Mady Mohamed
Asmaa Ibrahim
Mohamed Fekry *Editors*

Cities of the Future

Challenges and Opportunities

Springer

Cities of the Future

Mady Mohamed · Asmaa Ibrahim ·
Mohamed Fekry
Editors

Cities of the Future

Challenges and Opportunities

Springer

Editors
Mady Mohamed
Effat University
Jeddah, Saudi Arabia

Asmaa Ibrahim
Effat University
Jeddah, Saudi Arabia

Mohamed Fekry
Effat University
Jeddah, Saudi Arabia

ISBN 978-3-031-15459-1 ISBN 978-3-031-15460-7 (eBook)
https://doi.org/10.1007/978-3-031-15460-7

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Conference Organization

Conference Series: The 6th Annual Memaryat International Conference, MIC 2022
Title of the Conference: Cities of the Future: Challenges and Opportunities

Conference Chair

Prof. Asmaa Ibrahim, Dean of Effat College of Architecture and Design, Effat University, Jeddah, Saudi Arabia
Prof. Mohamed Fekry, Department of Architecture, Effat University, Jeddah, Saudi Arabia

Steering Committee

Chair of the Steering Committee

Dr. Haifa Jamal Al-Lail, President, Effat University, Jeddah, Saudi Arabia

Members of the Steering Committee

Dr. Mervat Chuman, Provost of the Effat University, Jeddah, Saudi Arabia
Prof. Mady Mohamed, Dean of Graduate Studies and Scientific Research, Effat University, Jeddah, Saudi Arabia
Prof. Asmaa Ibrahim, Dean of Effat College of Architecture and Design, Effat University, Jeddah, Saudi Arabia

Conference and Exhibition Manager

Prof. Asmaa Ibrahim, Dean of Effat College of Architecture and Design, Effat University, Jeddah, Saudi Arabia

Scientific Committee

Chair

Prof. Mady Mohamed, Dean of Graduate Studies and Scientific Research, Effat University, Jeddah, Saudi Arabia

Members

Prof. Abeer Sami, Department of Architecture, Effat University, Jeddah, Saudi Arabia
Dr. Haitham Hussein, Department of Architecture, Effat University, Jeddah, Saudi Arabia

Organizing Committee

Chair

Arch. Maya Kamareddine, Department of Architecture, Effat University, Jeddah, Saudi Arabia

Members

Dr. Haitham Hussein, Department of Architecture, Effat University, Jeddah, Saudi Arabia
Dr. Ahmad Refaat, Department of Architecture, Effat University, Jeddah, Saudi Arabia

International Scientific Committee

Dr. Abeer Sami, Professor, Effat University, Jeddah, Saudi Arabia
Dr. Ahmed Rashed, Professor, BUE, Al Shrroq, Egypt
Dr. Ahmed Refaat, Associate Professor, Effat University, Jeddah, Saudi Arabia
Dr. Ahmed Shehata, Professor, Umm Al-Qura University, Mecca, Saudi Arabia
Dr. Ali A. Alraouf, Professor, Qatar Foundation, Qatar
Dr. Asmaa Ibrahim, Professor, Effat University, Jeddah, Saudi Arabia
Dr. Emad El-Sherbiny, Professor, Cairo University, Cairo, Egypt

Dr. Haitham Hussein, Associate Professor, Effat University, Jeddah, Saudi Arabia
Dr. Heba Hassan, Associate Professor, Ban Suef University, Egypt
Dr. Hussam Al Waer, Dundee University, UK
Dr. Khaled Nabil, Professor, Zagazig University, Egypt
Dr. Mady A. A. Mohamed, Professor, Effat University, Jeddah, Saudi Arabia
Dr. Mohamad Kashef, Professor, Effat University, Jeddah, Saudi Arabia
Dr. Tarek Saad Ragab, Professor, Effat University, Jeddah, Saudi Arabia
Dr. Yasmin Abdalla, Associate Professor, Rithu for Heritage Conservation Consultancy
Dr. Yasmin Sabry, Associate Professor, Zagazig University, Egypt

كلية عفت للعمارة والتصميم
Effat College of Architecture and Design

Preface

Cities are where ideas form, where innovation glows, and where economic growth largely flourishes. They are where most people live and where significant risks can emerge as well as where challenges can be magnified. In the age of urban digitization, new and complex issues are emerging, and today's cities are likely on the cusp of the largest global social and economic transformation. Facing the pressing challenges of the unprecedented rates of urban expansions, it becomes inevitable to adopt a shared responsibility to create healthier, more accessible, and intelligent cities to better use human resources, promote needs and capacities, and advance a decent quality of life.

Considering the fact that the Kingdom of Saudi Arabia is currently witnessing rapid growing urbanization due to demographic, social, and economic growth in the country that increased the number of cities. In addition to the current implementation of the Future Saudi Cities Program in line with the 2030 Saudi Arabia's Vision and the National Transformation Program, the 6th Annual Memaryat International Conference (MIC 2022) seeks to address the key challenges and opportunities of "future cities" to embrace novel approaches and grounded technologies in pursuing a vision for smart, inclusive cities.

This volume contains papers presented at the 6th Annual Memaryat International Conference (MIC 2022). While the key objective of MIC is to build bridges between science, technology, and innovation, the 2022 MIC focused on cities of the future, whereby cities appear to be in a state of continuous expansion; their population growth has historically occurred in cycles. Innovations have generally addressed the challenges posed by rising populations, only to be replaced by new hurdles.

The thrust of the discussion in the proceedings is formed by multiple areas addressing challenges and opportunities of the future cities at the local, national, and international levels and how these challenges can hinder the development objectives planned to be achieved by the cities of the future. Accordingly, the papers included in this volume revolve around three parts:

The first part discusses the future of the Saudi cities and addresses different aspects and dimensions of the future cities at the local, national, and international levels. The papers also tackled critical challenges facing the current cities and how these challenges can hinder the development objective planned to be achieved by the cities

of the future. The focus of the papers varied from managing a handling food in cities of tomorrow, cities and tourism, intelligent cities of the future, problems of efficient exploitation of land in cities, and maintaining a city's identity in the cities of the future.

The second part revolves around smart, inclusive, and livable cities. Few papers tackled the role the social dimension can play in future cities. Future cities are not only places where smart technologies, advanced communication, and creativity meet but also cities that facilitate spaces and venues which can contribute to the residents' quality of life and social cohesion. Investigating the social dimension in future cities was the core of many presentations. Sense of community, safety, physical health and well-being, and economic activities are all aspects that proved to be significant to the planning and design of our future cities. Future cities are also characterized by workforce development, which helps bridge skill mismatches and gaps between the job opportunities and local workers, linking the domestic workforce and the economic development with high-impact and well-suited workforce training and development services.

The third part discusses environmental issues and smart solutions for future cities recognizing the benefits of a green approach to urban planning and design and the potential to lower urban temperatures, mitigate air pollution, and build natural environmental resilience. Sustainability experts predict carbon-neutral cities full of electric vehicles and bike-sharing schemes, with improved air quality.

The editors hope that the selected papers for this volume will lead to a better understanding of the challenges and opportunities of future cities. Viewed in this way, this volume is intended to promote research in the domains of architecture, urban design, and urban planning.

Sincerely,
The Editors
Mady Mohamed
Mohamed Fekry
Asmaa Ibrahim

Jeddah, Saudi Arabia

Acknowledgements

This book serves as the proceedings for Memaryat International Conference (MIC 6) which has brought the Effat family together to work collaboratively. Through the two days of the conference, Effat hosted rich academic and professional contributions from about 750 participants from 16 different countries, not counting the in-person visits.

The editors wish to deeply thank all authors for their participation in the conference. We had very scientific inputs from USA, UK, Saudi Arabia, and Egypt. Last but not least, we would like to express our sincere appreciation for the continuous support and insightful guidance from our President, Dr. Haifa Jamal Al-Lail. Our gratitude is extended to Effat University provost, Dr. Mervat, who has been following up with all the details. We would like to deeply thank members of the scientific committee and organizing committee, Dr. Abeer Samy, Dr. Tarek Saad Ragab, Dr. M. Kashef, Dr. Haitham Samir, Dr. Ahmed Refaat, and Mrs. Maya Kamareddine.

Contents

Introduction

Mady Mohamed, Mohamed Fekry, and Asmaa Ibrahim

Abstract Cities are where ideas form, where innovation glows, and where economic growth largely stems. They are where most people live and are also where significant risks can emerge as well as where challenges can be magnified. At the age of urban digitization, new and complex issues are emerging, and today's cities are likely on the cusp of the largest global social and economic transformation to date. Facing the compelling challenges of the unprecedented rates of urban expansions, it becomes inevitable to adopt a shared responsibility to create healthier, more accessible, and intelligent cities to better use human resources, promote needs, capacities, and advance a decent quality of life. This chapter serves as an introduction for the book's structure and content, and hence should serve as useful guide for exploring the key manifestation of "future cities" to embrace novel approaches and grounded technologies in the pursue of a vision for smart inclusive cities.

