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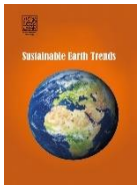

Strategic governance and financial solutions for ensuring safe drinking water access

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ABSTRACT

The research highlights the necessity of innovative governance and strategic management to ensure sustainable drinking water infrastructure, crucial for public health and economic growth amid climate change, which is a critical component of the sustainable earth trend. In this study, VOSviewer software was used for bibliometric analysis and visualization of conceptual relationships to examine the conceptual structure and research trends in areas related to strategic management of smart financial markets aimed at providing safe drinking water. The period for the studies being examined was chosen to span from 2020 to 2025. This search yielded 335 documents, and after filtering, 199 documents were analyzed, which included 87 research papers, 63 review papers, and 49 books. Four primary scientific outputs from the software were utilized for data analysis. Climate change, urbanization, and geopolitical dynamics have made access to water resources more complex. Investing in drinking water infrastructure not only helps improve public health and reduce healthcare costs, but also leads to economic growth. Transparent and equitable governance of water can help strengthen social cohesion and reduce international tensions. The use of smart financial markets and blended finance can help improve access to safe and sustainable drinking water. Especially in rural and remote areas, these approaches can help reduce inequalities and increase resilience to climate change. Finally, investment in technology, education and infrastructure development will be key elements for success in providing safe and sustainable earth trend.

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1. Introduction

Access to safe and clean drinking water is not only a basic human need, but also a cornerstone of sustainable development, economic prosperity, social cohesion and effective governance. Water security directly impacts health outcomes, agricultural productivity, education, urban development and overall quality of life. When citizens can rely on a continuous supply of drinking water, societies become more stable, economies more resilient and governance more responsive (Zeraati Neyshabouri et al., 2024). However, the global water crisis exposes persistent inequalities and inefficiencies in the provision, management and financing of drinking water infrastructure. Climate change, urbanization and geopolitical dynamics have further complicated access to this vital resource. In such a perspective, good governance, strategic management and smart financial instruments are important to bridge the gap between water demand and supply, especially for vulnerable populations (Mohammadidehcheshme and Hajipour, 2024). Safe drinking water is a vital element in the food security supply chain, human development and climate resilience. As a public good, this vital resource should be made available to everyone without discrimination, but field realities show that millions of people around the world are deprived of such access. The drinking water situation in Iran is characterized by significant disparities between urban and rural areas. While

approximately 90% of urban populations have access to treated drinking water, many rural communities struggle with inadequate access and often rely on untreated sources. Water quality remains a pressing concern due to pollution from industrial activities and agricultural runoff, leading to health risks from waterborne diseases. Additionally, severe drought conditions and climate change have exacerbated water scarcity, prompting the government to implement various initiatives aimed at improving water infrastructure and promoting conservation efforts. This deprivation not only threatens the physical health of individuals, but also deepens social, gender and economic gaps. According to UN reports, more than 2 billion people do not have access to safe drinking water, and this statistic indicates a widespread and complex crisis that requires multi-sectoral and cross-sectoral intervention. With population growth and increasing urbanization, many measures have been taken to provide the quantity and improve the quality of drinking water in the country. So that many villages and remote areas have also enjoyed safe and hygienic drinking water. Despite these efforts and developments, the health of drinking water and the management of the wastewater produced are facing problems. In addition, drought and climate change, given that most parts of the country are located in arid and semi-arid areas, have created risks in the supply of safe drinking water (Anarki Mohammadi, 2025a). This issue has also occurred in other countries. In recent years, many efforts have been made to provide safe drinking water, which has improved the health of the community and significantly reduced mortality, especially in children. According to the World Health Organization, more than 70 percent of child deaths in the world are due to unsafe drinking water. Despite all the efforts made, some compatriots still have to spend a lot of time and money in Iran to access safe drinking water daily. It is interesting to note that the return on investment in the health sector is three times in the urban sector and six times in the rural sector (Dehghanian, 2022), which means that the more investment is made in safe drinking water for the community, the lower the health costs in the urban sector and six times in the rural sector. The need for effective governance and strategic management in the issue of providing safe drinking water is evident from the fact that more than a quarter of the world's population, and perhaps with an optimistic generalization for the Iranian population, especially in areas affected by drought and areas where human activities such as agriculture, industry, and mining have affected their drinking water resources, is inevitable. Unhealthy drinking water is a direct or indirect cause of disease and ultimately the death of many people, which is preventable. Access to safe and healthy drinking water is not only of vital importance from a public health perspective, but also underpins economic growth, social development, environmental sustainability, and even national peace and security (Anarki Mohammadi, 2025). In today's world, the water crisis has become one of the most important global challenges; a challenge that directly affects human livelihoods, migration, social tensions, and international relations. At the same time, effective management and governance of water resources, especially in the field of drinking water, requires the use of innovative policies, smart financing, data-driven and strategic planning (Rezaei Eskandari, 2011). On the other hand, rural and remote areas are the most affected by the shortage of water resources. The lack of necessary infrastructure, lack of targeted investment, and lack of transparent governance in these areas exacerbate inequalities and increase pressure on the urban population. This trend can lead to widespread migration, social instability, and increased public spending. At the macro level, the use of smart financial markets and efficient public financing can provide a platform for improving access to safe drinking water across the country. Unfortunately, investments in providing safe drinking water are not keeping pace with investments in development and industrialization. In addition, climate change and drought are other threats to safe and healthy drinking water. Another important point is that activities and development of safe drinking water are vulnerable and unstable. Achieving safe and healthy drinking water is not a one-time investment, but requires continuous monitoring and maintenance (Dehghanian, 2022; Anaraki Mohammadi, 2025a,b). Factors such as climate change, drought, flooding, the entry of pollutants into water resources such as arsenic in mining areas, drying up of springs and aqueducts, polluted water resources, urbanization, population growth, and increasing marginalization limit the supply of

