Bibliometric Analysis of Public Sector Innovation

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Abstract

This article systematically reviewed the academic research surrounding public sector innovation (PSI) to deliver an overview of PSI development in public administration (PA). This study analyzed 289 articles published between 1970 and 2020 using a bibliometric meta-analysis with *HistCite software* and a qualitative approach. This study found four primary research streams in PSI literature: (1) nature of public sector innovation; (2) strategy and innovation capacity; (3) adoption and diffusion of innovation; and (4) implementation and impact of innovation. Our analysis also revealed that the strategy and innovation capacity cluster has the fastest growth in publications. While the nature of the PSI stream is the least published research area, leadership, and organizational culture were the highest frequent antecedent and identified impacts in the empirical PSI studies. Finally, we offer 20 future research directions for these four research streams. This study may be the first to use *HistCite* bibliometric and qualitative analysis to make detailed information about each research stream of PSI literature in the PA discipline by measuring the number of publications over 50 years. The results of our review are limited to PSI publications in the PA field, which stemmed from the web of science database.

Keywords:

Introduction

Although private sector literature dominates innovation studies (Jaskyte, 2011; Nählinder & Eriksson, 2019), public sector innovation (PSI), which is defined as the process of introducing, developing, and implementing something new with a radical or incremental scale of improvement into public organization routines (De Vries et al., 2016; Rogers, 2003), has gained much attention from scholars in the public administration (PA) fields (Demircioglu, 2021; Gieske et al., 2020). This popularity may relate to the multiple benefits which PSI produces for the performance of public organizations (De Vries et al., 2016; Salge & Vera, 2012).

The existence of substantial growth of PSI publications had encouraged several scholars to conduct a systematic literature review (SLR) and analysis PSI, such as Walker (2014), De Vries et al. (2016), De Vries et al. (2018), and Cinar et al. (2019a). However, their studies have limitations. De Vries et al. (2016)'s study only covered empirical articles from 1990 to 2014. While Walker (2014), De Vries et al. (2018), and Cinar et al. (2019a)' inquiries merely focused on the specific theme within PSI literature, such as the PSI antecedent in local government, the diffusion and adoption of PSI, and the barriers of PSI. Thus, a comprehensive systematic overview to discover multiple research streams

Figure 1.
Total Number of PSI Publications
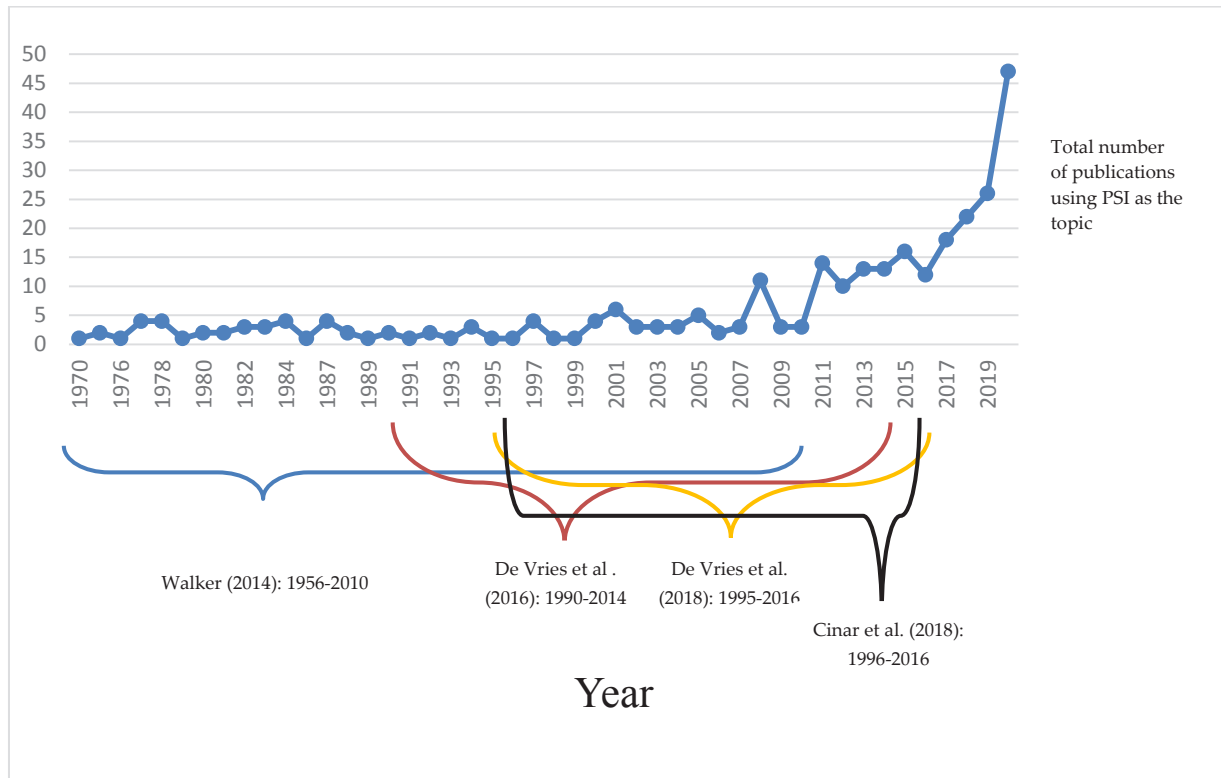
Source: ISI Web of Science

and cover the recent development of PSI literature within the last five years (2016-2020) is still lacking, although many publications (125 articles/ 43.25%) occurred between 2016-2020 (see Figure 1).