Keywords Future of Saudi cities · Smart inclusive and livable cities · Smart environmental solutions

1 Introduction

Innovation, ideas and economic growth mainly stem from cities. Cities are where most people live and also where more potentially significant risks can arise as well as challenges can be magnified. Modern cities are perhaps on the verge of the biggest worldwide social and economic transformation to date as a result of the new and complicated difficulties that are arising in the age of urban digitization. In order to make better use of human resources, promote needs and capacities, and advance a

M. Mohamed (✉) · M. Fekry · A. Ibrahim
College of Architecture and Design, Effat University, Jeddah, Saudi Arabia
e-mail: momohamed@effatuniversity.edu.sa

M. Fekry
e-mail: mfekry@effatuniversity.edu.sa

A. Ibrahim
e-mail: asibrahim@effatuniversity.edu.sa

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_1

reasonable quality of life, it is imperative that we all take responsibility for building cities that are healthier, more accessible, and intelligent. The chapters included in this book, were presented at the 6th Annual Memaryat International Conference "MIC 2022" titled "CITIES OF THE FUTURE: CHALLENGES AND OPPORTUNITIES", and held in Jeddah, Saudi Arabia, on February 9–10, 2022, contribute to raise the awareness about this shared responsibility.

Seven years ago, the idea of organizing an international conference of Architecture and Urban Design was emerged by the members of Effat College of Architecture and Design. This idea was an inspiration of the Saudi vision of 2030 that asserted the goal of "Vibrant society" and coincided with the release of the UN "Zero draft" report for the New Urban Agenda in May 2016. The Zero draft report stated, "In all of our actions, we need to be mindful of the impact on our planet." The agenda included a set of Sustainable Development Goals (SDGs) that intended to serve as a guideline, for urban development for the next twenty years. The official mission of SDG 11 is to "Make cities inclusive, safe, resilient and sustainable." To turn this idea into reality, determination and seriousness marked all the efforts of the college members.

The First Memaryat International Conference MIC was organized in 2017, adopting the theme of "Future Challenges in Architecture and Urbanism," which had direct relation to the Saudi Vision and to the UN Urban Agenda. Thus, the first conference was a challenging and fruitful experience, through which our faculty engaged in dynamic debates concerning multiple research problems, and current trends of architecture and urban design. We continued this rich scientific path to present other related themes including "Architecture and Urban Resiliency," in 2018 and "Architecture and Urban Safety and Well-being" in 2019. In MIC 5, 2021, the theme was about Masjid Architecture: Form and Meaning, as a valorization of the UNESCO thematic indicators to measure the progress of culture's enabling contribution to the national and local implementation of the goals of the NUA for sustainable development.

In MIC 6, and at the age of urban digitization, the conference addressed new and complex issues that are emerging in cities. From this view, this publication including selected papers from the Memaryat Conference that presents experiences and visions for the future of cities.

2 The Structure of the Book

In response to the initial call for paper, many submissions were received. Of these, based on academic merit and topicality, more than 20 papers were selected to be presented at MIC 2022. Following an arduous review process, 15 conference papers have been included in these MIC 2022 proceedings. These papers have been divided

into three parts. Part I (Chapter "Understanding the Role of Innovative Policies and Strategies on the Knowledge, Attitude and Practice (KAP) Among Food Handlers Impacted During Pandemic of Covid-19", Chapter "Rijal Almaa and Local Tourism in Saudi Arabia", Chapter "The Future of the City: Towards Establishing Intelligent Cities", Chapter "Strategic Development Plan Proposed for the Future City NEOM", Chapter "A Framework to Develop Neglected Open Space: The Case of Jeddah City (A Critical Review)", and Chapter "Reviving the Identity of Jeddah City Through Revitalizing the "Souq" in Al-Balad") discusses the future of the Saudi cities and addresses different aspects and dimensions of the future cities at the local, national, and international levels. Part II (Chapter "Promoting Social Interaction Through Jeddah's Neighborhood Parks Design", Chapter "Historic Significance and the Urban Ambiance of Public Open Spaces "Barahat" in Old Jeddah", Chapter "What Factors Affect Livability? A Theoretical Review", Chapter "Modeling Tactical Urbanism: A Contemporary Approach for Urban Regeneration" and Chapter "Child-Friendly Open Spaces: Towards Safety in Residential Neighborhoods") revolves around smart, inclusive, and livable cities. Part III of the book (Chapter "Role of Literature in Environmental Conservation Towards Better Future: A Critical Analysis of the Poetry of Sheikh ul-Alam", Chapter "Development Priorities of Housing Sustainability in Saudi Arabia: An Overview"; Chapter "Investigating the Effect of Urban Form on Heat Island Phenomena: Case Study of Jeddah, KSA" and Chapter "Sick Neighborhood Syndromes in Hot Dry Climate") discusses environmental issues and smart solutions for future cities recognizing the benefits of a green approach to urban planning and design and the potential to lower urban temperatures, mitigate air pollution and build natural environmental resilience. The following paragraphs offer an overview of the chapters' content.

2.1 Part I: Future of Saudi Cities

Chapter "Understanding the Role of Innovative Policies and Strategies on the Knowledge, Attitude and Practice (KAP) Among Food Handlers Impacted During Pandemic of Covid-19", by Nor Raihana Asmar Mohd Noor, Liziana Kamarul Zaman, Norhayati Yaacob, and Muhammad Syafiq Hassan explores the impacts of the pandemic on cities to highlight innovative policies and strategies on the practice of Knowledge, Attitude and Practice (KAP) among food handlers before and after pandemic. Despite having no evidence showing that infected people could spread the virus through the food they prepared, there is a theoretical risk that sneezing on food and direct touch on the food could transmit the virus. This current perspective outlines level of awareness on KAP among food handlers especially with the increasing trend of food business during COVID-19. For this study, questionnaire surveys were distributed to gain feedback on the food handling regulation's awareness among food handlers in Malaysia. Based on the results, it can be reassured that knowledge of food handlers does make a difference during food handling regulations. However, the results showed that the attitude and practice of food handlers during

COVID-19 doesn't necessary reflect their attitude and practice before the pandemic. This study is to contribute to the enrichment of knowledge on the adoption of KAP model among them, thus increase the level of awareness on the food hygiene before and during food handling and regulation especially increasing trend of food business during COVID-19. It is vital to ensure that the regulations are effective in addressing the desired public health conservation; thus, will provide higher returns to the government to take transformative action towards creating cities that are most just, resilient and sustainable.

Chapter "Rijal Almaa and Local Tourism in Saudi Arabia", by Nawal Hoque, Ahad Hannawi and Asmaa Ibrahim, discusses one of the Saudi Vision 2030 aims which is to develop Saudi historical and heritage sites to attract more tourism. Rijal Alma heritage village in Asir is preparing to be a UNESCO World Heritage site, but due to the lack of enough media coverage many people misunderstand the image of Saudi Arabia in terms of tourism. The aim of this research is to highlight the importance of Rijal Alma village in Asir as a factor that can affect the tourism in Saudi Arabia while keeping the community benefit in focus. A common misunderstanding which this research aims to break away from is that Saudi Arabia is not just a desert county, it has a wide array of climatic conditions which resulted in different kinds of local vernacular architecture in response to the climatic conditions. Rijal Alma is one of the many good examples of this kind of architecture. Tourism will increase jobs for example tour related jobs, investment companies investing in the kingdom and help the foster the economy and maximize the community integration within all development plans. This research will deploy a triangulated methodology using qualitative and quantitative data collection tools and analysis, including surveys, questionnaires and semi-structured interviews. The research would end up with deducing guidelines for fostering the local and international tourism in the area while keeping the community benefit and integration in focus. To sum up, this research will contribute to the 2030 vision of the Kingdom by focusing on the value of historical sites in Saudi Arabia. To align with the goals of the Saudi Ministry of Tourism who are currently working on the revitalization of the historical structures all over Saudi Arabia.

In Chapter "The Future of the City: Towards Establishing Intelligent Cities", Walaa Mohamed Metwally and Vitta Abdel Rehim Ibrahim imposes the questions about the lack of information on how to start smart city project and secure each point along the way, as they argue the Smart cities are in risk if there is limited understanding in the implementation phase, therefore its systems will become vulnerable in the future. The research aims to study smart cities prospects and how technology is resolving confronts for better anticipate the future to make cites inclusive, secure, resilient and sustainable. To achieve these goals the research will depend on the analytical application methodology, and it will focus on the characteristics of smart cities, and the ways to find relationship between people who are familiar with the technology to improve the different life aspects. The findings contribute to improving citizens' quality of life and to knowledge and practice by aiding smart solutions, underlying the role of sustainability in smart city development. The research proposes the smart city model that would offer appropriate sustainable solutions to improve

the quality of life of the inhabitants, and it will end with recommendations following smart design guidelines towards better quality of life.

