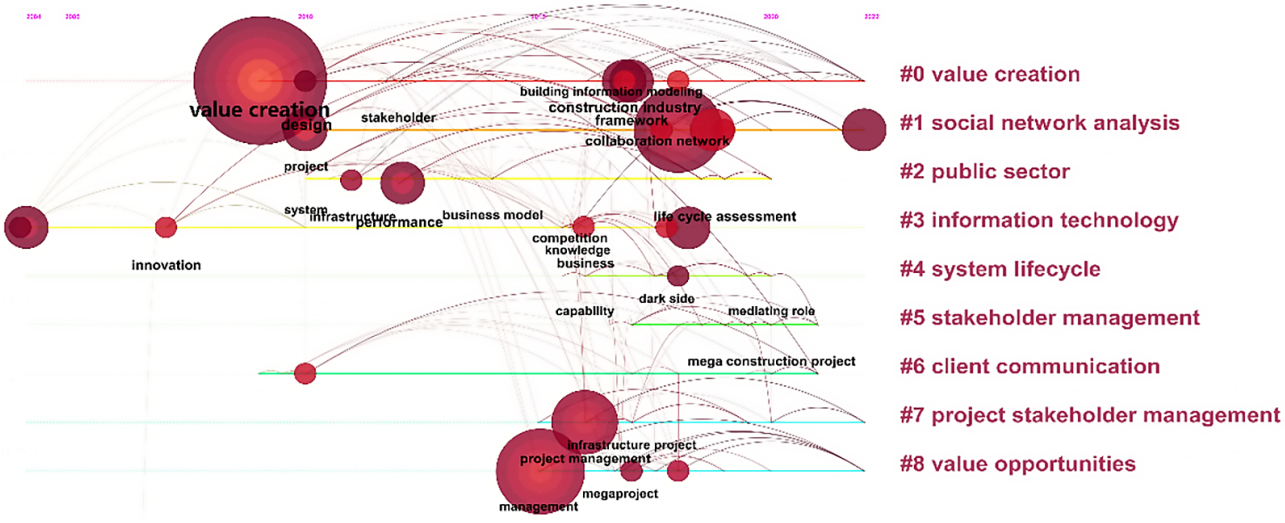


Figure 6. Timeline of keyword evolution

ed theory, construction contracts, early involvement and simulation. Taking the keyword of information technology as an example, Zheng et al. (2017) developed an benefit sharing model which considered sharing joint building information modelling benefits among stakeholders including designers, contractors, and clients for tracking moral hazards therein. And further revealed how this model contributed to value creation of construction projects. In Table 6, the number of papers in the cluster is indicated by 'Size', the homogeneity of papers in the cluster is represented by 'Silhouette', and the average publication age of papers in the cluster is illustrated by 'Mean(Year)' (Zhang et al., 2022). The closer the value of silhouette to 1, the better the clustering homogeneity and clustering performance (Li et al., 2017). As shown in the table, the cluster of value creation included the largest number of articles, and the average publication year of the cluster was 2017; hence, the major hot spots for value creation

