

How Supply Chain Regulates the Innovations Study of Diffusion in Public Service Organizations? Recommendations of Reform

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Abstract- This investigation will examine the effect of innovation, innovation process and performance on public service organizations with the moderating effect of supply chain management (Information Sharing). Why is innovation important for public service organizations? Public service innovation is an important concern in bureaucratic reform efforts. The need for bureaucratic reform, especially in public services, in an effort to fulfil the right to obtain services provided by the government. This study will gather data by using questionnaires and PLS-SEM was used for analysis. This study will present a systematic framework and methodology based on the synthesis of the results of the review so that it can be used as a rationale and recommendation for public service reform and innovation in Indonesia. The results of a systematic framework and methodology can be used in the broader context of public service organizations.

Keywords; Innovation, Innovation process, Innovation performance, Supply chain management, Public sector organization

1. Background

This review starts with the question of why is innovation important for public service organizations. In the 1960s, the diffusion theory of innovation then developed, which was originally only associated with social change. In the 1970s, it began to be associated with modern phenomena that occurred in society. Shoemaker (1971) defines the social change in 3 (three) important stages. The first is discovery, which is a process of ideas or new ideas created or developed. Second, diffusion which is the process of communicating ideas or ideas to the social environment, while the third is the consequences that are the result of changes in the social environment as a result of the adoption or rejection of innovation. A decade later, Brown (1981) raised the theory of diffusion of innovation into economic, market, and infrastructure perspectives. Until the early 2000s, innovation research did not only focus on technical and social perspectives but had already entered the human realm that was associated with environmental change.

Based on a study of public service organizations by Osborne & Brown (2013), in his book Handbook of Innovation in Public Services shows that the word innovation was rapidly used by researchers in the two decades of the revolutionary social movement in the 1960s to 1970s, which was then driven by major changes in public policy marked by public new management in the early 21st century [1].

From the history of innovation, it began in America in 1950 with the birth of the theory of innovation diffusion introduced by Everett M. Rogers. The theory is an important foundation in understanding the definition of innovation, the characteristics of innovation, why and how humans adopt innovation, social factors that support the adoption of innovation, and how the innovation process occurs in society. Next, what would this review contribute to the study of the diffusion of innovations? This review study discusses (1) illustrates the pattern of changes occurring in public service organizations from the early 1990s to 2019, (2) at the same time illustrates the shift in research knowledge gap related to public service invasion and (3) from this review hopes to build a research agenda as a systematic in future public service organizations [2]. And the second is, public service organizations must innovate public services, so that legitimacy in the eyes of the community remains strong. This is in accordance with different studies that public service organizations need legitimacy or recognition to increase trust in society. In a systemic review of public sector organizations, DeVries et al. (2015) state that the more ideas about innovation, the contribution of improving the quality of public services is also getting better. Public service innovation is often synonymous with the emergence of the New Public Management (NPM) movement, e-government, and good corporate governance [3].

Literature around the globe witnessed that the concept of Supply chain management (information sharing) is getting more important. Initially, there were only large-scale organizations were focusing on Supply chain management (information sharing) concept but now

keeping its importance in view even the small-scale organizations have a proper Supply chain management (information sharing) system in order to improve their operations [4]. Even the public sector organizations have their proper Supply chain management (information sharing) mechanism in order to improve their systems at all the levels. The Supply chain management (information sharing) is basically a system which deals with the information flow of the organization. The different organization deals with different types of information. Some with services and others with production information. In all the cases, Supply chain management (information sharing) plays a vital role to keep this information flow smooth [5]. The organization connects with its stakeholder in different ways. This connection happens with the help of information flow. The information float within the organization like accounting department info, marketing department info etc. are process through Supply chain management (information sharing). Numerous times the Supply chain management (information sharing) acts as a mediator with the innovation studies. There was a positive mediation association reported between Supply chain management (information sharing) and innovation, organization performance etc. [6]. In this present investigation, the Supply chain management (information sharing) is tested as a moderating variable in the relationship between Innovation, process, performance and Public sector Organizations.

