

## A META-ANALYSIS OF THE PUBLIC-PRIVATE PARTNERSHIP LITERATURE REVIEWS: EXPLORING THE IDENTITY OF THE FIELD

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**Abstract.** The growing literature in PPP has made the field multi-disciplinary, over-differentiated, and unconsolidated. Taking a meta-analysis lens, this study investigates an unexplored identity of the field. It consolidates 61 review articles in PPP, analyses them across numerous review categories, and provides implications and suggestions for future studies. The review categories include the purpose of study, methods used, dataset details, journal and author details, primary disciplinary focus, awareness of previous review studies, and evolution of the PPP review literature. The findings reveal that the literature progressed through four evolution phases: from initiation, formation, growth, to expansion. Future review works should involve more empirical studies and examine the practical relevance of the PPP research. Promising areas are PPP governance, complexity, post-transfer phases, sustainability-related issues, and real estate development through PPP. The PPP researchers in construction engineering and management, property management, public management, and transportation will benefit from understanding the field's identity, how it is currently being formed, promising areas, and where the literature is evolving.

**Keywords:** discipline identity, infrastructure projects, literature review, meta-analysis, property development, public-private partnerships, scientometrics.

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### Introduction

Global applications of public-private partnerships (PPP) to deliver public infrastructure and services have substantially increased over the past three decades. The popularity of PPP is observed in most of the developed, developing, and emerging markets (Osei-Kyei et al., 2017; Pu et al., 2021; Yang et al., 2013; Zhang et al., 2016). Some countries have chosen this procurement approach due to budgetary pressure and inefficient public involvement, while others have hailed it for operational efficiency and more active private participation (Chowdhury et al., 2011; De Marco et al., 2017; Osei-Kyei & Chan, 2016; Zhang et al., 2020). As a procurement approach, PPP has shown to be effective for developing all types of strategic properties, including land, residential, commercial, and industrial real estates (Garrett & Kate, 2014; Gupta & Tiwari, 2022). Also, the interest in PPP applications has increased due to the need to renovate outdated or own underutilised properties that, otherwise, could be less efficient by public authorities themselves (Garrett & Kate, 2014; Guarini et al., 2021).

Moreover, growing needs in public infrastructure are critical for global economic growth and sustainable development, e.g., achieving the UN's Sustainable development goals (United Nations, 2015).

Such popularity of PPP and the increasing need for private participation in public infrastructure development have proliferated the research into the field. Over the last decade, the PPP literature has both increased in quantity and improved in quality. In terms of quantity, it is published in a variety of journals and originates across multiple disciplines, resulting in a substantial increase in its academic publications. Both PPP-centric journals and multi-disciplinary outlets represent this variety. The research in the field emerged from a few disciplines like *Construction Management and Economics (CME)*, *Economics (EC)*, and *Public Administration and Management (PAM)* (Hodge & Greve, 2007; Ke et al., 2009; Kwak et al., 2009; Wang et al., 2018). In terms of quality, the literature has improved in its impact and research rigour. The PPP scholars address topics with more advanced methods demonstrating the research depth

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and offer solutions to the growing practice of PPP showing the breadth of their research applications (Chen et al., 2016; Cruz & Marques, 2014; Cui et al., 2018; Marsilio et al., 2011; Osei-Kyei & Chan, 2018; Roehrich et al., 2014).

The key findings of the above seminal review-type studies imply the existence of the identity of the PPP field and its dynamic evolution. The identity in this study is defined as a central construct of a research field that characterises its key, distinct, and unique aspects (Serenko, 2013; Sidorova et al., 2008) such as research purposes, theories, methods, practices, publications, researchers, and institutions. Understanding the identity helps to cumulatively portray the field's current state and model its further development (Harty & Leiringer, 2017; Kuhn, 1962; Raadschelders, 2010). In this regard, the PPP field has evolved by contributions from multiple disciplines with their associated theories, methods, and problem areas (Narbaev et al., 2020). Its literature is represented by articles from 395 academic journals (Shi et al., 2020), with the majority in CME, PAM, and *Transportation Research (TR)* journals. The field has collaboration networks of leading institutions (Shi et al., 2020), comprises its research domains (Narbaev et al., 2020; Torchia et al., 2015), and attracted recognised scholars from different disciplines (Marsilio et al., 2011; Song et al., 2016).

Dozens of such review studies are available in the PPP literature. They have been conducted to review specific topics, intellectual core, authors, journals, practical relevance, and future research in the field. As part of this broader literature review research in the last decade, scientometric studies have also been growing. Regarded as a science about science (Price, 1963), scientometrics is invaluable in accurately representing past scholarly contributions and illustrating a future roadmap for a research field (He et al., 2017). It assists in measuring and analysing a scientific field from a meta-perspective (Van Raan, 1997) and supports the development of a research field.

However, despite such expanding review research in PPP, this study will show that the identity of this field remains largely undiscovered. The existing review literature lacks consolidation as most of such studies are discipline-specific or have been performed in isolation. Also, the field has become genuinely multi-disciplinary but suffers from over-differentiation with contradictory findings across multiple disciplines. This is because an individual review (scientometric) study aims to investigate a specific aspect of a research field (e.g., topics, problems, journals, practical relevance) and, as a result, it reveals a single attribute of its identity. A review of labour productivity in CME (Yi & Chan, 2014), social network analysis applications in construction project management (Zheng et al., 2016), and sustainability indicators (Qasim, 2017) are some of many examples of such reviews. On the contrary, a meta-analysis consolidates findings from prior studies to form an in-depth understanding of the field's identity. A meta-analysis is used as a type of literature review that integrates primary research results with the aim of proposing state-of-the-art and a future research agenda (Sartal et al., 2021). It allows a researcher to consolidate evidence

across multiple studies investigating similar concepts or relationships around one phenomenon (Combs et al., 2018). Therefore, this work defines a meta-analysis as the analysis of analyses (i.e., review of reviews) to integrate research findings and it covers review results (Glass, 1976).

