Bagh-e Nazar

Bagh-e Nazar, 21(132), 21-34 / Jun. 2024
DOI: 10.22034/BAGH.2024.421660.5469

Persian translation of this paper entitled:
نقش فناوری اطلاعات و ارتباطات در باززنده‌سازی محلهٔ تاریخی لاله‌زار تهران
published in this issue of journal

Original Research Article

The Role of Information and Communication Technology in Tehran's Lalehzar Historic Area

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Received: 25/10/2023 ; accepted: 15/04/2024 ; available online:21/05/2024

Abstract

Problem statement: This research seeks to understand the ways in which Information and Communication Technology (ICT) might be applied in the regeneration process of heritage areas within the cities, such as the Lalehzar neighborhood of Tehran. Considering the historical background of the selected case study and its particular location in the heart of the country's capital, the significance of the research becomes more obvious. The migration of nobles and young people from historical centers has caused more urban decay in such centers.

Research objective: The research aims to attract noble, active, creative, and young people to the historical context to revive it at a reasonable cost, in a short timeframe with modern technologies days and nights.

Research method: The research is qualitatively conducted by providing vision-action alternatives through a case study. Using the Delphi technique, the alternatives are evaluated by fifteen specialists in five groups (Urban Design, Architecture, Computer, Information, and Communication Technology, Art, and Digital Media) to select the most feasible alternative.

Conclusion: One of the findings of the research is that ICT facilitates the cultural-artistic vision in the Lalezar neighborhood and increases the possibility of implementing art festivals at the international level. The priorities of implementation are in the social-activity, cultural-historical, and physical aspects of the studied context, respectively. The selected vision-action alternative accelerates the people's participation and best presents the collective memories of the place in terms of globalization, implementation, and economics. The alternative seriously competes with the previous alternatives for such neighborhoods. Lalehzar, due to its concentration of electrical businesses, has a strong potential for ICT adoption. However, success hinges on engaging stakeholders, particularly in the local industries of tourism, music, cinema, and digital media.

Keywords: *Information and communication technology, Collaborative Urban Design Vision, Culture and art, Digital media, Tehran's Lalehzar.*

Introduction

The impact of information and communication technology (ICT) on applied sciences, including urban design, which is closely related to people's living environment, is a necessary consideration to create more efficient places for better living (Carmona, 2021). ICT can support instrumental, non-place, and participatory theories of urban design (Rezaei, 2021 a&b) and be effective in urban contexts from these perspectives. However, what is its effective efficiency in terms of these dimensions, specifically in the historical areas of Iranian cities that have suffered

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severe decay? The effects of this technology, digital networks, mobile connections, the Internet of Things, and artificial intelligence on urban design, namely the space between buildings in terms of the cityscape, city image, public space, and the environment, have been categorized by researchers in Iran and around the world (Rezaei, 2003 a, 2004 & 2005, Townsend, 2013). While the impact of ICT on urban design is acknowledged, some argue it may not be the most significant factor influencing historical areas (Guillaume, 2015). In Iran, the integration of virtual spaces with real urban spaces has been a topic of discussion for a long time, with recommendations made for studying its impact on cities (Nourian & Rezaei, 2007). However, the urgency for practical application has intensified since the COVID- 19 pandemic (Rezaei, 2022a). Recent studies have shifted towards recommending technological advancements for urban areas. Experts have emphasized that digital innovations will be crucial for every city in the future. As a result, smart cities are beginning to introduce digital innovations, which will provide solutions to the most significant and uncertain issues in urban planning (Gassmann et al., 2019). This research questions the application and role of ICT in developing visions and urban design in valuable historical areas. One of the innovations of this research is the selection of the case study strategy in the internal study of the Lalezar area in Tehran, which is dedicated to the electrical industry. Although most of the design recommendations in this area have directly or indirectly ignored or excluded this industry (Tavakoli, 2009, Hanachi et al., 2013, Azizi & Safari, 2014, Khan Mohammadi et al., 2020, Pourzargar et al., 2020), this research considers this community as a key agent of transformation and innovation in the area. Therefore, another innovation of this research, which is derived from the same research methodology strategy, is the priority given to the intelligence of the residents over artificial intelligence. Today, the quality and attractiveness of urban spaces have become one of the most important criteria for development in cities. In this context, historical and cultural areas play a key role in creating social interactions in the ICT era and generating economic growth (Azizi & Safari, 2014). Urban spaces are changing and transforming due to the development of ICT, and the emergence of virtual open spaces is on the horizon. Future studies will focus on understanding the shift towards digital space and the emergence of a hybrid of real and virtual space in developed countries (Medghalchi et al., 2022). Successful cities consider ICT a powerful, evolving, and socially transformative tool and view this technology as complementary to a comprehensive vision of fairness and justice (Green, 2020). The impact of ICT on cities varies across different locations and is influenced by the social and cultural factors of communities. Therefore, it is necessary to anticipate a suitable platform for managing and maximizing the benefits of this technology within the framework of promoting the unique social, historical, and identity characteristics of Iran and entering the global urban competition arena (Moghtaderi Isfahani, 2010). ICT is a new layer that affects all aspects of the city (Farjamtalab & Sajadzadeh, 2022). Urban investments are a fundamental component of ICT adoption, which leads to the design of cities with a better quality of life while being more sustainable and affordable. In addition to residents, governments can also achieve their goals faster and more cheaply (Harter et al., 2010). This research has goals such as attracting active and creative people to the historical-cultural area of Tehran during most hours of the day and night, increasing the population at night, recreating forgotten memories and events of the Lalezar area, and facilitating the renovation and revival of Lalezar with less cost in the shortest possible time using ICT. It also aims to preserve, maintain, and organize the activities of the existing guilds in the Lalezar area and ultimately turn the Lalezar area into a hub for

