

APPLIED PUBLIC SECTOR ACCOUNTING FOR BROADBAND INFRASTRUCTURE DEVELOPMENT WITH PUBLIC PRIVATE PARTNERSHIP SCHEME: A LITERATURE REVIEW

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ABSTRACT

Governments all around the world are increasingly focusing on Public-Private-Partnership (PPP) schemes to develop broadband infrastructure. Private sector participation in the development and funding of public infrastructure has had a substantial impact on the delivery of public services. In PPP Broadband Infrastructure, there has been no attempt to integrate the literatures in order to present a holistic view. To expand our knowledge of PPPs in Public Sector Accounting Discipline, the author conducted a systematic literature review of articles published in international journals and to analyze the contribution of it to the body of knowledge. By using a qualitative method, the objective of the study is to find the major theme of public sector accounting literatures based on research of PPP in Broadband Infrastructure for the past 20 years (2000-2020) from the qualified international journals. The study also aims to find contribution of the major theme on infrastructure development and the direction of the future research that need to be addressed. The study found that UK is the country which has been publishing journals on PPP with high intensity of publication. Another findings are the literatures were published in high quality journal with scopus indexed is 60% in Q1 and followed 25% in Q2 and 15% in Q3. The main findings of this study identified four main topics in this discipline which are Public Policy Strategy has become the major theme in the field of research and become the first rank, followed by another themes which are PPP Implementation, PPP Framework and Value of Money. Therefore, in PPP research as part of Public Sector Accounting Literatures has shown that Public Policy Strategy as part of government's role in shaping the regulatory framework and plays an important role to catalyst the infrastructure development into the next level.

Keywords: *Public-Private Partnerships (PPP), Public Sector Accounting, Broadband Infrastructure, Systematic Literature Review, Broadband Infrastructure*

INTRODUCTION

Public Sector Accounting is essential in the context of New Public Management; it represents the reporting management activities information; it contributes significantly to the fulfilment of public management objectives on internal and external reporting for accountability purposes (De Jesus; Eirado, 2012). In the public sector accounting, the fundamental purpose for holding assets is to secure their capacity to assist public service delivery rather than their ability to generate cash flow (IFAC, 2020). The New Public Management movement has introduced methods and concepts into the Public Sector Administration inspired by business sector management practices and assumptions (Lapsley, 2008) that focused on economy,

efficiency, and effectiveness in the management of public services, in order to optimize public service delivery for the citizens' advantages with the resources available (Jansen, 2008).

Public Private Partnership (PPP) was introduced to deliver public service by combining contrast objectives from the public sector whose prime objective is to provide maximum service to the general public whereas the private sector whose main objective is to maximize profits and returns for its shareholders (OECD, 2013). One of the modern public services is the internet as the infrastructure to access the current global world.

The internet world is based on broadband. It's becoming a critical component of societies' communication infrastructure. Therefore broadband infrastructure is turning into an

important aspect, just like any other infrastructure. The importance of broadband access for the evolution of advanced communication and economic growth is significant. (Nucciarelli, Sadowski, & Achard, 2010). Public Private Partnership (PPP) in broadband development has become a popular way to supply infrastructure around the world (Wang, Liu, Xiong, & Song 2018). The general PPP has been concerned in involving private companies in public sector development to deliver better public service (Falch, 2010). PPP involves the cooperation of two parties, the public sector and the private sector to deliver the public policy goals (Williams, 2012).

Public Private Partnership (PPP) schemes in Broadband Infrastructure development are increasingly being adopted worldwide to reduce infrastructure gaps. Governments, both in developed and developing countries aim to provide public service especially on internet access, since it is currently becoming universal access and supporting humankind in daily activities (Adisti, 2017). The UK, Australia, Portugal, Spain, and other developed countries have witnessed a steady growth in the number of PPP projects (Gruber, H., Hätönen, J., & Koutroumpis, 2014). Developing countries are also using PPPs to build and operate their own infrastructure. PPP has been widely used in the fields of infrastructure and public services, such as transportation, water and sewage, energy, environment protection, public health, and others (Czernich & Falck, 2009).

PPPs are a significant device for public infrastructure development and the arrangement of public service delivery. PPP has drawn the interest of researchers to analyze the current infrastructure development scheme. By identifying the most critical features of the project, several researchers have sought to enhance PPP projects' functionality to find valuable strategies for better implementation (Ke et al., 2009).