Therefore, the current study aims to perform a meta-analysis of the literature review studies in PPP to consolidate such studies, better understand the identity of the field, and provide suggestions for future review studies. It is noted that, given the purpose of the study, the terms review and scientometric, as a type of research, are used interchangeably.

The remainder of the paper is structured as follows. Next, it presents the methodology with the data collection and review categories. Then, the study analyses the results across each review category. In discussions, the study elaborates on numerous implications on the current identity of the PPP review literature, provides suggestions for future review studies, and highlights main research directions in the field. Lastly, the study concludes with a summary of the work, research limitations, and contributions to the research community.

## 1. Methodology

### 1.1. Articles collection and screening

The methodology of the study included 3 main stages with their description and results presented in Table 1. The methodology, including its approach to searching for the articles, defining the review categories, and examining the collected articles, has been used in similar studies (Agi et al., 2021; Serenko, 2013; Seuring & Müller, 2008). In Stage 1, the study conducted a comprehensive search and collection of the review articles in the following steps.

*Step 1. A search in Scopus.* An initial search for the literature review studies in PPP was performed in Scopus. First, on its advanced search string, the search was performed using terms such as “public-private partnership(s), PPP, private finance initiative, PFI, build-operate-transfer, BOT”. Second, in order to get closer to locating “literature review” articles, the search was further delimited using review-related terms such as “analysis, evaluation, assessment, content analysis, review, ranking, trend, growth, productivity, citation collaboration, intellectual structure, state-of-the-art, discipline, field, literature, area, visualisation, mapping, scientometrics, bibliometrics”. This initial search resulted in a list of 887 articles. Then, the study routinely assessed the details of these articles that included reading their abstracts, keeping trusted journals, reading the full text of the articles, and disregarding the articles which reviewed PPP applications in a single country/region (not reviewed an attribute which portrays the identity of the research field). Also, the study excluded the articles which were not reviews (a literature review was not the main purpose of a study) or were non-PPP articles (e.g., when PPP meant “purchasing power parity”, BOT meant “internet bot”, etc.). This assessment resulted in 46 articles.

Table 1. Methodology of the current study

Stages	Description and result
1. Articles collection and screening	<p>Step 1. A search in Scopus: defining search terms to source articles published in peer-reviewed journals during 2001–2020 and in English; sourcing of articles (resulted in 887 articles); applying the routine assessment to screen 887 articles (resulted in 46 articles)</p> <p>Step 2. An additional search in PPP-centric journals: searching for new articles in the PPP-centric journal defined in the recent studies; applying the routine assessment from Step 1, screening the tables of content of the journals' issues (resulted in 5 additional papers)</p> <p>Step 3. An additional search with snowballing (backward and forward): applying snowballing search to the articles identified in Steps 1 and 2; applying the routine assessment from Step 1 to the snowballing search (resulted in 10 additional papers)</p> <p>Result: The final list of 61 review studies in PPP</p>
2. Defining review categories	<p>Examining available review categories from the literature (deductively); defining the relevance of the review categories to the current study by reading 61 articles (inductively)</p> <p>Result: The following 7 review categories (purpose of study, methods used, dataset details, journal and author details, primary disciplinary focus, awareness of previous review studies, evolution of the PPP review literature with major findings)</p>
3. Conducting articles evaluation	<p>Reading and analysis of the 61 articles against the 7 review categories</p> <p>Result: Numerous implications on the current identity of the PPP review literature, considerations for future review-type studies, and main research directions in the field</p>

### Step 2. An additional search in PPP-centric journals.

The study performed an additional search in all issues of the journals, which were identified as major PPP-centric outlets by the recent studies. This included 22 journals identified as ones with multiple PPP articles by Wang et al. (2018), 70 journals identified as publishing the most PPP articles and receiving the most citations by Narbaev et al. (2020), and 16 journals identified as publishing the most PPP articles by Shi et al. (2020). All these journals were indexed in Scopus, and the majority of their articles were found in Step 1 above. Therefore, the purpose of the current step was to find new articles by screening the tables of contents of the journals' issues and applying the routine assessment from Step 1. This process returned 5 additional articles.

*Step 3. An additional search with snowballing (backward and forward).* A snowballing search approach refers to using references of an article (going backwards to find prior articles) or citations to this article (going forward to find later articles) to identify additional articles for a literature review study (Wohlin, 2014). It is often used as an additional technique to the database-based search approach and has been applied in similar studies (e.g., Meng & Lu, 2017; Oraee et al., 2017; Padalkar & Gopinath, 2016). First, using backward snowballing, the study examined the references of all articles identified in Steps 1 and 2. Second, using forward snowballing, the study examined all studies which cited the articles identified in Steps 1 and 2 using citation information in GoogleScholar. The routine assessment in Step 1 was also used in the current step resulting in 7 and 3 new papers from the backward and forward snowballing, respectively.

Overall, the final list included 61 review studies in PPP. Supplementary material presents this list in chronological order. Next, in Stage 2 of the methodology, the study used these articles in developing the review categories and, in Stage 3, analysed them against the identified categories.