cultural, artistic, and cinematic events in Iran with the aim of globalization and cultural and economic growth. The importance of this research is further highlighted by the unique historical position of Lalezar Street, located in the heart of old Tehran (District 12). With the expansion of the city and the passage of time, Lalezar is currently one of the busiest central areas of Tehran. The change of use to electrical, electrical appliances and lighting, and warehouses of these guilds has damaged the original historical fabric and caused the original, young, and artistic residents to leave the area, leading to a twofold social and physical decay in the Lalezar area. Therefore, it is necessary to investigate the role of ICT in improving the area.

Research Background

The main components in the various definitions that have been presented for ICT include receiving, collecting, storing, transferring, retrieving, processing, analyzing, and displaying information. The modern concept of this technology is the same as remote computer communication and, ultimately, the global Internet. It has been said that the revolution of this technology has led to the emergence of a new information society in the third millennium (Rezaei, 2005, 6). ICT has important impacts on human societies and all aspects of the urban environment. To the extent that information technology is considered one of the urban infrastructures (Moghtaderi Isfahani, 2010, 90). The view of information technology as a tool for the growth and development of countries has given way to information technology as the axis of human development. These approaches will have a significant impact on the spatial and functional patterns of cities and will facilitate urban needs in the globalization process (Mohammadpour et al., 2017). Information technology (IT) is more than just a system of hardware and algorithms; it is also a cultural and intellectual system. Some scholars have even called it a "culture of information production" (Ashna & Borzooei, 2012). The use of ICT (Information and Communication Technology) can lead to increased participation between people, government, and urban designers, facilitate social learning, increase urban attractiveness, save costs, and make accessibility easier (Rezaei, 2021 a, Medghalchi et al., 2022, 109). Information and communication technologies (ICT) can serve as a novel and significant tool to facilitate the digitalization of each of the underlying urban processes (Farjamtalab & Sajadzadeh, 2022, 10). ICT (Information and Communication Technology) can play a role in increasing the number of historical urban places and helping people in three main dimensions, including increasing security, nightlife, and social interaction (Rezaei et al., 2022). The use of ICT (Information and Communication Technology) has been experienced in various ways, such as using GPS sensors to control snow plows in cold cities like Chicago, connecting citizen cards to free Wi-Fi networks in Spain, unlocking shared bicycles in the city, controlling books in libraries, paying fees, and controlling sewage (Townsend, 2013, 208). ICT is a management tool for creating gradual changes in urban spaces that must be guided by coherent strategies and policies towards the vision. Many variables play a role in the process of ICT impact on urban design, which leads to this coherence and, if not considered, can lead to strategies and policies with unintended negative effects (Afradi & Nourian, 2022). At the same time, new horizons with possibilities such as job creation and entrepreneurship in urban design can be expanded with the help of this technology. The exchange of information with existing methods began in the 1840s. Although the pattern and quality of urban life also changed along with the advancement of ICT, transformative changes took place in the early 1980s. In light of the expansion of electronic sciences and modern communications, many patterns and qualities of urban life began to change at an unforeseen speed, and from the early 1990s on, the practical flow for reaching intelligence in the cities of the world intensified