Therefore, our study aims to extend and enrich the four previous studies using a bibliometric analysis on the much-expanded PSI articles from 1970 to 2020 in the PA field. A bibliometric analysis is a quantitative tool to measure the impact and interconnection of past research on a particular topic (Ospina et al., 2018). Synthesizing previous studies has been considered a practical approach for accelerating knowledge in any academic discipline (Chandra & Walker, 2019). Although many scholars had used the bibliometric method, its application in the PA discipline has not gained much attention (Marques, 2021).

This bibliometric analysis is different from the four previous studies. First, it used HistCite software as a quantitative tool for analyzing PSI literature and displaying a timeline visualization of citations in a graphic format called historiography (Apriliyanti & Alon, 2017). Many scholars have employed HistCite in their bibliometric studies. Yet, there is still a scarcity of studies using HistCite as a bibliometric tool in the PA field (Ropret & Aristovnik, 2019).

Second, it combined HistCite bibliometric analysis with a qualitative method (using an interpretive logic to examine the study content). The utilization of a qualitative analysis is beneficial to tackle the main limitation of bibliometric analysis, which cannot fully capture the specificities of each analyzed article (Marques, 2021). Consequently, through the combination of quantitative and qualitative methods, this study can generate more comprehensive bibliometric results than the four previous studies, filling the research gap

in the PSI meta-analysis review and answering several research questions:

(1) Which countries, research methods, types of public organizations, government level, and sectors examined by the most PSI publications?
(2) How is PSI literature clustered?
(3) Which research streams are likely to gain the most attention in the number of PSI publications?
(4) What are the most frequent antecedents and impacts found in the PSI articles?
(5) What are future PSI research questions providing new avenues for public administration scholars?

This study has three contributions. First, it identifies the context of PSI research that PA scholars have conducted for the past 50 years. This element is essential for PSI scholars because it provides a context for PSI research that is rarely studied (e.g., country, layer of government, and sector). Second, it provides new insights into various research streams. The research stream is a crucial feature of bibliometric study because it represents a different research area, theme, or focus of study. Thus, it may help future scholars to decide which research streams they want to examine to expand the PSI body of knowledge (Apriliyanti & Alon, 2017; Chandra & Walker, 2019). Third, it synthesizes 289 PSI articles over the past 50 years (1970-2020) in the PA discipline to provide an evidence-based overview of the research clusters most concerned, most frequent antecedents and impacts of PSI, and future avenues to develop PSI academic research.

The rest of the article is organized as follows: methods, results, discussions, conclusions, limitations, and future research.

Methods

This study applied a bibliometric analysis because of its two main functions: performance analysis and science mapping. While the performance analysis aims to evaluate an individual's research performance, articles, and journals, science mapping shows the structure and development of a scientific topic (Zupic & Čater, 2015).

This bibliometric inquiry has two main limitations. First, it does not allow scholars to grasp why a particular research article is cited. Second, a citation's metric is potentially biased due to self-citation excessively (Chandra & Walker, 2019). Beyond its limitations, the bibliometric approach is a robust method that allows scholars to visualize hidden thematic connections and networks among research articles on a specific topic. Therefore, the development of research streams in a research topic can be justified using bibliometric citation and co-citation meta-analysis (Apriliyanti & Alon, 2017).

Analytical tools and methods

This study used quantitative and qualitative methods on 289 PSI publications in the PA discipline. Quantitatively, this study applied a bibliometric citation analysis. Qualitatively, this research employed content analysis to identify and categorize them into clusters or research streams. Our primary unit of analysis is journal articles due to their crucial role in distributing scientific knowledge, measuring the scholars' reputation, and recognizing intellectual property (Chandra & Walker, 2019).

This study used HistCite as a bibliometric analysis tool given that it is a robust quantitative software for conducting SLR by displaying literature visualization in a graphical format based on the interconnection of citation among articles in top-quality PA journals (Cuccurullo et al., 2016). HistCite also provides a citation network map through its graph-maker feature, which can be used as crucial guidance to identify research streams within a research topic (Apriliyanti & Alon, 2017; Fetscherin & Heinrich, 2015).

Data collection and research process

In quantitative methods, the data source was obtained from the ISI Web of Science (WoS) database with PSI articles from 1970 to 2020 in the PA category. The search term was "[innovat*]" because this keyword allowed us to find PSI articles published under various titles, such as innovate, innovation, innovative, or innovating. The selection of 1970 as the commencing of journal searching is based on Lee's (1970) publication. He was the first author in our database. Figure 2 delivers a summary of the SLR process employed to formulate this study. This study selected WoS because it provides more publications in 151 research categories. Thus, it is preferred by most researchers as a critical database to track top journals compared to other research engines (Shah et al., 2019).

In the qualitative analysis, the data is sourced from HistCite's graph maker. Based on this map, this study identifies several research streams by checking the citation or co-citations frequency. Finally, using the evaluative content analysis (qualitative method), this study analyzed and evaluated their purposes, methods, findings, and future research questions. This qualitative method has been used by previous studies and allowed the study to yield more richness in its discussion (Apriliyanti & Alon, 2017).

The article-selection strategy was conducted in three stages. First, we searched and filtered articles by English, article type, and Public Administration category. October 31st, 2020, was the last date accessing the WoS database. A total of 3,815 articles resulted from the application of this filtering process. Second, the articles were screened briefly, including titles, abstracts, and keywords. Using this screened process, we removed 3,001 articles due to inappropriate topics or keywords; thus, a total of 814 articles remained in our database. Third, we carefully filtered and analyzed the abstracts and content of the articles following the PSI theme in PA. The articles that do not discuss PSI as their main issue are excluded from our database.