For the past 20 years in the PPP literature, there have been countless studies about the major trend of PPP research especially in broadband infrastructure. With the growth of research in PPP broadband infrastructure projects, it is considered necessary to conduct a literature review to observe the development of research on PPP Broadband Infrastructure projects from 2000 to 2020, to identify

literatures and countries that are the subject of research, to identify the topics of researches have been explored in previous studies, and to find the direction for the future research.

In this study, the articles undertake a comprehensive review of the PPP broadband infrastructure literature and empirical evidence which ask the following points as the research question (RQ): (i) What is the major theme of Public Sector Accounting in Public-Private Partnership for Broadband Infrastructure Development research? and (ii) What are the contributions of the major theme on infrastructure development? (iii) what are the gaps that need to be addressed?

The paper is structured as follows: after outlining systematic review methods, the PPP literature is analyzed for specific patterns and trends. Then the study synthesizes the PPP research, distinguishing between specific themes connected to practice of PPPs and their outcomes. The paper concludes multidimensional framework, with the implications for both theory and practice.

METHODS

This study uses a qualitative method with a thematic, structured literature review approach. Secondary data were utilized which were obtained through literature data collection techniques. A Systematic Literature Review method differs from traditional narrative methods, because the former has a more explicit selection process for articles (Torchia, Calabro, and Morner 2015).

All previously published journal articles in the discipline of PPP Broadband Infrastructure were taken as sampled articles and were identified via Google Scholars Database. This database contains all such articles from all past years, starting 1 January 2000 to 31 December 2020. Taking the whole sample study could reduce the bias that would be generated from selecting only small samples, thus making our study more reliable and transparent (Ferrer, Thome, and Scavarda [forthcoming](#)).

The research articles are collected, selected, and grouped using interpretive paradigm methods, then a deeper understanding towards the PPP research topic in Broadband Infrastructure is conducted based on categories made thematically to generate a "research gap"

that can be used as a guide and reference for future research.

The sampling technique used is nonprobability sampling with systematic sampling technique. Five steps were required to conduct the SLR (see Figure 1), as follows:

Step 1: Problem Formulation

Planning and formulating the problem, the research questions were defined and understood as well as the main themes were focused on Public Private Partnership in the Broadband Infrastructure Development.

Step 2: Data Sampling

Searching the literature using the machine learning Google Scholars, we expanded the research period from the earliest available date 1 January 2000 up to 31 December 2020. The sampling technique used is non probability sampling with systematic sampling technique. The research sample obtained is based on the following criteria:

1. Research articles were obtained from "Google Scholar".
2. Searching the research articles is carried out with the following keywords: (i) "Public Private Partnership" and "Broadband Infrastructure";(ii) "PPP" and "broadband infrastructure and "Europe" ; (iii)PPP" and "broadband infrastructure and "Asia" and "Pasific" and "Australia";

Step 3: Data Quality Selection

Journal selected only from Scopus Index Journal Q1-Q3 and quality evaluating after selecting the articles, after reading the entirety of the selected articles, we made some basic statistical issues and main theories used to study PPP, including the aims of the research, framework, method, results, and conclusions.

For data validation, the data is also cross referenced from Scimagojr.com and Publish or Perish (Harzing, A.W., 2007). This step used an inductive approach to qualitative content analysis complemented with a quantitative visualization with NVIVO.

The total sample in this study was 11,320 articles written in the period between 2000 and 2020. The academic journals published articles with PPP in Broadband Infrastructure

research were identified first. The total sample is obtained after strict article selection with criteria:

1. Taking samples from different citations so that it is possible that the same article is listed in various places. Therefore, articles that are duplicated in other citations must be excluded from the sample. The publications used are only publications with the scopus indexing Q1-Q3 category whose validity was obtained through the Scimagojr.com website. If the journal is not indexed by Scopus, it will be selected based on the total citations counted that it should be more than 50cited.
2. Paper in the form of research articles such as theses, articles, or unpublished papers and articles are not used as samples.
3. Sample articles must be articles whose main discussion is about PPP in Broadband Infrastructure therefore articles whose discussion is outside the theme must be excluded from the sample. In a case where one of the three categories is not fulfilled then the article is excluded from the study sample.
4. Accordingly, the data completeness is checked. If the whole article is not available or only an abstract is present, it is also excluded from the sample.

