

# Social Acceptance of Innovative Water Technologies as a Development and Design Norm in North Cyprus

\* <sup>1</sup> Ph.D. Candidate **Behnoosh Boldaji** <sup>2</sup> Prof. Dr. **Shahin Keynoush**

<sup>1&2</sup>Department of Architecture, Graduate School of Social and Applied Sciences, GIRNE AMERICAN UNIVERSITY  
North Cyprus

E-mail <sup>1</sup>: behnooshboldaji@gmail.com , E-mail <sup>2</sup>: shahinkeynoush@gau.edu.tr

## Abstract

This paper addresses the necessary innovative methods for water production and harvesting as a design norm, especially in areas that are facing water shortages both now and in the long term, an example of which is Northern Cyprus. Amidst projections forecasting that half of the global populace may confront water scarcity by 2025, and an estimated 700 million individuals could face displacement due to water scarcity by 2030, the imperative to diversify water-sourcing mechanisms becomes paramount. This paper scrutinizes the intricate challenges engendered by the island's climatic peculiarities and constricted land resources, underscoring the imperative of formulating sustainable water management paradigms. It synthesizes extant scholarship on water management in North Cyprus, focusing on participatory design methodologies and their ramifications on the societal embracement of novel water technologies. Environmental determinants such as climatic conditions and human factors such as social behavioral patterns and infrastructure maintenance are factors that have a direct impact on the analysis of water management in multifaceted dimensions. In addition, attitudes, social norms, and perceived behavioral control are effective in social acceptance of renewable energy projects in general and, in this paper, innovative water projects. Participatory design in a special way causes the community to participate and receive their support, which results in achieving sustainable water solutions in North Cyprus and more widely in the global context.

**Keywords:** Social acceptance, Water Innovations, Social Norm, Participatory Design

## 1 Introduction

Half of the world's population could be living in areas facing water scarcity by as early as 2025. Some 700 million people could be displaced by intense water scarcity by 2030. (UNICEF, 2020) Water is precious worldwide, but when it comes to small islands like Cyprus with more than 300 sunny days and a warm climate, the need to find alternatives to produce or reuse the sources is quite bold. It is critical for an island where land is a finite resource and groundwater sources and its recharge and catchment areas may dwindle.

It is not only the water sources but also the social behaviour of water consumption that is an issue to discuss. The local people and tourists on the one hand and the municipal approaches on the other hand, play a vital role in consuming and producing water. In addition, the maintenance and distribution system is urgent due to the increase in water wastage and decrease in productivity. From all the above mentioned, the urgent need for water innovations is increasingly clearly endorsed and responded to with specific resources and methods.

This paper examines existing research on innovative water harvesting, with a specific emphasis on social acceptance approaches and their impact on implementations in North Cyprus. Water management is a multifaceted issue around the globe as well as in North Cyprus, encompassing natural factors like climate and human-related aspects such as social behaviour, municipal approaches, and infrastructure maintenance.

How attitudes, social norms, perceived behavioural control, and personal norms affect social acceptance and intentions towards or against new water technology projects or any other new-fangled developments will be discussed here. Likewise, it considers the development and design norm and analyses it in the broader social development context towards identified social and environmental goals. Further discussion will be on social acceptance and its relevant factors in approaching methods. Generally, achieving social acceptance of water production and recycling technologies requires a multifaceted approach that considers not only the technical aspects but also the perceptions, concerns, and active involvement of the communities and end-users. To find out the reason or reasons that prevented North Cyprus from implementing these technologies will be the subject of this article. The participatory design will be used as a method that can reveal the reasons why society and stakeholders refuse to oppose new technologies. This approach is influenced by factors that are explored in the context of the project and emerges as a critical element in fostering the adoption and ensuring the success of sustainable water solutions on a global scale.