safe and healthy drinking water to communities.

National policies and development strategies should also be based on good governance, transparency, accountability, stakeholder participation, and the use of new technologies for the provision and distribution of safe water. Foresight and innovation in this area are key to addressing the growing challenges of water scarcity, climate change, and increasing demand. In recent decades, the role of national policies, water safety planning, transparent regulation, smart financing, technological innovations, and reliable data has become more prominent than ever (Vushe, 2021). At the same time, international financial markets are also looking for opportunities to invest in sustainable infrastructure projects, including those related to drinking water. Ensuring access to safe and clean drinking water as a fundamental aspect of sustainable earth trend, highlighting how effective governance, strategic management, and innovative financing are essential for addressing inequalities, promoting public health, and fostering economic resilience in the face of climate change and urbanization. This trend has provided opportunities to combine private sector interests with sustainable earth trend goals (Jiang, 2023). Therefore, the purpose of this study is to surveys the effective governance and strategic management policies in smart financial markets to plan the provision of safe and healthy drinking water for the community.

2. Material and methods

This research employs a library-based and descriptive-analytical methodology. It investigated literature, policy documents, and relevant case studies to evaluate the governance and strategic management of drinking water resources, especially in regard to the role smart financial markets play. To achieve this, the researcher has conducted a broad scope literature review concerning the governance of water and relevant financing and strategic management instruments focusing on academic journal articles, books, reports, and policy documents. In this study, to examine the conceptual structure and research trends in areas related to strategic management of the smart financial market for the provision of safe drinking water and sustainable urban infrastructure, the VOSviewer software was used for bibliometric analysis and visualization of conceptual relationships. The search process was conducted in the Science Direct database. In this search, six keywords were utilized as smart financial market, strategic management, safe drinking water, sustainable investment, urban water infrastructure, infrastructure resilience. The time frame for the studies reviewed was selected from 2020 to 2025. As a result of this search, 335 documents were retrieved, of which 199 documents were analyzed after refinement; this included 87 research articles, 63 review articles, and 49 books. For data analysis, four main scientific outputs of the software were used. The VOSviewer software, through keyword co-occurrence analysis, automatically identified 31 frequently occurring keywords and illustrated them in the form of a clustered network that displays the relationships between concepts and research priorities. In addition, the researcher studied the successful models and practices of various countries which have managed their drinking water resources through innovative governance and financial models. The literature review was conducted to identify key themes and trends in water governance and safety management. Thus, in this regard, multi-case comparison of different governance and financial models looked into various contexts and highlighted best practices and lessons learned.