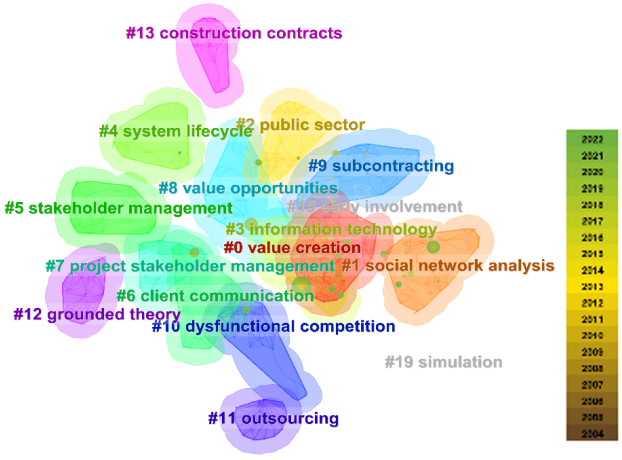


Figure 7. Cluster analysis of research topics

Table 6. Detailed information on cluster analysis

Cluster ID	Size	Silhouette	Mean (Year)	Theme (LSI)
0	46	0.864	2017	value creation
1	35	0.982	2019	social network analysis
2	30	0.958	2017	public sector
3	28	0.895	2013	information technology
5	26	0.894	2019	system lifecycle
4	26	0.955	2018	stakeholder management
7	23	0.898	2019	client communication
6	23	0.876	2015	project stakeholder management
8	22	0.908	2019	value opportunities
9	21	0.931	2013	subcontracting
10	20	0.946	2019	dysfunctional competition
11	18	1	2009	outsourcing
12	15	0.962	2021	grounded theory
13	14	0.967	2017	construction contracts
15	7	0.976	2020	early involvement
19	4	0.989	2019	simulation

gradually increased around 2017. Meanwhile, some topics mentioned both in the Figure 7 and Table 6, such as stakeholder management, public section, client communication, system lifecycle. It could indicate that the following scholars might pay attention on mentioned keywords for further research.

5. Future trends for value creation research

Based on the above results and analysis, value creation in the construction project setting is expected to be concentrated on the following four areas: value creation in developing areas, megaproject value creation, perceived value perspective and value creation throughout the life cycle. These four future research trends are discussed in the following section and summarised in Figure 8.

5.1. Value creation in developing areas

In the last two decades, a large amount of work has been conducted on value creation research in developed economics, such as the United Kingdom and Finland (Tables 4 and 5). However, the effort for increasing project value has not been sufficiently addressed in developing areas which have strong demands for project investment and construction (Caldas & Gupta, 2017); this insufficiency would lead to adverse effects on current construction practices. Moreover, the different social and cultural backgrounds that varied by project regions could bring about errors in the application of value creation-related theories or may need region-specific strategies. For example, construction projects in China, especially large-scale and mega-sized projects, are under the typical co-effects of 'governments and markets' (Li et al., 2018). One of the advantages is that projects are warranted to be undertaken with centralised leadership and high efficiency. This situation very differs from that in western economics. As such, implications for future research in this aspect include identifying strategies for improving project value in developing areas and further enhancing the effectiveness of established strategies. Research can also be conducted to identify differences in the dimensions of created value in developed and developing economies and so on forth. The research mentioned above can not only guide the practice of value creation but also enrich the theory of value creation in the construction project setting.

5.2. Value creation research in megaprojects

Projects have high importance to the growth of worldwide economy growth. As estimated by McKinsey, US$,3.7 trillion per year should be invested in projects to meet societal demands worldwide (Fuentes, 2019). Meanwhile, megaprojects are highly different from normal-sized projects, such as in terms of huge investment, multiple stakeholders and long life cycle, which could result in increasing difficulties and uncertainties in value creation. Most of current publications on value creation in construction pro-

ject settings focus on normal-sized projects, and research specified on creating value in large construction projects is still limited. Thus, scholars are welcome to emphasise value creation within the field of megaprojects in their future research. Considering research on the megaproject value is still on its early stages (He et al., 2021), fundamental studies including dimensions or criteria that indicate megaproject value, the effectiveness of megaproject governance strategies for value creation and driving paths of megaprojects' value creation should be highlighted to improve the development of megaprojects based on value creation thinking.

5.3. Public perceived value perspective of promoting high-quality development of value creation

As the 'clients' (end users) of such projects, the public's value perception and value recognition of the delivered outcomes are the key criteria for judging the high-quality development of the projects. Current scholars have paid attention to the public as stakeholders in value creation and carried out research focused on social value (Figure 4 and 5 referred to social value, and Figure 6 and 7 all mentioned keywords of client communication as well as stakeholder management). However, existing research mainly analysed the economic and social value of projects via objective analysis to win the public's support. Limited studies exist on the perceived value based on the subjective perspective of the public. Studies on the public's perceived value may provide a powerful perspective for improving the level of value creation.