The data is also cross referenced from Scimagojr.com and Publish or Perish (Harzing, A.W., 2007) for data validation. The following table is a detailed information regarding the time of sample data withdrawal:

Table 1. Literature Search

No	Source	Keywords	Date	Time	Results	Relevant Papers
1	Google Scholar	"Public Private Partnership" and "Broadband Infrastructure"	3 May 2021	18:15	1270	12
2		PPP" and "broadband infrastructure and "Europe"	3 May 2021	18:30	8110	5
3		PPP" and "broadband infrastructure and "Asia" and "pasific" and "Australia"	3 May 2021	19:40	1940	3
		Total			11,320	20

source: Author's research

Step 4: Literature Coding and Data Analysis

Coding processes were categorized each of selected articles into some clusters based on

year of publication, scopus indexing, countries of analysis, journal titles, citations per author, and main theories used to study PPP. This step used an inductive approach to qualitative content analysis complemented with a quantitative visualization with NVIVO. Coding process based on *Word Frequency*, *Cluster Analysis* or research categorisation.

Step 5: Result and Discussion

An integrative review, qualitative research are offered data analysis techniques as ways to improve the academics rigor based on empirical and theoretical sources. Presenting the results and summarizing the evidence to provide contribution to the body of knowledge as well as viewing the future research direction.

Step 6: Conclusion

Synthesizing the important aspects for providing an updated integrative review to allow the diverse research methods becoming a greater part of evidence-based practice initiatives.

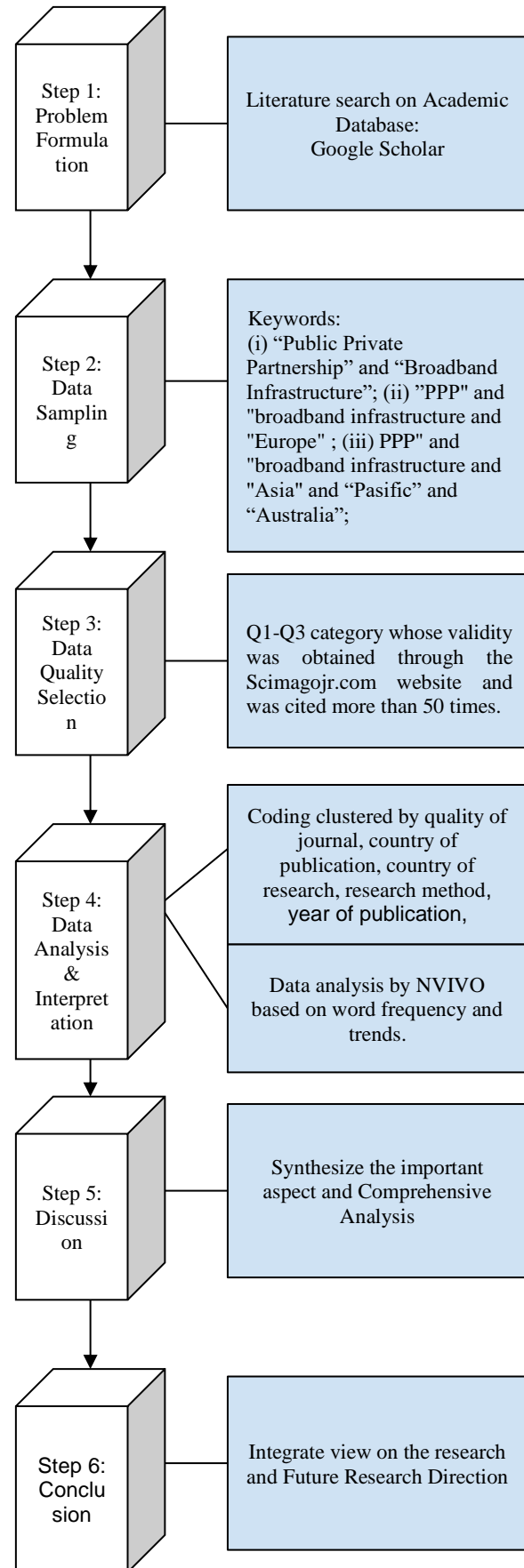


Figure 1.
 Framework Table
 Research Framework of this study
 source: Author's elaboration

RESULT AND DISCUSSION

The following outlines are the analysis result of the systematic literature review.

