The Relationship between Integrated Development Planning and Water Demand Planning

https://doi.org/10.36369/2616-9045/2024/v13i1a4
Online ISSN: 2616-9045.Print ISSN: 2218-5615

TINASHE MUKONAVANHU
University of Johannesburg
tmukonavanhu@uj.ac.za

DANIELLE NEL-SANDERS
University of Johannesburg
daniellen@uj.ac.za

Abstract

The correlation between integrated development planning and water demand planning represents innovative and noteworthy concepts within the field of public administration. In recent years, a significant number of researchers have focused their investigations on elucidating the connection between integrated development planning and water demand Planning, offering a fresh perspective on public management. These processes constitute vital elements of contemporary public management within governmental sectors. This study employs a mixed-method research approach, incorporating both qualitative and quantitative methodologies. Secondary data, obtained through a systematic review of literature comprising 237 documents from Scopus-indexed journals spanning the years 2019 to 2024, provides insights into the extensive body of literature concerning the relationship between integrated development planning and water demand planning. Primary data was collected from five interviews conducted with managers from the Vhembe District Municipality. The literature review analysis reveals that the research based on the relationship between integrated development planning and water demand planning is fragmented, with different subsets of documents focusing on distinct aspects or methodologies without much overlap or integration between them. The abundance of literature on the relationship between integrated development planning and water demand planning underscores its significance in the field of public management. Insights from interviews indicate a lack of clarity regarding roles and responsibilities concerning the connection between integrated development planning and water demand planning. In conclusion, this study emphasises the emerging importance of the relationship between Integrated Development Planning and Water Demand Planning within the realm of public administration.

Keywords: Integrated, Development, Planning, Water, Demand

Introduction

In recent years, a notable number of researchers have turned their focus towards exploring the correlation between integrated development planning (IDP) and water demand planning (Jorquera-Copier et al (2024); Zhang, L. et al (2024); Hoepers et al, (2024); Zhang, Q. et al (2024); Ehsan et al (2024). Research endeavours focusing on the interconnection between integrated development planning (IDP) and water demand planning (WDP) are increasingly acknowledged as crucial instruments for improving water resources management and facilitating daily decision-making processes for managers. Consequently, the concepts of IDP and WDP have attracted escalating interest among public policymakers and managers worldwide in the past five years or so.

Literature Review

WDP entails evaluating future water needs to ensure sustainable management of water resources. This planning phase takes into account various factors such as climate variability, population dynamics, and agricultural demands to guarantee sufficient water availability while also tackling socioeconomic limitations (Van Maanen et al (2022). By integrating WDP into sustainable development initiatives (SDI projects), stakeholders can effectively administer water resources, boost productivity, and fortify resilience against evolving environmental circumstances.

IDP entails a holistic strategy that takes into account diverse dimensions of development, including social, economic, and environmental aspects, in a cohesive manner. When applied to river basin management, IDP encompasses merging water resources management with other fields such as agriculture, energy, and environmental conservation to foster sustainable development (Harifidy and Hiroshi, 2022). This method strives to tackle the intertwined issues of water scarcity, environmental deterioration, and socio-economic progress by harmonising endeavours across various sectors and engaging multiple stakeholders (Harifidy and Hiroshi, 2022).

One of the key objectives of complex (integrated) governance is to identify the most optimal path towards sustainable development, which can serve as a framework for organising economic activities with maximum efficiency. This framework is crucial for ensuring the preservation, safeguarding, and rehabilitation of natural resource potential (Kuznietsov, Vladyshevska & Kuznetsov, 2023:37-49). Integrated governance has become the norm for managing activities across various regions in numerous countries, offering an alternative to sectoral management of socio-ecological systems. It emphasises the importance of implementing an integrated approach to managing water resources in regions to foster their sustainable development (Kuznietsov, Vladyshevska & Kuznetsov, 2023:37-49).

As pressures mount on urban water systems (UWS), there is a growing focus on sustainable solutions that address economic, environmental, and social concerns, meaning that urban water management is experiencing a transformation. Water managers are advocating for holistic approaches that connect different facets of the urban water cycle, stressing the importance of breaking down administrative barriers. For instance, wastewater and stormwater can be repurposed as a valuable resource through reuse, and flood control measures can be integrated with the management of urban parks and habitats. These strategies are known by various names such as "water-sensitive cities", "sustainable urban water management", and "One Water" approaches (Santelmann et al 2019:1149-1164).

Research Methodology

When embarking on this research project, the authors chose to adopt an integrated mixed methods approach, which involves the integration of various research methodologies throughout all stages of the study (Teddlie and Tashakkori, 2009). Thus, they decided to incorporate both qualitative and quantitative methods, examining a range of secondary literature sources and conducting interviews. The literature review encompassed journal articles and reviews, while the interviews involved open-ended questionnaires, all of which were approached with careful consideration and selectivity by the researchers. In total, the review included 223 literature sources, and the interviews involved five participants from the Vhembe District Municipality (VDM).

The research methodology followed a systematic process. The following question guided the analysis: What is the current status of research concerning the correlation between integrated development planning and water demand planning?

The research scope aimed to explore the historical evolution, present status, and catalysts for change in the realms of integrated development planning and water demand planning offers valuable insights into policy implementation. While this study delves into the historical progression of the interplay between integrated development planning and water demand planning, it operates under the premise that this relationship is pivotal for public administration reform. Thus, the research seeks to critically assess how this relationship has evolved over time and to understand the driving forces behind its changes. This entails examining its historical trajectory, current state, and underlying motivators for change, with the overarching aim of validating its importance in the broader context of public administration reform.