(Behzadfar, 1982). Previous ICT revolutions have shown that similar patterns of repetition have emerged between architecture, planning, and other areas of cultural production. The main event of the digital revolution is the displacement of a large part of our existence into the virtual realm. This change, in turn, has led to the doubling of the physical space of the city with a new type of space in which part of our social life takes place (Guillaume, 2015, 26). The digital revolution has added new concepts to human life that have had a profound impact on all aspects of human life. However, because the city is a very complex system, the importance and impact of information and communication technology vary from city to city (Moghtaderi Isfahani, 2010, 95). The combination of artificial intelligence and other digital technologies, such as big data, the Internet of Things, and telecommunications infrastructure, makes the development of smart cities possible. The increasing use of digital devices, sensors, the Internet of Things, and unprecedented growth in data production have made cities at least superficially and theoretically smart (Pellegrin et al., 2021). The Internet of Things (IoT) will become an important aspect of urban life in the future. ICT can be used to reduce urban problems and develop smart cities. Cities will experience much better impacts and changes than those that adopt conventional ICT (Hassan & Awad, 2018). Virtual space is not a substitute for real space, but rather a complement to it. ICT is not a panacea for solving urban problems, but it can be a tool for increasing the quality and flexibility of urban space (Rezaei, 2005, 23). ICT and intelligence have a common dimension and nature (Khodadadi et al., 2018). None of the new technologies are inherently good or bad, but it is the way they are used and applied that will affect the future of societies. The main issue is the introduction of the information and communication network into the complex system of the city (Moghtaderi Isfahani, 2010, 95). The smart cities of the future are not just about efficient resource management or increasing access to public services and amenities. Forward-looking smart cities should operate in a participatory manner for policy-making and decision-making, and people in these smart cities should learn how to use resources wisely (Aljoufie & Tiwari, 2017). Today, information technology as the axis of development has had extensive effects on all aspects of the individual and social lives of human beings in such a way that the way of life, work, recreation, and social interaction of human beings has changed (Mirrokni & Rezaei, 2012).

- **Some experiences of ICT application in the city**

iCT strategies in urban design have been implemented in both physical and non-physical aspects by integrating virtual spaces with real ones. The shape of the city will change when future generations of designers, planners, architects, and city users start building cities that are virtually influenced by their experience of real space (Guillaume, 2015, 29).

- **Information and digital interactions in urban spaces**

supermodern spaces focus on the integration of advanced technological products and their application with transparent materials and digital screens in the city (Rezaei, 2005, 10). In the body and facade of the city, bricks are transformed into pixels, and electronic space interacts with urban space, creating new spaces that push the boundaries of urban design (Crang, 2000, 31). For example, the facades of buildings around Times Square in New York have been replaced with moving images of advertisements and digital messages, transforming the physical space into a space full of experiences. The design of the facades of the buildings adjacent to Times Square has no relation or coherence with the functions inside these buildings, and the functions are only in service to the users and the general public inside or outside (Rezaei, 2005, 10-12). In Krzysztof Wodiczko's project "Attack on the Signs" the act of casting large-scale images onto architectural structures transforms these spaces into sites of information and memory. This intervention reveals

the inherent capacity of urban spaces to communicate beyond their original function of simply displaying information. Alternatively, supermodern buildings could be constructed using editable and non-static texts or images. The experience of expanding a public wireless network in Bryant Park, New York, not only connects the network to the existing park space but also merges the boundaries of recreational activities and work through remote connections, allowing for flexible usage (ibid.).

• Management aspects of sustainable development and urban transportation

some of the impacts of ICT on urban design include a new approach to urban management based on the creation and development of neighborhood institutions, taking into account the problems and characteristics of each location as the basis for design. Increased social participation in the city, attention to specialized urban design perspectives, and laying the foundation for quality of life criteria based on the needs of local people (Nourian & Rezaei, 2007). ICT can facilitate appropriate interaction between humans and the natural environment and solve urban design and management problems. This can be done by utilizing the 24-hour city and global communication between different institutions (Shahivandi & Mousavi Pour, 2017). By converting dead time into live time and making traffic smart, urban transportation problems can be solved. For example, the metro network in Los Angeles is equipped with a high-speed internet network so that passengers can perform remote activities. This allows people to do multiple tasks simultaneously without being physically present. The growth of urbanization, the consequences of modernity in urban life, and attention to smart city components are among the most important priorities of urban designers. Therefore, intelligence in management and solving some urban problems, such as security, is effective (Ghorbani Param & Rezaei, 2021). In recent years, there has been a growing focus on the impact of ICT on urban planning in terms of its social, economic, and cultural dimensions, as well as issues such as transportation, architecture, management, and infrastructure in Iranian cities. (Sufi et al., 2013). ICT in the city helps to connect and unite different city institutions. Increasing such communication creates unity and gives our cities richer connections and lives. Virtual cities are electronic information that is simulated by modeling urban spaces, and their service provision depends on the physical spaces of cities. For example, in the city of Amsterdam, efforts have been made to use ICT to accelerate the city's future strategies and visions, such as providing ultra-fast internet access, and, in general, digital networks and fiber optics are being integrated with the existing infrastructure networks in the city (Rezaei, 2005, 23–8).