3. Results and discussion

3.1. Bibliometric analysis and visualization of conceptual relationships

The bibliometric analysis conducted using VOSviewer indicates that in recent years, there has been a significant research focus on the relationship between strategic management in smart financial markets and sustainable urban water management. As shown in Fig. 1, the term "sustainability" was identified as the central core of the keyword network, highlighting the pivotal importance of the concept of sustainable development in this field of research. Around this core, terms such as "climate change," "circular economy," and "sustainable development" were also identified as prominent clusters. These concepts suggest that researchers, particularly in recent years, are seeking to connect smart financial policies with strategies to address climate change and the

transition to a circular economy in urban contexts. In the sub-layers of the clusters, keywords like "urbanization," "smart city," "urban resilience," "food security," and "wastewater treatment" reflect a focus on urban resilience and innovative approaches to water resource management and food security within the framework of sustainability.

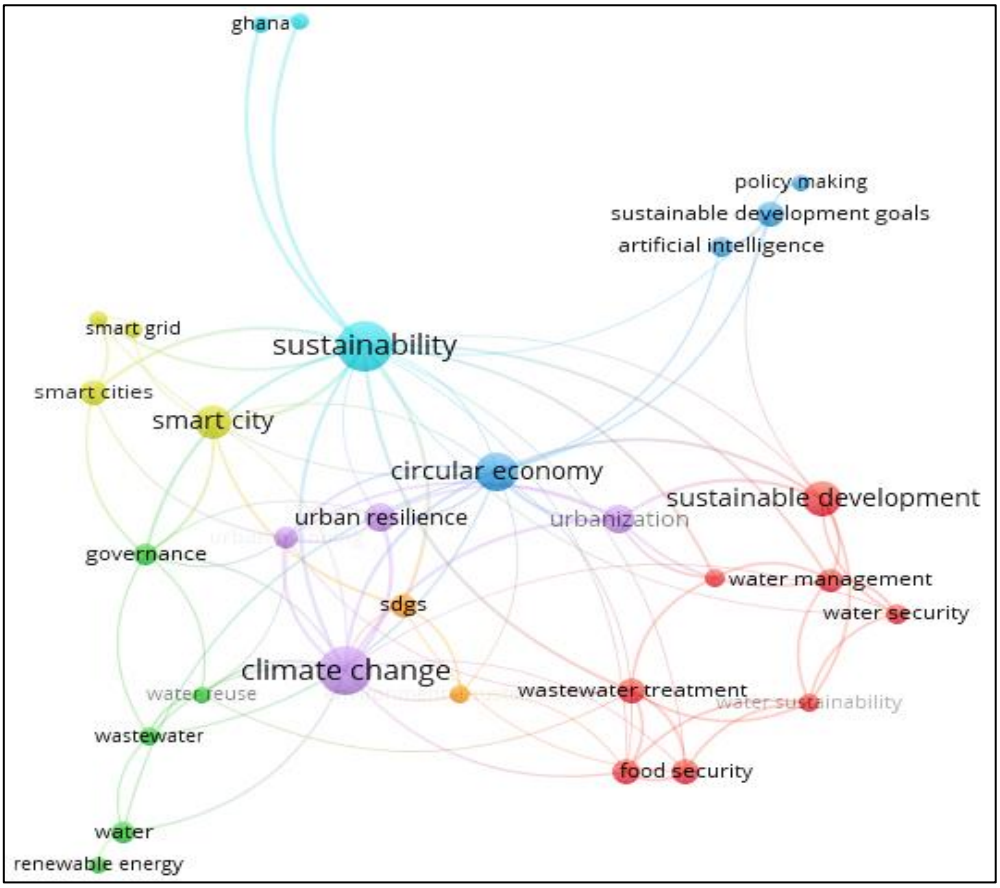

Fig. 1. Bibliometric analysis and visualization of conceptual relationships.

A distinct section of the conceptual network is dedicated to the terms "water," "wastewater," and "water reuse," which are directly linked to the clusters of "climate change" and "circular economy." Additionally, concepts such as "water management," "water security," and "water sustainability" are situated in a separate cluster with a direct connection to "sustainability" and a secondary connection to "climate change." This structure illustrates the central role of water and infrastructure resilience in sustainability analyses and environmental policymaking. Overall, the current analysis indicates that the convergence of financial technologies, strategic management, and strategies for sustainable urban water is recognized as one of the emerging focal points in interdisciplinary studies. These findings can guide future research directions as well as macro-level policymaking in the development of resilient infrastructure, optimal use of water resources, and the integration of environmental sustainability with smart financial systems.