(i) Quality of Journal

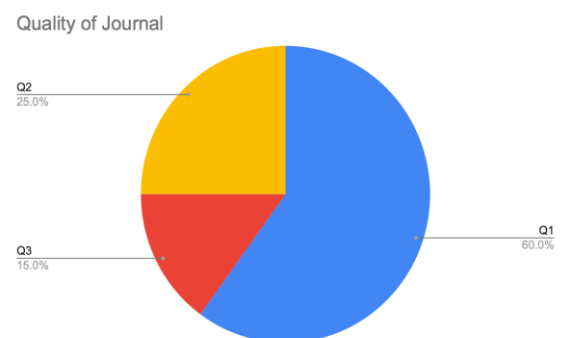
Based on the research results, there are 20 journals that have been captured but only 19 that included in selected criteria (above Q4 qualification in scopus indexed journal). The academic journals that publish PPP articles in Infrastructure Broadband in scopus indexed journals within the Q1 category were 60% obtained which from 12 journals as follows: 8 articles published in *Telecommunication Policy*; 1 article in *Journal of Rural Studies Journal*; 1 article in *European Journal Business and Management*; 1 article in *International Public Management Journal* and 1 article in *Journal of Rural Studies*. Q2 category Journals which are 25% which come from 4 journals as follows: 1 article in *Journal of Infrastructure System*; 1 article in *Transforming Government: People, Process and Policy*; 1 article in *Commonwealth and Comparatives Politics*; 1 article in *International Journal of Public Administration*. Q3 category are around 15% and comes from 3 journals as follows: 1 article in *International Journal Management and Network Economics*; 1 article in *International Journal of Scientific & Technology Research*; 1 article in *Journal Technology and Management Innovation*.

Table 2. Journal Quality

Scopus Category	Name Of Journals And Total Articles	Total
Q1	Telecommunication Policy (8); Journal Of Rural Studies (1); European Journal Of Business And Management (1); International Public Management Journal (1); International Journal Of Public Administration (1)	12

Q2	Transforming Government: People, Process And Policy (1); Commonwealth And Comparative Politics (1); Journal Of Infrastructure System (1) International Journal Of Public Administration (1)	4
Q3	International Journal Management And Network Economics (1);International Journal Of Scientific & Technology Research (1);Journal Technology And Management Innovation (1)	3

source: author's research



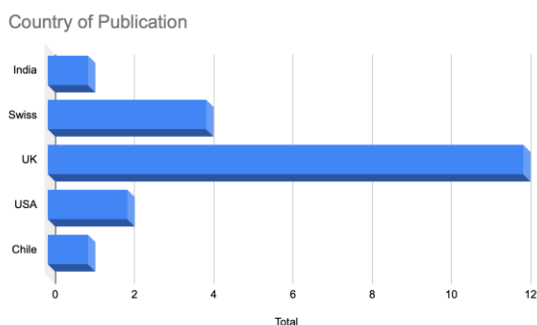
source: Author's research

Figure 2. Distribution of Journal Quality (Scopus Index Category)

Distribution of journals type described that Public Policy is the highest rank (70%) of Journal Type in publishing PPP Broadband Infrastructure research, followed by Management Journal (10%), Technology journal (10%) and Technology Management journal (5%).

(ii) Country of Publication

UK is the country which has been publishing journals on PPP with high intensity, around 12 publications or 63.2% journals were published. It is followed by 4 researchers in Swiss (21.1%) and USA with 2 Journals (10.5%) and other countries are Chile and India with 1 journal (5%) on each of them.



source: Author's research

Figure 3

Country of Publication Distribution

(iii) Research Theme

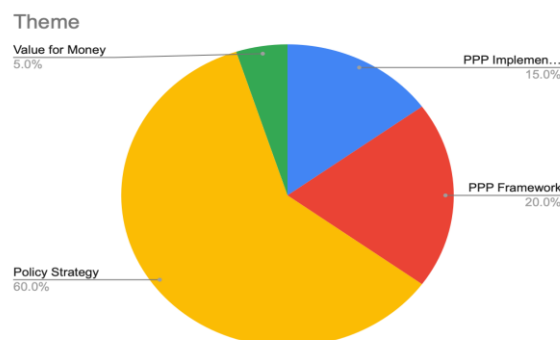
A summary of findings for identifying themes for each article is presented in Table 2. From 20 publications, the number of themes identified were 4 themes. The top 3 themes are Policy Strategy (identified in 12 articles), followed by PPP Implementation and PPP Framework each of them found in 4 articles. Finally, the Value for Money theme was discovered in 2 published articles.