Chapter "Strategic Development Plan Proposed for the Future City NEOM", authored by Abdulaziz Nasser Aldusari, proposes a strategic development plan for NEOM area emerged from the project launched by His Royal Highness Prince Mohammed bin Salman-Crown Prince and Minister of Defense- and Chairman of the Board of Directors of NEOM, the "Line project," which is a smart stripe city project that begins From the site of the King Salman Bridge in the Gulf of Aqaba in the west and extends to the east for a distance of 170 km, this proposal comes to complete the success of the project in an integrated urban form in the short and long term, in line with the Kingdom's Vision2030. This study aims to develop a strategic plan for the comprehensive spatial development of the entire NEOM area as a city for the future, in which the nucleus is the "Line project" for a balanced development spread over the entire region, taking into account the planning and environmental considerations and its potential for growth and development according to the stages and priorities of development in the area. The comprehensive strategic plan for the NEOM area includes three stages, the first of which is the development of the future vision for the NEOM area, followed by the development of the various sectoral strategies for the project, such as strategies for the environment, smart transportation, utilities, and other sectoral strategies related to the project, in which smart technical applications with artificial intelligence will be used in the project. Then the third important stage, which is the preparation of the structural plan for the entire NEOM area, which is the missing study that will be clarified in this proposal. The study has adopted case study method by reviewing Neom area project to develop a comprehensive strategic proposal as a future city acquiring the kingdom Vision 2030.

In Chapter "A Framework to Develop Neglected Open Space: The Case of Jeddah City (A Critical Review)", Ahmed Mohamed and Wijdan Jamjoom explores the rapid urbanization that many cities around the globe experienced. Consequently, a lot of neglected open space (NOS) and vacant land emerge in those cities structure. These NOS represent a vital asset that can contribute to enhance the city identity, and function. To develop this neglected open space, several dimension should be addressed such as, social, functional, visual, and temporal dimensions. In this paper, the author will focus on the social dimension of urban design as a tool to develop NOS. In this sense, this paper will start by giving an introduction about neglected open spaces, their characteristics and types, following that presenting some theories and approaches in order to develop these spaces socially and concluding with a social framework in order to develop these spaces.

In Chapter "Reviving the Identity of Jeddah City Through Revitalizing the "Souq" in Al-Balad", by Hatoon Al Ghamdi and Asmaa Ibrahim, the authors explore the traditional Souqs that are commonly located in the historical city centers. Albalad is one of the most famous ones in old Jeddah. However, through the last decades, it has encountered a lot of transformations due to the change of the community needs and moving more towards modernity. The presence of contemporary malls and changes

in lifestyle led people to withdraw from traditional markets, which has caused a lot of deterioration in these old Souqs and left them to be subject to many informal and unplanned interventions destroying the historical essence of the place. Accordingly, this research aims to regenerate the old markets while satisfying the current needs of the community. This research will use the ethnographic strategy using triangulated methods of observations, and questionnaires. Also, some similar case studies will be analyzed to provide visionary guidelines for revitalizing Souqs in historic areas. The expected outcome will be in the form of guidelines that will be used to revitalize Souqs in historical sites with a focus on Al-Balad.

2.2 Part II: Smart Inclusive and Livable Cities

In Chapter "Promoting Social Interaction Through Jeddah's Neighborhood Parks Design", the authors, Hend Al-Mohandes and Mady Mohamed, delves into the open space as a vital component of cities. High-quality open space can contribute to the quality of life and social cohesion, for example, well-managed open space can be an opportunity to affect the urban environment, enhancing the financial, social, and environmental benefits, and bringing the community together. Neighborhoods are a part of the urban structure that consists of two important things which are housing and open space, both contribute to residents' quality of life and social interactions. Gehl (2011), confirmed that neighborhood parks are social spaces, where are open and accessible to people, they are the life between buildings where people can interact and feel attached to the neighborhood and the city. Moreover, the better design of neighborhood parks enhances the quality of the social experience and gives a valuable place to socialize with neighbors. (Quayle and van der Lieck 1997). Nowadays, some neighborhoods are still facing a lack of interaction among inhabitants because of the lack of substantial urban design needed for these parks. According to (Francis et al. 2012), they ensure that community interactions in planning and designing open spaces create an impact of increasing the use of these spaces and their value to people. This research explores the design guidelines of neighborhood parks that can achieve social interactions. The main findings of this research contribute to generating guidelines for neighborhood parks design within the urban context of Jeddah City in Saudi Arabia. Furthermore, this research is critical for Jeddah Municipality, stakeholders, urban designers, and landscapers to raise their awareness of neighborhood parks design and its relationship to outdoor social interactions.

Chapter "Historic Significance and the Urban Ambiance of Public Open Spaces "Barahat" in Old Jeddah", by Norhan M. Elsheny and Haitham Samir, explores the urban public spaces and how they play an important role in the social life, culture, and traditions of old Jeddah. Urban public spaces are defined by their urban form and design which express the unique identity of historic cities. They contribute to the development of social bonds, the integration of local communities and the

overall public realm experience. The historical significance of urban public spaces is a prerequisite for the space ambiance. The aim of this study is to explore how the historic significance and space ambiance can influence the space identity and particularity. Three urban public spaces (Barahat) within the UNESCO nominated property in Jeddah, Saudi Arabia were evaluated based on the existing condition. The goal was achieved by the use of a quantitative research method based on questionnaires and fieldwork. The result of the evaluation will be used to assist in the enhancement of the public realm within the historic context. The analysis framework has been proposed based on the historic significance and ambiance of the spaces.

In Chapter "What Factors Affect Livability? A Theoretical Review", by Shahad S. Oyuni and Haitham Samir, the authors investigate the livability as a term that has no precise definition, and which is used variously by different scholars in varied contexts despite its frequent appearance in the research and professional fields. In response, this article provides an in-depth understanding of this multifold concept developed through literature analysis. Moreover, this paper seeks to answer the question of what factors affect livability? Which is derived from the fundamental livability spheres. In this framework, this research will theoretically investigate the concept of livability and different livability ranking tools to highlight livability factors under three dimensions: social, economic, and environmental. These factors will aid and assist urban designers and decision-makers to incorporate livability factors in the current and future projects.

Chapter "Modeling Tactical Urbanism: A Contemporary Approach for Urban Regeneration", by Tarek Saad Ragab discusses the economics of the urban regeneration aims, among other objectives, to revive the city's declined and sluggishly animated public spaces. He argues most of these projects target the city's principal public spaces, such as central parks, squares, downtown, and waterfronts. Whether selectively, consecutively, or collectively carried out, the magnitude of these projects usually drains the city's budget as they consume extended times, resulting in a few numbers being implemented in those primary spaces and fewer directed to the city's secondary spaces. This paper focuses on developing a strategic multi-tiered framework to revive underutilized public spaces considering the time and cost layers. Such a framework builds on the employment of "local events" as a viably flexible and low-cost "Temporary Urbanism" tactic to revive poorly utilized city spaces of different grades. The research employs a qualitative and a desktop analysis approach to develop a framework to assist the city's stakeholders in taking necessary and efficient actions to activate the city's spaces as a parallel tool for traditionally used urban regeneration approaches.

Chapter "Child-Friendly Open Spaces: Towards Safety in Residential Neighborhoods", by Mohamed Fekry and Hala I. Masri., explores the rapid urbanization, high traffic density, and lack of open spaces as noticeable challenges that impose several repercussions on children within the urban context and restrict them from living a normal childhood. Independent mobility is reduced according to the spatial deprivation of children from pedestrian experiences through urban environments. Consequently, children's opportunities for active engagement and participation in social life will be diminished. Residing in safe environments is a fundamental right

that should be granted to all children around the world. Recently, child-friendly urban design has gained a lot of attention due to its remarkable advantages as it brings children's needs and desires into practice. Creating safe child-friendly open spaces contributes to protecting children from traffic injuries and crimes while at the same time stimulating their imagination and nurturing communication skills. This paper addresses the topic of safe child-friendly open spaces in residential neighborhoods which can significantly improve the life, health, and growth of children with a focus on social and traffic aspects within the urban context. Identifying the design principles of safe child-friendly open spaces is the main aim that will be tackled. To achieve this goal; the research will follow a theoretical approach by applying a qualitative research methodology through historical interpretation and understanding of the main characteristics and design principles of child-friendly open spaces. This would be followed by an evaluative analysis of a related case-study. The expected results of this research are planned to introduce an adapted design model for safe child-friendly open spaces in residential neighborhoods for the local context of Saudi cities with more focus on both social and traffic safety aspects.