Therefore, based on exclusion criteria, a total of 525 articles were eliminated leaving 289 articles remaining in our database record as eligible articles following the inclusion and exclusion criteria. Eligible selected articles were analyzed using a qualitative method based on excel data. Due to the complex nature of the PSI topic, three authors independently coded the articles based on the pre-defined research clusters. We discussed any distinctions in coding and our approach, following previous scholars who conducted SLR studies (e.g., Nolan & Garavan, 2016).
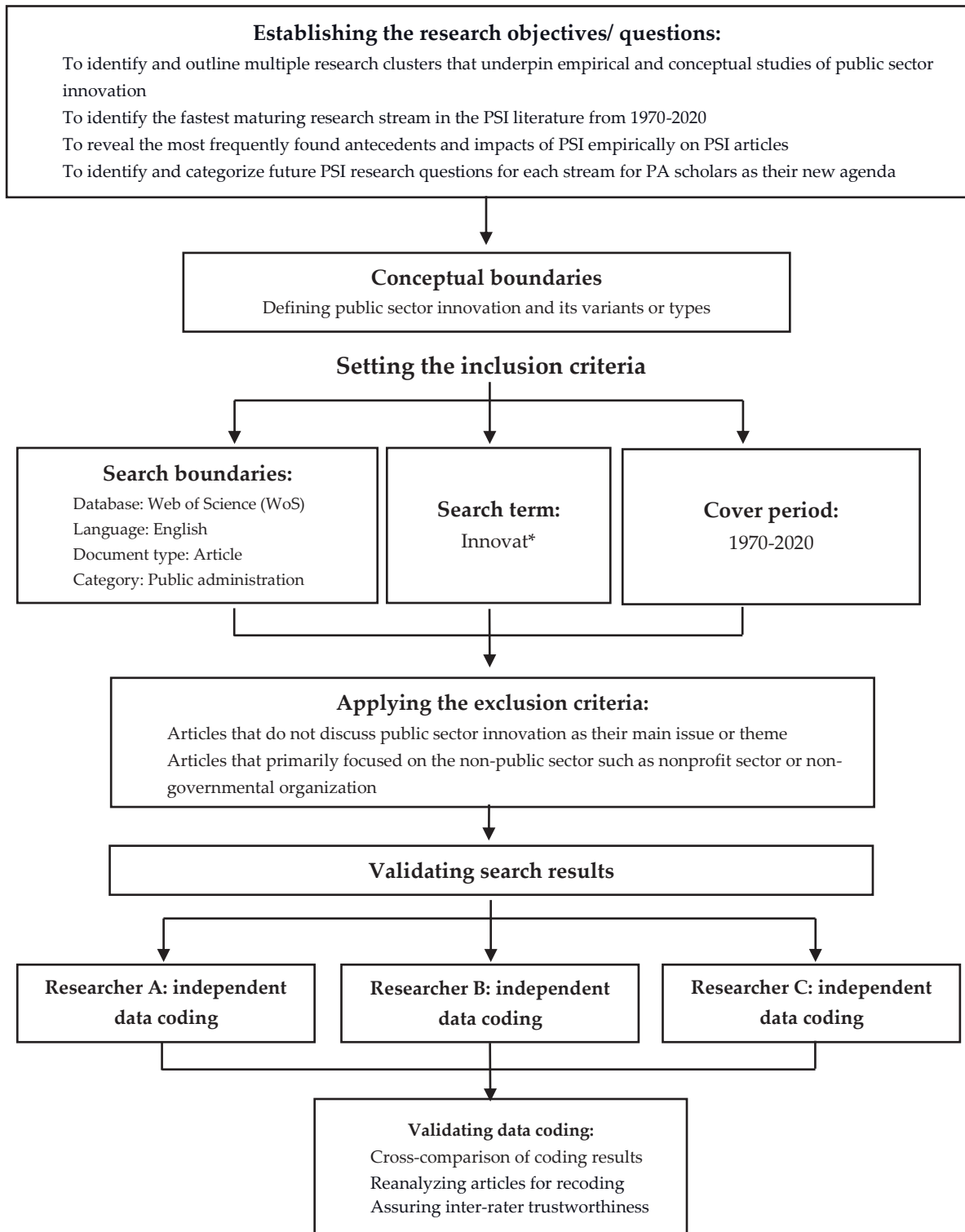
Results
Countries, research methods, type of public organization, government level dan sector

The qualitative analysis results from 289 PSI articles revealed that most of the empirical PSI studies were conducted in the USA (68/22.5%) and Anglo-Saxon countries, such as the UK (50/16.6%), Australia (24/ 7.9%), and Canada (13/ 4.3%). Also, we found that continental European countries occupy the second dominant position in the context of the PSI study with the Netherlands (20/6.62%) as the leading country. In addition, we discovered the growth of Asian countries as a new context for PSI studies with East Asian countries, such as China as the leading country (15/4.9%). Meanwhile, South and Southeast Asian countries are the rarest loci of PSI study (e.g., Jones, 1984; Torfing et al., 2020). This finding shows that the development of PSI theory is led by an American-Anglo Saxon standpoint (161/53.3%), which may contain institutional bias for non-western countries.