• Historical-Tourism

The development of ICT and globalization are changing the nature and concept of cultural identity. This culture, which emerges from new relationships, is supported by information based on communication and information technologies (Ghafari et al., 2016). Design can be developed in a specific location based on its physical, functional, and perceptual characteristics. ICT can play an instrumental role in providing digital documentation for the improvement of urban heritage (Rezaei et al., 2022, 157). The phenomenon of cultural transfer supports the values of digital culture and a new concept of urban space that emerging urban designers follow during design. While cultural transfer has begun to change urban design, it seems that emerging urban spaces are replicating the specific values produced by digital culture (Guillaume, 2015, 29). For example, in downtown Los Angeles, a new tourism initiative has increased the motivation for walking in urban spaces. The computer recognizes the location of the live observer and displays information about the important points around the observer according to their route (Rezaei, 2005, 12). Historical tourism software and online performances allow the audience to access an audio file that tells the story

by being in that location and using their phone. Examples of this include the Avayar and Seyareh software. Art exhibitions, with the help of ICT, are a place for entrepreneurs, technology experts, and artists to gather. This leads to an increase in electronic knowledge and its integration with the art and culture of society, improving the city conditions for the creative class of society and attracting them to creative and innovative activities. An example of this is the digital art gallery using digital screens in Dubai. In addition, with the use of digital arts, urban spaces will be transformed into recreational places. For example, Rafael Anadol's work in translating Antoni Gaudi's thoughts during the design process on the facade of the Casa Batllo building (Crespo, 2023). Table 1 and Fig. 1 provide an overview of the reviewed experiences of ICT implementation in urban design in relation to placemaking components.

Research Method

The main method in this research is qualitative and uses future research techniques through scenario planning, simulation, and guided Delphi. The initial scenarios of this research were selected based on participatory futures research and six probable scenarios resulting from the university's continuous participation with the community in the central historical texture of Tehran. These scenarios are "Tourism-Historical," "Employment," "Cultural-Artistic," "Transportation," "Sustainable Development," and "Social Housing." Accordingly, the case study strategy focused on the Lalezar neighborhood among the neighborhoods of the historical texture of Tehran (Mohseni & Rezaei, 2023; Rezaei, 2021 & 2023 a). Three tools were used to collect data. The first was document analysis, which involved searching libraries and electronic resources (including books, articles, master plans, and similar reports) to gather theoretical foundations and case study information. The second was field observation and data collection from Lalezar Street, including interviews with residents, citizens, shopkeepers, and old cinemagoers of Lalezar, as well as participation in meetings, associations, and related gatherings. The third tool was the Delphi technique, which involved collecting the opinions of a group of experts or specialists in multiple rounds using relevant questionnaires until the group reached a consensus or agreement.

Table 1. Sample of Key Features of ICT Application Experiences in Urban Design in Physical, Social-Activity, and Cultural-Historical Dimensions. Source: Authors.

Components	Key Features of ICT Application Experiences in Urban Design
Physical (natural-artificial)	- Forms emerging from algorithms and computer programs. - Dynamic facades and walls generating supermodern spaces (non-place, immaterial, global, multi-meaningful, and full of new experiences). - Supermodern buildings skin with editable and non-fixed text or images - Development of the 24-hour city based on the principles of a sustainable city - Installation of digital walls around squares and key points of the city - Revitalization of urban spaces - Mediated Spaces - Tele Working - City-Level New Media - Environmental analysis and site selection with a focus on sustainable development
Social-Activity	- Artistic initiatives (such as "Attack on the Signs") for public engagement with the environment. - Smartening traffic by smartening public transportation systems - Ability to perform multiple activities simultaneously without being physically present. - Online tourism - Creation of virtual cities - Possibility of connecting to wireless internet and digital equipment anywhere in the city - Urban Televillage - Communication corridors
Cultural-Historical	- Use of display interfaces to access cultural-historical events - Design based on cultural transfer - Design of historical software and online performances - Holding art exhibitions - Converting urban spaces into attractive recreational spaces - Adventure Tourism - Information Districts