As mentioned earlier, the first phase of the research included a systematic review. The Scopus database was selected for the systematic review. To identify relevant publications, the authors selected specific search terms, namely: "Integrated Development Planning", "Water demand", and "Planning". These terms were employed to search through the titles,

abstracts, and keywords of scholarly articles and reviews available in English within the specified scholarly literature database. The search terms (themes) act as the primary inclusion criterion. In essence, the dataset comprises all scholarly works (published in English) containing at least one term from the search words in the title, abstract, or keywords. The authors decided to include literature from the last five years to ensure relevance. To maintain validity and reliability, they chose to exclude literature older than five years. A total of 237 literature sources were reviewed.

The systematic review entailed primary and secondary data sources, employing critical analysis and synthesis skills. The analysis and synthesis process involved addressing several inquiries: "Was the research project appropriately planned and executed? Do the results and discussions logically follow, aligning with the research objectives and methodology? What are the strengths and weaknesses of the study? How do the authors support their findings? How does this study contribute to the existing research?" (Leite, Padilha & Cecatti, 2019: e1403). Both primary and secondary sources were utilised for triangulation purposes, aiming to enhance convergence and validity by employing different research methods to examine the same phenomenon (Cameron, 2009). Qualitative data gathered through concurrent mixed-methods data-collection approaches were quantified to create a comprehensive dataset, which was then analysed (Driscoll et al, 2007).

Maps, graphs, pie charts, and spreadsheets were employed to illustrate both similarities and discrepancies. Once these patterns were identified within the data, the researchers proceeded to articulate their own insights and formulate conclusions.

The second phase of the research was based on qualitative interviews. This research employed an open-ended interview protocol, conducting interviews directly with participants over a span of three days. The researcher developed an interview guide to facilitate open-ended discussions with selected participants. A total of five interviewees were engaged in this study.

Findings from Systematic Literature

This research undertakes a review of literature concerning the correlation between IDP and WDP, focusing on publications indexed in Scopus journals. The search employed specific keywords such as "integrated development planning", "Water Demand", and "planning" to scour the titles of Scopus indexed journals, yielding 237 articles and reviews published between 2019 and 2024 addressing this relationship. An analysis of the data indicates that a limited number of authors in this field might exert a disproportionately substantial influence or connectivity within the network. Notably, the United States and the Netherlands exhibit the most robust collaborative networks and involvement in research concerning the relationship between IDP and WDP, followed by China, Australia, and Canada, while developing nations exhibit significantly less engagement in this area.

Bibliographic data underwent analysis utilising VOSViewer, as depicted in Figure 1. Association strength served as the normalisation method. Co-occurrence was employed for analysis, with all keywords selected as the unit of analysis. The full counting method was utilised, with a minimum of five occurrences of a keyword being selected. In total, 223 keywords were chosen from 237 documents indexed in Scopus journals between 2019 and 2024 (n=223). The total strength of co-occurrence links with other keywords was computed. Keywords with the highest total link strength were identified, enabling the generation of a network visualisation map illustrating keywords with significant total link strength.

In the network visualisation map (Figure 1), items are depicted by their label and by default, also by a circle. The size of both the label and the circle of an item is determined by the weight of the item. A higher weight results in larger labels and circles. In some cases, labels may not be shown to prevent overlap. The colour of an item corresponds to the cluster it belongs to. Links between items are represented by lines. By default, a maximum of 1,000 lines are displayed, showcasing the 1,000 strongest links between items.

The proximity of two keywords in the visualisation roughly reflects their correlation in terms of co-occurrence. Typically, keywords positioned closer together indicate a stronger association. The most robust co-occurrence connections between keywords are also depicted by lines.

Among the 223 items analysed, four clusters were identified, comprising a total of 9,400 links and a combined total link strength of 19,475. Water management emerged as the most frequently occurring keyword, appearing 93 times and possessing a total link strength of 1,300. Following closely, water supply had the second-highest frequency with 86 occurrences and a total link strength of 1,259. Sustainable development ranked third, appearing 82 times with a link strength of 1,132. “Article” came in fourth with 41 occurrences and a total link strength of 807, while water conservation occupied the fifth position with 49 occurrences and a link strength of 754.

Water management stands out with the highest occurrence count of 93 and the greatest total link strength of 1,300, indicating its pivotal role and extensive interconnectivity within the discourse concerning the relationship between IDP and WDP. Water supply follows closely behind, boasting 86 occurrences and a total link strength of 1,259, signifying its significant relevance and strong association with water management in this context. Sustainable development, though slightly less prevalent with 82 occurrences, exhibits a notable total link strength of 1,132, emphasising its importance as a central theme in discussions pertaining to the relationship between IDP and WDP and its intricate connections to other concepts discussed in the literature.

Despite being less prominent in terms of occurrences (41), the keyword "article" surprisingly has a relatively high total link strength of 807. This could indicate that articles serve as a significant source of information or discussion within the literature on this topic. With 49 occurrences and a link strength of 754, water conservation is another important concept within the network visualisation. It is closely related to water management and sustainable development, highlighting its significance in discussions on the relationship between IDP and WDP.

Overall, this analysis suggests that water management, water supply, sustainable development, article, and water conservation are among the most central and interconnected concepts in the literature on the relationship between IDP and WDP. These keywords form the core of discussions and research within this field, emphasising their importance in understanding and addressing water-related challenges.