2.3 Part III: Smart Environmental Solutions

In Chapter "Role of Literature in Environmental Conservation Towards Better Future: A Critical Analysis of the Poetry of Sheikh ul-Alam", Tawhida Akhter presents two main ideas linking literature to society. Literature has always been a mirror to society. Since ancient times, literature has performed two functions. To some, it is art for the sake of art, while to others; it is a reflection of modern society. These two ideas are always at the foundation of great literature. The planet (Earth) has suffered much as a result of global ecological catastrophe, mostly as a result of human atrocities against nature. As a result, literature cannot turn its back on this. A new field of study for literature emerged at the close of the previous century. The present article seeks to explore the Ecocritical issues as represented by a great environmentalist and a poet of Kashmir- Shaikh-ul-Alam. His poetry, written in Kashmiri and translated into other languages, is the apex of literary and environmental excellence. Sheikh ul-Alam has created a large body of poetry that covers a wide range of topics, from cultural to ecological sustainability. The purpose of this study is to see how literature has helped and will always inspire people become more aware of hazards like deforestation and its repercussions. We witness a gradual change in our attitude toward nature, while reading his poetry. In his poems, the interconnectedness of human nature is at the heart of Ecocriticism, is emphasized.

Chapter "Development Priorities of Housing Sustainability in Saudi Arabia: An Overview", by Omar Asfour, elaborates how housing that is not merely the construction of housing units, but also the creation of an adequately planned living environment. In this environment, green building, economic viability, and social well-being come together under the umbrella of sustainable housing. This study aims to offer an overview of housing sustainability considering these three main pillars in the Saudi

housing sector. This study conducted a literature review and identified 30 aspects that are used to address the environmental, economic, and social sustainability of housing. To prioritize these aspects, the study approached a group of experts in the field with a structured online questionnaire. The study concluded some aspects that are needed in Saudi Arabia to enhance housing sustainability according to these three main domains, including resource efficiency, housing affordability, and respect for local cultural values and identity. The study also concluded that, although several major achievements could be seen in the environmental and economic aspects of sustainable housing, many development opportunities remain in the social sustainability domain.

Chapter "Investigating the Effect of Urban Form on Heat Island Phenomena: Case Study of Jeddah, KSA", by Amani Aburuzaiza, Mady Mohamed and Tarek Saad Ragab debate urban forms embracing urban heat island adaptation and mitigation actions. It also aims to investigate the effect of urban design impacts, to develop strategies for reducing urban heat island influences with a good preparation for climate change adaptation, and to contribute to improving quality of urban life. In order to achieve the objectives of this study, the scientific methodology was used due to its suitability to the nature of the research, which depends mainly on three stages; record facts from the field build a preliminary theory from the literature review, and experimental situations. Several approaches have been used: data collection, literature review, preparation through data bases, probability analysis using SPSS program, and Space Syntax analysis. The study investigates two districts in Jeddah which are Al-Balad and Al-Basateen. The results show differences in temperature between the two districts at the same time schedule. The factors impacting this urban heat island's result were attributed to different urban fabric between the two districts. The study recommends decreasing urban heat island by using robust structures, increasing the use of plants in design, and implementing an effective urban design. Design Strategy Properties of urban materials, particularly, solar, reflectance, thermal emissivity and heat capacity, also influence the development of urban heat island as they determine how the suns energy is reflected, emitted, and absorbed. The contribution of this study is the formulation of asset of strategies and principles that can help directing designers to transform these defunct downtowns into sustainable urban cores for people to live, work, play and visit.

Chapter "Sick Neighborhood Syndromes in Hot Dry Climate", authored by Widad Elessawi, Mady Mohamed, Mervat El-Shafie and Husam Alwaer explore the neighborhood and its relationship with health which has witnessed an explosion of interest. Several researchers investigated neighborhood problems and its impacts on well-being. Different urban problems vary in mental and physical health impacts. A lot of longitudinal and cross-sectional research linked the characteristic of neighborhood whether physical or social to the health condition of the community. Furthermore, heart disease, skin disorder, cancer diabetes, depression and drug use are some of the

health problems that an individual might face while living in an insufficient neighborhood particularly in harsh climate conditions. In desert climate, thermal low performance can lead to urban problems such as the well-known phenomenon "Urban Heat Island (UHI)". The later can lead to several illness syndromes for residents. Reviewing the literature revealed a gap in the knowledge on the detailed relationship between the urban design elements and the sick health syndrome. This paper discusses the negative impact of the neighborhood design elements and its interconnection with illness syndromes. Similar to the Sick Building Syndrome (SBS), the paper introduces a new term to define the relationship between the urban design elements and the sick health syndromes which is "Sick Neighborhood Syndrome" (SNS).

3 Conclusion

In summary, this volume addresses the key challenges and opportunities of "future cities" to embrace novel approaches and grounded technologies in pursuing a vision for smart, inclusive cities. The first part tackled critical challenges facing the current cities and how these challenges can hinder the development objective planned to be achieved by the cities of the future. The second part elaborated how future cities are not only places where smart technologies, advanced communication, and creativity meet but also cities that facilitate spaces and venues which can contribute to the residents' quality of life and social cohesion. The third part explored sustainable environmental approaches for future cities. The editors wish that the papers presented in this publication help to explore different perspectives for designing and planning future cities that help serve the community needs and enhance the quality of life.

References

Francis J, Giles-Corti B, Wood L, Knuiman M (2012) Creating sense of community: the role of public space. J Environ Psychol 32:401–409. https://doi.org/10.1016/j.jenvp.2012.07.002

Gehl J (2011) Life between buildings: using public space. Island Press, Washington DC

Quayle M, van der Lieck TCD (1997) Growing community: a case for hybrid landscapes. Landscape Urban Plan 39(2–3):99–107, ISSN 0169-2046. https://doi.org/10.1016/S0169-2046(97)00048-0

Future of Saudi Cities

Understanding the Role of Innovative Policies and Strategies on the Knowledge, Attitude and Practice (KAP) Among Food Handlers Impacted During Pandemic of Covid-19

Nor Raihana Asmar Mohd Noor, Liziana Kamarul Zaman, Norhayati Yaacob, and Muhammad Syafiq Hassan

Abstract Thoughtful planning and support are essential to rebuild and recover cities from the economic and social crisis that are impacted by the Covid-19. The main aim of this study is to understand the impacts of the pandemic on cities and to highlight innovative policies and strategies on the practice of Knowledge, Attitude and Practice (KAP) among food handlers before and after pandemic. Despite having no evidence showing that infected people could spread the virus through the food they prepared, there is a theoretical risk that sneezing on food and direct touch on the food could transmit the virus. This current perspective outlines level of awareness on KAP among food handlers especially with the increasing trend of food business during Covid-19. For this study, questionnaire surveys were distributed to gain feedback on the food handling regulation's awareness among food handlers in Malaysia. Based on the results, it can be reassured that knowledge of food handlers does make a difference during food handling regulations. However, the results showed that the attitude and practice of food handlers during Covid-19 doesn't necessary reflect their attitude and practice before the pandemic. This study is to contribute to the enrichment of knowledge on the adoption of KAP model among them, thus increase the level of awareness on the food hygiene before and during food handling and regulation especially increasing trend of food business during Covid-19. It is vital to ensure that

N. R. A. Mohd Noor · N. Yaacob · M. Syafiq Hassan
Faculty of Administrative Science and Policy Studies (FSPPP), Universiti Teknologi Malaysia, Kelantan's Branch, Machang, Kelantan, Malaysia
e-mail: raihana6791@uitm.edu.my

N. Yaacob
e-mail: norhayati_yaacob@uitm.edu.my

M. Syafiq Hassan
e-mail: syafiq212@uitm.edu.my

L. Kamarul Zaman (✉)
Faculty of Law, Universiti Teknologi Malaysia, Kelantan's Branch, Machang, Kelantan, Malaysia
e-mail: lizia735@uitm.edu.my

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_2

the regulations are effective in addressing the desired public health conservation; thus, will provide higher returns to the government to take transformative action towards creating cities that are most just, resilient and sustainable.