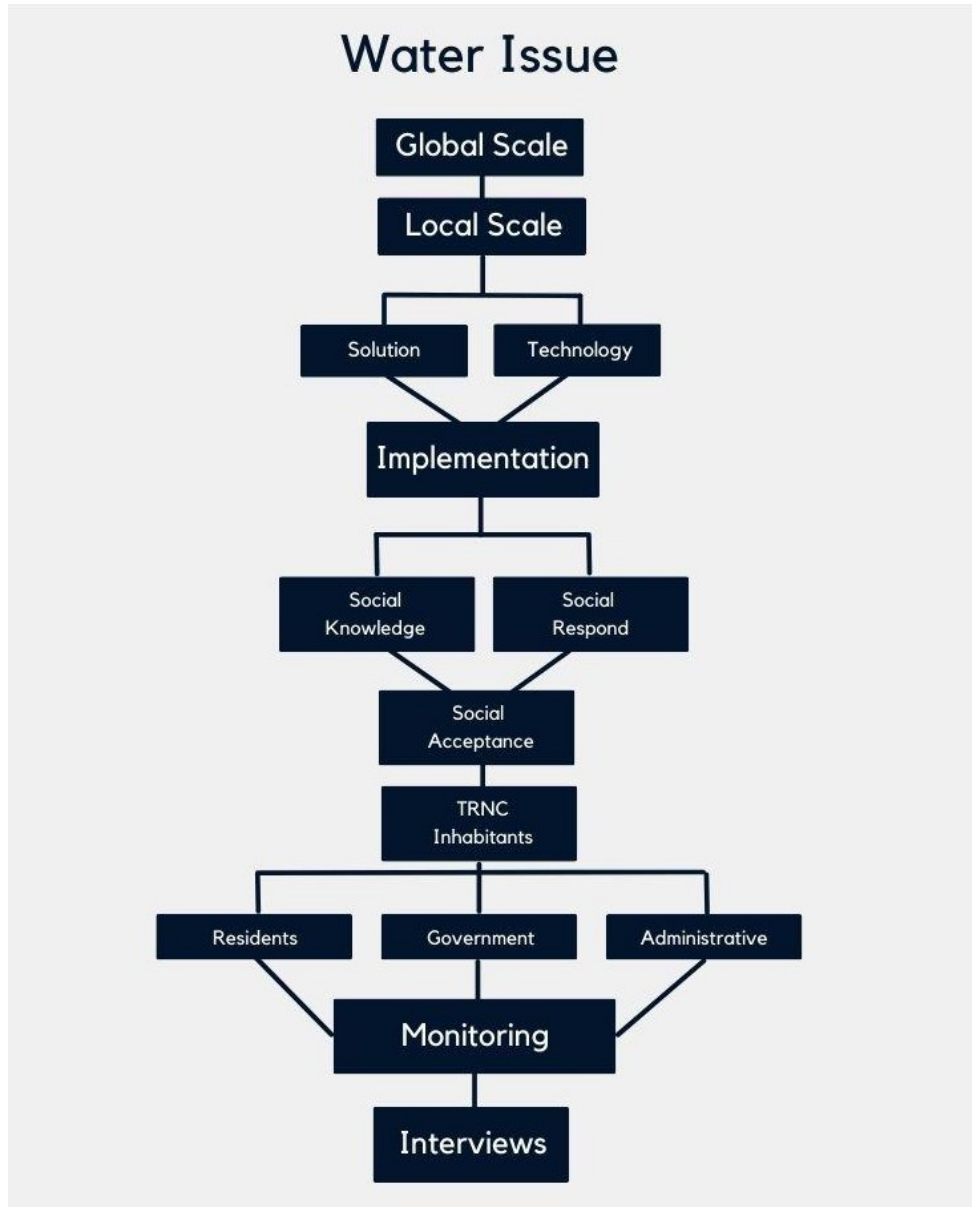


Figure 1. Structure of the Study (Developed by Author).

### 1.1 Problem definition and Context

The water shortage and water wastage in Cyprus Island both north and south has been an issue for years. Study and design the water innovation systems for future water sources, maintain the existing water sources, and consumption critics, and recommend remedial measures to address current problems and mitigate expected future shortages.

Cyprus is one of six countries identified as facing the greatest water scarcity in the world, according to a report by the World Resources Institute. It found that Cyprus, along with Bahrain, Kuwait, Lebanon, Oman, and Qatar are the world's most water-stressed nations. It categorized a country experiencing "extreme water stress" as one that uses at least 80 percent of its available water supply, while those with "high water stress" use 40 percent of its supply. (Theodoulou, 2023) At present, the social consumption of water on different scales, which involves both local communities and tourists, at the same time, local communities include all social groups, including government, private and administrative groups.