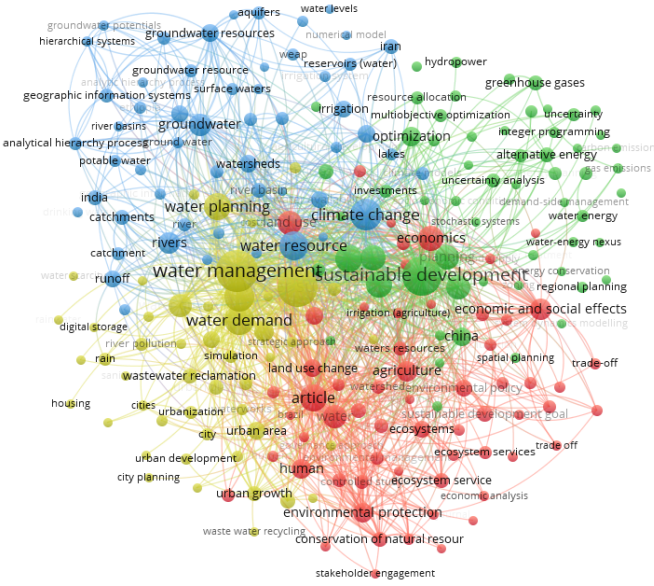

Figure 1: Network visualisation of keyword density

Employing association strength as a normalisation method and co-authorship for analysis, the study focused on organisations as the unit of analysis to identify those with the highest total link strength. The analysis utilised the full counting method, with a maximum of 25 organisations per document, a minimum of 3 documents per organisation, and no minimum citation threshold. From a total of 723 organisations identified across 237

documents sourced from Scopus-indexed journals spanning 2019 to 2024 (n=237), only 4 organisations met the established criteria (n=4).

Realising that the thresholds set for the first overlay visualisation (despite these thresholds being highly generous) severely limited the number of organisations that met the criteria, the threshold limits were adjusted to allow for more data to be incorporated into the overlay visualisation (Figure 2). Association strength was once again employed as a normalisation method. Co-authorship was utilised for analysis, with organisations selected as the unit of analysis. The full counting method was applied, with adjustments including a maximum of 223 organisations per document, a minimum of 2 documents per organisation, and no minimum citation requirement. From a pool of 723 organisations identified across 237 documents sourced from Scopus-indexed journals spanning 2019 to 2024 (n=237), 18 organisations met the set criteria (n=18). For each of these 18 organisations, the total strength of co-authorship links with other organisations was computed. The organisations exhibiting the highest total link strength were chosen to facilitate an overlay visualisation, highlighting those with the most substantial collaborative ties. Notably, only organisations with existing link strengths (6 out of 18) were depicted in the visualisation.

The Department of Agricultural Engineering in the Faculty of Agriculture at Mansoura University in Egypt has 3 documents and 86 citations, resulting in a total link strength of 10 (Figure 2). It indicates that the Agricultural Engineering Department at Mansoura University is actively involved in collaborative research efforts within the study's scope, contributing significantly to the overall network. The Centre for Advance Agricultural Science and Technology (CAAST) for Climate Smart Agriculture and Water Management (CSAWM) at Mahatma Phule Krishi Vidyapeeth (MPKV) University in Rahuri, India has 2 documents and 86 citations, also resulting in a total link strength of ten. Despite having fewer documents than Mansoura University, CAAST-CSAWM demonstrates strong collaborative ties and contributions to the study.

The College of Environmental and Resource Sciences (CERS) at Zhejiang University in Hangzhou, China, also has 2 documents and 86 citations, with a total link strength of 10. It showcases the active participation and collaboration of Zhejiang University in the study. Another institution in India, the Department of Geology at Rashtrasant Tukadoji Maharaj Nagpur University, has 2 documents and 86 citations, resulting in a total link strength of 10. It indicates strong collaborative efforts within the Department of Geology at the university. Lastly, the Indian Institute of Forest Management in Bhopal, India, also has 2 documents and 86 citations, with a total link strength of 10. It underscores the institute's active involvement and contributions to collaborative research endeavours in studies highlighting the relationship between IDP and WDP (Figure 2).

Overall, these organisations demonstrate robust collaborative networks and active participation in the study, contributing significantly to the advancement of knowledge and understanding of the relationship between IDP and WDP.

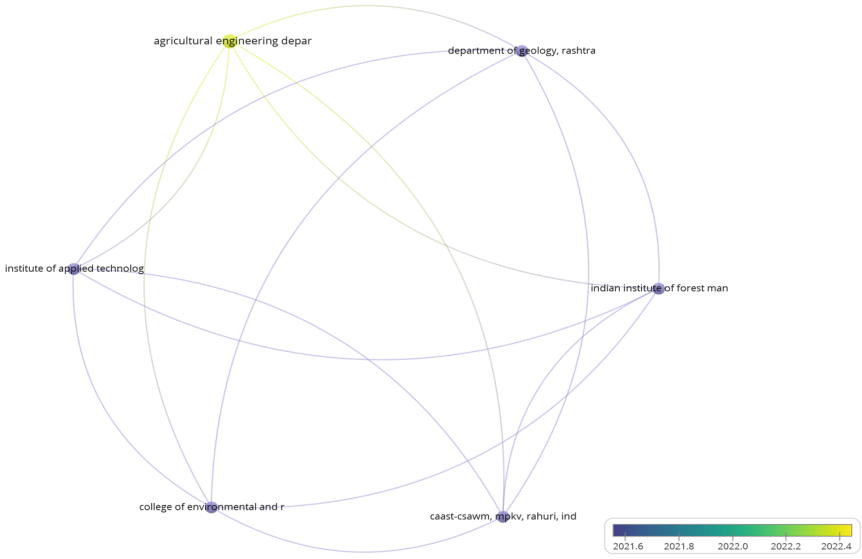

Figure 2: Overlay visualisation of the organisations with the greatest total link strength (with the minimum number of documents of an organisation being 2 instead of 3 and selecting 223 as the maximum number of organisations per document