2. Hypotheses development

From the total search results in the initial stages with predetermined keywords produced more than 20,000 literature. Based on the relevance of the combination of keywords, resulting in 565 journals that will enter the next selection process. The first process is to make a selection based on the relevance of the title and abstract. In this process, it is needed to read quickly in the abstract according to the specified topic to produce 55 journals. In the second stage, the authors do a quick reading of the entire contents of the journal to do the screening process of journal material in more depth according to the topic. In this process, full reading activities on abstract material are needed, and some are read in full. The adoption of innovation has attracted many researchers. A number of innovation studies focus on adopting innovations that are not only carried out in developed countries but also developing countries [7]. The decision-making process must be based on knowledge of innovation itself. Second, make careful and persuasive observations and third, through the stages of planning and implementation. At the knowledge stage, consumers are faced with innovation and gain an understanding of how their functions can provide added value to the organization's products and services. In the persuasive observation stage, consumers

form attitudes towards the innovations that have been generated, both those that are profitable and those that are not profitable [8].

From the concept of diffusion of innovation above, there are some important things that can be concluded that the process of diffusion in an organization includes at least three things namely, (1) knowledge of the innovation itself, (2) the ability to make in-depth persuasive observations, (3) the ability to add added value to the organization's products and services. These three things must be well planned by an organization because the decision to innovate depends on the attributes of relative excellence, complexity, compatibility, testing ability, and observation ability. In his research, Everett M. Rogers in the 1950s did a lot of research on modern agricultural techniques in America as demands for the increasing needs of modern agricultural products. Traditional farming techniques are becoming obsolete, turning to new technologies that are more effective and efficient. In his 1953 book *Diffusion of Innovation*, Everett M. Rogers explored much about diffusion as a form or process of communication-related to new things [9]. Diffusion is related to "which is the spread of a new idea from its source of invention or creation to its ultimate users or adopters." Next came several figures who wrote about innovation, including F. Floyd Shoemaker and Rogers, with his book titled *Communication of Innovation* [10]. The criterion that innovation is useful for the public or the public requires that time is long enough so that an assessment of the impact of innovation can be carried out [12].

Whether the definition of the Oslo Manual can be made more applicable to measuring user innovation by companies and consumers and for public sector innovation, the main obstacle to the definition is the relation of implementation with the market, in this case, that product innovation must be introduced in the market, while other types of innovation must be used. So studies suggest defining the implementation of new products or the existence of a significant improvement in operational processes available to potential users and allowing definitions in the Oslo Manual to apply to users and public sector organizations.

From private organizations to public organizations. Researchers argue that most operational / production processes in the public sector are associated with services, [13], from Bloch and Bugge's research above, that the concept of public service organizations is driven by the development of private services used by the community. With the increasingly strong public demands for services to the community, the improvement of public services to the public is demanded to be better. At the organizational, group, and individual level, a number of factors differentiate the public from the private sector in terms of innovation [9]. The main difference is that public sector

organizations, in principle, do not operate within a market-based framework and are therefore not driven solely by profit-seeking motives. Public service users, in many cases, do not have the possibility to replace service providers with other providers.

Value creation in services can occur through increased efficiency, increased quality, increased user satisfaction, the greater scale of service usage, more equitable distribution of services or choices, or greater variation. Social outcomes such as equality, welfare distribution, safety, poverty alleviation, information disclosure, access to better education, or improving the quality of health, are the main objectives of public services [8]. Because public sector service provision focuses a lot on providing services that are cost-effective, efficient, and create public welfare, the measurement of innovation performance in the public sector is more complex when compared to private organizations [3].

Likewise, the risk for failed innovations can be greater for the public sector because of the media and social criticism of the community's inability to provide public services. In private sector organizations, there is a culture of rewarding successful innovations, whereas, in the public service organization sector, it is less appreciative of innovation [14].

The process of innovation diffusion is another thing where there is a very important difference between the private and public sectors, whereas innovations in the private sector try to be protected from being used by others to increase the revenue value from the use of these innovation patents. But some of the researchers' common ground is that the diffusion of innovation in both the public and private sectors can ensure better use of public resources. The view of the public bureaucracy or public administration in general as slow, rule-bound performance, rigid hierarchy, performs less effectively than it should. Public bureaucracy must be more efficient and adopt new technologies, better care and operations, and best service practices from the public sector [15]. What is needed is critical thinking about the status quo, some of which we can do better leadership. In other words, it's time for reform. Highlight a number of important differences in innovation in the public and private/industrial sectors. Innovation in the private/industrial sector is driven by competitive advantage, while encouragement to the public sector includes improvements in governance and service performance, including efficiency in improving public services. In the UK, collaborative practices, sharing, and adopting can create a competitive advantage among several public services that result in a decentralized system. Including the case of solving congestion problems in the UK by the transport department as a service innovation as well as organizational governance. So that the definition of innovation in public services is more

focused on the type of multidimensional innovation (how many dimensions change/innovation) to make it easier to measure and compare innovation performance [16].