Regarding research methods, this study revealed that most PSI studies used quantitative methods (121/50.4%). The second was qualitative studies (95/39.5%). Only a few PSI publications applied mixed methods

Figure 2.
A summary of the SLR process

Establishing the research objectives/ questions:

To identify and outline multiple research clusters that underpin empirical and conceptual studies of public sector innovation

To identify the fastest maturing research stream in the PSI literature from 1970-2020

To reveal the most frequently found antecedents and impacts of PSI empirically on PSI articles

To identify and categorize future PSI research questions for each stream for PA scholars as their new agenda

Conceptual boundaries

Defining public sector innovation and its variants or types

Setting the inclusion criteria

Search boundaries:

Database: Web of Science (WoS)
Language: English
Document type: Article
Category: Public administration

Search term:

Innovat*

Cover period:

1970-2020

Applying the exclusion criteria:

Articles that do not discuss public sector innovation as their main issue or theme
Articles that primarily focused on the non-public sector such as nonprofit sector or non-governmental organization

Validating search results

Researcher A: independent data coding

Researcher B: independent data coding

Researcher C: independent data coding

Validating data coding:

Cross-comparison of coding results
Reanalyzing articles for recoding
Assuring inter-rater trustworthiness

Source: Obtained from Nolan & Garavan (2016)

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(20/8.3%) (e.g., Hansen & Nørup, 2017; Hartley & Rashman, 2018). This finding showed that the use of quantitative methods dominates the development of PSI studies. We also found that most PSI studies were conducted in government organizations (162/66.9%), followed by the public hospital, (14/5.7%), non-higher education (8/ 3.3%), police departments (8/ 3.3%), and State-Owned Enterprises (8/ 3.3%). In contrast, the smallest group is public universities (4/ 1.6%) and public innovation labs (I-labs) (4/1.6%) (e.g., Dudau et al., 2018; Tõnurist et al., 2017).

Concerning the level of government organization, our study found that local government (117/ 70.9%) is the most common, as opposed to the central government (48/29.9%). The health sector ranks highest as a policy area studied by PSI scholars, while the energy management sector, the court or tribunal sector, and the public museum received the least attention (1/1.8%) (Vicente et al., 2012). The high attention of PSI scholars in the health sector and local government is due to the public management reform agenda, the primary government program in the UK and US.

Citation mapping: the research streams on public sector innovation (PSI)

HistCite citation mapping depicts a network connection of 30 articles with TLCS at least nine times since 1990 (Figure 3), representing 10 percent of the 289 articles in our sample. The vertical axis is the year of publication. Each node represents an article, and the number of relationship lines between the nodes shows how influential the article is in the total local citations score (TLCS). The TLCS indicates how many articles are cited and co-cited in our database collection.

This study analyzed the content of 30 articles in Figure 3 carefully and labeled them as

Figure 3.
HistCite citation mapping of PSI literature based on TLCS
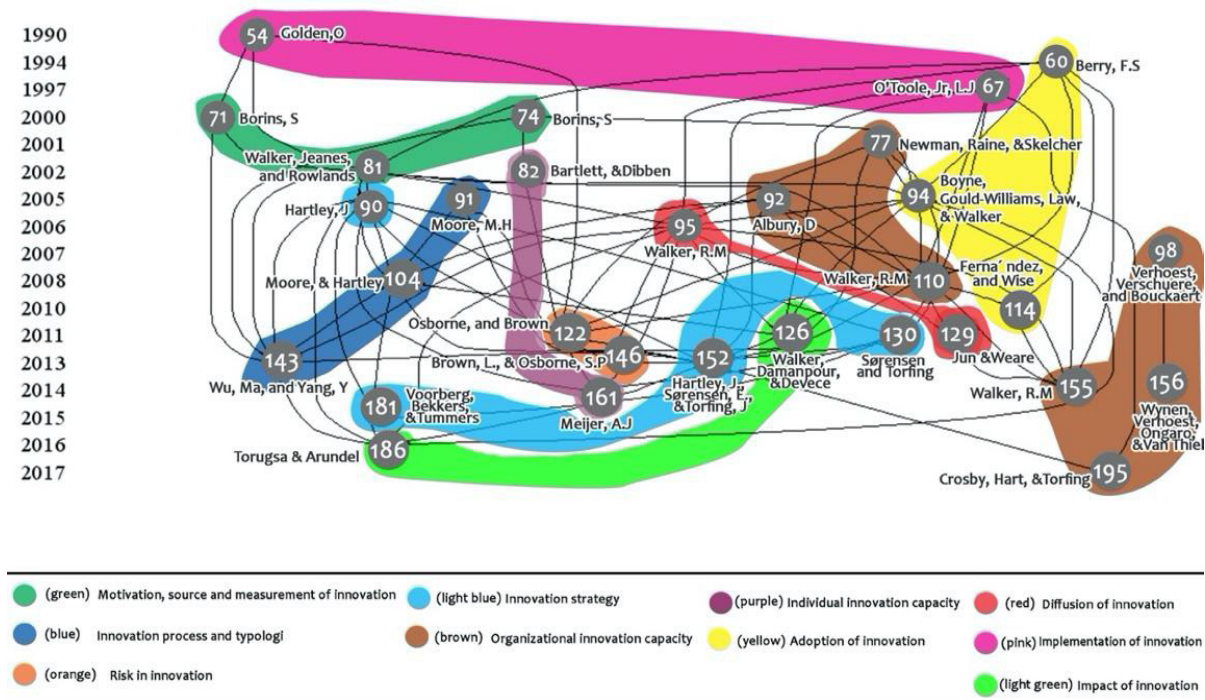
Source: ISI Web of Science

follows: 1) nature of public sector innovation (8 articles); 2) strategy and innovation capacity (13 articles); 3) adoption and diffusion of innovation (5 articles); 4) implementation and impact of innovation (4 articles). The brief descriptions of each research stream are as follows:

Nature of public sector innovation

This research stream is focused to develop a theoretical foundation for PSI that differs from the private sector. Consequently, the theoretical assumption of PSI should be distinct from the private sector, such as the motivation to innovate, antecedent and barriers, innovation taxonomy, and the risks in producing public innovation (Potts & Kastelle, 2010). Therefore, this research stream is divided into three sub-clusters: motivation, sources, and measurement of innovation, process, and typology of innovation, and risks in innovation.