Employing co-authorship for analysis and countries as the unit of analysis, the full counting method was implemented, with 223 set as the maximum number of countries per document. The minimum threshold required two documents per country and no minimum citation count. From a pool of 74 countries identified across 237 documents sourced from Scopus-indexed journals spanning 2019 to 2024 (n=237), 35 countries met the established criteria (n=35). For each of these 35 countries, the total strength of co-authorship links with other countries was computed. The countries demonstrating the highest total link strength were chosen to facilitate an overlay visualisation, depicting those with the most substantial collaborative ties. Notably, only countries with existing link strengths (34 out of 35) were depicted in the visualisation. Association strength was once again utilised as a normalisation method.

In the provided data (Figure 3), 74 countries are analysed based on their involvement in a study on the relationship between IDP and WDP. The analysis considers the number of documents produced, the total number of citations received, and the resulting total link strength, indicating the collaborative strength of each country within the study. Here is an analysis of the top five countries with the greatest total link strength:

The United States emerges as the leading country in terms of total link strength, with a substantial number of documents and citations. The United States has 41 documents, 806 citations and a total link strength of 60. This indicates extensive collaboration and strong engagement in the study, reflecting the country's significant contribution to studies focused on the relationship between IDP and WDP. The Netherlands follows closely behind the United States with 22 documents, 329 citations and a total link strength of 51, as a result having a comparatively smaller number of documents but a high number of citations, resulting in a strong total link strength. This suggests that despite producing fewer documents, the Netherlands has a considerable impact and collaboration within the study field (Figure 3).

China ranks third in terms of total link strength, with a large number of documents and citations. China has 51 documents, 828 citations and a total link strength of 39 (Figure 3). While China has a significant presence in the study, its total link strength is slightly lower compared to the United States and the Netherlands. Australia exhibits a moderate total link strength, with a relatively smaller number of documents and citations compared to the leading countries. However, its contribution is notable within the study, particularly in terms of collaborative efforts. Canada, with 14 documents, 299 citations, and a total link strength of 24, shares a similar total link strength with Australia, indicating a comparable level of collaborative engagement within the study despite having fewer documents and citations.

Overall, the United States and the Netherlands demonstrate the strongest collaborative networks and engagement within studies highlighting the relationship between IDP and WDP, followed by China, Australia, and Canada. These countries play pivotal roles in advancing knowledge and research in this field through their collaborative efforts and contributions.

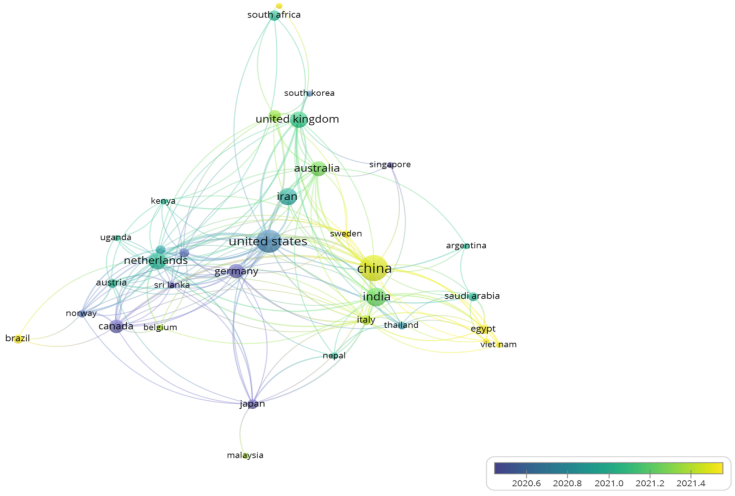

Figure 3: Overlay visualisation of the countries with the greatest total link strength

Utilising citations for analysis and considering documents as the unit of analysis, the criteria stipulated a minimum of one citation per document. From a total of 237 documents sourced from Scopus-indexed journals spanning 2019 to 2024 (n=237), 198 documents met the established threshold (n=198). For each of these 198 documents, the number of citation links was computed. The selection of documents was based on the total number of citations per document, disregarding link strength, to enable the generation of an overlay visualisation encompassing all 198 documents, arranged by the number of citations. Association strength served as the normalisation method in this process (Figure 4).

Zhang (2019b) has the highest number of citations (135) in the subset, indicating significant influence or importance within the study. However, Zhang (2019b) does not show any cross-citations (0) with the other documents in the subset. Allafta (2021) has received a substantial number of citations (93), although less than Zhang (2019b), suggesting relevant significance within the study. Similar to Zhang (2019b), Allafta (2021) does not have any cross-citations (0) within the subset. Jamil (2020) has garnered a considerable number of citations (84), though not as many as the top two documents. Jamil (2020) does not show any cross-citations (0) within the provided subset. Naderi (2021) has received a notable number of citations (63), although lower than Zhang (2019b), Allafta (2021), and Jamil (2020). Naderi (2021) does not have any cross-citations (0) within the subset. Pande (2021) has obtained a significant number of citations (54), though ranking lower than the preceding documents in terms of citation count. Like the others, Pande (2021) does not show any cross-citations (0) within the subset (Figure 4).