3.2. Investing in governance and management of safe and secure water supply

Providing safe and adequate drinking water is one of the main factors in disease prevention. Many diseases, especially infectious diseases, are transmitted through contaminated water. By investing in water supply infrastructure and improving sanitation systems, we can help reduce the incidence of these diseases. This in turn leads to reduced medical costs and increased quality of life for people. Safe and secure drinking water increases the general health of the community, and many diseases that require significant investment in their management can be eliminated by providing adequate and suitable water and improving personal hygiene (Hrudey and Hrudey, 2004).

Therefore, safe and sustainable drinking water guarantees and protects the health of the community. Water is one of the key factors in the production of agricultural products. Providing safe and adequate water for agriculture helps to improve the quality and quantity of agricultural products. This not only helps to provide food for the community, but also leads to economic development and increased income for farmers. Also, by using clean water, contamination of agricultural products can be prevented, which in turn helps to increase community health and food security (Zahoor and Mushtaq, 2023).

3.2.1. Smart financial markets in safe and sustainable drinking water

The negative effects of climate change and drought, including changes in rainfall patterns, severe floods and droughts, rising temperatures, and human activities in mining, industry, and urbanization, threaten to make investments in safe and sustainable drinking water worthless. This has caused disruption to infrastructure and services (including water supply and wastewater treatment networks) and has imposed heavy costs in many countries, the repair and reconstruction of which has brought enormous costs to the government. The existence of a smart and targeted climate financial market can create resilience against these impacts and reduce the consequences of climate change (Sun et al., 2022).

3.2.2. Positive economic impacts of safe and clean drinking water

The economic benefits of safe drinking water are realized in both the short and long term. For example, when water is available, there is no need to provide water in various forms such as water tankers, which is time-consuming and costly, and various other efficiencies can be achieved. Safe drinking water increases economic productivity by reducing the prevalence of disease and improving public health. By reducing water-borne diseases, people can continue to work, and on the other hand, medical costs are reduced, which can be spent on economic development (Dolan et al., 2021). In agriculture and industry, safe water also leads to higher production and better-quality products, which has a chain effect on other sectors. According to the World Health Organization, every dollar invested in water and sanitation has an average return of 4$ in economic productivity (WHO, 2022) Therefore, water security directly contributes to GDP growth, poverty reduction, and human capital development.

3.3. Adaptation and resilience to the negative impacts of climate change and drought

Currently, many experts and government officials have realized that investments and the financial market for the provision of safe and healthy drinking water must be based on adaptation and resilience to climate change, which in turn requires adaptation and resilience of infrastructure to the threats of climate change and confidence in the resilience of society to the negative impacts of climate change and drought (Kumar et al., 2021). UNICEF emphasizes criteria for designing resilient drinking water systems that aim to increase the resistance of these systems to climate change and environmental crises. These criteria include the use of corrective measures to reduce risk. For example, providing alternative water sources, such as using rainwater or groundwater as complementary resources, can be very effective in times of water scarcity. Also, designing infrastructure at appropriate elevations in flood-prone areas can prevent damage from floods. Creating additional storage capacity is another measure that helps collect and store water during times of scarcity. In addition, implementing educational programs and using modern technologies to optimize water consumption and storage are also important. In addition, risk-based assessments of the supply of safe and sufficient drinking water under different scenarios, especially under extreme conditions of climate change and drought, are essential (Alavian et al., 2009). These assessments should include simulations of extreme scenarios and risk analysis to identify and assess the risks associated with water supply in critical situations. Finally, governance of strategic management models should be designed in a way that has sufficient resilience to severe crises and ensures the long-term sustainability of infrastructure. Developing rapid response and crisis management plans to address the challenges of climate change and ensure the sustainability of infrastructure are among the measures that can help these systems succeed. Overall, adhering to these criteria leads to the design of resilient