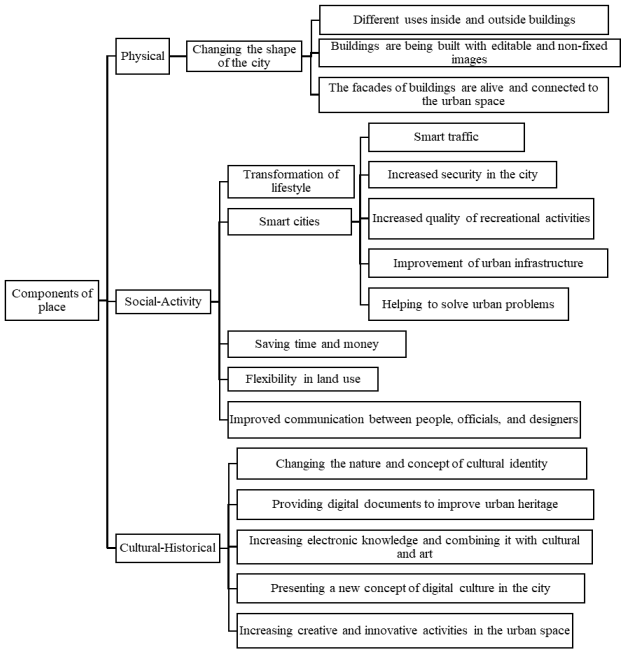

Fig. 1. Categorization of the Impacts of ICT Application in the City by Location Components. Source: Authors.

This method was chosen because Delphi is a future research technique that can be used for exploration, testing, and evaluation. The characteristic of this method is its iterative and evaluative nature, which encourages respondents to reconsider their initial opinions and those of others. In this way, opinions are refined and improved throughout the process. In addition to the research objective of exploring, testing, and evaluating the effects, another reason for choosing this method was that it is process-oriented and allows for the free exploration of diverse options or alternatives without setting a single criterion or predetermined law (Rezaei & Irani Molkkian, 2020). Interviews were conducted with fifteen experts in five groups: urban design, architecture, computer science, ICT, and art and digital media who were knowledgeable about Lalezar or ICT. The details of the interviews are summarized in Table 2.

After three rounds of analysis of opinions and the selection of feasible scenarios and alternatives, the opinions finally reached a consensus with an agreement of 78.9%. The criteria for selecting, judging, and ranking alternatives were based on the opinions of experts, with an emphasis on feasibility (socio-economic criteria such as budgeting, cost, return on investment or benefit, feasibility, and timing). The results regarding quality and success were flexible, relative, and not absolute, with an interpretation consistent with the research documentation. Therefore, the research result is only one of several subjective-collective perspectives that can be envisioned with consensus.

A Case Study of Lalezar Street in Tehran

Events are virtual realities that are embedded in physical, social, and historical contexts. They can be ephemeral, lasting for only a short period, or they can be more permanent, leaving a lasting legacy in the places where they occur. Bagh Lalezar was a beautiful Persian garden located outside the city walls of Tehran during the Qajar period. It was the closest royal garden to the city and has witnessed events and local industries such as tourism and gardening, music, modern clothing, Iranian cinema and theater, and finally the electrical equipment trade. and was a popular destination for festivities and celebrations. On Nowruz (the Persian New Year) and the last Wednesdays of the year, the garden was used as a place for joy and happiness, private parties, and the temporary residence of foreign dignitaries (Habibi & Ahari, 2008). Due to the increase in population and the expansion of the city limits by order of Naser al-Din Shah, Lalezar Park became part of the city and took on a European atmosphere. With the expansion of the city and the construction of infrastructure on the outskirts of the city, the function of Lalezar Park became recreational. A zoo was built in the eastern part of the park, and the western part took on an atmosphere reminiscent of European streets, especially the Champs-Élysées, and new facilities were built there (p. 8). “Lalezae e No” to “Jomhuri e Eslami” is a new section of the street that was added by Reza Shah Pahlavi during his reign. At its peak, Lalezar was a commercial thoroughfare that offered the most attractive

Table 2. Characteristics of Participants. Source: Authors.

Group	Position	No. of Participants	Specialization and Field of Activity	Years of Experience
Urban Design	Faculty Member (Professor, Associate Professor, Assistant Professor)	3	Postdoctoral Fellow in Architecture and Urban Planning - Researcher, Architect, and Urban Designer at the International Level	Over 25 Years
			PhD in Architecture and Urban Planning - Urban Designer, Architect	Over 10 Years
			PhD in Urban Planning and Architecture - Urban Designer and Architect	Over 15 Years
Architecture	Consulting Engineers	1	Master of Architecture	10 Years
	Faculty Member	1	PhD in Architecture - Architect and Researcher	Over 20 Years
	Designer and Researcher	1	Technological Designs	10 Years
Computer Science	Programmer and Researcher	1	Master of Science in Computer Engineering	10 Years
	Chairman of the Board of Directors of a Knowledge-Based Company in the Field of Computer Systems	1	Master of Science in Mechanical Engineering - Active in the Knowledge-Based Field and Winner of the Khwarizmi Prize	Over 30 Years
	Programmer and Active in New Computer Fields	1	Master of Science in Computer Engineering (Software) and Active in the Field of Artificial Intelligence	Over 10 Years
ICT	CEO of a Knowledge-Based Company in the Field of Optical Cables and Wires	1	PhD in Electrical Engineering and Active in the Field of ICT and Active in Lalezar Street	Over 20 Years
	Active in a Knowledge-Based Company in the Field of ICT	1	Master of Science in Electrical Engineering	Over 20 Years
	Active in the Field of ICT	1	PhD in Architecture	Over 10 Years
Art and Digital Media	Painter and Gallery Owner	1	Master of Science in Graphic Design	Over 20 Years
	Designer and Graphic Artist	1	Bachelor of Arts in Graphic Design and Modern Art and Cardiography	Over 10 Years
	Active in the Field of Digital Media	1	Master of Arts in Acting	Over 10 Years