Public Service Innovation. The concept of public service sector innovation has evolved but is separate from the public sector reform agenda. Unlike the reform agenda, innovation studies are sexy and fun. Over the past half-century, fields of innovation and cognitive such as creative problem solving have been the focus of research, consultation, and development of organizational management. Innovation can be considered only as an increase in operations originating from a brilliant new idea. But not just stopping at getting ideas, knowledge, and solutions, urging team members in the public service bureaucracy to think creatively "out the box" is possible to make creative people have the opportunity to break the rules, including initiatives to find solutions that tend not to be linear with the rules that apply, and that will continue to appear in public service organizations [12].

The concept of innovation pertains valuable importance in the world. The organizations in the world seek a competitive advantage in order to compete with the competitor. One of the basic rules to win the competition is the differentiation, whether in product or services [17]. The competition around the globe is getting worse and worse with the passage of time. The organization, whether public or private put their head to toe efforts in order to get success [18]. In this modern world, the public sector organizations are also updating themselves with the view to remain the competition. The public sector organizations are also focusing more and more on innovations. This focus on innovation leads them to follow a detailed process stands behind the innovation, usually termed as research and development [19]. This process and the outcome received from that process i.e. innovation throws a strong impact on the organization irrespective of the matter whether it's private or public. One of the key elements which plays a vital role in the entire innovation process is the supply chain management (information sharing) [20]. The information sharing between the stakeholders, competitors, users and also with the organization's departments is the key element. This entire sharing process controlled by supply chain management (information sharing). The supply chain management (information sharing) receives the information from outside like from the competitors regarding their choice, importance etc., from stakeholders like shareholders about their interests and from competitors regarding their products [21]. At the second step the supply chain management (information sharing) arrange this gathered information with the view to deliver an authentic information to the relevant section. This stage is called supply chain management (information sharing) information processing [22]. At the final stage the supply chain management (information sharing) float the

information at the right time to the right stage, the person in a required way to use this information for the betterment of the system as well as an organization like innovation. The supply chain management (information sharing) not only impacts the innovation process but also the performance. If the innovation came to the market, but there is a lack of proper information deliverance to the concern. This will lead to failure. Supply chain management (information sharing) make it possible [23]. The supply chain management (information sharing) share the right information to the right persons like users in order to get the organization product succeed. The supply chain management (information sharing) has a positive influence over the organization performance like to get the competitive advantage [24]. In research a number of times the supply chain management (information sharing) act as moderator or mediator. To test whether in the public sectors context the supply chain management (information sharing) act as mediator or not, in this present investigation the supply chain management (information sharing) employed as mediator.

Now that there have been many innovations that were born from the public sector, this is also recognized as a more systematic effort to promote innovation to improve high-level welfare services and help overcome the economic challenges and social problems faced by the community. However, there is still a lack of a framework for understanding and measuring innovation in the public sector [9]. Several previous studies have suggested that the innovation of an organization has a direct impact on changes in the structure and strategy and performance of the organization. However, Damapour only focuses on factors that influence the adoption of innovations that are administrative and technical, not yet explored how the impacts of the adoption of innovations (administrative and technical) affect each other.

There are still many researchers who study the theory of innovation adoption only focus on the process of innovation diffusion in one or more organizations and only focus on measuring the level of organizational innovation influenced by variables in the organization, very few which explores the relationship between innovation performance and organizational performance. Then the question that often arises is, why do some organizations have higher innovation performance than others? This question has been answered by many previous studies that innovation has a positive effect on organizational performance, but according to Manral even though the question is theoretically proven to have a positive relationship, but there is no comprehensive model describing the implementation of innovation in an organization [3].