For motivation, sources, and measurement of innovation, Borins (2000a) (74 in Fig.3) and Borins (2000b) (71 in Fig.3) clarified that innovators could come from the middle and lower levels; thus, innovation could also emerge from front-line employees. Furthermore, Walker et al. (2002) (81 in Fig.3) presented a method for measuring PSI using the literature-based innovation output indicator (LBIOI).

For innovation process and typology, Moore (2005) (91 in Fig.3) depicted the types of innovation aiming to build systems and organizational structures to innovate sustainably. Three years later, Moore & Hartley (2008) (104 in Fig.3) presented governance innovation as an innovation type originating from the public sector. Five years later, Wu et al. (2013) (143 in Fig.3) explored the innovation typology in the Chinese context and demonstrated that technology and governance are the emerging and growing types of innovations recently.

Finally, for risk in innovation, Osborne & Brown (2011) (122 in Fig.3) emphasized that the focus of the PSI literature should be directed at the relationship between risk and innovation, particularly how to identify and minimize the potential risk during the process of innovation. Two years later, Brown & Osborne (2013) (146 in Fig.3) explained the necessity to shift the focus of PSI studies from minimizing risk to managing the risk based on three approaches. They are technocratic risk management, decisionism risk management, and transparent risk governance.

Innovation strategy and capacity

This research area is focused to examine various strategies, factors, or conditions contributing to strengthening or diminishing innovation capacity. This research stream is classified into three sub-clusters: innovation strategy, organizational innovation capacity, and individual innovation capacity. We classified this stream into three sub-clusters because the innovation strategy theme generally focuses on discussing the best ways to increase the capacity of the public organization to generate innovation both at the organizational level or individual level (behavior, character, or attribution) (see De Vries et al., 2016).

For innovation strategy, Hartley (2005) (90 in Fig.3) depicted three models used in generating innovation: the traditional model of public administration, the NPM model, and the networked governance model. Six years later, Sørensen & Torfing (2011) (130 in Fig.3) unveiled a new perspective on collaborative innovation strategies for encouraging PSI. Two years later, Hartley et al. (2013) (152 in Fig.3) again presented their analysis regarding the strengths and weaknesses of the NPM, the neo-Weberian, and the collaborative innovation strategy. Two years later, Voorberg et al. (2015) (181 in Fig.3) SLR study explained the role of co-creation strategy in spurring public innovation practices through the involvement of end-users at each stage of the innovation process.

For organizational innovation capacity, Newman et al. (2001) (77 in Fig.3) claimed that

central government policies might shape the innovation climate in local government. Four years later, Albury (2005) (92 in Fig.3) described five conditions encouraging or inhibiting innovation in the public sector. Three years later, Walker (2008) (110 in Fig.3) demonstrated the complex relationship between organizational and the environmental antecedents with the types of public innovation. Six years later, two studies were published with different focuses. Wynen et al. (2014) (156 in Fig.3) investigated the relationship between NPM and organizational innovation. Walker (2014) (155 in Fig.3) focused on mapping internal and external antecedents of the PSI process.

Individual innovation capacity. Bartlett & Dibben (2002) (82 in Fig. 3) outlined the role of champions and sponsors in driving local government innovation activities in the UK. In the next decade, Meijer (2014) (161 in Fig.3) presented distributed heroism theory, explaining that innovation is a collective result of the heroes of innovation in each organizational hierarchy.

Adoption and diffusion of innovation

This research cluster is focused to answer: 1) why do a single or some government organizations adopt innovations while others do not; 2) why do government organizations in one or several jurisdictions act more quickly in making decisions to adopt a spreading or diffusing innovation; 3) what factors affect the diffusion process of innovation among government organizations. This research stream is divided into two sub-clusters: innovation adoption and innovation diffusion. These clusters are interrelated in the context of the innovation process life cycle; as stated by Rogers (2003), innovation adoption is the result of a diffusion process.

For adoption of innovation, Berry (1994) (60 in Fig.3) claimed that the decision to adopt innovation by government organizations is primarily determined by four factors: strong

fiscal conditions, the early cycle of governor leadership, the intensity of cooperation between the public and private sectors, and the number of neighboring public agencies adopting similar innovations. In the next decade, Boyne et al. (2005) (94 in Fig.3) stated in their empirical analysis that prior experience related to innovation implementation was a necessary factor that significantly influenced innovation adoption decisions. Five years later, Fernández & Wise (2010) (114 in Fig.3) illuminated the influence of leadership behaviors and dispositions, slack resources and tasks, and the institutional environment for the innovation adoption process.

In the diffusion of innovation, Walker (2006) (95 in Fig.3) explained that the relationship between the diffusion process of innovation with a different typology and the decision to adopt innovation in public organizations is complex and contingent. Five years later, Jun & Weare (2011) (129 in Fig.3) claimed that the most influential drivers for adopting a diffusing technological innovation are the necessity to pursue efficiency and adapt to complex external environmental alteration.

Implementation and impact of innovation

This research stream focuses on answering two main questions. First, how to implement public innovation successfully. Second, what are the impacts of PSI on public organizations?

This research area is categorized into two sub-clusters: innovation implementation and innovation impact because the themes of implementation and the impact of innovation are interrelated in the PSI realm. Implementing innovation aims to catch the impact or benefits of innovation for public organizations, a prerequisite for innovation continuity in organizational routines (Scheirer, 2005).