foreign goods, entertainment, and culture to its modernist customers. This represented an innovation in Iranian social and urban culture. During the Pahlavi II era, Lalezar Street remained a center of residence and traffic for the wealthy in Tehran. The street was home to several luxury stores, cafes, and restaurants, as well as several theaters and cinemas. Lalezar was also a popular destination for political and social gatherings. The entire Lalezar Street was, as in the past, full of various shops and arcades offering new products, and cinemas and theaters, confectioneries, flower shops, music schools, cafes, and bars had made the cultural and commercial development of Lalezar Street prosperous. In the 1960s, new attractions emerged in other parts of Tehran. Gradually, the cultural and recreational values of Lalezar Street diminished. The development of Tehran and the increase in population after the 1970s, along with the tendency of cinemas and theaters in Lalezar Street to show non-artistic performances, quickly reduced the cultural and artistic prosperity of this street. With the concentration of electrical goods sellers from the south of Lalezar and the change of use of most of the shops in this alley to electrical goods stores, Berlin Alley and Mehran Alley became the centers of production of tricot and knitwear, and the structural system of Lalezar Street changed. After the Islamic Revolution, this process accelerated in Lalezar Street, and it was gradually removed from the center of attention (Pourzargar et al., 2020). For Lalezar Street, which is a historical, recreational, commercial, cultural, artistic, and political street, various and continuous strategies have been presented during different periods, some of which are shown in Tables 3 and 4, classified by their impact on physical, social activity, and cultural-historical aspects.

This research was conducted based on field studies

Table 3. General analysis of physical, social-activity, and cultural-historical components of the Lalezar area over time. Source: Authors.

Period	Type of Components		
	Physical Components	Social-Activity Components	Cultural-Historical Components
Safavid to Qajar (Garden and Tourism Industry)	- Construction of the garden closest to the Naserian Wall - Place of recreation for the Shah and the country's dignitaries - Holding of ritual celebrations on special days of the year - Residence of foreign representatives - Temporary residence of Qa'im Maqam - Holding of wedding and funeral ceremonies of princes - Holding of the Sizdah Bedar and Chaharshanbeh Suri celebrations	- Proximity to the royal court - Patronage of the arts and culture - Center of social and political activity - Important religious site - Symbol of Persian identity	- Royal gardens - Historical monuments - Religious sites - Cultural institutions - Traditional arts and crafts - Persian language and literature
Qajar to Pahlavi (Arts and Cultural Industries)	- Construction of the street and paving it with stone - Planting trees on both sides of the street - Running water	- Construction of recreational facilities, including a zoo in the eastern part - Construction of arcades and the first cafe and restaurant - Offering new products - Construction of cinemas and theaters - Expansion of the apparel industry (tailoring)	- Taking on a European atmosphere - Establishment of New Lalezar and construction of an entertainment and cultural arcade - Decline of cultural and artistic values and performance of low-quality shows - Residence and movement of intellectuals and wealthy people
Islamic Republic	- Formation of commercial warehouses - Demolition and decay of valuable buildings, construction of parking lots	- Formation of the electrical and chandelier district - Change of use of shops - Formation of the electrical and chandelier district - Change of use of the shops in - Berlin and Mehran Alley to the clothing district	- Exodus of young and original people - Neglect of memories and historical background - Demolition and decay of historical buildings

Table 4. Analysis of Sample Strategies Presented in the Past for Improving Urban Design in the Lalezar District of Tehran, Classified by Component. Source: Authors.

