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# The Importance of Digitalization for Sustaining Cultural Environments in Resilient Cities

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## Abstract

In recent years, cities have started to develop faster than ever, and this improvement has led to crucial changes in terms of social, environmental, as well as cultural conditions. Today, people mostly prefer living in cities for many reasons, where cities' sources have been forced to their limits for adaptation to this growth. In this respect, planners and designers have started to search for sustainable and innovative solutions with the help of technology and digitalization. With this dramatic improvement, not only planning and design professionals but also governments started to take smart and long-term solutions for resilient cities into consideration.

Sustainable cities are self-sufficient with their natural and cultural environments. They can also manage their economic and social acts from the viewpoint of sustainability. With the increasing demand for technological developments in the age of digitalization, cities should also include *'Smartness'* in order to achieve sustainable development for resilience, where environmental, social, and cultural aspects need to be provided in a sustainable way via creating smart solutions.

Digital transformation can help fulfill the needs and future expectations of city dwellers by increasing opportunities and cultural values for a sustainable lifestyle as one of the fundamentals of resilient cities. In this regard, this paper mainly discusses how digitalization and smart technologies can help with sustainable development and propose a new model for digital transformation to achieve culturally resilient cities.

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***Keywords***

*Sustainability; Resilience; Cultural Environments; Digital Transformation; Smart Cities*

## 1. Introduction

Cities can be defined as *'Smart'* when they provide better planning and design solutions via technology in order to fulfill the expectations. Technology has a crucial role to play in creating and maintaining sustainable cultural environments for resilient cities, where they defined as places in which technologies are combined with infrastructure for dealing with the social, economic, and environmental problems. In this case, technological improvements need to be considered by the actors who are responsible for sustaining cities, such as; local governments, NGOs, stakeholders, city planners, and designers. These actors should focus on the needs and benefits of city dwellers by using digital and communication technologies for sustainable solutions.

Smart cities have to provide benefits for their citizens, including a high-quality environment, smart public transportation, safety, real-time info about the city, cultural and educational facilities by using new technologies. Creating smart cities requires considering the demands of city dwellers and every 'intelligent' activity must be

motivated by well-being. Digital transformation is becoming increasingly important in everyday life to make the environment more livable and sustainable for people through increasing social participation as well as cultural networks among people and public heritage. In this case, governments, institutions, and NGOs must work in collaboration to improve digital literacy, make policies, develop digital skills, etc.

Digital transformation tools must be developed and used in many areas of everyday life. To do that, a smart city interface needs to be created as a framework that helps municipalities and local governments analyze real-time data to make more feasible design and management decisions. Smart cities should also be equipped with basic infrastructure for sustainable development through the application of smart solutions. Smart city planning for resilient cities needs to be based on collecting and analyzing consumer behaviors by gathering them via digital elements and using technological tools and developments for possible innovations. In this respect,

• Citizens' engagement with social and cultural environments through public information,

• Protecting and optimizing natural resources via digital technologies and related applications,

• Encouraging smart and sustainable development for the components of cities through intelligent management systems can be classified as the main components that smart cities need to consider to be identified as *'Resilient'*. To reach these goals, the new model is developed with respect to the dynamic nature of cities and their components for sustainable and long-term solutions.

## 2. Components of Smart and Resilient Cities

The smart city concept emerged in the 1990s (Hollands, 2008) and the term *'Smartness'* is used in a variety of meanings such as creative, digital, and virtual (Vanolo, 2016). The term *'Smart City'* has become an inspiration for the future, from the governmental issues to the environmental, social and cultural developments that lead to a sustainable city (Bakıcı, Almirall and Wareham, 2012). Smart environments address the efficiency and sustainability of urban life in every aspect, including efficient use of natural resources and energy, environmental and cultural spaces (Albino, Berardi, and Dangelico, 2015). In this case, smart living is defined as improving quality of life by increasing cultural and natural inputs into the daily lives of urban dwellers by transforming city functions into smart environments (Giffinger, 2015).