Table 3. Research Theme

Theme	Authors	Total
Policy Strategy	Gyaase and Takyi (2014); Falch, M and Henten, A (2008); Gilet, Lehr and Osorio (2004); Picot and Wernick (2007); Falch and Henten (2010); Howela and Sadowski (2018); Given (2010); Girth (2018); Zhen and Qiang (2010); Gyasee and Takyi (2014); Gerli, Matteucci & Whalley (2019)	11
PPP Implementation	Nucciarelli, Sadowski, Paola, Achard (2010); Pant and Odame (2015); Al-Shqairat, Al-Rawd, Al-Kilani, Al-Shra'ah (2015)	3

PPP Framework	Williams (2009); Williams (2012); Gomes-Barroso and Feijoo (2010); Ehrler and Ruhle (2009); Latteman, Stieglits, Kupke, Schneider (2009)	4
Value for Money	Cui; Wang, Liu, Coffey (2019)	1

source: Author's research



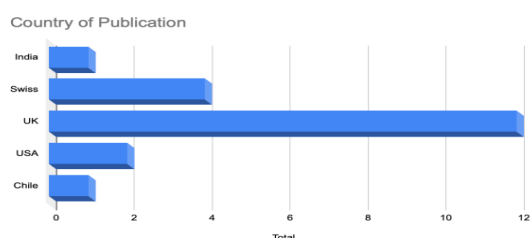
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Figure 4

Research Theme Distribution

(iv) Country of Publication

UK is the country which has been publishing journals on PPP with high intensity, around 12 publications or 63.2% journals were published. It is followed by 4 researchers in Swiss (21.1%) and USA with 2 Journals (10.5%) and other countries are Chile and India with 1 journal (5%) on each of them.



source: Author's research

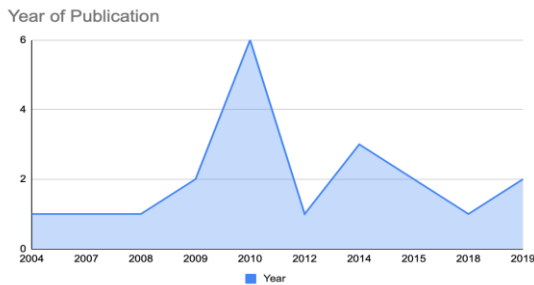
Figure 4

Country of Publication Distribution

(v) Year of Publication

Year of 2010 is the highest rank in publication of PPP Broadband Infrastructure, 6 journals were published, followed by 2014 and 2015 with 3 journals on each of them. In 2009

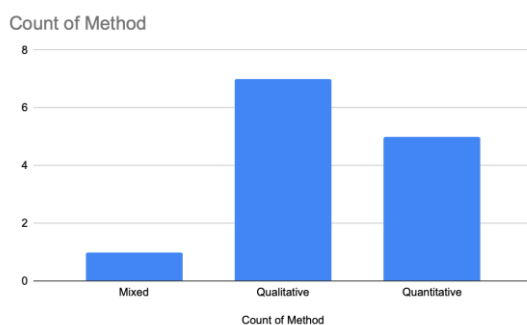
and 2019, 2 journals were published each year. Meanwhile, the years of 2004, 2007, 2012, 2018 were only published 1 journal each year.



source: Author's research
 Figure 5. Year of Publication

(vi) Research Method

Qualitative Methods with Case studies are the most popular Research Method in PPP Broadband Infrastructure. Because the majority of case studies are to study an ongoing or existing project and assess how the PPP project is performing. A total of 7 journals use this method. This is in accordance with research conducted by (Petersen, 2019) that case studies are indeed a method that is widely used by international researchers. No less popular is the Quantitative method, which is used in 5 journals. Where the researchers discussed previous research by providing opinions and input concluded based on research that had been done previously. In a journal, they do not only use one method, there are also those who use several methods to get better and more reliable results, there is 1 journal which uses a Mixed Method both Qualitative and Quantitative.



source: Author's research
 Figure 6. Research Method Distribution

(vii) Research Trend

To see the research trends of all the journals that have been obtained, this study uses the help of Nvivo software version 12 to carry out the autocoding process for the 100 words or more that most often appear in the journals that have been collected. Word Frequency Analysis from NVivo is a data exploration technique that can classify research topics by analyzing scientific content with indications of high frequency words (Cui, Yong, Hope, & Wang, 2018). The results provided by the software are as follows: In the NVivo analysis results are based on basic words. From the results of the autocoding analysis produced by the Nvivo software, the journals that have been obtained in this study are sufficiently in accordance with the formulation of problems and predetermined topics.