For the implementation of innovation, Golden (1990) (54 in Fig.3) narrated a strategy to implement innovation successfully, known as the groping-along model. This model explains that the innovation results from a modified

practice or program to respond to operational experience. Seven years later, O'Toole (1997) (67 in Fig.3) illuminated the existence of two main obstacles during the process of implementing innovation in a networked or pluralistic environmental context: networked uncertainty and lack of institutionalization.

Finally, for the impact of innovation, Walker et al. (2011) (126 in Fig.3) explored the impact of management innovation on organizational performance in the UK's local government context. Five years later, Torugsa & Arundel (2016) (186 in Fig.3) established the term innovation complexity referring to an innovation composed of more than one typology, having a hybrid innovation character.

Growth of the public sector innovation (PSI) research stream

Using the qualitative analysis method, this study calculated the number of publications in each research stream by year through content identification from 1970 to 2020 and found that the number of publications on the strategy and innovation capacity stream has the fastest increase (119 articles / 41.2%) compared to other research streams. The second most popular stream is the implementation and impact of

the innovation, with a total publication of 77 articles (26.6%) followed by the adoption and diffusion of innovation (61 articles / 21.1%). While the nature of PSI streams (38 articles / 13.1%) is left far behind, as presented in Figure 4. Our study also reveals the lack of the nature of the PSI stream because current scholars still prefer to adopt theories or concepts of innovation from the private sector, leading to the deficit use of solid theories or models when investigating the phenomenon of innovation in the public sector.

Antecedents and impacts of innovation in the public sector

This section analyzed the antecedents and impacts of PSI that have been justified empirically in 289 PSI literature using evaluative content analysis (Table 1). This study found that organizational antecedents dominate the overall empiric findings of PSI studies in PA discipline with 156 (52%) articles, followed by environmental (98/ 33%), individual (29/ 5.7%), and innovation characteristics (17/ 9.7%). Meanwhile, 39 empirical studies found eight types of impact generated by public innovation.

Interestingly, among these antecedents, the top three originated from organizational

Figure 4.
Total Numbers of Publication in Each Research Stream
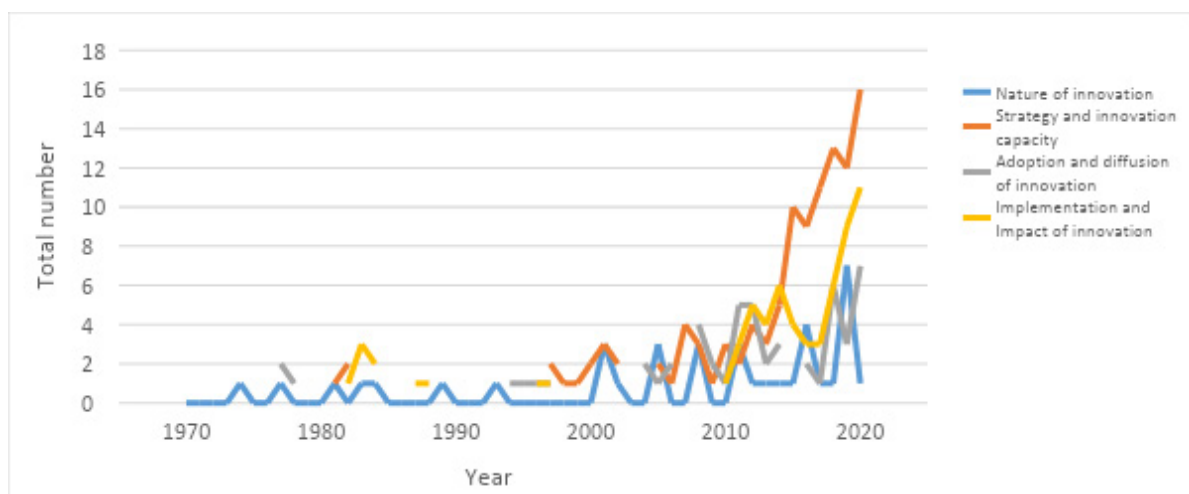
Source: ISI Web of Science

Table 1.
Antecedents and impacts of PSI

Organizational antecedents		Environmental antecedents		Innovation characteristic antecedents		Individual antecedents		Impact of innovation	
Leadership (style, quality, support, and network)	39 (25%)	External stakeholder/ collaboration/ partnership	20 (20%)	Complexity	2 (12%)	Motivation	3 (10%)	Job satisfaction	4 (10%)
Reward/ incentives	8 (5%)	Unemployment rate	6 (6.1%)	Compatibility	4 (24%)	Gender	3 (10%)	Organizational performance	20 (51%)
Cultural norms and values	29 (19%)	Economic/ fiscal strength	13 (13%)	Ease of use	3 (18%)	Personal attributes or position as champion/ promoter	9 (31%)	Transparency and accountability	3 (7.7%)
Empowerment and training	7 (4.5%)	Location with states adopting similar innovation / diffused area innovation	7 (7.1%)	Relative advantage	5 (29%)	Political skill	1 (3.4%)	Quality of service	4 (10%)
Organizational capacity (human resources, fiscal and technology capacity)	22 (14%)	Citizen's feedback	6 (6.1%)	Trialability	3 (18%)	Career path	4 (14%)	Citizen engagement/ user involvement	4 (10%)
Managerial autonomy and result control	14 (9%)	Demography (population size, change, density)	19 (19%)			Job background (age, tenure, education)	4 (14%)	Reducing corruption	1 (2.6%)
Organizational size/ complexity	15 (10%)	Vertical/ political pressure (mandate/ ideology/ central government policy)	11 (11%)			Job satisfaction	2 (6.9%)	Organizational knowledge sharing	1 (2.6%)
Management support	12 (8%)	Public pressure	4 (4.1%)			Individual commitment	2 (6.9%)	Public satisfaction and trust	2 (5.1%)
Employee involvement	4 (3%)	Citizen engagement	3 (3.1%)						
Organizational change	2 (1%)	External funding	4 (4.1%)						
		Public service competition	5 (5.1%)						
Total (N)	156 (52%)	Total (N)	98 (33% %)	Total (N)	17 (9.7%)	Total (N)	29 (5.7%)	Total (N)	39 (100%)