Research related to organizational creativity and innovation requires multidimensional analysis (individuals, groups, and organizations) in an effort to

develop a comprehensive model of organizational innovation. Since then, a comprehensive organizational model of creativity and innovation has developed and is based on multidimensional analysis (i.e., Kanter, 1988; Woodman et al., 1993), but again has not been able to explain the performance variables of specific organizational innovations or various types of organizations. Moussa et al., (2018), based on their research that although many researchers have tried to define the concept of innovation, especially in the public sector, there is no consensus on what innovation is. Moussa added that behavioral leadership factors that enhance the culture of innovation in the public sector remain ambiguous [1]. From literature review and analysis, innovation initiators often succeed in structures and systems of public organizations that are less dominant, but public services remain ineffective. Finally, based on the literature, it is clear that the main obstacle is the lack of resources and political power at the organizational level, negatively affecting innovation in the public sector [25].

Thus, public services oriented to community satisfaction are related to administrative services provided by public service providers. Innovation in the implementation of public services needs to be realized in order to accelerate the improvement of the quality of public services themselves. This means that the success of service providers depends on the quality of the service provider organization. Good public services will focus and continue to prioritize the needs and desires of the community and do not ignore the rules or rules of existing bureaucratic services. Currently, the demand for public service innovation continues to roll in the environment of government organizations. But in reality, the relationship between organization and innovation is a complex, dynamic, and multilevel relationship. Good innovation is an innovation that is able to solve problems. Advocating for public service innovation is not new. Since the enactment of the public service law in 2009, many scientific implementations involving multidisciplinary over the past ten years have identified several important issues, why some innovation initiatives have succeeded, whereas other innovations have not been successful. Many researchers from multidisciplinary sciences, including sociology, psychology, sociopsychology, economics, anthropology, political science, IT, communication science, health sciences studies, and organization and management, have contributed to the study of innovation [26].

H1: There is a positive association between Innovation and Public Service Organizations.

H2: There is a positive association between the Innovation Process and Public Service Organizations.

H3: There is a positive association between Innovation Performance and Public Service Organizations.

H4: Supply Chain Management (Information Sharing) positively mediates the relationship between Innovation and Public Service Organizations.

H5: Supply Chain Management (Information Sharing) positively mediates the relationship between Innovation Process and Public Service Organizations.

H6: Supply Chain Management (Information Sharing) positively mediates the relationship between Innovation Performance and Public Service Organizations.

3. Methodology

This research has been adopted quantitative method for data collection and distributed 450 questionnaires during personal visit. Out of these 450 questionnaires only 290 were returned that represents 64.44 per cent response rate. The variables include three independent variables such as innovation (IN) that has six items, innovation process (INP) that four items, and innovation performance (INPR) that also has four items. In addition, mediating variable include supply chain management (SCM) that has four items and dependent variable such public sector organization (PSO) that has three items. These are highlighted in Figure 1.

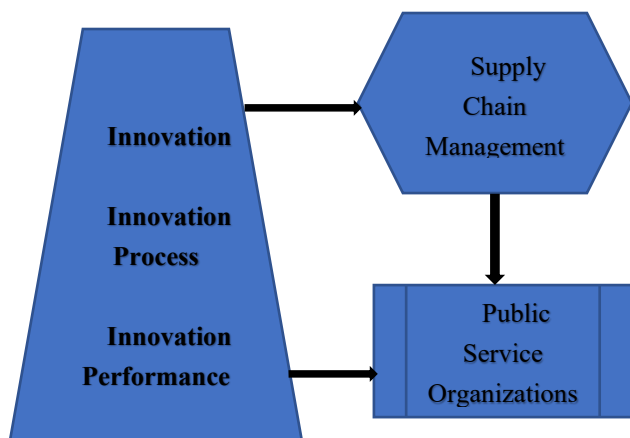


Figure 1. Theoretical model

4. Results

The findings show that convergent validity has been proved and high relationships between items are exists because the Alpha and CR values are larger than 0.70 while loadings and AVE values are higher than 0.50. These values are mentioned in Table 1.

Table 1. Convergent validity

Items	Loadings	Alpha	CR	AVE
INP1	0.841	0.826	0.885	0.658
INP2	0.784			
INP3	0.832			
INP4	0.787			
INPR1	0.754	0.802	0.870	0.627

INPR2	0.820			
INPR3	0.790			
INPR4	0.801			
IN1	0.743	0.893	0.917	0.650
IN2	0.694			
IN3	0.845			
IN4	0.853			
IN5	0.859			
IN6	0.830			
PSO1	0.845	0.845	0.906	0.763
PSO2	0.887			
PSO3	0.888			
SCM1	0.957	0.868	0.920	0.794
SCM2	0.793			
SCM4	0.916			

The findings show that discriminant validity has been proved and no high relationships between variables are exists because the values of Heterotrait Monotrait (HTMT) ratios are lower than 0.90. These values are mentioned in Table 2.