Based on this subset of documents, it appears that Zhang (2019b) is the most cited document, followed by Allafta (2021), Jamil (2020), Naderi (2021), and Pande (2021). There is a considerable lack of cross-citations among all 198 documents, suggesting that the research within the field of the relationship between IDP and WDP is fragmented, with different subsets of documents focusing on distinct aspects or methodologies without much overlap or integration between them. Each document may address highly specialised topics within the broader field, leading to limited overlap in terms of citation patterns. This could suggest a diverse range of research interests and focal points within the field. There may be a lack of comprehensive synthesis or integration of findings across different studies, resulting in minimal cross-referencing or citation of related work. This could hinder the advancement of cumulative knowledge within the field. It is possible that the field of IDP and WDP is still in its early stages of development, with researchers primarily focusing on establishing foundational knowledge and frameworks before delving into more interdisciplinary or cross-cutting research. The lack of cross-citations could also be influenced by publication bias, where researchers tend to cite works from the same subset of authors or journals, leading to limited exposure to diverse perspectives and ideas.

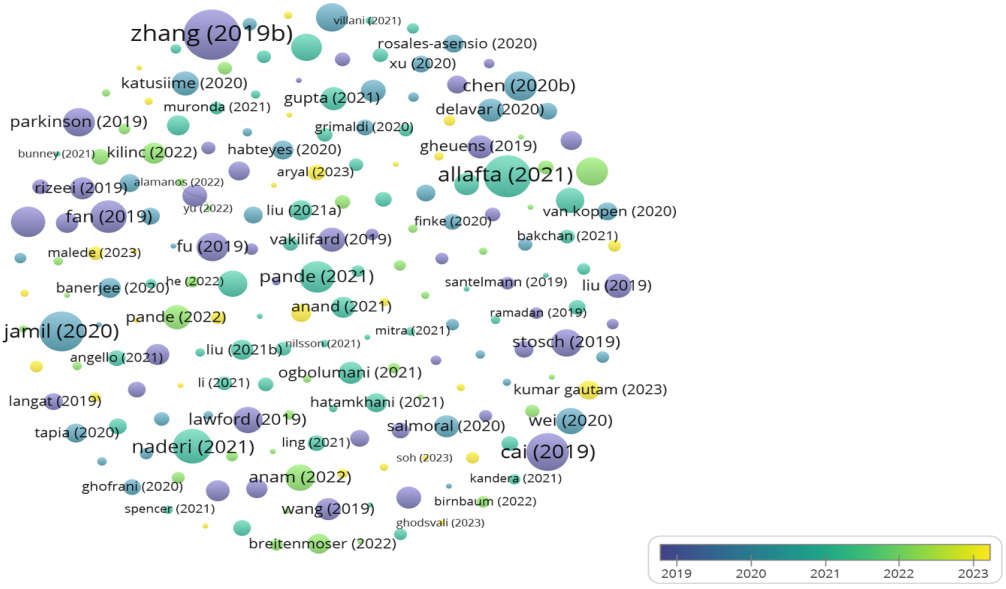

Figure 4: Overlay visualisation of number of citations per document

Utilising citations for analysis and selecting documents as the unit of analysis, with a minimum citation threshold of 1, out of a total of 237 documents from Scopus-indexed journals spanning from 2019 to 2024 (n=237), the results show that only three documents met the criteria (n=3) when configured to display only documents with cross-citation links. The majority of the 198 documents meeting the initial threshold from the total of 237 documents in the network were not interconnected. Only three documents were found to have connections to each other. Association strength was once again utilised as a normalisation method. The three interconnected documents out of the total 198 documents were Apostolaki (2019) with 26 citations and 2 links, Yu (2022) with 2 citations and 1 link, and Alamanos (2022) with 3 citations and 1 link.

Using citation analysis and selecting authors as the unit of analysis, with a maximum of 25 authors per document and excluding documents with an excessive number of authors, while setting the maximum number of documents per author at 198, and the minimum number of documents authored by an individual at 1, with a minimum citation count of 0, out of a total of 1,069 authors from 237 documents indexed in Scopus journals between 2019 and 2024 (n=223), 1,069 authors met the specified criteria (n=1069). The total citation links for each of these 1,069 authors were computed, and those with the highest total link strength were selected for visualisation, resulting in an overlay visualisation of authors with the greatest total link strength (Figure 5). Only authors with existing link

strengths (12) out of the total 1,069 were displayed, as the remaining authors had no existing links. Association strength was once again employed as a normalisation method.

The data provided in Figure 5 shows the link strengths for the top five authors out of a total of 12 authors with the only existing link strengths out of an overall total of 1,069 authors. Based on total link strength (Figure 5), Phoebe Koundouri has the greatest total link strength of 11, followed by Stella Apostolaki and Nikitas Pittis, both with a total link strength of 10. Angelos Alamanos and Zhanglong Li have lower total link strengths of 3 each. This analysis indicates that Koundouri has the strongest overall connectivity in terms of document linkages in the studies that focus on the relationship between IDP and WDP.