### 1.2. Defining review categories

To determine the review categories (Stage 2 in Table 1), the paper used a mix of deductive and inductive approaches. The deductive process was applied to select the categories which represented common structural components of a review study. For this, similar review studies from the management area were examined whose purpose was to review literature or reveal the identity of a field (Agi et al., 2021; Kumar et al., 2020; Pollack & Adler, 2015; Serenko, 2013). In pursuing this, the study also consulted seminal studies on how to write literature reviews (Denney & Tewksbury, 2013; Seuring & Müller, 2008; Van Wee & Banister, 2016). Then, an initial set of the categories, adapted from these studies, were evaluated as to their relevance to the PPP review literature. For this, the inductive process was used, which implied reading of the 61 articles to verify this relevance. This process continued until all articles in the dataset were reviewed and stopped when it became clear that identified categories were enough for describing the collected articles from the meta-analysis perspective. Overall, using such deductive and inductive approaches to defining the review categories implies the comprehensiveness of the current study's methodology that has also been applied in similar research (Serenko, 2013; Seuring & Müller, 2008).

As a result of this stage, 7 review categories were identified, presented in Table 1. Concerning the categories *purpose of study* and *methods used*, since an article may set more than one purpose or apply several methods, this study used all purposes (Table 2) and methods used (Table 3) per each article. Regarding the category *dataset details*, per an examined article (if applicable), the study defined the number of sources reviewed by the article, the review period covered, keywords used to search for sources, and databases used to collect the sources. The category *journal and author details* aimed to define the

Table 2. Purpose of the literature review studies in PPP

Purpose of review	Description
Specific area	Review of certain concepts in PPPs (the focus is on reviewing specific area or topic, not the entire field)
Intellectual core	Review of the state, structure, and trends of the entire PPP field
Author research	Analysis of productivity, impact, and ranking of PPP scholars, their institutions, and countries as well as their collaboration patterns
Journal research	Analysis of productivity, impact, and ranking of journals publishing PPP research
Practical relevance	Review of the impact and applications of the academic research on the practice of PPP
Future research	Review of research avenues and future development of the PPP field as one of the main objectives of the study

Table 3. Methods used by the literature review studies in PPP

Methods used	Description
Conceptual review	A review of literature, as well as results and findings reported in the paper, are based on the subjective experience or opinion of an author. Often, they are not supported by prior research or empirical evidence
Content analysis	Analysis of a title, abstract, and full-text of prior studies (excluding keywords) which is mostly inductive
Narrative review	A review of literature without following a distinct data collection and review approach. Most of results and findings are presented narratively from a theoretical or contextual point of view, but based on the analysed literature. An approach for data collection is not applicable or not reported in the paper as in the case of the content analysis or systematic review
Systematic review	Systematic literature review of prior studies. The approach for data collection and analysis mostly follows a preset deductive approach
Counting techniques	Count of journals, articles, authors, their institutions, and countries
Citation analysis	Evaluation of references to prior studies including co-citations to external papers and within select papers
Keyword analysis	Analysis of keywords of publications (excluding title, abstract, and full-text analysis) and use of word-frequency techniques
Network analysis	Use of mapping and visualisation techniques to produce research networks and clusters

most productive journals and authors in the review literature. The productivity of authors was based on the approach by Howard et al. (1987), which is widely used to rank the contribution of scholars to a multi-authored article (Akomea-Frimpong et al., 2021; Tsai & Wen, 2005). Based on the order of authors in a paper, the approach assigns different weights to multiple authors. The first author receives a higher weight than the second one, and so on. The sum of all author weights in a multiple-author paper is equal to 1. For a single-author paper, the author receives a score of 1. PPP as a field of study is multi-disciplinary (Hodge & Greve, 2017; Kwak et al., 2009) and its research interests stem from multiple disciplines, among which the following constitute its body of knowledge: CME, EC, PAM, TR, and *Healthcare Management (HCM)* disciplines (Ke et al., 2009; Kwak et al., 2009; Wang et al., 2018; Narbaev et al., 2020). Therefore, the category *primary disciplinary focus* was used to reveal the distribution of the purposes and methods used in the collected literature across these 5 disciplines. Review studies serve the purpose of analysing past research, explore the current state-of-the-art, and suggest future directions for the development of

a particular field. To propose such reviews with originality and novelty, scholars are expected to be aware of previous review studies similar in purpose (as per Table 2), objectives, and primary disciplinary focus. Therefore, for the category *awareness of previous review studies*, the paper examined the references of all articles published after 2002 (the first review paper appeared in 2001) to determine whether they cited prior relevant articles in the dataset. The studies which employed the conceptual review method (as per Table 3) were not considered under this review category. Lastly, for the category *evolution of the PPP review literature*, the study analysed the major findings from each article. This, then, was checked against the results from the other categories in this study. For example, the categories *purpose of study* and *methods used* in the past studies, when analysed over 2001–2020, help depict the overall progression of the PPP review literature. This, in turn, contributes to revealing the identity of the field. Since the two categories were analysed by the 5-year timeframe, the evolution is also analysed by this timeframe. To posit the progression logic, each timeframe represents a phase in the evolution of the PPP review literature.

## 2. Results and analysis

### 2.1. Purpose of study

Figure 1 shows the distribution of the purposes of these articles and their evolution over the analysed period. Studies on journal research and author research (aimed at evaluating productivity, impact, and ranking of journals and authors, including their affiliations and countries) appeared in the PPP field in 2009 (Ke et al., 2009) and steadily increased since 2014 (Liu et al., 2014; Roehrich et al., 2014; Wang, 2014). The reviews with a purpose to investigate a specific area (topic) within the PPP field and future development of the entire PPP field appeared in 2001 (Tanczos & Kong, 2001) and 2010 (Tang et al., 2010), respectively. These two purposes, together with the purpose of the intellectual core, have been growing since 2016. Unlikely, the research on the practical relevance of the PPP literature did not attract much attention from the research community. It appeared in 2001 (Widdus, 2001); the earliest purpose in the PPP review literature but did not evolve in size compared to the review studies with other purposes.