Table 2. Discriminant validity

	DMP	PI	PO	PSO	SCM
INP					
INPR	0.473				
IN	0.515	0.858			
PSO	0.558	0.650	0.790		
SCM	0.279	0.591	0.527	0.474	

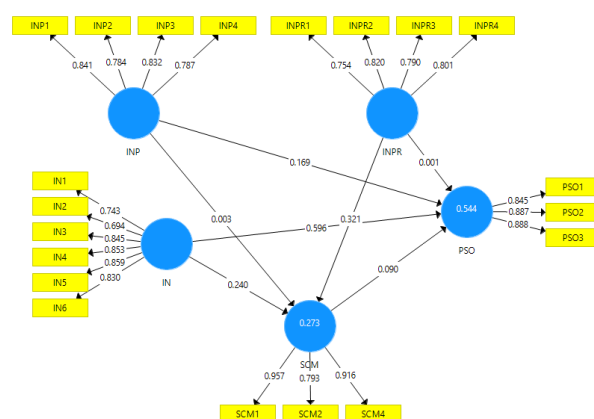


Figure 2. Measurement model assessment

The path analysis show that innovation and innovation process have positive association with public sector organization and accept H1 and H2. However, innovation performance has insignificant linked with public sector organization and reject H3. In addition, supply chain management has positive mediating among the links of innovation and public sector organization and accept H4. Moreover, supply chain management has positive

mediating among the links of innovation process and public sector organization and accept H5. Finally, supply chain management has positive mediating among the links of innovation performance and public sector organization and accept H6. These relationships are mentioned in Table 3.

Table 3. Path analysis

Relationships	Beta	S.D.	t-statistics	p-values
INP -> PSO	0.169	0.045	3.742	0.000
INPR > PSO	0.001	0.064	0.013	0.990
IN -> PSO	0.596	0.054	11.091	0.000
SCM -> PSO	0.090	0.040	2.255	0.025
INP -> SCM -> PSO	0.210	0.095	2.211	0.021
INPR -> SCM -> PSO	0.129	0.016	8.062	0.000
IN -> SCM -> PSO	0.122	0.013	9.385	0.000

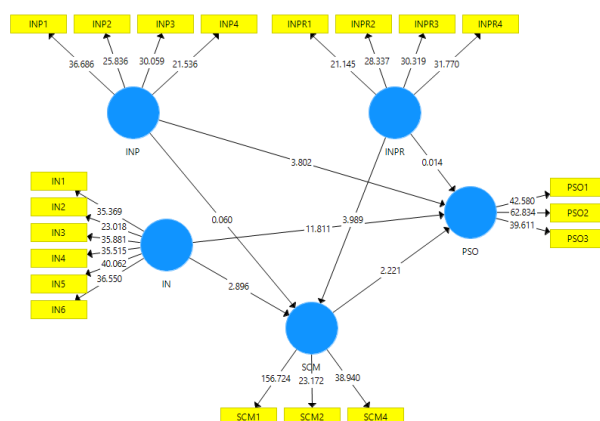


Figure 3. Structural model assessment

5. Discussion and conclusion

The purpose of this study is to present a systematic review of how the development of innovation paradigm patterns in public service organizations. It is hoped that more and more innovation research will focus on public services with a variety of different scientific backgrounds while being able to benefit the community. In the future, it is hoped that this paper will be able to recommend important agendas, especially the diffusion theory of innovation in public services.

Research shows that public service organizations are constantly looking for significant breakthroughs and innovations through new ideas and initiatives to serve the community. The innovation process that occurs in public service organizations requires leaders and leaders who are able to carry out initiatives and continue to drive changes consistently in accordance with their capacity of responsibility. The process mentioned above called "creativity management" is a strategy that encourages public service officials to have greater initiative and creativity. The portrait of changing the paradigm pattern

of public service organizations, as described in table 4, illustrates that the great influence of management creativity has been able to change the concept of public services in the last three decades.

The shift in the public service paradigm also has implications for changes in organizational strategy, where the change was first driven by the need for efficiency in the paradigm of traditional public service organizations. Changes in needs then shifted to aspects of effectiveness and efficiency in serving public needs. NPM, as a new approach to public service organizations, also cannot be separated from the need for change, including bureaucratic reform. At the time, the demands for bureaucratic reform arose because of the lack of competitiveness of public service organizations compared to those of the private sector. So that the demand to be more competitive in serving the community is increasingly high.