Source: obtained from primary data

antecedents. They are leadership (37/24%), cultural values and norms (29/19%), and management capacity (22/14%). Finally, public innovations produce five significant impacts. They increase organizational performance (14/36%), administrative-cost efficiency (6/15%), job satisfaction (4/10%), service quality (4/10 %), and involvement of citizens as users (4/10%). Additionally, we found that cultural values and norms can act as drivers or barriers to the PSI process. For instance, learning and inclusive culture increase organizational innovativeness. While the culture that tends to be risk-averse and has a silo mentality inhibits the realization of innovation (De Vries et al., 2016).

Future avenue for public sector innovation research

Based on qualitative analysis, this study generated a map of 20 future research questions representing each research area in the PSI literature as shown in Table 2.

Discussion

Our literature meta-analysis on 289 PSI articles in the PA discipline managed to answer the five research questions in this article and extended the four SLR studies conducted by Walker (2014), De Vries et al. (2016, 2018) and Cinar et al. (2019a).

For the first research question, this study found that contemporary empirical PSI research is mostly still conducted in Developed-Western countries with Anglo institutional settings, local government, and health sector. These findings showed that the landscape of PSI literature is not altered, as demonstrated by a previous SLR study conducted by De Vries et al. (2016). Thus, scholars need to examine non-western countries with unique institutional settings to expand the PSI theories further.

For the second research question, the analysis revealed four distinct research streams in the PSI literature. They are the nature of PSI, strategy and innovation capacity, adoption and diffusion of innovation, and implementation and impact of innovation. This finding implies a significant distinction of phenomenon complexity amidst each research cluster, covering its drivers, barriers, actors, interactions, and context; thus, requiring examination in different focuses (Cinar et al., 2019a). For instance, the innovation production realm is the opposite of innovation sustainability. The area of sustainability requires innovation to become an unchanging program in organizational routines. In contrast, producing innovation aims to discontinue sustained structures or practices (Osborne & Brown, 2011).

For the third research question, this study found that the strategy and innovation capacity cluster obtain the most attention (see Figure 4). This finding implies that PSI contributes to the PA discipline by focusing on multiple factors or conditions facilitating or hampering innovation capacity at organizational and individual levels, as demonstrated by prior SLR studies on PSI literature conducted by Walker (2014), and De Vries et al. (2016).

In contrast, less attention is given to the nature of the PSI stream. The lack of attention on this stream is caused by the dispute among scholars related to the concept of innovation, originating from the uniqueness of the public sector. Also, most scholars prefer to adopt the theory of innovation from the private sector to study the PSI phenomenon (Arundel & Huber, 2013; Bloch & Bugge, 2013). Furthermore, the more mature the research stream suggests, the more future research questions are worthy of being investigated.

For the fourth question, our review shows that the most frequent antecedent is leadership (styles, qualities, roles, and attitudes), and the most frequent impact of innovation is organizational performance (see Table 4). This finding indicates that leaders play a crucial role in the PSI either as a source of innovative ideas or to create an environment to stimulate innovative behavior (Orazi et al., 2013; Susanto,

Table 2.
Suggested research questions

Research stream	Future research question/ direction/ author
Nature of public sector innovation	Which organizational actors (individual users, citizens, politicians, service professionals, or other stakeholders) will be involved in public innovation risk governance, and how these actors engage with each other in digital governance to tackle the risks within the public innovation process? (Brown & Osborne, 2013)
	Why is a new organizational structure created and remained to survive in the public sector? (Tõnurist et al., 2017)
	Does the categorization of innovation type in the public sector be robust in Asian or Latin American contexts, non-profit organizations, or state-owned enterprises? (Chen et al., 2020)
	What is the difference between the innovation process based on STI (science and technology-based) and DUI (doing, using, interacting) in the public sector? What are the specific conditions that impede or promote STI and DUI process in the public sector? (Nählinder & Eriksson, 2019)
Strategy and innovation capacity	Using a longitudinal approach, what are causal relationships between various forms of collaboration (inward, outward, and upward) and two types of innovation (exploitative and explorative innovation)? (Barrutia & Echebarria, 2019)
	Using the quantitative method, what are the effects of hands-off and hands-on governance strategy to the innovation process in the various policy domains and administrative traditions other than the Scandinavian welfare state? (Vento, 2020)
	What is the relationship between barriers and long-term innovation survival? (Cinar et al., 2019b)
	How do innovations become institutionalized within the public sector? (Bernier et al., 2015)
	Using qualitative research designs, how is the life process of an innovation starting from crib to casket? what is the association between the complexity and radicalness of the innovation with the idea of sunk costs? (van Acker & Bouckaert, 2018)
	How is the effect of multiple organizational changes on organizational innovation? (Wynen et al., 2020)
	Using top managers' and peers' views as a sample, what are the associations between innovative work (IWB) behavior, creative self-efficacy (CSE), and creative collective efficacy (CCE)? (Oppi et al., 2019)
	Using a qualitative design, when do cutbacks encourage employees to pursue innovations in the public sector workplace? What is the nature and efficacy of the innovations adopted during cutbacks? (Taylor, 2020)
Adoption and diffusion of innovation	Using the Agent Network Diffusion (AND) model, to what extent can professional mobility and network transfer become a diffusion channel for management performance innovation? (Yi et al., 2018)
	Using a quantitative study approach, do managers' other social, political, and information networks affect the diffusion of innovations in the public sector? (Yi & Chen, 2019)
	Using multiple types of horizontal diffusion mechanisms (e.g., learning, competition, and imitation), How is the relationship between top-down interventions and each type of horizontal pressure? (Zhang & Zhu, 2020)
	How and to what extent is the relationship between the ruling political party and the process of adopting innovation that has been introduced by the party elsewhere? (Doberstein & Charbonneau, 2020)
Implementation and impact of innovation	What are the consequences of a particular innovation type to the public organization when it is still in the pre-adoption circumstance and continuing sustained for the long-term? (Cucciniello & Nasi, 2014)
	How the role of political officials affects the shaping and outcomes of public innovation? (De Vries et al., 2016)
	Does innovation implementation is fully shielded from high verticality partners (government ministers and members) and low verticality stakeholder perspectives of innovation source? (Moldogaziev & Resh, 2016)
	How do government agencies implement open innovation in their political context with the differences in top-management sentiments towards innovation, and diverse organizational cultures? (Mergel, 2018)