### 2.2. Methods used

Regarding the methods employed in the literature (Figure 2), the citation analysis, content analysis, keyword analysis, counting techniques, and systematic review are ones that appeared in the literature in 2009 and have been

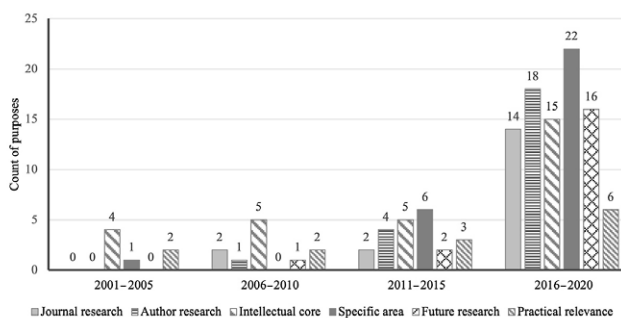


Figure 1. Distribution of purposes of the literature review studies in PPP over 2001–2020

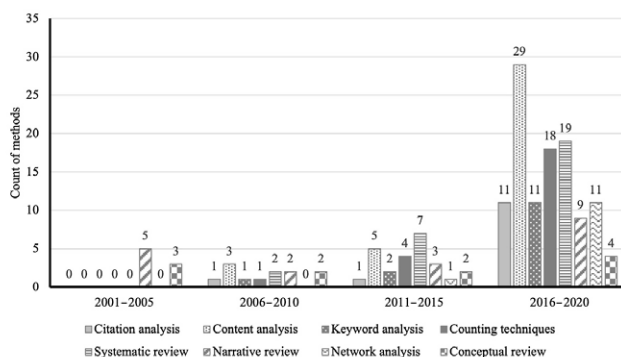


Figure 2. Distribution of methods used in the literature review studies in PPP over 2001–2020

growing in applications since 2014–2018. The network analysis method, which involves mapping to build and visualise networks and clusters, is the most recent in the field (first appeared in Marsilio et al. (2011) and has been gaining popularity since 2016 (Song et al., 2016; Ullah et al., 2016). The studies with narrative review and conceptual review methods are the earliest works that did not grow in size, with 0–2 papers per year over the analysed period.

### 2.3. Dataset details

In this category, out of the 61 literature reviews, 8 used Scopus to collect their data, 11 – Web of Science (WoS), 4 – journal homepages directly, 3 – other single sources (or publishers), and 16 – combinations of multiple databases (including Scopus, WoS, and GoogleScholar). The remaining 19 studies (mostly with narrative or conceptual review methods) did not indicate or use such databases. 41 works out of 61 indicated the number of records reviewed; a total of 15,854, an average of 387 per a relevant article, encompassing the period of 1962–2020. In addition to the generic keyword “public-private partnership”, the keywords used to source articles differ across the disciplines. Reviews from the perspective of CME or TR discipline employed more sector-specific terms such as “build-operate-transfer”, “public or private infrastructure”, “highway public-private partnerships”. Studies investigating the PPP field from the perspective of ED or PAM discipline used additional terms such as “public-private partnerships”, “public-private collaboration”, “private finance initiative”, and “government-business partnerships”. The review works with the HCM focus used such additional terms as “product-development partnership” and “public-private mix”.

### 2.4. Journal and author details

The 61 studies were published in 40 journals and 12 of them published more than one review article (Table A1 in Appendix). Broadly, in terms of research focus, 5 groups of journals can be identified: 16 in construction and project management (with 30 papers), 8 in public administration and management (with 12 papers), 8 in economics and business management (with 10 papers), 4 in healthcare management (with 5 papers), and 4 in transportation research (with 4 papers). This corroborates with the statement that the research in PPP emerged from the CME, EC, and PAM disciplines (Hodge & Greve, 2007; Ke et al., 2009; Kwak et al., 2009; Wang et al., 2018); the groups that are also the most influential, receiving the majority of citations. However, the overall publication trend of the PPP review literature shows the growing interest also in the HCM and TR disciplines, especially in the last few years.

In terms of authors, the dataset is represented by 150 authors and 177 authorship appearances (2.9 authors per article). Table A2 in Appendix lists the most productive authors found by the approach of Howard et al. (1987). The most productive scholar has a score of 2.17

(i.e., co-authored 8 two-author to five-author papers with varying orders in these papers), while the least productive author has a score of 0.08 (i.e., co-authored only a single five-author paper with the fifth order in the paper). The study observes that the listed authors have contributed significantly to the review (scientometric) literature in PPP.

## 2.5. Primary disciplinary focus

Most of the collected articles reviewed the PPP literature from the perspective of the CME discipline (18 papers), HCM and TR discipline (7 papers each), PAM discipline (6 papers), EC discipline (3 papers), and 20 articles offered multi-disciplinary reviews.

In terms of the category *purpose of study*, notably, most reviews in CME aimed to analyse productivity, impact, and ranking of journals and authors, including their institutions, countries, and collaboration patterns (journal research and author research as a purpose of study). The PAM scholars investigated mainly the state, structure, and agenda of the PPP literature (the intellectual core), while articles in TR and HCM mainly addressed practical applications of PPP (the practical relevance). The papers in EC reviewed specific topics and concepts within the PPP field like financial analysis, modelling economic and social returns (the specific area), whereas the multi-disciplinary studies had a mix of purposes. In terms of the category *methods used*, most studies in CME, TR, and EC employed citation analysis, keyword analysis, and network analysis. At the same time, reviews in PAM and HCM were also notable for employing (more subjective) narrative review and conceptual review approaches.