Keywords COVID-19 · Food handling · Food borne disease · Food handlers and innovative policies and strategies

1 Introduction

Maintenance of good hygiene standards set by the government is one of the top priorities of the public as they contribute significantly to the hygiene and clean food handling process to protect people's health. The restaurant owners and food handlers were severely impacted by the Covid-19 pandemic due to the restrictions of the government to dine in restaurant as social distancing guidelines took effect. Most of the food handlers are struggling for their business survivability and neglect the maintenance of good hygiene standards. However, it is still questionable whether the positive cases are transmitted through food (Han et al. 2020). It is reported by Klein (2004) that the infections are infinitesimally small from the surfaces including food or packaging that are touched by patients with COVID-19. European Food Safety Authority (European Food Safety Authority (EFSA) 2020) contended that the detection of the virus by touching food or food packaging showed that efforts to contain the virus are not enough. But, due to some premises that are negligent towards hygiene and sanitation in food handling, the consumers are exposed to the increasing risk of foodborne illnesses. Unfortunately, these cases have always been neglected because most of the incidents were not reported to the enforcement authorities (Soon et al. 2011).

The term 'food safety' encompasses all the imperative practices that businesses must follow to ensure food is fit for consumption, in which 'food hygiene' is one of the important practices, and can be defined as handling, preparing and storing food or drink in a way that best reduces the risk of consumers becoming sick from the foodborne diseases. Preventing foodborne illness remains a major public health challenge worldwide, including in Malaysia. Food that is mishandled can lead to foodborne illness. According to the United States Department of Agriculture (USDA), preventing foodborne illness can be done by following four simple steps namely to clean, separate, cook and chill (U. S. 2016). These food safety practices aim to prevent food from becoming contaminated and causing food poisoning. The willingness of food establishments to adopt this principle not only shows that they comply with the law properly, but it is also one of the effective, efficient, and sustainable business strategies. The commitment of food operators to serve the best quality food as well as a high awareness of food safety duty is certainly able to gain the trust of customers to remain loyal to the business (Burton-Hughes 2019).

2 Literature Review

2.1 Awareness of Food Handlers to the Knowledge, Attitude and Practice (KAP)

The public awareness on the importance of food safety is still at unsatisfactory levels (Salleh et al. 2017). Most of the consumers put less attention on the preparation of the food (New et al. 2017). They are more concern about the food tasting, food presentation and give prioritisation on low price food especially street foods. This issue has grab public attention as street food consumers had lower knowledge and awareness (Al Banna et al. 2022) about microbial hazards like bacteria, fungi, viruses and parasites. However, contamination of the food supply with pathogens, such as Salmonella Typhi, Escherichia coli, Staphylococcus aureus, Vibrio cholera, Campylobacter jejuni, and Listeria monocytogenes represents a major concern for food safety (Abdul-Mutalib et al. 2015). Generally, food safety awareness is needed for the general people during COVID-19 pandemic (Ceylan et al. 2020) due to there is no specific recommendation for food handling or cooking (Sim and Wiwanitkit 2021).

Nevertheless, besides shown solidarity in practising the standard operating procedures (SOP) for COVID-19, a comprehensive food premises inspection must be done regularly in order to enhance a good awareness on food safety among the food handlers (Salleh et al. 2017). Most of the studies on food borne disease have analysed KAP among food handlers (Soon et al. 2011; Izyan et al. 2019; Isoni Auad et al. 2019). Thus, to fill in the gap of the previous studies, this paper identifies the awareness of foodborne disease among food handlers in Malaysia before and during COVID-19 by using KAP. This study is to contribute to the enrichment of knowledge on the adoption of food handling regulation among them, thus increase the level of awareness on the food hygiene during food handling and regulation especially increasing trend of food business during Corona Pandemic 2019.

3 Methodology

This study was a cross-sectional study that was conducted from June to October 2021, based on the convenience sampling, and a total number of 281 food handlers participated. Survey methods specifically an online questionnaire was employed in this study. Negative statement in the KAP statements were reversed scaled prior to analysis. This study was approved by the ethics commission of the Universiti Teknologi MARA (REC/06/2021 (MR/432)). The participants were asked on the awareness of hygiene practice, knowledge, attitude before and during COVID-19 and awareness of the regulations that have been used in food handling in Malaysia. The statistical analysis was conducted while using SPSS. The KAP determinants score results obtained for the period before the COVID-19 pandemic and during the COVID-19

pandemic were compared using the paired sample T-test to find the awareness of foodborne disease before and during COVID-19 pandemic. The $p < 0.05$ level was interpreted as statistically significant. Laws and regulations are very important to control restoration of remaining structures and its adaptive re-use. During the maintenance process, the reinforcement should be implemented in ways to avoid ruining the original historic fabric.

3.1 Results

Profile of the Respondents

More than half of the participants in the study were female (57.1%) and 55.2% of the participants were ranged between 18 and 25 years old. Almost all the food handlers received formal education, and out of this, 54.1% have secondary qualification and 30.6% have tertiary education. Majority of the food handlers (59.4%) mentioned that they having less than one year of experience, while 32% indicated that they have one to three years experience in food handling. İn terms of food handling training, 96.1% attended the training certified by the Ministry of Health. However, only 59.4% of them were injected with typhoid immunization. 85.4% indicated that they works in restaurants, stalls and canteen. The awareness of foodborne disease was measured by using determinants of KAP, for the period before and during the COVID-19 pandemic.

Knowledge of Food Handlers Before and During COVID-19

Table 1 provides descriptive statistic for the research variables. Means scores are over the mid-point on the one to five scale, where (1) is the extent that the respondents strongly disagree; and (5) is the extent that the respondents strongly agree. Most of the food handlers agree that hands should be washed before meal preparation to prevent food borne disease, diarrhoea can be transmitted by consuming contaminated food, raw chicken should be washed before preparation, if cooking meat and poultry, the juices should be clear and not pink when cooked and separate equipment such as chopping boards and utensils are used for raw meat and cooked food before and during COVID-19. It shows that food handlers had sufficient knowledge on most of the issues. This finding is supported by a study done in Indonesia. The study reported that 99.2% of the respondents knew that it was necessary to wash their hands regularly when handling foods (Sihombing et al. 2018). A similar finding was obtained in a recent study conducted in Lesotho, where all participants showed a high level of knowledge concerning hand washing before food preparation (Nkhebenyane and Thekisoe 2021). On the other hand, a study in Brazil by Cunha et al. (2014) reported that about 92% of the food handlers knew using earrings, rings, and watches could contribute to food contamination.

Table 1 Knowledge of food handlers before and during COVID-19

No.	Knowledge	Mean before COVID-19	SD before COVID-19	Mean during COVID-19	SD during COVID-19
1	Hands should be washed before meal preparation to prevent food borne disease	4.44	0.956	4.47	0.978
2	Diarrhoea can be transmitted by consuming contaminated food	4.17	1.408	4.20	1.428
3	Pets are allowed into the kitchen area	4.64	0.711	4.68	0.736
4	Raw chicken should be washed before preparation	4.48	0.526	4.50	0.519
5	If cooking meat and poultry, the juices should be clear and not pink when cooked	4.19	0.944	4.19	0.964
6	Runny eggs are safe to eat	4.08	1.122	4.09	1.137
7	Separate equipment such as chopping boards and utensils are used for raw meat and cooked food	4.38	1.386	4.40	1.394
8	Raw meat can be stored anywhere in the refrigerator as long as it's chilled	3.85	0.900	3.85	0.902
9	Food preparation utensils can be washed with pipe water only	3.00	1.152	3.01	1.172
10	Frozen food is thawed at room temperature	3.34	0.983	3.31	0.982
11	Cooked food should be served hot (more than 60 ℃)	3.69	0.712	3.69	0.712

(continued)

Table 1 (continued)

No.	Knowledge	Mean before COVID-19	SD before COVID-19	Mean during COVID-19	SD during COVID-19
12	Leftover food can be stored at room temperature to be eaten at the next meal	3.53	0.622	3.56	0.639
13	Wearing a watch during food preparation can cause food contamination.	3.12	0.655	3.12	0.661

Attitude of Food Handlers Before and During COVID-19

From Table 2, the majority of the respondents had a desirably positive attitude when handling food preparations before and during COVID-19. Most of the food handlers agreed that washing hands with soap can prevent food poisoning, hand injuries or cuts are covered to prevent cross contamination of food, and if there is only one chopping board, it should be washed after using it to prepare raw meat/poultry/seafood.

Practice of Food Handlers Before and During COVID-19

The awareness of food handlers toward good hygiene practice is presented in Table 3. There were thirteen (13) questions prepared to determine whether the practices adopted by the food handlers in the preparation of the foods are adhered to and consistent with the procedures demanded by the health authorities. All the statements are meant to examine whether the respondents follow good food hygiene practices. These include personal hygiene, safe handling of food, preventing cross-contamination, cleaning procedures, safe storage of food, and cooking temperatures.