The development of information technology demands the governance of improved public service organizations. Openness and the right to public information are the main issues of bureaucratic reform, especially service organizations that are directly in contact with the public. The drive for innovation in public service organizations continues to grow amid the changing dynamics of heterogeneous social structures and the need for more integrated public service managers. Innovation in the public sector is an important part and will continue to develop by entering the government bureaucratic structure where a community finds organizational goals and begins to carry out initiatives in a coherent manner as a form of collective aspiration for justice, prosperity, relations social and ecological sustainability.

A number of times before the results of the investigations proposed a mixed result regarding the moderation or mediation effect of the supplies chain management (information sharing). Many of the times, the effect of supply chain management (information sharing) differs from research results due to geographical changing like cultural effect etc. [27]. The results of this investigation concluded that in the context of public sectors organizations, the supply chain management (information sharing) acts as a positive mediator. The supply chain management (information sharing) impacts the innovation process of any organization which have influence over the innovation process and performance of the organization irrespective of the matter whether the organization is private or public [17]. The results of this investigation also supported by a number of studies that the supply chain management (information sharing) positively mediates.

Community needs for integrated public services are increasingly dynamic. Awareness to get enough information makes public service organizations continue to improve. Aware of limited organizational competence, the idea of about collaborative governance in response to

leadership that failed to transform public service organizations. The importance of leadership variables that are able to collaborate in an effort to complement the competencies of public service organizations is the main key to answering information needs in the digital age. The principle of no one-size-fits-all solution becomes the background of the innovation process of public service organizations in an effort to increase the legitimacy of the community so that the model of public services begins to develop by adapting mobile-based technology and digital information.

The main weaknesses of this study are the bias in the selection of journal references and inaccuracies in synthesizing data and information. To ensure and reduce the bias as well as inaccuracies when doing journal synthesis, three stages of selection were developed in protocol reviewing as outlined in the introduction. Included in this systematic review are a number of journals that are the main references for strengthening the diffusion theory of innovation.

So from these findings, recommendations for future public service organization innovation research are focused on adding dimensions of organizational culture and the environment. Future cultural and environmental dimensions will be the main considerations of the innovation process in public service organizations. Digitalization will greatly change the pattern of how public service organizations interact with the public so that the importance of the cultural and organizational dimensions becomes an important antecedent of how the diffusion process of public service innovation develops.