and resilient drinking water systems that not only help provide safe and sufficient water but also maintain the health and well-being of society. Providing and servicing drinking water that is adapted to and resilient to climate change will cost both the government and consumers less in the medium and long term. Therefore, the main advantage of investing in climate resilience, whether it is infrastructure or the system itself, is that this investment never loses and improves the level of service, quality of construction, operation and maintenance despite the challenges of climate change, which has significant financial and coverage benefits. Building climate resilience with a risk management approach such as water sustainability programs is one of the most cost-effective approaches to governance and strategic management of climate risk. The selection of water resources and the type of technology is essential to create resilience to climate change in the drinking water of the community (Feilberg and Mark, 2016). There are several methods for smart investment in the drinking water sector in order to contribute to reducing the consequences of climate change, as well as reducing costs and building resilience. These methods include eliminating water stagnation in water transmission systems, reducing water waste by utilizing water-saving technologies, promoting the use of wastewater, especially gray wastewater, reducing the use of treated water for various purposes, improving the energy efficiency of water transmission and purification processes such as solar energy, and green solutions for water purification such as artificial wetlands that reduce the need for water purification and energy (Alrbai et al., 2024).

3.3.1. The role of safe drinking water in reducing conflict, promoting peace and strengthening national pride

Access to water can be a strategic resource that, when not managed properly, can lead to conflict and even, in more extreme cases, a threat to national and regional security. When managed properly, it can be a tool for peacebuilding. In areas with water scarcity, tensions often increase between communities or even neighboring countries. In contrast, fair and transparent water governance promotes social cohesion and national unity. Countries that invest in inclusive water infrastructure send a clear message about justice and equity (Khalifa et al., 2025). Water-related cooperation enhances diplomacy and cross-border trust. Also, when citizens see their government succeeding in providing vital services such as water, a sense of national pride and trust in government institutions is strengthened. Water scarcity, which is increasing due to factors such as climate change and drought, causes competition between individuals in society, resulting in conflict and violence, with conflicts and violence over water issues increasing every year (Unfried et al., 2022).

3.3.2. Negative effects of lack or lack of safe and clean drinking water on migration and its problems

Water scarcity often leads to displacement and migration, especially in rural areas or those affected by climate change. Communities facing prolonged droughts or contaminated water sources are forced to migrate, leading to urban congestion, pressure on infrastructure and socio-economic tensions. Migrants may have difficulty accessing employment, education and housing, and these inequalities sometimes lead to alienation or xenophobia. Host communities may also face increased pressure on resources, which increases the risk of conflict. Addressing the root causes of water-related migration through effective governance and strategic management of water-resilient infrastructure and community-based resource management is essential. Water scarcity is expected to remain a major cause of migration in the future. Governments that design effective governance and strategic management to provide safe and clean water to their communities and invest wisely in safe and clean drinking water services and infrastructure can reduce water-related conflicts and migration to urban areas through climate resilience (Anarki Mohammadi, 2025).

3.4. Current status of effective strategic management in smart financial markets for water safety planning

To understand the progress of a country in the field of drinking water supply, it is important to examine the governments' plans for effective strategic governance and management in the field of resilience of the community's drinking water supply model to climate change, drought and human activities, as well as the various methods of financing and smart financial

markets in the field of drinking water supply and services. Governance structures for safe and clean drinking water planning vary across countries. Some countries have adopted integrated water resources management frameworks, while others have weak regulatory enforcement and institutional capacity. Smart financial markets can support water planning by introducing performance-based investment models and mixed financing methods. However, fragmented data systems, weak coordination and limited stakeholder participation often hinder effective implementation. Strengthening governance requires not only technical reforms, but also participatory mechanisms, transparent decision-making and adaptive management strategies (Lebu, et al., 2024).

3.4.1. Status of policies and national plans for drinking water supply

Most countries have plans for drinking water supply in rural and urban areas, but they must have sufficient resources available to be effective and resilient against human and environmental hazards. Another important point is that due to the different climatic, mining and industrial conditions in different regions, it is not possible to have the same strategic governance and management for all regions of the country. Among the common management models in the world for drinking water supply, we can mention the independent supply model, collective management, government supply and transfer to the private sector with subsidies (Di Vaio et al., 2021).