## 2.6. Awareness of previous review studies

Overall, the majority of the articles were unfamiliar with previous relevant reviews in PPP. Based on the reference count of the examined articles, out of 282 possible citations to the prior articles in the dataset, the study located only 65 citations. On average, this is a citation to 1.5 articles out of 6.4 potential, the portion of 23.0%. Out of 44 available articles for this analysis, 17 cited none and 12 cited only one article from the dataset.

The awareness weight (cited references versus potential references) of the prior review studies across the disciplines varies, with an average of 17.6%. The highest weight had the studies with the multi-disciplinary focus, 27.4%. The scholars in the CME, PAM, and TR disciplines cited 21.0–25.0% of the prior works. Regrettably, the articles with the HCM focus cited 7.1% and the ones with the EC focus cited none of the previous review studies from the current dataset. Regarding the awareness weight across the category *purpose of studies*, the reviews with the journal research, author research, intellectual core, and future research have above-average weights of 28.0–33.0%, the specific area – 20.9%, and the practical relevance – 11.5%.

Also, the study acknowledges that not citing previous review articles may not be a result of unawareness.

Therefore, the paper counted citations to *relevant* articles only, those similar in purpose and primary disciplinary focus. For example, for the article aimed at analysing journals and authors in the entire PPP field focusing on the PAM discipline, the paper considered citations to previous articles with the same purpose, similar objectives, and in PAM only. However, if the prior article's purpose was to review a specific area (e.g., risk management) and from the TR perspective, then such an article was considered irrelevant and excluded in this example.

## 2.7. Evolution of the PPP review literature with major findings

Figure 3 presents the 4 phases in the evolution of the review research in PPP. Overall, the research into PPP emerged with interest in the PFI-type arrangement in the early 1990s and the first review studies appeared in the early 2000s.

Decade-long accumulated literature was enough for the scholarly community to initiate the review research in this field, marking Phase I (*Initiation of the PPP review research*, 2001–2005). A few studies with the focus on the intellectual core (the first questioning of the PPP phenomenon), specific area (the first review of risk management in the field), and practical relevance (the first review of the benefits of PFIs in healthcare) are representatives of this period. They agreed in their findings that the (so-called) PPP, as a public procurement approach, was still young for design and delivery of public facilities (Akintoye & Chinyio, 2005; Bovaird, 2004; Widdus, 2001). This procurement scheme was generally viewed as a social experiment compared to established traditional procurement. Also, the evaluation of the state and trends in PPP was restricted mainly to project-level performance issues and the review of organisation-level governance and broader social value issues had yet to come. The scholars in the HCM discipline and those from other disciplines but exploring healthcare type projects were pioneers to judge the relevance of the accumulated knowledge to practice and how practitioners can benefit from them. In this respect, risks and risk management techniques to tackle PPP healthcare problems, mainly in the United Kingdom (UK) and Western Europe, were among the first topics to review. The body of knowledge was not large enough in size to come to the use of advanced review methods and computer tools. Therefore, these studies employed narrative or conceptual review approaches based on the authors' personal experience or opinions and did not require a formal data collection process and analysis of the previous literature.

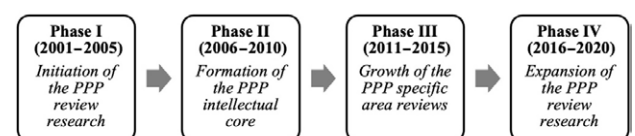


Figure 3. Evolution of the PPP review literature

Next, Phase II (*Formation of the PPP intellectual core, 2005–2010*) shaped the formation of the PPP review research with growing interest in exploring the state, structure, and trends in the field. The analysis of PPP-centric journals and authors as well as exploring future research in the field were common research purposes in this phase. It included the first use of bibliometric measures to analyse citation, productivity, and keywords for articles, journals, authors, affiliated institutions, and countries. All of the review methods (except the network analysis) were evolving but with a moderate rate of 1–3 counts during this timeframe (Figure 2). Also, only 5 studies (out of 61) are representatives of this period but seminal which, in total, received 1,325 citations (36% of all citations) (Hodge & Greve, 2007, 2010; Ke et al., 2009; Kwak et al., 2009; Tang et al., 2010). The formation of the PPP review research was achieved in most due to these influential works.

The beginning of 2010s marked Phase III (*Growth of the PPP specific area reviews, 2011–2015*) which, denoted the interest in reviewing specific topics within the field (Andon, 2012; Brinkerhoff & Brinkerhoff, 2011; De Pinho Campos et al., 2011; Marsilio et al., 2011; Osei-Kyei & Chan, 2015; Roehrich et al., 2014). Among such specific areas, the extensive review of organisational product development, partnership effectiveness, land and industrial property development, accounting, and financial issues as well as project-level critical success factors and performance measures were on the agenda of the researchers. The PPP literature started to increase both in width and depth. In width, along with the CME and PAM disciplines, it spread into other disciplines like HCM, TR, and urban studies with associated journals and topics. In depth, it penetrated discipline-narrow topics like system dynamics applications, PPP forms, scrutinising PPP phenomenon and definitions, and contract types modelling. The field welcomed non-academic authors from governmental and not-for-profit organisations (e.g., World Health Organization, United Nations) who mainly reviewed HCM and EC issues, and to a less degree other discipline-related topics. The growing body of knowledge required more advanced and objective counting and network visualisation techniques which outpaced more subjective content analysis and systematic review methods (Figure 2). However, the empirical research was still limited, which would otherwise help corroborate or reject the findings of the studies with limited data as to the generalisation of the PPP outcomes and practical relevance.