In the table below, we have shown the 100 or more most frequently occurring words in the results from the Word Cloud Nvivo analysis. In plain view, the journals that were collected did not directly focus on the Accounting topic. Based on the calculation, we discovered the most common words are *PPP, Broadband, Infrastructure, Public, Private, Access, Infrastructure and Government*. In the journals that researchers have collected, there are few words related to accounting or finance that are discussed or referred to which are: *Policy, Investment, Economics*.

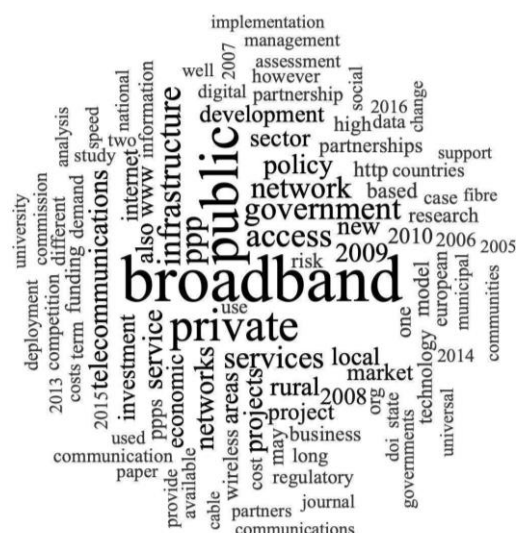


Figure 7. Word Cloud NVivo

Table 4. *Word Frequency (NVIVO)*

Word	Length	Count	Weighted Percentage
broadband	9	1715	1,44%
public	6	1343	1,13%
private	7	1048	0,88%
access	6	650	0,55%
Infra-structure	14	628	0,53%
government	10	613	0,52%
ppp	3	603	0,51%
services	8	568	0,48%
network	7	555	0,47%
networks	8	464	0,39%
service	7	464	0,39%
policy	6	445	0,37%
Telecom-munications	18	428	0,36%
projects	8	420	0,35%
2009	4	411	0,35%
rural	5	403	0,34%
new	3	381	0,32%
also	4	376	0,32%
local	5	372	0,31%
areas	5	366	0,31%
sector	6	361	0,30%
Develop-ment	11	340	0,29%
investment	10	337	0,28%
economic	8	333	0,28%
www	3	326	0,27%
project	7	320	0,27%
2008	4	315	0,26%

Summarized the Evidence

With an increase in PPP Broadband Infrastructure research, this study provides conclusions on various kinds of research from various parts of the world as well as provides details of research gaps, and provides input and direction on future research. Based on the Systematic Literature Review study for the PPP Broadband Infrastructure publication, the results of data analysis and discussion are in the following conclusions:

- ***Research Categorisation***

- Q1 journal quality in SCImago Rank is represented by 60% of journals, Q2 is represented by 25% of journals, and Q3 is represented by 15% of journals. It explains that all research publications in this study have been selected with a tight process and can be used as references

- Most of the Journals are being published in several type of journal: Public policy (60%), Technology (15%), Management (10%) and Management and Technology (5%)
- Country of publication represented by the UK (60%) as the highest rank publisher, followed by Swiss (20)%, USA (10%), Chile and India (5%)
- Popular research methods are the Qualitative method represented by 53.8%, Quantitative (38.5%) and Mixed Method is (7.8%).