At present, the social consumption of water on different scales, which involves both local communities and tourists, at the same time, local communities include all social groups, including government, private and administrative groups. Also, municipal policies play an essential role in aggravating or reducing the problem of water shortage. Wasting water and reducing its productivity are among the factors that increase the urgent need for sustainable water management and emphasize its necessity. As an immediate response, a comprehensive strategy that includes public awareness campaigns and educational initiatives to change social behaviour is highlighted. At the same time, it is very important to implement new and strict regulations on the part of executive units such as municipalities and invest in innovative methods to deal with the dynamic challenges caused by climate and social impacts.

To deal with global water scarcity, it is necessary to implement a combination of sustainable water management practices, investment in infrastructure, raising awareness, and efforts for social acceptance of innovative technologies. Integrated

approaches involving governments, communities, and businesses are key to achieving long-term solutions to water scarcity.

Meanwhile, the General Secretary of the Green Peace Movement Doğan Sahir said, “Yes, global climate change used to be a scenario; now we are living in it and are in a crisis. “We have not produced any political decisions on this issue, nor do we make any conservation efforts. We are consuming as much water as we want, thinking that water comes from Turkey anyway. Therefore, there is also a lack of control in the management of water”. (News, 2023)

The intertwined challenges faced by water management are multifaceted. Especially when water management is conceived broadly, many different factors will appear to be studied. There are interrelated social challenges such as population growth, urbanization, migration, changing lifestyles, and providing sanitary and hygiene services. Considering the different methods of water production and recycling that have been invented, used, and approved all over the world, the point that remains is the public acceptance and acceptance of these technologies, which are affected by various factors.

To understand the relationship within this discussion more clearly, the breakdown of the discussion is to delve deeper into minor parts. The solution and technology section discusses the different methods of water production and recycling and the clusters, which will be the game changers of this project. Later, the application status with the factors that may affect social acceptance will be explored.

### **1.2. Solution and Technology**

Limited water resources and a semi-arid climate in Northern Cyprus are the main issues that make water harvesting vital for sustainable water management. One of the challenges that this region is dealing with is the high evaporation rate, irregular rainfall, and increasing water demand.

With the increasing scarcity of water in the world, the demand for sustainable water production has increased. Innovative methods of water harvesting are not recent techniques, several different traditional methods have existed in the past in water-scarce areas. For example, methods such as collecting and storing rainwater, improving water efficiency and ensuring more reliable water supplies.

There are technological issues such as finding and exploiting new sources of fresh water, smart infrastructure, use of efficiency technologies, water reuse, and recycling.

There are technological issues such as finding new sources of freshwater and tapping them, smart infrastructure, usage efficiency technologies, water reuse, and recycling. All the mentioned cases can be resolved when the economic aspect is considered from the beginning. Ecosystem services, energy supply, aging infrastructure, and climate adaptation are the main effective spots in any water innovation system. Another issue that is worth mentioning is the case of environment, flood, drought, groundwater depletion, agricultural and climate change, and pollution. On top of all, political challenges have a very effective and decisive role in the field of water.

This paper focuses on mitigating water scarcity challenges in North Cyprus through innovative water harvesting methods as a development and design norm.

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#### **Different Innovative Water Harvesting Methods:**

- Rainwater Harvesting (RWH)
- Check Dams and Contour Trenches
- Permeable Pavements
- Watershed Management
- Greywater Recycling

Some of the methods are related to seasonal rainfall variations.

In a region like Northern Cyprus, the combined method that includes the simultaneous use of two methods or combining several methods can be used to solve the challenges caused by water shortage. As mentioned before, to reach the final result, multi-structural stages and agreement of government centres, community participation, and technological innovations are needed.

Mutual understanding leads to social acceptance, which is its practical achievement with a collaborative plan. The cooperative plan is obtained by different methods; one of these methods is participatory design. Participatory design is emphasized, involving end users and stakeholders throughout the design process. Key factors include user involvement, conceptual understanding, iterative processes, and ethical considerations. This approach ensures that water-harvesting solutions align with user needs and expectations, fostering a sense of ownership and sustainability. (Blanke J, 2022)

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There will be many obstacles in front of the acceptance of the integration of water harvesting technologies, which arise not only from the environmental and structural aspects but also from the social aspect, with issues such as sometimes limited, cultural reluctance to change. The water shortage crisis is one of those issues that require a comprehensive approach to solve. Approaches with a management structure to implement sustainable water management practices, development of efficient infrastructure and targeted initiatives to reduce social barriers are among the integral parts of this project. Successful implementation and adoption of water harvesting technologies depend on integrated efforts involving governments, communities, and businesses.