The last timeframe, Phase IV (*Expansion of the PPP review research, 2016–2020*), witnessed a substantial proliferation of the review research across all *purposes of study* and *methods used* (Figures 1 and 2, respectively). Also, this rapid progression was observed in both quantity (66% of all articles in the dataset) and quality (52% of all annualised citations in the dataset). Noticeably, the period is prosperous to studies that reviewed specific areas, journal and author productivity and impact, and explored future research avenues in the field. An exception is a purpose on the practical relevance with the narrative

review and conceptual review methods that did not grow much in size. Predominantly, most PPP scholars investigated (and continue to do so) research issues within the boundaries of CME and PAM disciplines. It is in this timeframe and by the use of the computer packages, where several studies performed comprehensive multi-disciplinary reviews of the field (de Castro e Silva Neto et al., 2016; Song et al., 2016; Wang et al., 2018; Shi et al., 2020). Their findings corroborated the statement made about a decade ago by the foundational works (Hodge & Greve, 2007; Kwak et al., 2009) that the PPP field originated from multiple disciplines such as CME, EC, and PAM. Among new disciplines (and lines of research) that have penetrated the field are *Sustainability science* and *Smart engineering and policy* (as a concept, e.g., smart city or smart infrastructure) with their associated agendas and policies (Jayasena et al., 2020; Pinz et al., 2018; Wang & Ma, 2021). Sherratt et al. (2020) provided a notable statement that culminates the major findings in this phase. In most, their statement corroborated the finding made by the PAM scholars a decade ago, related to the contradictory evidence as to the PPP effectiveness and mixed results on value for money. From this, they called the CME counterparts to broaden their research agenda and look at the PPP phenomenon not only at the project level but also as a construction industry system that operates within broader economic, political, and social contexts.

### 3. Discussions and implications

#### 3.1. Implications on the identity of the field

The interest in the review-type research in PPP has been growing since 2009. However, despite such expanding review-type research, the field's academic identity remained largely undiscovered and the existing literature lacked consolidation. Based on its findings, next, the study provides numerous implications that describe the field's current identity.

*Implication 1. The interest of the review-study scholars has shifted to the review of specific topics in the field.* The studies on analysing journals, authors, intellectual core, and future research are continuing at a moderate rate, but research on specific topics within the field is comparatively growing. These topics include project selection, risk management, performance management, critical success factors, concessionaire issues, social and corporate responsibility, economic analysis, housing and urban development, system dynamics applications, sustainability issues, and smart infrastructure.

*Implication 2. The review of risk management research in PPP is maturing.* This research has been extensive with cumulated knowledge over the two decades. Risk management and allocation, risk analysis and mitigation strategies, and risk factors and their taxonomy have been heavily addressed in the literature, including in dominating disciplines of CME and PAM.

*Implication 3. The researchers are employing more advanced review methods.* Narrative and conceptual review methods were review approaches used at the earlier phases of the literature evolution. During the last 5 years, the body of knowledge has been accumulated significantly and the use of the above conventional methods was not adequate to review this expanding literature. Such growth required the need to apply more advanced content and systematic review methods as well as computer-aided citation, keyword, counting, and network analysis techniques.

*Implication 4. The field is truly multi-disciplinary, which, on the other side, makes it suffer from over-differentiation with contradictory findings.* The PPP literature is continuously expanding in width, spreading across multiple disciplines and borrowing their theories, principles, and concepts into the comprehensive PPP field. The research on the project level with topics on the project investment environment, financial modelling, project success, real estate project performance, and concessionaire selection provided consistent or more optimistic findings (examined mainly from the CME perspective) (e.g., Osei-Kyei & Chan 2015; de Castro e Silva Neto et al., 2016; Song et al., 2019). On the contrary, the research on the organisation level of PPP with topics on the PPP governance, long-term benefits, and social impact resulted in contradictory or pessimistic findings (examined mainly from the PAM perspective) (e.g., van Marrewijk et al., 2008; Roehrich et al., 2014; Hodge & Greve, 2017).

*Implication 5. The review literature is widely distributed across multiple journals and countries.* The 61 studies were published in 40 journals; the majority of the outlets are in construction and project management as well as public administration and management. The literature is also well spread across many countries, but the research, both in productivity and impact, is led by the institutions from the UK, United States of America (USA), Australia, China, and Hong Kong.

*Implication 6. The scholars in PPP are not well aware of the prior relevant works.* On average, the examined articles cited 1.5 prior studies; only 23.0% of the studies to be cited. Moreover, out of 44 examined articles, 17 cited none and 12 cited only one prior study. This is true even for some influential papers in the field. Therefore, the researchers should form an in-depth understanding of the expanding PPP literature.

*Implication 7. Several seminal works serve as the foundation for the PPP review literature.* The PPP scholars have consistently recognised the following works: on the overall effectiveness of PPP (Bovaird, 2004; Hodge & Greve, 2007), on providing a comprehensive review of PPP for the construction industry community (Ke et al., 2009; Tang et al., 2010), on the holistic understanding of PPP, its phenomenon and forms (Brinkerhoff & Brinkerhoff, 2011; Kwak et al., 2009), on the review of PPP for the public healthcare infrastructure (Roehrich et al., 2014), and on the review of the PPP critical success factors (Osei-Kyei & Chan, 2015). These works were highly cited by

researchers in the PPP field and in other social science and management fields who adapted their review approach or acknowledged them as exemplary review studies.