Mean knowledge scores for good hygiene practice for majority of food handlers before and during COVID-19 pandemic is good. In general, most of them show attention about the hygienic rules of preparing food as wash hands with soap after using the toilet, wash hands if sneezed or coughed into hands while preparing food, select fresh and wholesome food when purchasing food and clean food preparation areas and utensils after preparing raw meat/poultry/seafood. According to the Centres of Disease Control and Prevention (U. S. 2021), handwashing is one of the most important things can be taken to prevent food poisoning when preparing food, since hands have high potential to spread germs in the kitchen and some of these germs, like Salmonella, can be very harmful to the health. Different chopping boards should also be used to cut vegetables and other sensitive foods to prevent food poisoning, and these utensils should also be constantly washed with disinfectant (Carter 2019). Using the same plates and utensils that store raw products to serve cooked products should also be avoided, since any bacteria found in raw meat or juices can easily contaminate cooked products. It is essential to serve cooked products on clean plates,

Table 2 Attitude of food handlers before and during COVID-19

No.	Attitude	Mean before COVID-19	SD before COVID-19	Mean during COVID-19	SD during COVID-19
1	Washing hands with soap can prevent food poisoning	4.29	0.956	4.29	0.978
2	When coughing/sneezing, we should cough/sneeze into our elbow	3.08	1.408	3.07	1.428
3	Hand injuries or cuts are covered to prevent cross contamination of food	4.32	0.711	4.32	0.736
4	Fruits and vegetables (e.g. *ulam*) are washed before eating	4.55	0.526	4.56	0.519
5	I do not use damaged or cracked eggs	4.31	0.548	4.31	0.526
6	If I use a thermometer, I will clean it with water and soap each time after using	3.67	0.944	3.67	0.964
7	Raw meat is stored at the bottom of the refrigerator shelf	3.51	1.122	3.51	1.137
8	If there is only one chopping board, it should be washed after using it to prepare raw meat/poultry/seafood	4.15	0.900	4.14	0.902
9	It is adequate to use one kitchen towel for all cleaning and drying purposes	4.12	1.152	4.14	1.172
10	Leftover food is kept at room temperature so I don't have to reheat it	4.11	0.983	4.12	0.982
11	Jewellery such as ring can be worn while handling food	4.59	0.712	4.59	0.712

using clean utensils and clean hands (U. S. 2016). Participants also decided that individuals cannot wear jewellery while handling food. Most of the respondents disagreed to use the same kitchen towel to wipe kitchen surfaces and dry my hands. In addition, food handlers disagreed that pet (e.g. cat or dog) are free to roam in the kitchen area (Table 3).

Table 3 Practice of food handlers before and during COVID-19

No.	Practice	Mean before COVID-19	SD before COVID-19	Mean during COVID-19	SD during COVID-19
1	I wash my hands with soap after using the toilet	4.51	0.622	4.51	0.639
2	I wash my hands if I sneezed or coughed into my hands while preparing food	4.49	0.655	4.49	0.661
3	If I have a pet (e.g. cat or dog) it's free to roam in the kitchen area	4.60	0.653	4.62	0.632
4	When purchasing food, I select fresh and wholesome food	4.54	0.603	4.56	0.564
5	I wash raw meat before cutting or preparing them	4.54	0.560	4.56	0.539
6	I do not use food beyond its expiry date	4.42	0.862	4.42	0.863
7	I clean food preparation areas and utensils after preparing raw meat/poultry/seafood	4.53	0.548	4.55	0.526
8	I chopped vegetables using a separate or a clean chopping board	4.54	0.547	4.55	0.546
9	I use the same kitchen towel to wipe kitchen surfaces and dry my hands	4.55	0.810	4.57	0.795
10	I check if the food is cooked by tasting it	3.47	1.251	3.45	1.261
11	I check if the food is cooked by visual appearance (e.g. fish should be opaque and flaky; egg yolk and white should be firm)	3.80	1.060	3.79	1.077
12	Leftover food from lunch are kept at room temperature until the next meal (e.g. dinner)	3.68	1.139	3.69	1.133
13	I wear jewellery while handling food	4.51	0.833	4.51	0.833

Table 4 T-test

No.	Elements	Mean before COVID-19	Mean during COVID-19	Sig.
1	Knowledge of food handlers	3.92	3.93	0.002 (t-value = − 3.144)
2	Attitude of food handlers	4.06	4.07	0.516 (t-value = − 0.650)
3	Practice of food handlers	4.32	4.33	0.052 (t-value = − 1.948)

To further analyse the result, a t-test was conducted to compare the knowledge, attitude and practice of food handlers before and during COVID-19. Based on the result in Table 4, there is statistically significant with the level of knowledge t (281) = − 3.144, $p < 0.05$. Meanwhile, there is no statistically significant with the level of attitude t (281) = − 0.650, $p > 0.05$, and practice t (281) = 1.948, $p > 0.05$.

4 Discussion

The impacts of the global pandemic Covid-19 are driving people to undertake various precautionary measures around the world. Thus, innovative policies and strategies on the practice of KAP among food handlers should be highlighted. Therefore, the food handlers need to have knowledge of proper safety rules and bear attitude for practicing those to stay safe from spreading Covid-19. From the present study, the role of innovative policies and strategies on food handling regulations for better future cities should be enhanced by emphasizing on the food handling regulations (see Table 5).

The food handlers' specific roles before, during and after food preparations should be clearly communicated to ensure that they would have better understanding when handling food. This can be done by regularly updating the regulations. It is important

Table 5 Food handling regulations

No.	Contributions of food handling regulations
1	The food handlers' specific roles before, during and after food preparations
2	Promoting a healthier food, by putting the focus to regulate food advertising by sharing the responsibility with government, the food industry, the academy and civil society
3	Rigorous research investigates the efficacy of knowledge, attitude and practice of food handlers during food preparation
4	The roles of policy makers for assessing and implementing appropriate hygiene and sanitation practices
5	Monitoring development by authorities to deliver critical services that preserve the integrity of the food safety programs

because public compliant is important to educate and as spreading public health intervention. It is vital to ensure that the regulations are effective in addressing the desired public health conservation; thus, will provide higher returns to the government.

It has always been top priority of the government to promote a healthier food, by putting the focus to regulate healthy food campaign by sharing the responsibility with government, the food industry, the academy and civil society in a fun and interactive way. This is in line with the 2030 Sustainable Development Goal (SDG) 2, which is to achieve food security and improved nutrition and promote sustainable agriculture through the implementation of reduce food waste, facilitate food transport and support urban agriculture production.

Apart from that, rigorous research investigates the efficacy of knowledge, attitude and practice of food handlers during food preparation should be conducted among the other stakeholders such as nutritionists, dietitians, regulators and policy makers as they might contribute to the different and beneficial information in promoting food safety regulations.

In regard to the Covid-19 pandemic, this is high time for policy makers for assessing and implementing appropriate hygiene and sanitation practices. The policy makers should continue to encourage and provide guidance on hygiene and sanitation practices. It is important to help and guide the food handlers to improve the quality of food handling preparation through the knowledge, attitude and practice as it provides a value- added element to the sustainability and survival of the restaurant owners and food handlers thus will help them to expand in the long run.

Moreover, in terms of hygiene aspect, there is an urgent need of comprehensive monitoring development and follow-up by authorities to deliver critical services that preserve the integrity of the food safety programs. This can be done by conducting audit process to ensure the food handlers' compliance. The compliance is vital in managing the Covid-19 outbreak and therefore, the authorities would prefer to have further engagement with relevant stakeholders.

5 Conclusion

This study has determined a perspective on the adopting the KAP model among food handlers. The awareness of the food handlers on food safety knowledge, attitude and practice have been presented and contrasted before and during pandemic of Covid-19. The findings from this study may suggest the sufficient of understanding on the knowledge, attitude and practice among food handlers to provide appropriate and hygienic food. The food handlers should follow all the general and new norms hygiene rules including wearing masks, physical distancing and frequent hand washing should be maintained to combat the rapid genetic evolution of COVID-19. For the future study, it is recommended that a study is conducted to interpret the awareness of food safety among dietitians, as they have professional competency to practice food safety. Despite having explored the awareness of food handlers as they relate to food borne illness in this study, this project has identified the need to study the perceptions of the

food handlers towards the provision of food safety regulations and their perception of their role as food handlers.

Acknowledgements The authors would like to thank and acknowledge the very helpful comments provided by the editors. The authors also would like to express their gratitude to Universiti Teknologi MARA Kelantan Campus, Malaysia for financial support (Grant no: 600-TNCPI 5/3/DDN (03) (002/2020)) and to Kelantan's State Health Department Food Safety and Quality Division, Ministry of Health for tremendous support to complete this project.