### 1.3 Application

The global water shortage poses a complex challenge rooted in population growth, climate change, inadequate water management, and uneven resource distribution. Apart from the lack of awareness of water shortage and its production, the point that has remained silent is the neglect of the principle that Northern Cyprus is facing a serious water shortage. One of the main reasons that North Cyprus still has not been involved in technological development is societal ignorance. To overcome this issue a collaborative method is needed to attract people and demonstrate to them the benefits. How can community-based strategies and social networks be leveraged to promote the acceptance and sustainable use of innovative water technologies?

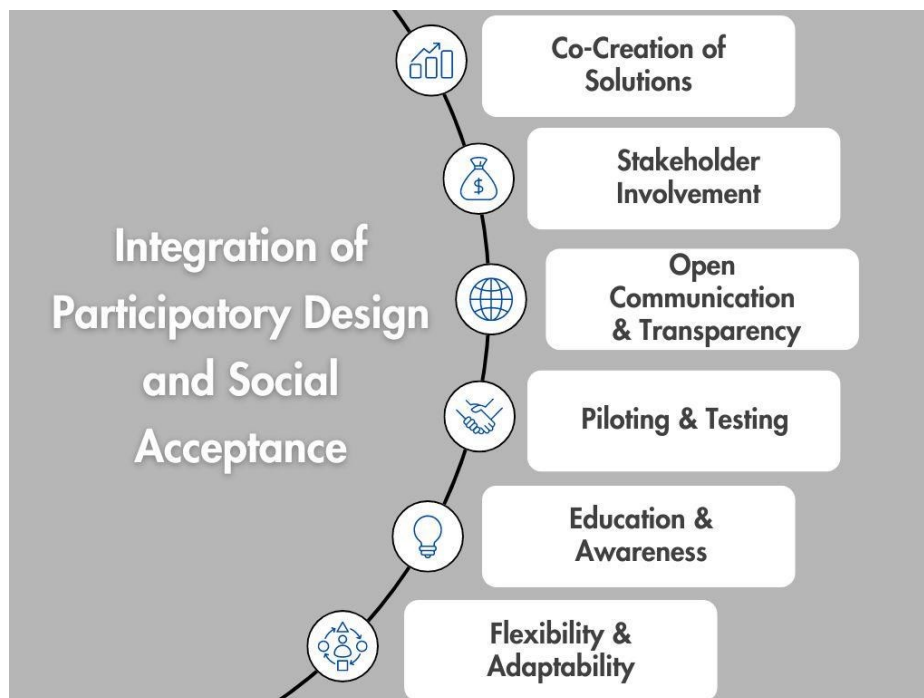
To achieve an innovative approach to the issue of water, participatory design, and social acceptance will affect the construction acceptance and productivity of this issue and ensure a comprehensive approach to address the challenges of water scarcity in the region.

To form a positive social environment, the main elements of social acceptance should be applied one by one and comprehensively in society. Therefore the social communities reach a sympathy and sense of involvement in the new project.

The main elements of Social behaviour are listed below

- **Recognition**
- **Approval**
- **Inclusion**
- **Support**
- **Non-Discrimination**
- **Respect**

Social acceptance is acknowledgment and positive regard within the above fundamental social context.



**Figure 2.** Integration of Participatory Design and Social Acceptance (Developed by Author).

To achieve a comprehensive social behaviour, participatory design will ease the applications of the administrative teams to be implemented.

The outcome of the integration of social acceptance and participatory design will be a platform for administrative organizations to embark on the project.

- **Co-Creation of Solutions:** brainstorming, prototyping, and iteration
- **Stakeholder Involvement:** workshops, interviews
- **Open Communication and Transparency:** transparent communication
- **Piloting and Testing:** Implement pilot projects or prototypes
- **Education and Awareness:** Inform different levels of society including stakeholders, governmental associations, and residents.
- **Flexibility and Adaptability:** An adaptable design process

By integrating participatory design and social acceptance, designers can create solutions that are not only technically but also well received by the communities. This collaborative approach helps build a sense of ownership and fosters positive relationships between designers and the community to accelerate the process of application and harvest the advantages.