- ***Research Trend***

- Policy Strategy as a theme is discussed in 60 % of all journals; it explains that the PPP project in Broadband Infrastructure is closely related to Policy conditions in a country and how to strategize the Policy to be more conducive for PPP projects.
- The Second Rank Theme is PPP Framework (20%) and PPP Implementation discussed in (15%) of all journals; it explains that PPP projects need to be built by a strong framework in the design phase and PPP Projects need to be monitored and evaluated during the implementation stage.
- Fourth, Value for Money themes are discussed in 5% of all journals; it showed that PPP projects are closely related to VfM and it is considered as the uniqueness of PPP Projects.
- Based on the results of the autocoding analysis produced by the Nvivo software, the journals that have been obtained in this study are sufficiently in line with the formulation of problems and predetermined topics. It shown by the most common words “*PPP, Broadband, Infrastructure, Public, Private, Access, Infrastructure and Government*” and also the atmosphere of accounting and finance are described in words of “*Policy, Investment, Economics and Service*”

This part is an integrative review, for improving the academic rigor based on data analytics and evidence-based to provide contribution to the body of knowledge. In order to clarify the state of the art of PPP knowledge

and pave the way for future research, this section provides critical reflection on the key themes of PPP in broadband infrastructure research, especially The Policy Strategy. It is part of Applied Public Sector Accounting on the macro level to accelerate infrastructure development. Following are the contributions from the major theme in PPP Broadband Literatures to the body of knowledge that can be referred as insight for broadband infrastructure development.

How Policy Strategy impacts the PPP for Broadband Infrastructure Development?

The deployment of broadband services is a dynamic process. The relevant of broadband internet access to local economy growth This study, highlighting four type of initiatives according to the role of government in broadband policies as (1) broadband user; (2) rule-maker; (3) financier; or (4) infrastructure developer (Gillet, 2004) For those across the role, government policies play as early catalyst role in stimulating the development of infrastructure and at the end, as the market matures, private-sectors will be the principal role to deliver the public service.

In Ghana's case, Several ICT related policies have been adopted in the country as explained in their National Communication Policy (Government of Ghana, 2004) and the National Broadband Policy. Including strategies to outline the combination and collaboration between the policy makers which are regulatory agencies, legislator agencies, tax policy makers and other stakeholders which significantly accelerate broadband development (Gyaase; Takyi, 2014).

Many different policy instruments are used to boost demand and support supply and stimulate infrastructure development. There are two major types of policy initiatives: (i) economic support for infrastructure development and (ii) universal service policies. The implementations are different in each country around the globe (Falch, 2010) In Korea, universal service policies have been implemented to support infrastructure development since the first generation of communication technology. Europe and the US are also taking the universal service policy into account. Meanwhile Australia is using the state

budget to develop the infrastructure for delivering the service.

Australia and New Zealand are also participating in Public Private Partnership for developing broadband infrastructure. Even though they are using the state budget which is funded by taxpayers, they both have a long history of public investment in telecommunication especially with PPP scheme (Given, 2010). New Zealand, under the Ministry of Economic Development, has made some changes required in the telecommunication regulation that allow the PPP scheme to accelerate the development of NZ Broadband infrastructure (Howell; Sadowski, 2018).

As well as in Europe, policy strategy also became the main issue to accelerate the broadband infrastructure, especially policy which relates to funding schemes (Falch; Henten, 2008). Universal service concept fits to the next generation network environment. PPP scheme is giving significant impact to broadband development especially in remote and rural areas. PPP is highly contented in Public Policy areas since it caused the usage of public funds.

CONCLUSION

The research question raised in the paper is what the major themes of Public Sector Accounting in PPP Broadband Infrastructure literatures during the past 20 years. The study found Policy Strategy is the main theme of the body of research. Broadband Infrastructure is public services which became fundamental since the internet as universal access in millenium era. The collaboration between the public and private sector could enhance broadband infrastructure development to cover all areas. Whereas governments could exist to enhance and provide public service. Therefore a funding mechanism became essential to support the acceleration.

To enhance the internet usage, it should cover rural as well as remote areas which most of the time are not financially feasible from the private sector perspective. Therefore Government's role is crucial to support private sector could be part of the internet infrastructure development.

In PPP, private initiative should be supported by Government's role through Public

Policy and Regulatory Framework which impacts the use of public funds and private investment areas. Policy Strategy plays an important role to shape the regulatory framework and as the catalyst to extend the infrastructure development into the next level. Policy strategy on using state budget from the taxpayer as well as policy on universal access are both giving significant impact to infrastructure development. Government as the representative of the public sector should consider the public policy strategy in broadband infrastructure as the primary concern to accelerate the development.

Based on the previous literatures, this study finds some areas that can be explored as future directions of research which are the PPP Governance and Accountability as both are the topic of Public Sector Accounting which relate to Public Policy and Government's Role in public service delivery that will impact to broadband infrastructure development.

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