3.4.2. Status of strategic management of drinking water supply to the population of remote areas and those affected by drinking water shortage

Although one of the key objectives of the government's strategic management is to address remote communities. Various measures are being taken to provide drinking water, which face many challenges. However, there are undoubtedly differences in the effectiveness of these measures regarding the level of success in different places, and the financial market is not targeted and transparent and is prone to disruption, which is visible in most remote cities, especially in the south of the country. Remote communities face specific barriers to access to safe water, including geographical isolation, high costs, and limited institutional support. Strategic management in this area requires decentralized approaches such as local water governance, indigenous purification systems such as solar and mobile water purification units. Collaboration with non-governmental organizations and the use of indigenous knowledge can improve the sustainability of projects. Also, investment and smart financial markets in digital monitoring tools help identify disruptions and maintenance needs in real time and enable preventive interventions (Mishra et al., 2021).

3.4.3. Status of regulation of safe drinking water services

A country can establish regulations for the quantity and quality of drinking water, regulate tariffs, environmental impacts, market structure, consumer protection, provision of information to consumers, and other aspects. Effective regulation of safe drinking water services ensures safety, reliability, and equity. Regulatory bodies should set and enforce quality standards, monitor service performance, and address consumer complaints. In many countries, regulation is institutionally fragmented or lacks sufficient independence. Independent regulators with technical expertise and public accountability are better able to protect the public interest. International standards, such as the World Health Organization Guidelines for Drinking Water Quality, provide a framework for harmonizing the regulation of safe drinking water services (World Health Organization, 2022; United Nations Children's Fund, 2022).

3.4.4. Costs of access to safe and clean drinking water

As previously mentioned, investment and expenditure in the provision and services of safe and sustainable drinking water will yield a multiple return on investment. When investment is made in drinking water, capital is actually saved. The costs of providing safe drinking water include initial investment, operation and maintenance costs, and monitoring systems. These costs vary depending on geographical location, population density, and existing infrastructure. The issue of affordability is of great importance, especially in low-income areas were paying for services may be difficult. Targeted subsidies, cost-reimbursement mechanisms, and

transparency in pricing and costs can maintain a balance between financial sustainability and social equity (Ferreira et al., 2021).

3.4.5. Smart financial markets for safe and healthy drinking water

The provision of safe and healthy drinking water services depends on smart financial markets, including adequate funding for initial investment and maintenance, realistic revenue projections, and smart financing management. The main sources of funding for drinking water include taxes, national resources such as state mineral royalties, domestic and foreign aid, tariffs, and consumer bills. Once a utility reaches financial sustainability, it can access capital markets through a variety of financial instruments such as commercial loans, bonds, or other methods. It is worth noting that financial instruments such as blue bonds, green loans, and impact investments are used to bridge financing gaps. Multilateral institutions such as the World Bank and regional development banks play a key role in reducing investment risk and promoting collaborative financing models. Blended financing that combines concessional and commercial capital is a promising approach to attract more resources while managing risk (Leckie et al., 2021; Jiang, 2023).

3.5. Good governance with effective management in the provision of safe and clean drinking water

Good governance involves transparency, accountability and stakeholder participation in decision-making. In the context of water supply, this means clear roles, data-driven planning and accountable institutions. Effective management requires trained human resources, reliable data and efficient supply chains (Cantor et al., 2021). Public-private partnerships, if properly structured, can improve services. However, inefficient management in some areas is a challenge. Building institutional integrity and community trust is essential for long-term success.

3.5.1. Smart public finance as a driver for effective investment

Smart public finance aligns fiscal policy with development objectives so that resources are allocated where they are most effective. In water supply, this means prioritizing preventive maintenance, investing in disadvantaged areas and promoting climate resilience. Tools such as results-based financing, participatory budgeting and life-cycle cost analysis help to improve financial efficiency. Governments should integrate water financing into broader economic planning to achieve synergies between sectors such as health, education and agriculture. Therefore, governments can make informed and evidence-based decisions on budget allocation by providing clear objectives in their policies to guide financial and budgetary decisions and by understanding the costs of drinking water supply and services. Smart investment of public funds can also create incentives for efficient and sustainable service delivery, prioritizing the poorest populations (AbuEltayef et al., 2023; Lebu et al, 2024).