The fact that only 12 out of 1,069 authors had any existing link strengths suggests several possible interpretations (Figure 5). It indicates that a small subset of authors has a disproportionately high influence or connectivity within the network of documents related to the relationship between IDP and WDP. These authors may have produced seminal works, collaborated extensively with other researchers, or contributed significantly to the foundational literature in the field. The limited number of authors with link strengths may reflect the specialised nature of the topic. The relationship between IDP and WDP likely involves complex interdisciplinary research, and only a select group of experts may have the requisite knowledge and expertise to contribute substantially to this area.

It also suggests a pattern of collaboration among certain authors, where they frequently co-author papers or cite each other's work. Collaborative networks often form within academic disciplines, and these networks can influence the flow of knowledge and ideas within a field. Conversely, it could also indicate fragmentation within the research community, where different researchers work in isolation or within small, disconnected groups. This fragmentation may hinder the exchange of ideas and collaboration, leading to fewer authors with significant link strengths. Overall, the limited number of authors with existing link strengths highlights the importance of understanding the dynamics of authorship and collaboration networks in academic research, particularly within specialised fields like IDP and WDP.

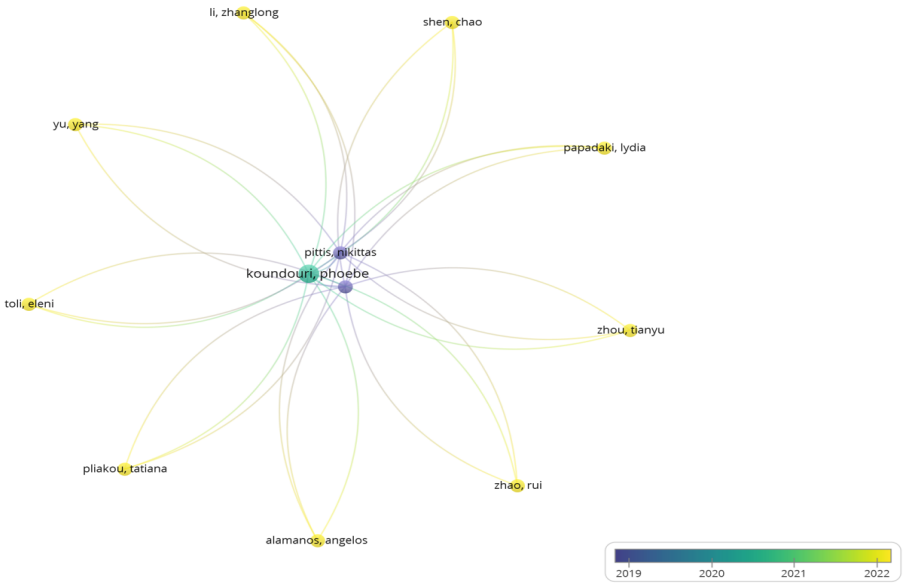

Figure 5: Figure 5: Overlay visualisation of authors with existing links

Overall, the results from the systematic review highlighted inadequacies in the information (Driscoll et al, 2007; Leite et al, 2019), specifically noting, "There is a notable absence of empirical studies concerning the correlation between integrated development planning and water demand planning in developing nations. Consequently, additional research is essential to determine the optimal procedures for these countries and whether implementing such procedures improves water resource management."

Discussion of Interview Findings

In a research project aimed at gathering insights and recommendations from experts regarding their perspectives and insights on IDP and its impact on performance in WDP within the VDM, interviewees were asked the following question: "In your opinion, does integrated development planning enhance performance in water demand planning efforts in the Vhembe District Municipality?" Five participants took part in the interviews. The participants were all managers within the VDM. All five participants were interviewed in March of 2021.

Most participants concurred that IDP enhances performance in WDP efforts in the VDM (Figure 10). There was widespread consensus among participants regarding the effectiveness of IDP in improving performance within WDP endeavours in the VDM. Despite their agreement on the efficacy of IDP in enhancing performance in WDP efforts in the VDM, participants expressed divergent expert opinions on its potential.

Sixty percent of the participants concurred with the notion that IDP enhances performance within WDP endeavours in the VDM. Among those participants who supported this idea, one individual mentioned that IDP provides guidance to WDP, implying that IDP assists in enhancing WDP. Another participant who agreed with the notion that IDP improves performance within WDP efforts in the VDM stated that IDP indeed aids by enabling all stakeholders, including community members, to participate in decision-making processes. Additionally, another participant who agreed with the notion that IDP improves performance within WDP efforts in the VDM emphasised that communities are consulted regarding their needs during the planning stage throughout the IDP process, and they are also engaged in planning for the implementation of water-related projects (Figure 6).

Forty percent of the participants expressed disagreement with the notion that IDP enhances performance within WDP endeavours in the VDM (Figure 10). None of the participants opted to remain neutral regarding this idea. Among those participants who disagreed with the notion that IDP improves performance within WDP efforts in the VDM, one participant stated that:

> "Sector departments view IDPs as products of the municipality. Sector departments do not view IDPs as if they can be able to participate in the process because government has its own plans. Sector departments do not consider themselves as being part of IDP processes. If the municipality can attempt to engage with sector departments the latter can just invite municipalities but there will remain a form of segregation. Because of this lack of integration there is a lot of duplication of activities at the local level and at the district level. Different departments just share information but there is no integration. Perhaps the newly launched district model by President Cyril Ramaphosa would enable all sector departments to plan together and to support each other and thus perhaps improve IDP."