Smart cities need a vibrant environment among people to be sustainable in terms of social, cultural and educational aspects (Toppeta, 2010) by using technological development and digital transformation via better planning and design decisions (Neirotti, 2014). Therefore, cities need to find their capabilities for smart solutions on a city scale with their citizens (Ruhlandt, 2018). With the development of technology, various environmental solutions can be applied to smart cities, addressing environmental and cultural issues through digitalization. Ahad (2020) described the features of smart cities in which networked infrastructure enables social and cultural development, emphasizing on creative activities for urban growth (Komninos, 2011). Smart city planning is mainly based on understanding consumers and combining digital elements using technology for innovation. To do that, ICT communication infrastructures should be supported by governance to use resources and technologies in innovative and coordinated ways to develop sustainable and resilient cities (Barrionuevo, Berrone and Ricart, 2012).

Resilient cities are those that can effectively respond and adapt to various shocks and stresses, and cultural environments play an essential role in making a city resilient, as they shape a city's identity, foster social cohesion, and provide a sense of community. In this context, resilient cities embody the fundamentals of sustainable development and integrate the social, economic, and environmental components of their communities, considering the needs of existing and future generations. These cities also provide a safe and healthy environment, respecting the cultural roots and heritage derived from the city itself (Bernardo, 2017). In this case, the needs of dwellers should be crucially considered by using smart technologies and digital transformation tools to contribute to the resilience of the city with all its components.

Cultural environments also play a crucial role in making a city resilient by fostering social cohesion, promoting cultural exchange, and contributing to the local economy. By valuing and investing in their cultural environments, cities can become more adaptable, innovative, and sustainable in the face of various challenges. Communities are dealing with socio-economic inequalities, poverty, social exclusion, and a lack of cultural development (ODPM, 2005). In this case, although resilience has been considered in various scientific fields such as ecology and social sciences (Vale, 2014), today the term *'Resilience'* mostly describes the interrelated system of adapting capacities for confronting external stressing factors in cities (Ahern,2011).

In the urban context, resilience aims at enabling cities to respond to shocks and stresses (Melkunaite and Guay, 2016) while improving the functions and services both on a regular basis and in crisis situations by building new social, economic, and environmental responses (Desouza et al, 2013). Urban resilience intends to augment the ability of the urban system, including physical, environmental and socio-economic perspectives, to build up its adaptive capacity while diminishing its vulnerabilities (Tollin and Hamhaber, 2017). Considering these definitions, cultural environments in resilient cities can be defined as public spaces, cultural institutions, preserving heritage and creative industries as well as cultural diversity (World Bank-CRP, 2019).

In order to create and maintain sustainable development in cities, cultural sustainability is as vital the economic, social and environmental ones. In this respect, these environments can be mainly divided into five sub-categories, which help to create the structure for sustainable development by encouraging cultural sustainability:

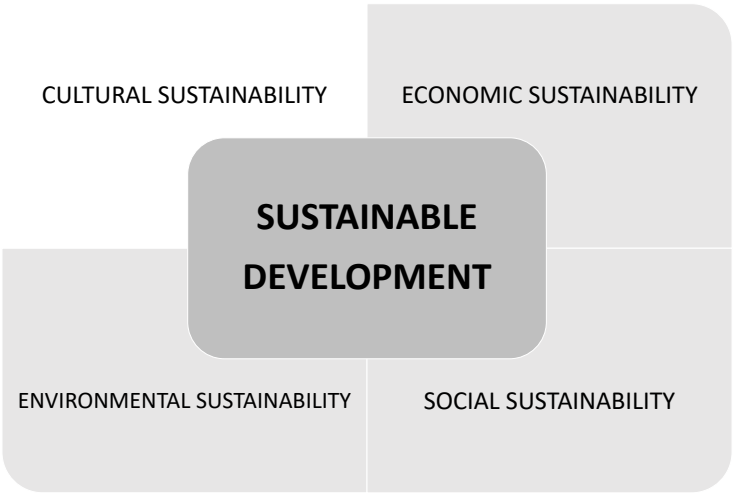


Figure.1. Components of Sustainable Development for Resilient Cities *(Deniz D.,2023)*

*Public spaces:* Resilient cities should have vibrant public spaces that serve as gathering places for the community, because these spaces provide opportunities for social interaction, recreation, and cultural events.

*Cultural institutions:* Resilient cities should have a diverse range of cultural institutions that provide cultural and educational opportunities for the community. These institutions not only promote cultural tourism, but are also crucial as an important economic driver for the city.