### 3.2. Suggestions for future review studies

Based on the findings from the examination of the 61 review articles across the review categories, the following are suggestions for future review-type studies that may help to shape the identity of the PPP review literature.

First, the PPP academic literature is not yet likely to achieve *its maturity*. It is just expanding in Phase IV (Figure 3) and the next evolution phase may be on the aggregation of the PPP review research. For this, the PPP scholars should adapt and examine relevant theories, paradigms, and methods from allied management fields, across multiple disciplines, and types of PPP projects (e.g., healthcare, transportation, utilities PPPs). For example, recently, Narbaev et al. (2020) proposed 4 distinct research domains in the field: the domain of partnership, public welfare, worldwide diffusion, and project level. These domains were developed with their associated disciplinary bases (e.g., CME, PAM, TR) and contributing theories (e.g., contract theory, governance theory, optimisation theory, new public management theory).

Another suggestion is that the growing objective method-based research should be complemented with more subjective method-based works like *narrative and conceptual reviews*. Journals should welcome such review studies. Often, such reviews are critical, challenging, or even pessimistic but call to rethink the evolving one-stream progression in the field. This is likely to pave new research directions that include addressing PPP outside-the-box and broadening the research agenda to broader economic, political, and social contexts. Recent works by Hodge and Greve (2017) and Sherratt et al. (2020) are exemplary in this respect.

Also, the PPP field should encourage research with more rigorous *empirical studies*. In the earlier years of the review literature evolution (Phases I and II), researchers primarily engaged in the theoretical debate of PPP phenomena and concepts, employing narrative and conceptual review methods. The later evolution phases experienced the growth in more narrow topics within the field and expanded the review research with more advanced and quantitative methods. In future, the literature will continue evolving in-depth into specific topics and expanding in-width into multiple disciplines with thousands of articles and hundreds of journals. Eventually, the field will need more rigorous empirical studies (Aerts et al., 2017; Brogaard, 2021; Chen et al., 2016; Tang et al., 2010) to assess the PPP literature impact and validate its propositions (e.g., for the practice) as well as to maintain its academic sustainability as a multi-disciplinary research field.

Lastly, more review studies on the *practical relevance* of the PPP research are needed. The scholars conducting review studies should derive not only research implications (common in the CME and PAM disciplines) but also



practical implications (common in the HCM and TR disciplines) from their findings. Also, research implications in some studies were very technical (data centred) or not provided at all. As found in the present study, the PPP research community is also represented by non-academic institutions like non-for-profit organisations. Such professional bodies and communities of practice are more concerned with policies and recommendations for the practice of PPP.

### 3.3. Main research avenues

In the section on the evolution of the PPP review literature, the study presented the main characteristics of the literature evolution, including the changes in the review categories. One of such categories is the purpose of study that includes research of a specific area or topic (Table 2). The analysis of this category, in general, and of specific topics reported in the previous studies, in particular, revealed that some research areas were trending. From the meta-analysis perspective, the following are the main avenues for future studies in PPP.

*First, research into PPP project governance.* Effective governance frameworks, stakeholders management, and sustainable cooperation between the public and private sectors are the core areas of research that keep attracting scholarly interest (Dewulf & Garvin, 2020; Hodge & Greve, 2010; Song et al., 2019; Wang et al., 2018). This is important in balancing their interests: the public agency with social value objectives and the private sector with revenue and profit objectives.

*Second, research into the complexity of PPP arrangements.* Investigation of collaboration, negotiation, tendering, and procurement in the PPP contracts are the promising areas for future studies. In recent years, as the findings showed, applications of modelling techniques like using game theory, fuzzy set theory, real options, and system dynamics will be critical to better understand the above problems, especially under uncertain environment or information asymmetry (Button, 2016; Guo et al., 2021; Ke et al., 2009; Pagoni & Georgiadis, 2020; Sarmiento & Renneboog, 2016; Song et al., 2016).

*Third, the research into PPP transfer, post-transfer, or termination phases.* The findings showed that, over the last decade, especially in developing and emerging markets, many PPP projects in healthcare, transportation, utilities sectors are being completed and transferred into operation, or back to the public sector, or terminated. Consequently, the research into PPP transfer, post-transfer, or termination phases is one of the areas to grow in the near future (Bao et al., 2018; South et al., 2018; Zhang et al., 2020a).

*Fourth, the research into sustainability-related issues.* The recent studies suggest that the focus on sustainability-related issues, such as smart infrastructure, building information modelling, social responsibility factors, and environmental aspects of PPP contracts, is growing (Shi et al., 2020; Wang & Ma, 2021; Zhang et al., 2020b). Research in this direction may help to form a solid basis for scientific

assessment of this organisational form, which some studies found to be a solely political instrument (Pinz et al., 2018).

*Fifth, the research into real estate development through PPP.* The past decade has shown a growing interest in the studies that investigated the effectiveness of real estate project development and investment through the PPP approach. From a practical point of view, the financial constraints, weak management expertise, and operational inefficiency of the public agencies in the public real estate markets are the main reasons for involving private investors through the PPP contracts (Chin, 2021; Kumar et al., 2022; Ullah et al., 2016). The trending topics in this direction are profitability factors, sustainability aspects, and financing mechanisms of the wider urban redevelopment, land use, and industrial property development and operation.