## 2 Raising Questions

What are the main water-related challenges in North Cyprus, and how can innovative water technologies, supported by education, public engagement, and appropriate policy frameworks, address these challenges while considering the economic implications and fostering social acceptance?

## 3 Monitoring Methods

Apart from the awareness of North Cyprus water shortage, the knowledge of water production, environmental and structural aspects, and integrating water-harvesting technologies may encounter significant social acceptance obstacles. Resolving the water scarcity crisis necessitates a holistic approach involving governments, communities, and businesses. Each person beyond his or her position is considered an End-user and a consumer. According to this point, the importance of participation, feedback, and reviews of each society's level of social acceptability becomes more prominent.

### ➤ Three clusters of stakeholders in this paper

#### 3.1. Social cluster

- Residents
- Tourists
- Small businesses and shops

#### 3.2. Governmental cluster

- Prime minister/ president
- Head of the water department
- Minister of Energy

#### 3.3. Administrative

- Municipalities
- Contractors
- Construction companies



**Figure 3.** Interconnected clusters (Developed by Author).

Understanding and collaborating with these clusters, which are interconnected in different layers, may create a cohesive strategy for promoting innovative water technologies that are socially accepted, supported by government policies, and guided by effective design standards and Norms.

Also by clustering the groups of people and consumers, the design and establish the interview questions will be easier and more clear. The complexity of the given context leads the mentioned interview toward an open-ended interview which has the potential to enclose the hidden patterns as well as provide a deeper interpretation of the current praxis.

### 3.1 Interviews and Observation Methods

The research will use interpretative methods to classify, discover, and disclose the hidden patterns on one hand and the other hand generate new sets of information to expand the existing knowledge about the research topic. In addition to the standard data collection methods in qualitative research, this work will hire a variety of open-ended interviews to dig out the required/necessary data and sets of information. These interviews will be designed with the capacity to establish the best possible connection with the context of the research topic and its relevant environment.

The general topic organization will be classified below

- **Awareness and Knowledge**
- **Perception and Attitudes**
- **Social Acceptance Factors**
- **Personal Experience and Behaviour**
- **Barriers and Challenges**
- **Policy and Governance**
- **Future Perspectives**

The interview questions will be designed in two questionnaire groups; first, one is the general questions, which will be asked by each interviewee. In addition, the second question list will be set for each group individually. By examining all the interviews and questions the possible barrier will appear. Meanwhile, some feasible barriers were considered.



Figure 4. Barriers (Developed by Author).

The process of designing interview questionnaires allows the interviewer to evaluate the possibility of experimentally exploring public attitudes and perceptions toward these technologies. The integration of all data and findings leads us to a complete understanding of the opinions and criticisms or suggestions obtained at different levels through the interviews. The results obtained from each interview session determine the indicators of the social and cultural norms of that group that will be used in the index tables in the future and create a platform based on which the necessary methods, decisions, and actions are planned.

#### 4 Conclusive Note

This research focuses on understanding how societies, at different levels mentioned in this article, may accept or resist new technologies regarding water harvesting methods and, henceforth, find directional and influential factors that strengthen social acceptance to encourage people for a smooth implementation of projects related to this field. Exploring the dynamics of social acceptance reveals that, the design norm results from a certain valuable insight that contributes to the design and implementation of technology in a socially responsible manner. Moreover, it attempts to bridge the gap between recommended practices for water production, technology developers, and end users to understand the reasons why North Cyprus was not involved in any independent water production project yet. Striving to facilitate a more harmonious integration of technology into diverse social contexts, creating an environment in which technological advances are implemented taking into account social values and preferences.

#### 5 Limitations

This research is part of the development of the doctoral thesis, and the author has decided to share the existing research so far in the form of an article. In doing so, it looks into the opportunities to encourage all the stakeholders to implement existing technologies to explore possibilities of establishing design norms in various scales in the context of North Cyprus. Measuring the social, environmental, and economic impacts of Innovative Water Technologies is not within the scope of this research however the social, environmental, and economic impacts will be investigated and discussed throughout the research process for the thesis itself.

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### Conflict of Interests

The Author(s) declare(s) that there is no conflict of interest.

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