*Heritage preservation:* Resilient cities should value and preserve their cultural heritage and cultural traditions. This preservation not only protects the city's identity, but also attracts visitors and provides opportunities for cultural exchange.

*Creative industries:* Resilient cities should have thriving creative sectors, including artists as well as designers. these sectors contribute to the local economy and enhance the city's cultural identity, providing a platform for social commentary and innovation.

*Cultural diversity:* Resilient cities should embrace cultural diversity and celebrate the contributions of different communities. This diversity fosters social cohesion, promotes intercultural understanding, and enables the city to better respond to crises.

## 3. Sustaining Cultural Environments in Resilient Cities Through Technology

After the industrial revolution, the loss of natural resources increased due to changing lifestyle, which led to rapid urban development, and the idea of a smart city derived from the need to accommodate rapid urbanization. Digital transformation is crucial to understand the complexity of cities with their built environment, social and cultural components, which create networks among social, economic, environmental, and technological factors. In this context, these transformations should mainly focus on developing opportunities with increased citizen engagement.

Technological developments and digitalization are important for resilient cities in many ways. There are some crucial aspects that need to be considered for creating Urban Resilience *(Figure2),* including;

*Preservation of cultural heritage:* Because technology can be used to preserve cultural heritage sites and artifacts. Digital technologies can create replicas of artifacts and structures, that can be used for research, education, and exhibition purposes. In this context, digital archives can also be created to store and preserve historical documents and images.

*Sustainable urban planning:* Using technology is crucial for sustainable urban planning to create resilient cities. Smart city technologies and Geographic Information Systems (GIS) can be used to map and analyze data on land use, transportation, and environmental conditions, which can inform urban planning decisions.

*Cultural exchange and communication:* Technology can facilitate cultural exchange and communication between different communities, both within a city and across the globe, to share information and ideas about different cultures, traditions, and practices. Virtual reality technologies can provide immersive experiences that allow people to explore different cultures and environments.

*Education and research:* Technology can provide access to education and research resources that are critical to understanding and preserving cultural heritage. Online courses and digital libraries can facilitate knowledge transfer among people from all over the world. In addition, technologies such as artificial intelligence can be used to analyze and interpret data, which can inform research in fields such as history and cultural studies, as well as anthropology and archaeology.

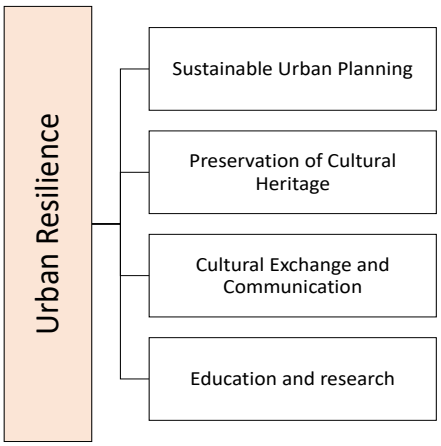


Figure.2. Fundamentals of Urban Resilience *(Deniz D.,2023)*

Smart technologies change the city's infrastructure in many ways: naturally, culturally, and economically, with the contribution of related partners such as; governments, decision-makers, planners, entrepreneurs, designers, stakeholders, and residents, by finding new methods for optimizing systems for new challenges. Improving the

cultural exchange and communication with the help of education, technology can be a powerful tool in creating and maintaining sustainable cultural environments in resilient cities. It can not only help to preserve cultural heritage, but also support sustainable urban planning, facilitate cultural exchange and communication, and provide access to education and research resources.

**A Smart City Model Through Digital Transformation**

Smart cities have a great potential for sustaining cultural development, which can mostly be supported by governments and private companies. Designing smart cities is a complex issue, and it requires collaborative studies with the contributions of many disciplines, including decision-makers, designers, planners, ICT professionals, as well as citizens. At that point, social and cultural dimensions must be considered since the smartness of a city mainly depends on community participation *(Figure3).* Citizens have a crucial role to play in sustaining cultural resilience in smart cities to be increasingly connected in cultural places, public networks, and smart transportation, which affect services through digital devices. In this case, the IoT needs efficient data and smart objects. Data management is also inevitable for smart cities, and the data collected from cities must be generated carefully to develop applications in order to fill this vital gap.