References

Abdul-Mutalib NA, Syafinaz AN, Sakai K, Shirai Y (2015) An overview of foodborne illness and food safety in Malaysia. Int Food Res J 22(3):896–901

Al Banna MH, Kundu S, Brazendale K, Ahinkorah BO, Disu TR, Seidu AA, Okyere J, Khan MSI (2022) Knowledge and awareness about food safety, foodborne diseases, and microbial hazards: a cross-sectional study among Bangladeshi consumers of street-vended foods. Food Control 134:108718

Hughes LB (2019) Is there a difference between food hygiene and food safety? 22 Mar 2019. https://www.highspeedtraining.co.uk/hub/difference-between-food-hygiene-and-food-safety/

Carter A (2019) Why is food hygiene important? 9 Jan 2019. https://hygienefoodsafety.org/why-is-food-hygiene-important/

Ceylan Z, Meral R, Cetinkaya T (2020) Relevance of SARS-CoV-2 in food safety and food hygiene: potential preventive measures, suggestions and nanotechnological approaches. VirusDisease 31(2):154–160

Da Cunha DT, Stedefeldt E, De Rosso VV (2014) The role of theoretical food safety training on Brazilian food handlers' knowledge, attitude and practice. Food Control 43:167–174

European Food Safety Authority (EFSA) (2020) Coronavirus: no evidence that food is a source or transmission route

Han J, Zhang X, He S, Jia P (2020) Can the coronavirus disease be transmitted from food? A review of evidence, risks, policies and knowledge gaps. Environ Chem Lett 1–12

Isoni Auad L, Cortez Ginani V, Stedefeldt E, Yoshio Nakano E, Costa Santos Nunes A, Puppin Zandonadi R (2019) Food safety knowledge, attitudes, and practices of brazilian food truck food handlers. Nutrients 11(8):1784

Izyan FN, Zuraini MI, Maria MS, Lovelyna BJ, Maimunah M, Afzan AS (2019) A preliminary study on food safety knowledge, attitude and practices among home-based food providers in Klang Valley, Malaysia. Malays Appl Biol 48(2):157–160

Klein G (2004) Spread of viruses through the food chain. Dtsch Tierarztl Wochenschr 111(8):312–314

New CY, Ubong A, Premarathne JM, Thung TY, Lee E, Chang WS, Loo YY, Kwan SY, Tan CW, Kuan CH, Son R (2017) Microbiological food safety in Malaysia from the academician's perspective. Food Res 1(6):183–202

Nkhebenyane J, Thekisoe O (2021) Street food handlers' food safety knowledge, attitudes and self-reported practices and consumers' perceptions about street food vending in Maseru, Lesotho. Br Food J 123(13):302–316

Salleh WA, Lani MN, Abdullah WW, Chilek TZ, Hassan ZA (2017) A review on incidences of foodborne diseases and interventions for a better national food safety system in Malaysia. Malays Appl Biol 46(3):1–7

Sihombing J, Padmawati RS, Kristina SA (2018) Knowledge, attitude, and practices regarding food safety among food employees in Ambon City, Indonesia. Malays J Nutr 24(2):293–299

Sim S, Wiwanitkit V (2021) Food contamination, food safety and COVID-19 outbreak. J Health Res 35(5):463–466

Soon JM, Singh H, Baines R (2011) Foodborne diseases in Malaysia: a review. Food Control 22(6):823–830

U. S. Department of Agriculture (USDA) (2016) Safe food handling and preparation, 2 Dec 2016. https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation

U. S. Department of Health and Human Services (2021) Handwashing: a healthy habit in the kitchen, 6 May 2021. https://www.cdc.gov/handwashing/handwashing-kitchen.html

Rijal Almaa and Local Tourism in Saudi Arabia

Nawal Hoque, Ahd Hannawi, and Asmaa Ibrahim

Abstract One of the vision 2030 aims is to develop Saudi historical and heritage sites to attract more tourism. Rijal Alma heritage village in Asir is on top of the list of heritage sites that are recommended to be a UNESCO World Heritage site. Rijal Alma, like other heritage sites in Saudi Arabia is not well-known due to the lack of enough media coverage. This research aims to highlight the importance of Rijal Alma as an important touristic destination in Saudi Arabia. In contrast to what is familiarly known, Saudi Arabia has a wide array of climatic conditions that can accommodate different kinds of local vernacular architecture. Rijal Alma as a historical representation of one of these architectural heritage can become an important touristic attraction that has the potential to provide different job opportunities and help in the local community development. This research will deploy qualitative data collection tools through analysis and semi-structured interviews. The research would end by deducing guidelines for fostering the local and international tourism in the area while keeping the community benefit and integration in focus. Finally, this research will contribute to the 2030 vision of the Kingdom by focusing on the value of historical sites in Saudi Arabia to align with the goals of the Saudi Ministry of Tourism, currently working on the revitalization of the historical structures all over Saudi Arabia.

Keywords Local tourism · Architectural tourism · Vernacular architecture · Historical buildings · Heritage

N. Hoque · A. Hannawi · A. Ibrahim (✉)
Effat University, Jeddah, Kingdom of Saudi Arabia
e-mail: asibrahim@effatuniversity.edu.sa

N. Hoque
e-mail: nahoque@effatuniversity.edu.sa

A. Hannawi
e-mail: ahhanawi@effat.edu.sa

A. Ibrahim
Cairo University, Giza, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_3

1 Introduction

1.1 Challenges Faced

Saudi Arabia is rich in many historical sites. Asir region is an example of that. It consists of 20 provinces, and the most known provinces are Soudah and Rijal Alma. The area is characterized by its cultural and historical diversity and rainy spring weather during the summer. Prince Mohammed bin Salman founded the Soudah Development company The company is specialized in developing Soudah and Rijal Alma. Husameddin Al-Madani, SDC's CEO, said, "One would think that Saudi Arabia is mainly desert with dry, hot weather, but there are beautiful, untapped destinations all around the Kingdom" (Hussam 2021). Rijal Alma has a great value because it was chosen as a heritage village from more than 5000 villages in the Asir Region. Rijal Alma is distinguished from the other villages in Asir by the white frame windows as a significant architectural element. Although the materials used in the structure are stone and clay, the locals were able to build multi-storey buildings. It can reach seven floors.

1.2 Principles of Historical Sites Revitalization

There are four principles: principle of authenticity, principle of protective utilization, principle of readability and principle of sustainability. The first is about historical continuity, maintaining the pattern, environment, architecture, and humanity of historical and cultural districts. The second is protecting and utilizing the purpose of the historical site which is preservation. The district's readability should be maintained so the people can read the cultural connotation of districts through the street patterns and historical buildings etc. throughout the process of urbanization and modernization. Revitalization of a historic site benefits the future generations and the economy of a country (Tourism, visa, tickets, hotel rents, in general money spent by the tourists) making it a long-term process which requires sustainable approaches to maintain the vitality of the site.

1.3 Methods

The method of historical sites revitalization including using the same spatial pattern of streets and lane to mimic the texture of traditional styles. The main goal of street revitalization and preservation is thus to strengthen the protection and renovation of street space by continuing the traditional pattern, the architecture style, the traditional elements, a better visuality of the traditional parts to attract tourists and to also add activities in the spaces to make them more livable. The priority will be to meet

the modern life necessities while still preserving the authenticity of the historic architectural features. This strategy includes strengthening the protection and repair of historic buildings, continuing the original functions of these historic buildings, and adding new practical functions to them (UN HABITAT 2008; Ataöv 2022).

Laws and regulations are very important to control restoration of remaining structures and its adaptive re-use. During the maintenance process, the reinforcement should be implemented in ways to avoid ruining the original historic fabric.

The construction process should depend on workers who are familiar with the process of construction used by the historic civilization of the site. The revitalization process should also include incorporating emerging industries on an appropriate scale. The idea of this process is to develop the industry while keeping the traditional one and adding the new necessities in the system. This process includes exploring historical and traditional business forms and raising awareness about them to help in their revival. At the end it is important to understand that the most important part of an historical site are its residents living in it thus its necessary to improve the living facilities in the area to keep up with the modern time (Taherkhani et al. 2021).

This part has thus presented the theoretical background of historical sites' revitalization to introduce challenges and methods, as shown in Fig. 1. It is important to focus on community development as an important aspect in the process.

1.4 Case Study: My Bayut- Heritage Village Abu Dhabi-United Emirates

Abu Dhabi Heritage Village is a remodeled village settlement that showcases a preserved version of the old UAE of the times when they didn't discover oil. It's located 38 km from Abu Dhabi International Airport Village. It displays in detail how life was by imitating everyday life scenarios around the village such as the local marketplace "Souq" which features how goats and sheep were sold in the marketplace and a section for the fresh fruits and vegetables. A small shop which sells things like handmade soaps and dried herbs, and a shop for traditional Emirati jewelry and silver things. They have a date market around a friendly neighborhood and an early mosque at the center to feature that Islam was an important part of an average pre-modernized Emirati day (https://www.bayut.com/mybayut/heritage-village-abu-dhabi/).