## Conclusions

This paper presented a first meta-analysis of the literature review studies in PPP in order to consolidate the literature, better understand the identity of the field, and provide suggestions for future review studies. Using a meta-analysis approach, it analysed 61 review studies published during 2001–2020 across the defined review categories. The categories included the purpose of study, methods used, primary disciplinary focus, dataset details, journal and author details, awareness of previous review studies, and the evolution of the PPP review literature. These categories represented structural components of a review study and specific characteristics of the review studies in PPP.

The main findings of this review study suggest the following. In terms of the purpose of study, risks, critical success factors, and PPP models are the most reviewed topics, while content analysis and systematic review dominate among the review methods in the literature. Among the primary disciplines where the PPP literature prevails, the CME discipline is leading, followed by the HCM and TR disciplines. The field has become truly multi-disciplinary but suffers from over-differentiation with contradictory findings across multiple disciplines. In terms of the PPP literature evolution, it has progressed through four phases: from initiation, formation, growth, to expansion. Future review works should involve more empirical studies and examine the practical relevance of the PPP research. Among the promising research areas are PPP governance, complexity, post-transfer phases, sustainability-related issues, and real estate development through PPP.

The primary contributions of this study are four-fold. First, the PPP scholars in each of the representing disciplines and examining various types of PPP projects (healthcare, transportation, utilities, and other economic and social infrastructure) will benefit from understanding the field's identity under the lens of a multi-disciplinary perspective, how its identity is currently being formed, and where the literature is evolving. Second, the paper adds a new meta-analysis approach and perspective to the existing review-research genre in PPP that can be extended in future review studies. Lastly, for the construction

engineering and management research community, the study offers an overview of the most critical topics on PPP, the methods used to analyze them, and the problems that exist in planning and implementing PPP projects. Fourth, for the strategic property management researchers, the study suggests the trending topics, including profitability factors, financial aspects, and sustainability issues for the urban redevelopment, land use, and industrial property development and operation.

The study acknowledges the following limitations that could be addressed in future research. First, a meta-analysis is a broad analytical approach. The current work used it for the analysis of analyses (i.e., review of reviews) to integrate research findings and it covered review results (Glass, 1976). However, it is also used as a technique to integrate empirical results of independent studies using statistics (see, for example, Chen et al., 2016), such as regression or analysis of variances (Hedges & Olkin, 1985), which was not the intended purpose of the current study. Also, the articles which reviewed PPP practices in a single country or with a regional focus were not included in the review. Given the paper's purpose and scope of the review, adding them into the analysis would require a change in the approach and extend the review focus into country/region specific issues.

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## Appendix

Table A1. Journals with literature review articles in PPP

Journal	Number of papers
Public Management Review	4
International Journal of Project Management	4
Engineering, Construction and Architectural Management	4
Journal of Infrastructure Systems	4
Built Environment Project and Asset Management	3
Australian Journal of Public Administration	2
Construction Management and Economics	2
International Journal of Construction Management	2
Journal of Construction Engineering and Management	2
Scientometrics	2
Social Science and Medicine	2
Sustainable Development	2
Accounting, Auditing and Accountability Journal	1
Advances in Civil Engineering	1
Australasian Journal of Construction Economics and Building	1
Bulletin of the World Health Organization	1
California Management Review	1
Evaluation and the Health Professions	1
Facilities	1
Health Policy	1
International Journal of Economics and Financial Issues	1
International Journal of Managing Projects in Business	1
International Journal of Productivity and Performance Management	1
International Journal of Sustainable Construction Engineering and Technology	1
International Journal of Systems Assurance Engineering and Management	1
International Review of Administrative Sciences	1
Journal of Financial Management of Property and Construction	1
Journal of Management in Engineering	1
Periodica Polytechnica Transportation Engineering	1
Public Administration and Development	1
Public Administration Review	1

End of Table A1

Journal	Number of papers
Public Organization Review	1
Public Performance and Management Review	1
Public Works Management and Policy	1
SAGE Open	1
Systems Research and Behavioral Science	1
Transport Reviews	1
Transportation Planning and Technology	1
Transportation Research Part B: Methodological	1
Utilities Policy	1
Total	61

Table A2. Top 10% most productive authors in the PPP review literature

Rank	Author	Score	Articles co-authored	Reported affiliation
1	Chan, A. P. C.	2.17	8	Department of Building and Real Estate, Hong Kong Polytechnic University, Hong Kong
2	Hodge, G. A.	1.80	3	Faculty of Law, Monash University, Australia
3	Wang, N.	1.60	2	Faculty of Humanities and Social Sciences, Dalian University of Technology, China
4	Osei-Kyei, R.	1.28	4	School of Built Environment, Western Sydney University, Australia
5	Greve, C.	1.20	3	Department of Business and Politics, Copenhagen Business School, Denmark
6-12	Andon, P.	1.00	1	School of Business, University of New South Wales, Australia
6-12	Bovaird, T.	1.00	1	Bristol Business School, University of West of England, United Kingdom
6-12	Gurn, A. M.	1.00	1	Rockman et al. USA
6-12	Karim, N. A. A.	1.00	1	Civil and Environmental Engineering Department, Universiti Tun Hussein Onn, Malaysia
6-12	Valila, T.	1.00	1	Bartlett School of Construction and Project Management, University College London, United Kingdom
6-12	Wettenhall, R.	1.00	1	Center for Research in Public Sector Management, University of Canberra, Australia
6-12	Widdus, R.	1.00	1	International Centre Cointrin, Switzerland
13	Love, P. E. D.	0.92	3	School of Civil and Mechanical Engineering, Curtin University, Australia
14	Song, J.	0.89	2	Faculty of Management and Economics, Dalian University of Technology, China
15	Yu, Y.	0.80	2	Department of Building and Real Estate, Hong Kong Polytechnic University, Hong Kong