3.5.2. Reliable data supports better decision-making

Reliable and disaggregated data is essential for strengthening political commitment, policy-making, decision-making and informed decision-making, identifying the most vulnerable segments of society, activating targeted investments, maximizing health, benefiting from God-given and economic resources, and enabling timely reforms on the path to progress. Reliable data is the backbone of effective water governance. This data supports evidence-based planning, performance monitoring, and resource allocation. Key data include water quality indicators, consumption patterns, infrastructure status, and demographic trends. Investment in digital infrastructure, such as smart meters and remote sensors, enhances real-time data collection and analysis. Open data policies and stakeholder access to information also improve accountability and public participation. (Jahanddideh-Tehrani et al., 2021)

3.5.3. Innovation in approaches and emerging challenges

New technologies play a key role in improving the efficiency and quality of drinking water. The use of smart sensors in distribution networks helps reduce water losses and leakage. Membrane and reverse osmosis technologies enable high-quality water purification. Desalination of seawater using renewable energy in coastal areas can be a new source of water. Innovation in water

management encompasses technology, policy and social practices. From AI-powered leak detection to decentralized water systems and payment apps, new solutions are changing the way water is delivered and monitored (Jana, 2024). Climate change, urbanization and pandemics have reinforced the need for adaptive systems. Innovation in governance, such as participatory mapping and crowdsourced data, empowers communities and improves accountability. The expansion of these innovations requires supportive regulation and smart investment. Water companies are increasingly adopting innovative technologies such as advanced filtration, smart meters and leak detection to increase efficiency and sustainability (Gupta et al., 2020). Strategic managers are adopting sustainability principles to reduce environmental impacts, reduce energy consumption and encourage water conservation. Sustainable management also increases resilience to climate risks. Artificial intelligence and the Internet of Things are being used to forecast consumption, identify leaks and optimize networks. Water data management software and digital platforms are increasing transparency, monitoring and stakeholder engagement. If properly implemented, these technologies can significantly improve the quality and quantity of drinking water (Adesina et al., 2024).

3.6. Outlook and future studies in the provision and services of safe and healthy drinking water

Foresight studies analyses different development paths using scenarios. The future of drinking water supply depends on resilience, inclusiveness and sustainability. With population growth and climate risks, water stress is increasing. Forward-looking planning must anticipate future demand, technological developments and socio-economic trends. Scenario analysis, water risk mapping and integrated policy frameworks are essential tools. Ultimately, a comprehensive and forward-looking approach that combines infrastructure, finance, governance and community participation will be essential to ensure universal access to safe and clean drinking water. Given climate change and population trends, foresight is essential for sustainable planning (Sivagurunathan et al., 2022). Climate modelling and scenario analysis show that Iran needs to prepare for more severe drought conditions, reduced water resources and increased demand. The use of new technologies and adaptive management strategies will help design flexible and resilient policies. Training specialized human resources, developing interdisciplinary research, and utilizing global experiences are other key elements for a successful future of the water sector. Policymakers should pay special attention to long-term investment in technology, education, and infrastructure development (Sinha et al., 2023).

4. Conclusion

This study utilized VOSviewer for bibliometric analysis to examine the conceptual structure and research trends related to the strategic management of the smart financial market for the provision of safe drinking water and sustainable urban infrastructure .Effective governance and strategic management in smart financial markets for water resources should be prioritized as a fundamental necessity for sustainable development and meeting the future needs of human societies. Given the growing challenges such as climate change and population growth, it is essential to adopt comprehensive and integrated approaches to water management, especially through international cooperation and the participation of local communities. Also, the use of modern technologies and analytical data can help improve the efficiency and effectiveness of these processes. Finally, educating and raising awareness among the public about the importance of conserving water resources and sustainable management practices is the key to success in achieving water governance goals. These measures not only help improve the quality of life of people, but also lead to environmental protection and sustainable development. Given the challenges ahead, foresight and strategic planning are essential for providing safe and healthy drinking water. This article emphasizes that to deal with the water crisis, a comprehensive and inclusive approach is needed that includes infrastructure, finance, governance and community participation. The smart investment in technology, education and infrastructure development will be key elements for success in providing safe and healthy drinking water. As a final point, addressing the pressing challenges of water scarcity, climate change, population growth,

effective governance, strategic management, and technological innovation in water resource management are essential for achieving sustainable earth trend.

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