Components	Emphasized Components
Physical (natural-artificial)	- Improvement of the quality of urban furniture, green spaces, pedestrian paths, access to public transportation, and related services (Tavakoli, 2009) - Reconstruction of the physical fabric, including the repair and removal of undesirable physical features (Khan Mohammadi et al., 2020) - Restoration of the facades of valuable buildings (Tavakoli, 2009, 77) - Increasing pedestrianization to eliminate car traffic within the blocks adjacent to Lalezar and Arg streets instead of Lalezar and Ferdowsi axes, pedestrianization zoning at intersections, squares, and historical areas blocks (Rezaei, 2022 b)
Social-Activity	- Improvement of the civil life and social status of the residents of the Lalezar district (Khan Mohammadi et al., 2020, 14) - Forecasting tourist destinations (ibid.) - Forecasting low-cost workspaces, studios, cafes, and street markets (ibid., 15) - Attracting private investors and film companies (ibid.)
Cultural-Historical	- Use of cultural products in the revival of Lalezar in line with current needs (Azizi & Safari, 2014) - Strengthening the sense of belonging and the memorable and urban memory index (Khan Mohammadi et al., 2020, 15) - Preservation and maintenance of historical elements and architectural heritage of the neighborhood with a technology-based approach (Hanachi et al., 2013) - Creation of pedestrian paths and spaces for cultural and artistic events and festivals (Khan Mohammadi et al., 2020, 15)

and participatory methods. In three rounds, using the Delphi technique, 15 experts in five groups (with a consensus of 78.9%) selected and prioritized feasible alternatives. Based on this consensus, it can be said that the "cultural-artistic", "employment," and "historical tourism" scenarios have the highest priority for implementation. The emphasis was placed on the feasibility of the scenarios, considering social, economic, and cultural aspects using criteria such as cost-benefit, feasibility, and scheduling. Consequently, the priority of feasible strategies is organized as follows:

• Socio-activity strategies in the urban space of lalezar

iCT, with the greatest participation of current residents and future stakeholders emerging from the history of the place, can increase the feasibility of those design options that deal with the maintenance or organization of existing activities. In the Lalezar neighborhood of Tehran, considering the concentration of the electrical industry in the current situation on the one hand and the possibility of the participation of artists in the fields of apparel industry, music, cinema, and theater related to

the location-events of the area on the other hand, the most likely option in the future is to guide the industries towards ICT while strengthening such industries. Therefore, ICT can play a role in the desirable future of these neighborhoods with a focus on knowledge-based companies and a "cultural-artistic" and "employment-generating" vision. In line with such a vision, this technology can lead to the following axis of organizational operations: Establishment of knowledge-based companies with the investment of institutions affiliated with the affairs of the site location (for example, in the case of Lalezar, the field of art, cinema, theater, music and apparel) as well as computer, telecommunications, and online affairs. Providing digital pages to creative artists in these fields. Providing free internet access to the public for presence and liveliness.

• Cultural-historical strategies in the urban space of lalezar

iCT can represent the events and memories of the place that are potentially and virtually present in the space for the current, old, and future generations with less cost in a shorter period compared to physical implementation. For example, the memories of Lalezar can be provided by maintaining, renovating, and reviving historical buildings, cinemas, and theaters, and by displaying national and religious culture, art, and ceremonies at certain times of the day, especially at night and on special days of the year. Some of the selected operations include designing lighting in combination with music, as well as planning and implementing cultural, artistic, and tourism programs specific to the night, and holding art festivals, including the Fajr International Festival, in the cinemas and theaters of the Lalezar area and expanding it to the supra-regional level.

• Physical strategies in the urban space of lalezar

in the urban design of the Lalezar area, with the help of ICT, the above cases will cause physical changes in the location to be reflected. For example, the design and installation of digital, three-dimensional pages using artificial intelligence, according to the application, advertising, revival of culture and art, lighting and design of daily and night shows, smart artistic, historical, and advertising walls in the studied points, and placing places for sharing information are among these cases. Also, strengthening the infrastructure of the pedestrian and bicycle path, and spotlighting with artificial intelligence the memorable architectural elements and signs of the Lalezar area, especially at night, are among the physical reflections in the place.

The strategies considered for the urban design of the Lalezar area of Tehran using ICT are presented in Table 5 based on the priority of realization in terms of social activity, cultural-historical, and physical components.

Table 5. Some implementation strategies of ICT urban design in the probable cultural-artistic, employment, and tourism visions of Lalezar. Source: Authors.