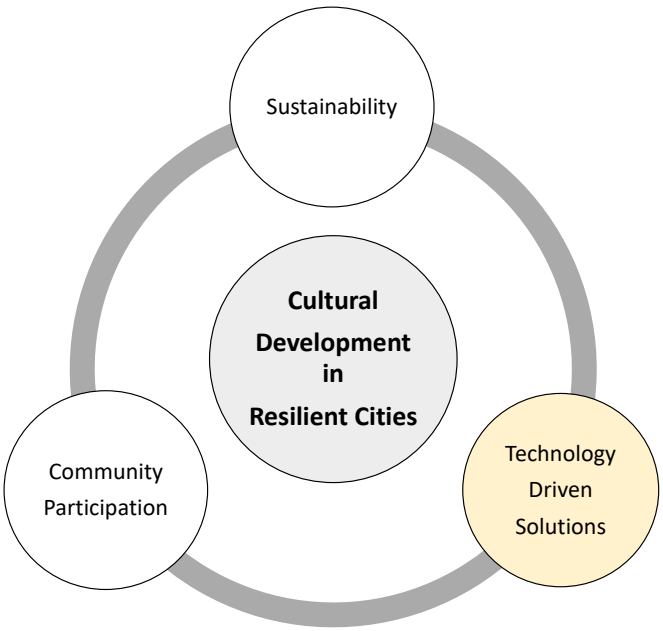


Figure.3. Cultural Development in Resilient Cities Through Technology *(Deniz D.,2023)*

Understanding the needs and expectations of the city and combining them with digital elements through technology is crucial for cultural innovation. To do that, ICT communication infrastructures need to be supported by governance to use resources via technologies in innovative and coordinated ways to develop smart sustainable cities. In this case, *'Smart and Sustainable City Model through Digital Transformation' (Figure4)* was created as guidance for further studies which is defined with its components and responsibilities.

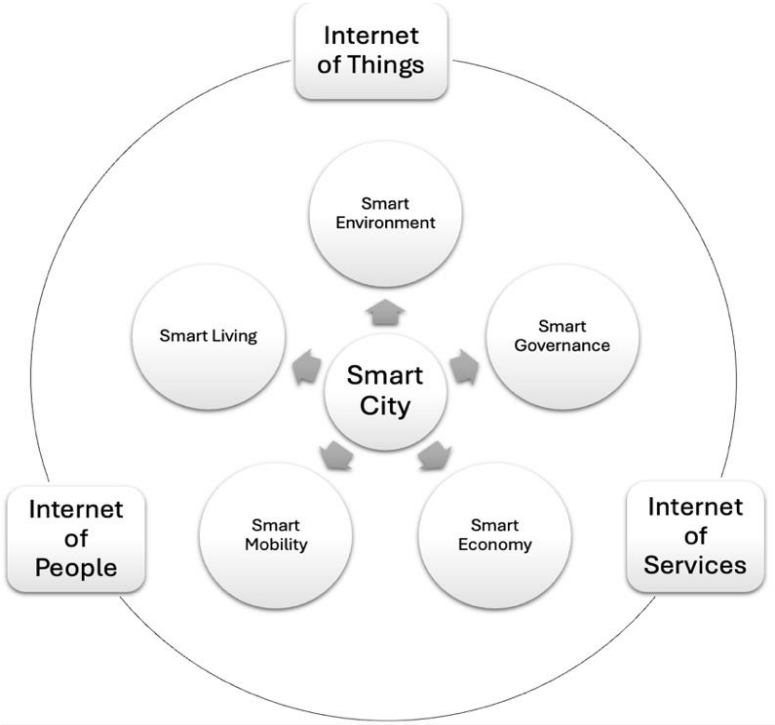


Figure.4. A Smart and Sustainable City Model through Digital Transformation *(Deniz D.,2023)*

Although various methods are proposed to develop the smartness of cities, there are some obstacles related actors and responsibilities in the digital transformation process. In this respect, this approach needs to be considered not only by governments or policymakers but also by design professionals to create resilience in cities through the viewpoint of sustainability with its cultural and natural environments.