Another participant who opposed the notion that IDP enhances performance within WDP efforts in the VDM pointed out existing challenges within the IDP process. According to the participant, these challenges include the difficulty in implementing decisions made during consultations with stakeholders, such as communities. The participant highlighted that what is discussed with communities often proves to be impractical or challenging to implement. Additionally, stakeholders frequently have conflicting wishes, views, and demands, further complicating the process.

The implication is that there is a lack of clarity regarding roles and responsibilities related to the IDP within the VDM. This lack of understanding could lead to challenges in goal setting, task allocation, and target achievement. The results also indicate a need for enhanced training and skills development concerning the IDP within the VDM. Additionally, there appears to be insufficient integration among different departments within the VDM

and between the VDM and other governmental sectors. Furthermore, it is suggested that planning efforts within the VDM should align with national and provincial planning objectives, goals, and legal frameworks.

Further research is needed to deepen the understanding of stakeholder engagement in WDP. Community involvement is crucial for effective IDP. Additional studies focused on WDP are necessary to equip decision-makers in the water services sector with valuable insights and information. Engaging communities can facilitate feedback, allowing stakeholders to voice their perspectives on WDP in their respective environments. It is imperative to cultivate a culture of public participation in WDP within organisations. Information about WDP should be disseminated widely. Training and skills development initiatives should be implemented for all stakeholders to promote and enhance public participation in WDP.

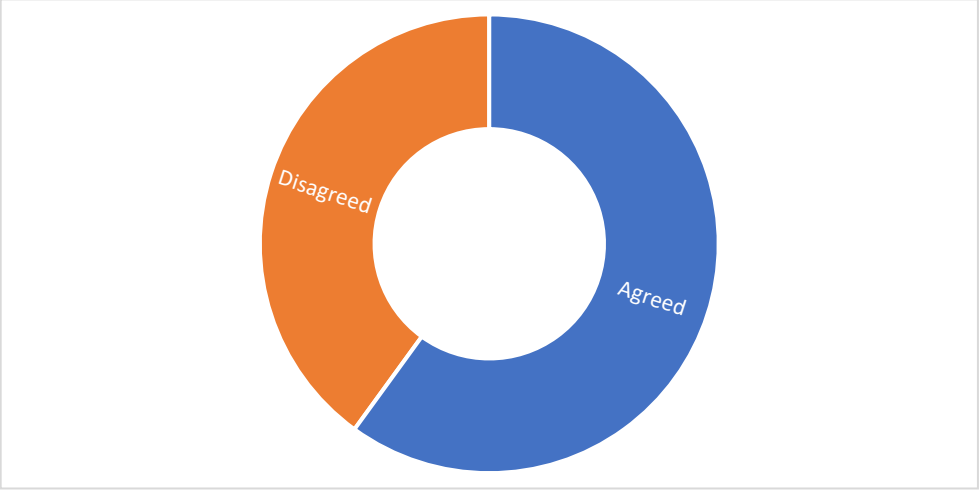

Figure 6: Interview findings: Does IDP improve performance within WDP efforts in the VDM?

Conclusion

This research investigated 237 scholarly journal articles and reviews focusing on the correlation between IDP and WDP, published from 2019 to 2024. The analysis revealed that a small group of authors in this field might wield disproportionate influence or connectivity within the network. With regards to geographical patterns, the United States and the Netherlands exhibited the most robust collaborative networks and engagement in this area, trailed by China, Australia, and Canada, while developing nations lagged considerably behind. The study found inadequate collaboration and networking among the various organisations involved in researching the relationship between IDP and WDP, indicating a general lack of connectivity.

This paper conducted a systematic literature review based on an analysis of research on the relationship between IDP and WDP across various parameters including keyword density, total link strength density between key organisations, total link strength between countries, citations analysis and link strength per document, link strength between authors as well as carrying out an analyses of questionnaire findings and triangulation of primary and secondary data from the literature review and the interview findings. Through this examination, several significant research opportunities were highlighted for future researchers. Specifically, there is a need to explore the collaborative networks among authors, organisations, and countries to understand the dynamics of collaboration within the field. Key stakeholders must be identified and their roles in collaborative research efforts must be defined in order to foster stronger connections and partnerships.

The authors identified several correlations between the interview findings and the literature data. Both the interview findings and the literature data emphasise the importance of IDP in improving performance within WDP efforts. The literature mentions IDP as a central concept in discussions related to the relationship between IDP and WDP, while the interview findings reveal widespread consensus among participants regarding the effectiveness of IDP in enhancing WDP performance in the VDM.

Both sources identify challenges and limitations within the IDP process. The literature highlights issues such as lack of integration among different departments, duplication of activities, and unclear roles and responsibilities, which are echoed in the interview findings. Participants express concerns about difficulties in implementing decisions made during stakeholder consultations, conflicting views and demands among stakeholders, and a lack of clarity regarding roles and responsibilities within the VDM. Both the literature and the interview findings provide recommendations for addressing the identified challenges and improving performance in WDP efforts. Suggestions include enhancing training and skills development related to IDP, promoting public participation and stakeholder engagement in WDP, aligning planning efforts with national and provincial objectives, and fostering collaboration among different departments and governmental sectors.

The interview findings offer insights into stakeholder perspectives and experiences related to IDP and WDP, complementing the broader themes and trends identified in the literature. While the literature provides a theoretical framework and overview of key concepts, the interviews offer first-hand accounts and viewpoints from individuals directly involved in the planning processes within the VDM. Overall, the correlations between the interview findings and the literature data underscore the significance of IDP in WDP efforts and highlight the challenges, recommendations, and stakeholder perspectives relevant to this relationship. The consistency between the two sources strengthens the credibility of the research findings and provides a comprehensive understanding of the topic. It also conforms to recent research findings on the topic (Mubangizi, 2022; Munzhedzi, Phago & Mubangizi, 2022).