Components	Strategies Considered for the Lalezar District of Tehran Using ICT
Social-Activity	- Establishing knowledge-based companies with investment from local capacities and social capital: a focus on iranian clothing, performing arts (cinema and theater), and digital media - Maintenance and organization of the existing electrical trade activity in the Lalezar district - Harnessing Social Capital and Fostering Collaboration among Lalezar Merchants, Residents, and Artists - Providing digital screens to individuals to support the activities of young artists and generate income for shopkeepers and residents at certain times of the day and night - Implementation of programs, especially at night, to increase round-the-clock activity - Providing free internet access to the public
Cultural-Historical	- Virtual revival of events and memories of the place (with less cost and time compared to physical changes) - Revival and display of national and religious arts and rituals - Implementation of various artistic and tourism programs, especially at night, for the general public and to increase night activity - Holding national and international artistic and cultural festivals
Physical	- Revival of the area as a symbol of civilization and a place for innovative ideas of creative and young people - Design of smart artistic, historical, and advertising walls in key points of the Lalezar area - Placing digital ID cards next to historical buildings in the Lalezar area - Designing a pedestrian and bicycle path, infrastructure for musical ideas (musical) - Lighting using artificial intelligence on memorable architectural elements and symbols of the Lalezar area at night

Conclusion

Information and Communications Technology (ICT) can play a supportive role in urban design from an instrumental, placeless, and participatory perspective. It strengthens the cultural and artistic vision of neighborhoods, especially in historical areas. The historical core of Tehran, located within the boundaries of the Naserian Wall, has the potential to use citizen participation through ICT to improve production and employment. For instance, Tehran's Lalehzar district, because of its unique capabilities and existing social capital in industries such as tourism, apparel, music, cinema, and digital media, is well-suited to adopt this technology. This technology, in turn, has the potential to expand these capabilities from the local to the transnational level. Therefore, when ICT increases people's participation and facilitates and accelerates non-physical memories and revivals, alongside globalization, it will be a serious competitor and complement to the previous alternatives for the neighborhood in terms of implementation and economy. In other words, although Lalezar has a good ability to accept ICT due to the concentration of the electrical industry, this research has identified the focus on human interactions as a superior factor to the instrumental factor of ICT. In other words, social capital and the intelligence of the residents of each place are superior to what ICT and related concepts such as artificial intelligence are. ICT has made significant progress in various fields in recent decades and has become intertwined with urban life. Over time, with the advancement of ICT and its combination with innovative technologies, artificial intelligence, and the Internet of Things, it has peaked and turned into an amazing tool to help improve performance in the field of urban design. ICT has a facilitating role in drafting neighborhood participation visions and, due to its cross-border nature, enables the holding of international events. However, the priority of development with the help of ICT is in the social-activity, cultural-historical, and then physical aspects of the area. ICT can be effective when it increases participation and facilitates and accelerates memories and physical revivals. Then, this participation, due to its virtual capabilities, can be a serious competitor and complement other alternatives in terms of globalization, implementation, and economy. This research introduces a new innovation by demonstrating the successful implementation of ICT in adapting to human interactions. Additionally, it highlights the effectiveness of social capital in the process and emphasizes the importance of adapting to the neighborhood's sense of solidarity. Various design proposals and visions in these areas, such as the Lalezar area of Tehran, can be realized with ICT while strengthening Iran's software and electronic knowledge. The priority of realization of urban design vision-operations in the old area can be prioritized in several aspects in terms of the impact of application: One of the important priorities is to pay attention to non-physical aspects, including social activity and cultural-historical dimensions. In this priority, activities such as establishing knowledge-based and employment-generating companies in the central area and also using the virtual space equivalent to the real space of the area for optimal urban management are emphasized. In terms of the physical aspect, in such areas, suggestions such as simulating valuable historical spaces in the real area can be made. The main purpose of using ICT in historical neighborhoods such as the Lalezar area of Tehran should be to attract creative, dynamic, original, and young people at most hours of the day and night to lead to the development of the place, city, and country. This technology, due to its virtual capability, can facilitate the physical revival of valuable urban complexes with less cost than other direct and physical interventions in the shortest possible time. So with its help, a few effective physical

changes can be made. ICT can reveal and evoke events and memories hidden in places for old and new generations. In the Lalezar neighborhood of Tehran, the selected option is in line with the vision of the hub of cultural and artistic festivals in Iran with the aim of globalization and economic leap while maintaining and organizing existing activities- even the electrical industry- which can lead to more participation of people, businesses, and artists. Ultimately, ICT can bring significant employment and income generation for the founders, municipalities, and businesses, and in terms of globalization, implementation, and economy, it is a serious competitor and complement to the previous alternatives for the Lalezar area.

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HOW TO CITE THIS ARTICLE

Rezaei, M., & Nasiri, M. (2024). The Role of Information and Communication Technology in Tehran's Lalehzar Historic Area. *Bagh-e Nazar*, 21(132), 21-34.

DOI: 10.22034/BAGH.2024.421660.5469
URL: https://www.bagh-sj.com/article_194786.html