Understanding the role and responsibilities of '*Smart Governance'* through digital transformation is crucial for smart solutions since they are the main decision-makers for sustainable solutions in cities. Because technological developments enable smarter solutions through quick and accurate collection and processing of data for better results. In this respect, smart governance helps to ensure the efficient use of natural, social, and financial sources with well management in addition to provide public services that are accessible for all. Besides, encouraging citizen participation and community engagement in decision-making processes should be provided for sustainable solutions.

'*Smart Environment*' through Digital Transformation is another aspect of creating a balance between planning and design for resilient cities. To do that, developing alternative tools for the efficient use of environmental, social, and cultural resources for future generations is crucial.

'*Smart Living*' through Digital Transformation is also crucial to consider for sustainable solutions in cities by having easy access to information and related technology for increasing social and cultural resilience.

'*Smart Mobility*' through Digital Transformation should offer sustainable mobility for fast and easy access to social and cultural facilities for a well-connected community via easy access to public environments, services, and opportunities for everyone.

'*Smart Economy*' through Digital Transformation helps to provide new opportunities for resilient cities by supporting entrepreneurship and encouraging leadership to provide an environment in which businesses are productive, efficient, and competitive for developing possible collaborations to reach success.

Today, digital transformation is at the heart of discussions on creating resilient cities via technological development to build more livable and sustainable cultural environments. To reach that goal, defining the existing problems and providing solutions for them via digital innovation to generate sustainable opportunities and facilitate community participation is inevitable. *'Smart and Resilient City'* must be defined as an extension of a sustainable city to create advanced opportunities for people while minimizing environmental impacts with the help of technology and digital transformation.

## 4. Conclusion

Smart cities use digital data and advanced technologies for sustainable solutions to increase quality of life, as well as economic, social, and cultural developments that engage effectively with their citizens. In this respect, cultural transformation for resilient cities via technology facilitates the adoption of sustainable practices and behavior change among city residents. This approach use the power of technology to create a culture of resilience, where individuals and communities are equipped to respond effectively to related challenges. At that point, technology has become crucial to use for promoting cultural transformation in resilient cities in many ways, such as improving smart infrastructure with the help of technological tools, etc.

The importance of cultural preservation is undeniable for resilience planning to increase the value of the cultural heritage within the city. By protecting cultural diversity in a city plan, it is possible to improve a sense of belonging among its residents. Technology helps to develop and implement resilience plans that are customized to the unique needs of each city. In this case, a resilient city plan should promote social cohesion and interactions among different cultural groups through the creation of attractive public spaces, as well as community events for all.

Resilient city planning should also consider the existing and potential vulnerabilities of different cultural groups, which have their own unique socio-cultural practices and emergency management strategies to be inclusive and culturally sensitive. This may involve targeted communication and community engagement to ensure that all residents can access their needs equally and in a better way. Inclusive decision-making, where a resilient city plan should involve the participation of diverse cultural communities by ensuring that people from various groups can join in decision-making processes to reflect their needs and expectations is also crucial. In this regard, cultural diversity plays a crucial role in the development of a resilient city plan in several ways. Thus, as stated in the proposed model, by involving residents, urban dwellers, and other related actors in decision-making processes with the help of technology, cities can boost cultural sustainability and improvement.

It is obvious that encouraging social connections and improving networks via technology can also help raise awareness among city residents about the importance of resilience and sustainability. To do that, collaborative platforms must be created to help facilitate knowledge sharing and collaboration among related actors. These platforms must be used to share best practices and promote community engagement to encourage cultural development in resilient cities.

In order to create smart and resilient cities, economic empowerment will also drive cultural diversity and resilience. By supporting economic initiatives within diverse communities, a city plan can help improve knowledge transfer and the possible resources it offers. This can not only create a more inclusive economy but also enhance the resilience of the city.

Consequently, cultural diversity should be seen as a valuable asset in developing resilient city plans. In this regard, the use of technological tools and digitalization can play a critical role in promoting cultural transformation in resilient cities. By embracing differences, cities can harness the collective strengths of their diverse populations by fostering social cohesion and building a more resilient future for all. By leveraging technological solutions to foster a culture of sustainability and resilience, cities can create more livable, vibrant, and resilient communities for all.

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