Source: obtained from primary data

2020). Lastly, for the fifth question, this study proposes 20 research questions for future PSI research to develop the PSI theme in PA fields (see Table 2).

In the nature of PSI cluster, future research may focus on unveiling multiple types of risks in the innovation process (Brown & Osborne, 2013), identifying the diversity of PSI typologies in a different form of public organization (Chen et al., 2020), and the process of generating public innovation through STI (science and technology-based) and DUI (doing, using, interacting) approaches (Nählinder & Eriksson, 2019). Therefore, this future research area will be beneficial to analyze: 1) the originality of risk characteristics in each phase of innovation; 2) the innovation taxonomy which characterizes the nature of public organizations; and 3) the distinctions in the process of innovation based on the STI and DUI strategy.

The innovation strategy and capacity stream develop several promising future directions. First is the relationship between collaborative strategies (inward and outward) and exploitative and explorative types of innovation (Barrutia & Echebarria, 2019). Future research may also uncover the black box concerning the sustainability of innovation in organizational routines and the reasons behind stopping or resuming an innovation (van Acker & Bouckaert, 2018). Lastly, the association between organizational changes, innovation culture, IWB, and creative efficacy (individual or collective) is noteworthy for future investigation (Taylor, 2020; Wynen et al., 2020).

In the innovation adoption and diffusion cluster, future research may focus on the theme of top-down interventions, horizontal pressure, and the decision-making process to adopt an innovation (Zhang & Zhu, 2020). Also, future studies may analyze the influence of the political context (political parties as sponsors of specific innovations) on the innovation-diffusion process through political-official

recruitment, network transfer, or mobility (Doberstein & Charbonneau, 2020; Yi & Chen, 2019).

The innovation implementation and impact cluster extends the future direction by focusing on the issue of political context (actor, authorities, sentiments, and parties), bureaucracy partner, and the implementation process of innovation (Mergel, 2018; Moldogaziev & Resh, 2016). Future research is also directed at identifying multiple consequences resulting from innovation and their sustainability in a certain period generated by different types of innovations for the organization, public employees, and the external environment (Cucciniello & Nasi, 2014). Lastly, future studies can examine the dark side (negative impacts) of public innovation empirically (Jordan, 2014; A. Meijer & Thaens, 2020).

Conclusion

The dearth of a bibliometric study that thoroughly examines PSI publications from 1970 to 2020 in top PA journals to pinpoint diverse research streams delivers a void for this study to occupy. This research aims to expand and supplement the previous SLR studies on PSI topics by identifying and outlining the context of PSI studies, research theme classification, highlighting research clusters, discovering antecedents and impacts of PSI, and the future agenda for PSI scholars.

More than half of the PSI empirical research was conducted in western countries, particularly Anglo-American countries. While Asian countries still lack attention by PSI scholars in a research context, particularly South and Southeast Asian Countries in the PA field. Moreover, the local government and health sector is empirically the most common public organization type examined by the PSI scholars. While PSI scholars lack attention to the national government, SOEs, state universities and I-labs, energy management,

museums, and the judicial and legislative sectors. Therefore, future studies need to dwell deep into these contexts, either countries or public organizational levels, types, and sectors, to mature the PSI topic.

The novel findings of this study are related to the four research clusters in the PSI literature. They are the nature of PSI, strategy and innovation capacity, adoption and diffusion of innovation, and implementation and impact of innovation. This study also found that the strategy and innovation capacity dominate the advancement of PSI literature. While the nature of PSI streams is the least popular. Moreover, this study demonstrated leadership and organizational performance as PSI's most frequent antecedents and impacts. Lastly, our study offers 20 future research questions for the PA scholars to expand PSI research topics based on the four research clusters (see Table 2).

This article has several limitations. First, this study cannot cover new publications offering a new research theme in less than five years because they may have a low citation rate. Second, HistCites only accommodate articles from the WoS database, and our sample is limited to the PA journals.

Therefore, this study suggests several future avenues. First, future studies may conduct a bibliometric analysis every five or ten years to uncover new research streams that potentially enrich the PSI construct development in the PA field. Second, future meta-analysis studies could adopt journals from outside the WoS database and PA discipline because many PA scholars may publish their interdisciplinary work outside the PA journals.

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