Additionally, the new generation of information technology enables construction projects to move from the former physical site to a situational space where the virtual space and the real world are integrated, which greatly breaks the closed boundary of construction projects. The digital environment is also driving the mobile, social and personalised development of public behaviour. In this case, the role, status and resources of the public occupy an important position, and the public has changed from the initial end users (consumers of value) to co-participants in the value creation network. Hence, as the public becomes increasing important in the value creation network, the public's perceived value should also be paid attention to. Future research topics can cover dimensions of public's perceived value of construction projects, critical factors of public's perceived value, influence mechanism of public's perceived value on the effectiveness of value creation and strategies for improving public's perceived value. Mentioned topics could broaden the value creation research and deepen participants' understanding of construction project value from the perspective of perceived value.

6. Conclusions

This research provided a comprehensive analysis of the development, state of the art, and future directions of value creation in the context of construction projects. Specifically, it contained a total of 63 peer-reviewed journal articles from 2004 to 2022, summarised the status quo of selected field of research and put forward three implications for future considerations. The main research results of this study are as follows:

Firstly, the *International Journal of Project Management, International Journal of Managing Projects in Business, Construction Innovation, Sustainability, Construction Management and Economics, Journal of Management in Engineering and Built Environment Project and Asset Management* were found to be the dominant journals on the value creation research (accounting for over 50%). Most published articles originated from the developed economies, such as the United Kingdom, Finland and Norway. However, the developing areas with active construction activities made relatively less contributions to target research presently. Secondly, the co-occurrence analysis showed the keywords value creation, model, design, construction and innovation have high centrality. And burst detection and timeline analysis by the CiteSpace software uncovered that the keywords such as megaproject, governance, social value and co-creation were emphasised in the recent 5 years. Meanwhile, according to the cluster analysis, a total of 16 clusters, including value creation, social network analysis, pub-

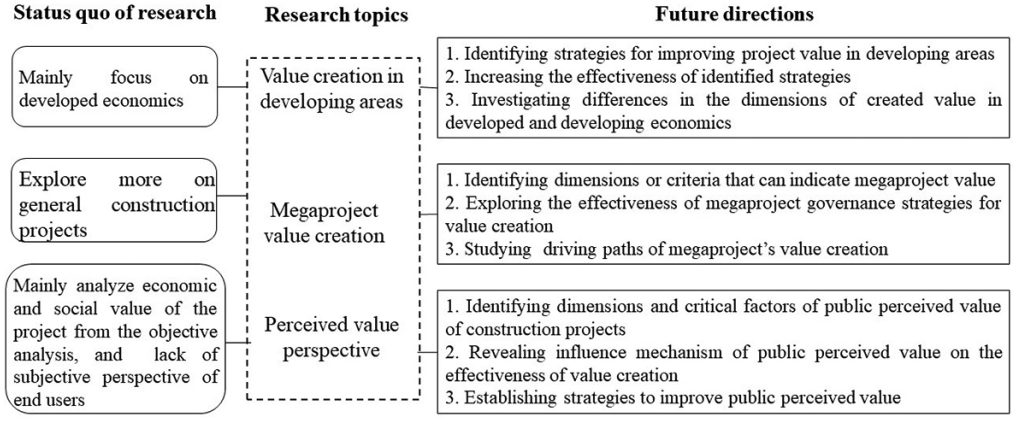


Figure 8. Recommendations in value creation research within the context of construction projects

lic sector, information technology, system life- cycle,etc., were identified. Based on the state of the art, we proposed future agenda that suggests three avenues: (i) value creation in developing economies; (ii) studies in the megaproject context; and (iii) promotion of the high-quality development of value creation from public perceived value perspective.

This work sheds light on the current state of value creation in construction projects and benefits studies that across theoretical sciences and project industry. Moreover, the identified research implications may enable scholars and construction practitioners to further explore the potential issues in value creation research to accelerate the development of value creation in academic and practice. For example, following scholars could enrich the theory of value creation by focusing on the megaproject setting and view of public perceived value. Besides, future research concentrating on the developing areas would help decision-makers to set up effective strategies to improve project value in such regions.

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The authors report there are no competing interests to declare.

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