Recommendations

Analyses of citation patterns among documents used in this study based on the relationship between IDP and WDP reveal gaps and areas requiring integration within the literature. There is a need to understand why certain documents receive more citations than others, and which analyses can provide insights into research trends and areas of focus within the field. There is a need for further interviews or surveys with stakeholders to gather insights into their experiences and perspectives on the relationship between IDP and WDP. Understanding stakeholder perspectives can inform more inclusive and effective planning processes.

There is a need to assess the effectiveness of IDP in improving WDP outcomes. This evaluation can include case studies and comparative analyses to identify best practices and areas for improvement. There is a necessity to develop strategies to enhance stakeholder engagement in planning processes, including community involvement and collaboration with government agencies and non-governmental organisations. As many authors have emphasised, effective engagement can lead to more sustainable and inclusive planning outcomes Knowledge gaps must be identified within the literature and research topics that address emerging challenges in the relationship between IDP and WDP. This may involve interdisciplinary research and collaboration to address complex issues.

Capacity building initiatives need to be supported to enhance research capabilities and institutional capacity for integrated planning. This includes training programmes and skills development workshops for researchers, policymakers, and practitioners. Greater alignment between local, regional, and national planning efforts must be advocated for to ensure coherence and consistency in IDP and WDP strategies. This can involve harmonising planning processes and integrating cross-sectoral goals. Knowledge exchange platforms must be developed to promote dialogue and information sharing among stakeholders. This can include conferences, seminars, and online forums for sharing best practices and innovative solutions. Evidence-based recommendations must be provided to inform policy development and decision-making processes. Policymakers and stakeholders should be engaged in the research process to ensure that findings are relevant and actionable.

References

Cameron, R. (2009). A sequential mixed model research design: Design, analytical and display issues. *School of Commerce and Management Papers*, 3.

Driscoll, D., Appiah-Yeboah, S., Salib, P. & Rupert, D. (2007). Merging qualitative and quantitative data in mixed methods research: How to and why not. *Ecol Environ Anthropol*, 3.

Ehsan, M., Shabbir, H., Al-Quraishi, A., Al-Ansari, N., Ahmad, Z., Abdelrahman, K., Sohail, M.T., Manzoor, Z., Shafi, A. & Elbeltagi, A. (2024). Groundwater delineation for sustainable improvement and development aided by GIS, AHP, and MIF techniques. *Applied Water Science*, *14*(2).

Harifidy, R.Z. & Hiroshi, I. (2022). Analysis of river basin management in Madagascar and lessons learned from Japan. *Water (Switzerland)*, *14*(3).

Hoepers, T.R., Leithold, J., Monteiro, M.M., Corzo Perez, G.A., Fernandes, C.V.S., Zevenbergen, C. & Santos, D.C.D. (2024). An integrated approach to decision-making variables on urban water systems using an urban water use (UWU) decision-support tool. *Science of the Total Environment*, 912.

Jorquera-Copier, J., Lorca, Á, Sauma, E., Lorenczik, S. & Negrete-Pincetic, M. (2024). Impacts of different hydrogen demand levels and climate policy scenarios on the Chilean integrated hydrogen-electricity network. *Energy Policy*, 184.

Kuznietsov, S., Vladyshevska, V. & Kuznetsov, S. (2023). Coastal regions of Ukraine: Governance transformation amid the Russian invasion. *Lex Portus*, *9*(1):37-49.

Leite, D.F.B., Padilha, M.A.S. & Cecatti, J.G. (2019). Approaching literature review for academic purposes: The Literature Review Checklist. *Clinics*, 74e1403.

Mubangizi, B. C. (2022). The Interplay between Civil Society and Local Government in South Africa: Conflict and Collaboration in the Delivery of Public Services. *African Journal of Development Studies* (formerly AFFRIKA Journal of Politics, Economics and Society), 2022(si1), 39-58

Munzhedzi, P. H., Phago, K., & Mubangizi, B.C (2022). Contending for the designs and features of integrated development planning in South Africa? An empirical analysis of the Limpopo Province. Journal of Local Government Research and Innovation, 3, 11.

Santelmann, M., Hulse, D., Wright, M., Enright, C., Branscomb, A., Tchintcharauli-Harrison, M. & Bolson, J. (2019). Designing and modeling innovation across scales for urban water systems. *Urban Ecosystems*, *22*(6):1149-1164.

Teddlie, C. & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioural sciences*. London, England: Sage Publications.

Van Maanen, N., Andrijevic, M., Lejeune, Q., Rosa, L., Lissner, T. & Schleussner, C-F. (2022). Accounting for socioeconomic constraints in sustainable irrigation expansion assessments. Environmental Research Letters, *17*(7).

Zhang, L., Wang, H., Liu, X., Li, Y. & Jiang, X. (2024). An integrated analysis framework towards identifying circulation relationship of water-energy-carbon in complex system: A case study in Shandong Province. *Ecological Indicators*, 158.

Zhang, Q., Shen, X., Shen, C., Chen, Y., Su, B., Yin, Q. & Zhou, S. (2024). Integration of land ecological consolidation and ecosystem product value realization: A case from the Yangtze riverside industrial park in Changzhou, China. *Journal of Environmental Management*, 353.