REFERENCES

- [1] J. M. Lewis, L. M. Ricard, and E. H. Klijn, "How innovation drivers, networking and leadership shape public sector innovation capacity," *International Review of Administrative Sciences*, Vol. 84, No. 2, pp. 288-307, 2018.
- [2] A. Kankanhalli, A. Zuiderwijk, and G. K. Tayi, "Open innovation in the public sector: A research agenda," Vol. 8, No. 2, pp. 12-17, 2019.
- [3] O. Boukamel and Y. Emery, "Evolution of organizational ambidexterity in the public sector and current challenges of innovation capabilities," *The Innovation Journal: The Public Sector Innovation Journal*, Vol. 2, No. 22, 2017.
- [4] A. Abdul-Kahar, S. B. S. Ebi, and S. M. A. Nasser, "Conceptualisation of lack of discipline and probity as the main cause towards good governance practice", *International Journal of Public Policy and Administration Research*, Vol. 6, No. 1, pp. 12-22, 2019.
- [5] D. J. Fiorino and M. Bhan, "Supply chain management as private sector regulation: what does it mean for business strategy and public policy?," *Business Strategy and the Environment*, Vol. 25, No. 5, pp. 310-322, 2016.
- [6] H. Haralambides, "Globalization, public sector reform, and the role of ports in international supply chains," Vol. 84, No. 2, pp. 7-9, 2019.
- [7] M. Afzal, S. Ejaz, and S. Ahmad, "Analysis of domestic versus foreign banks efficiency in Pakistan," *Asian Journal of Economics and Empirical Research*, Vol. 6, No. 1, pp. 36-44, 2019.
- [8] M. M. Khurshid, "Analyzing diffusion patterns of big open data as policy innovation in public sector," *Computers & Electrical Engineering*, Vol. 78, pp. 148-161, 2019.
- [9] M. A. Demircioglu, "Reinventing the wheel? Public sector innovation in the age of governance," *Public Administration Review*, Vol. 77, No. 5, pp. 800-805, 2017.
- [10] P. Tönurist, R. Kattel, and V. Lember, "Innovation labs in the public sector: what they are and what they do?," *Public Management Review*, Vol. 19, No. 10, pp. 1455-1479, 2017.
- [11] A. Arundel, C. Bloch, and B. Ferguson, "Advancing innovation in the public sector: Aligning innovation measurement with policy goals," *Research Policy*, Vol. 48, No. 3, pp. 789-798, 2019.
- [12] D. Schuurman and P. Tönurist, "Innovation in the public sector: Exploring the characteristics and potential of living labs and innovation labs," Vol. 4, No. 1, pp. 45-47, 2018.
- [13] M. Audenaert, "When employee performance management affects individual innovation in public organizations: The role of consistency and LMX," *The International Journal of Human Resource Management*, Vol. 30, No. 5, pp. 815-834, 2019.
- [14] M. A. Demircioglu and D. B. Audretsch, "Conditions for complex innovations: evidence from public organizations," *The Journal of Technology Transfer*, Vol. 45, No. 3, pp. 820-843, 2020.
- [15] M. A. Demircioglu, "The effects of organizational and demographic context for innovation implementation in public organizations," *Public Management Review*, Vol. pp. 1-24, 2019.
- [16] T. F. Agbanike, A. C. Osigwe, D. N. Yuni, T.G. C. Onoja, and Okwor, S. A, "Cluster development in a transforming economy: The case of motorcycle spare parts firms in Nnewi, Anambra State of Nigeria," *Economy*, Vol. 6, No. 1, pp.13-24, 2019.
- [17] J. C. Okiria, R. Mwirumubi, and K. A. Mpaata, "Inventory management practices and the effectiveness of the supply chain of essential medicines in the public sector," *Evidence from Six Selected Public Hospitals in Uganda*, Vol. 9, No. 2, pp. 22-26, 2019.
- [18] A. El Mokrini, L. Benabbou, and A. Berrado, "Multi-criteria distribution network redesign-case of the public sector pharmaceutical supply chain in Morocco." in *Supply Chain Forum: An International Journal*, Vol. 11, No. 2, pp. 23-26, 2018.
- [19] K. Mhelembe, C. Mafini, and M. Mashiloane, "Supply chain exposures in the South African public sector," in *30th Annual Conference Of The Southern African Institute of Management Scientists (saims)*, Vol. 15, No. 2, pp. 14-16, 2018.
- [20] W. Muchaendepi, "Challenges faced by the mining sector in implementing sustainable supply chain

- management in Zimbabwe,”* Procedia Manufacturing, Vol. 33, pp. 493-500, 2019.
- [21] N. Nkwanyana, “*An assessment of the efficiency and effectiveness of Supply Chain Management in the public sector: a case study of the Department of Justice and Constitutional Development in KwaZulu-Natal region,*” Vol. 7, No. 2, pp. 45-50, 2018.
- [22] O. Martin-Ortega, “*Human rights risks in global supply chains: Applying the UK Modern Slavery Act to the public sector,*” Global Policy, Vol. 8, No. 4, pp. 512-521, 2017.
- [23] A. A. Desai and S. Rai, “*An empirical approach for the application of knowledge management on downstream supply chain management of Indian public sector oil companies,*” in 2017 Fourteenth International Conference on Wireless and Optical Communications Networks (WOCN), Vol. 84, No. 2, pp. 288-307, 2018.
- [24] S. Balasubramanian and V. Shukla, “*Green supply chain management: an empirical investigation on the construction sector,*” Supply Chain Management: An International Journal, Vol. 10, No. 2, pp. 25-28, 2010.
- [25] M. Bogers, H. Chesbrough, and C. Moedas, “*Open innovation: research, practices, and policies,*” California Management Review, Vol. 60, No. 2, pp. 5-16, 2018.
- [26] C.-H. Huang and T. C.-T. Hou, “*Innovation, research and development, and firm profitability in Taiwan: Causality and determinants,*” International Review of Economics & Finance, Vol. 59, pp. 385-394, 2019.
- [27] L. R. Vijayasathy, “*An investigation of moderators of the link between technology use in the supply chain and supply chain performance,*” Information & Management, Vol. 47, No. 7-8, pp. 364-371, 2010.