They also have activities which allows people to have a first-hand experience of the old UAE life such as weaving, tanning leather, making pots, glass, goat rearing, blacksmithing and campfire. They also feature Barasti which are traditional middle eastern houses made of palm-leaf "Barleej" which are designed to catch the breeze through the palm to help with the Middle eastern heat and they have tents that are made in the traditional way using goat's hair. They also have an ancient irrigation channel system, known as falaj which is still functioning, and it still waters the plantation over there. The village is overlooking a thin strip of beach which have

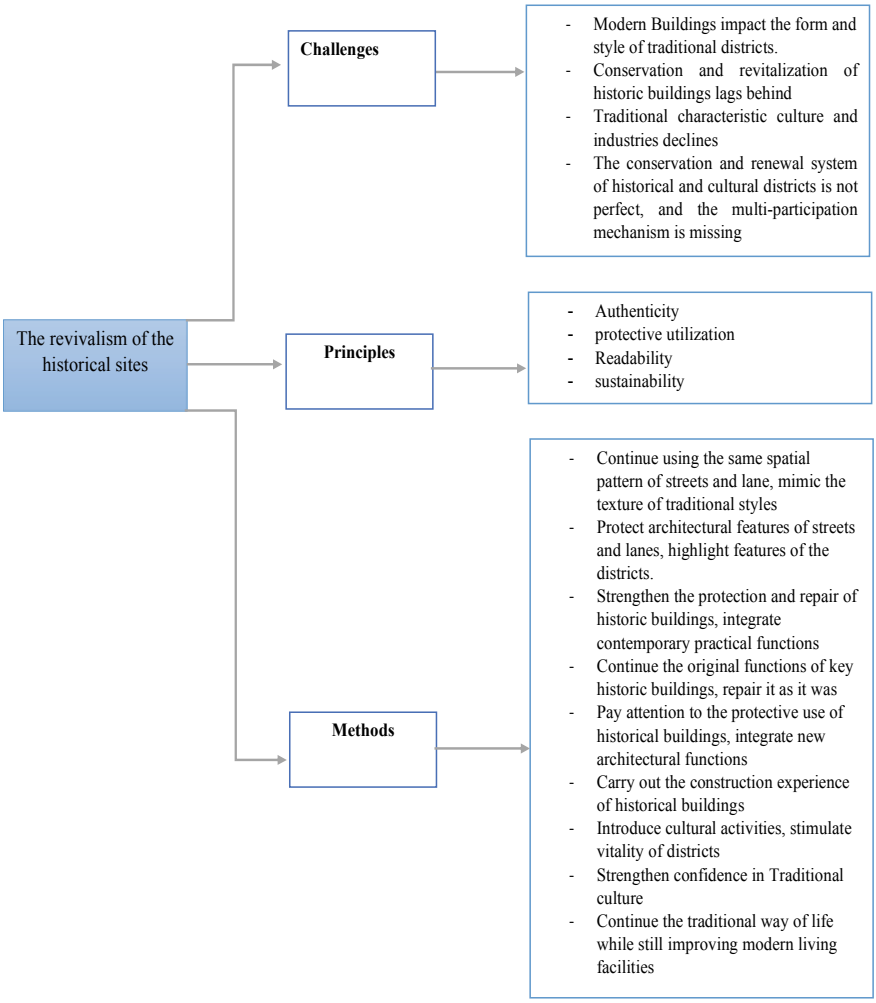


Fig. 1 The revivalism of the historical sites. *Source* Authors

traditional boats called "Dhow" in Arabic. To make it feel more olden Emirati days they included goats, camels, and horses in the village.

Their approach was to make learning about history enjoyable so to avoid the formal museum route they choose to remodel an actual village settlement which preserves the integral systems till now. One of the major differences between Rijal Almaa heritage site and My Bayut Heritage village Abu Dhabi is the acoustic factor and the sensual experience. In My Bayut Heritage Village they included animals and every day activities played by actors that mimics the overall background sound that a person would have heard back in that time and the smell from the animals, food and

clay etc. because apparently sound and smell are two very important sensual factors that makes the experience more realistic and enjoyable.

The other major difference between the two heritage villages are the location and the accessibility factor. My Bayut is 38 km away from the Abu Dhabi International airport which makes it very easy and less time consuming to reach whereas Rijal Almaa heritage site is in the mountains and the streets are not the best due to the weather and climatic conditions making it dangerous.

2 Empirical Case Study

The empirical case study starts with introducing the methodology that is mainly based on an ethnographic strategy, site analysis, then proceeds with explaining the semi-structured interviews together and end up with data analysis and discussion of findings. The site analysis includes context analysis, location background, urban analysis, and social economic aspects. This can be summarized in Fig. 2.

2.1 Site Analysis

Location Background

Rijal Alma is located in the southwest of the country specifically 45 km west from the capital of Asir region (Abha city). Rijal Alma played an important role in the historical trades because it took a place in connecting Yemen with the rest of the Arabian Peninsula and the Red Sea. The village surrounded by Al Marwah Mountain from east, Al Sharqi mountain and Al-Bayh valley from west, Faqwa mountain from north and Al Awda mountain from the south. See Fig. 3.

Urban Analysis

The history of the village goes back more than 350 years. According to the researcher Muhammad Hussan Gharib, the village witnessed development throughout history.

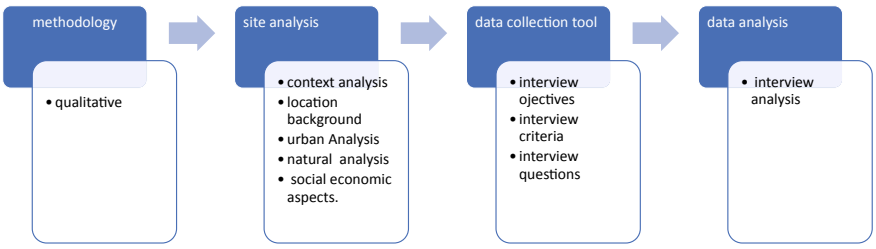


Fig. 2 Empirical case study flowchart. *Source* Authors

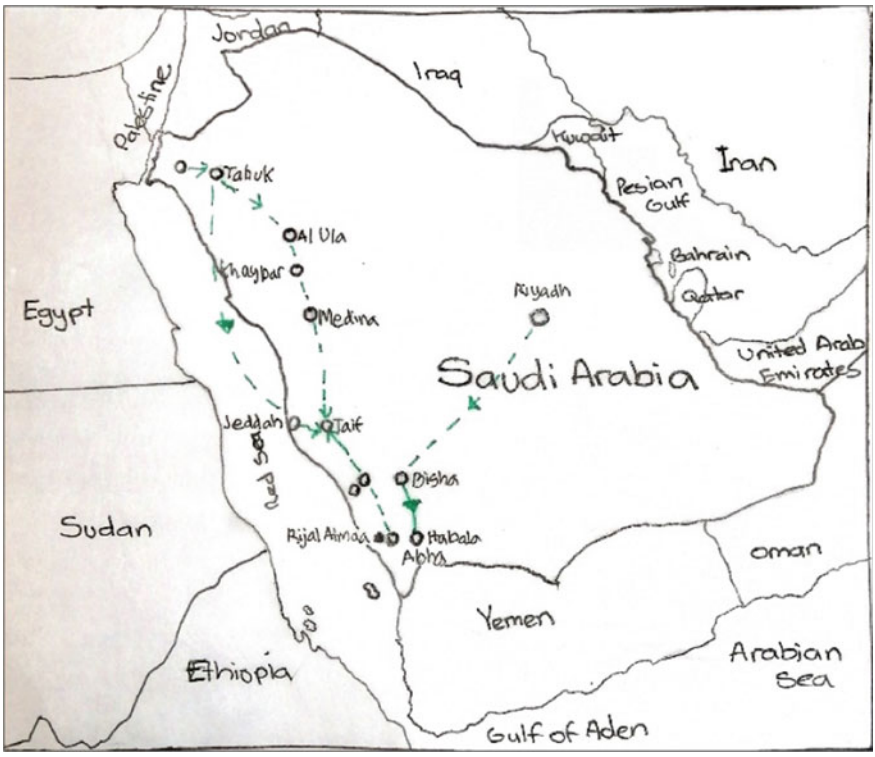


Fig. 3 Rijal Alma'S location. *Source* Author, based on google maps

There is evidence of civilizations which existed before the tenth century AH. Such as the exist buildings, roads, agricultural terraces, wells, and a cemetery found underneath the village. All of these are considered as evidence of the historical value and the life that existed in the past. The ancient Rijal Alma village was known as the trading center of the region, and it was a destination for the merchants.

Street Network and Accessibility

Rijal Alma village can be reached through several roads but there are three main roads as shown in Fig. 4.

Other way to access Rijal Alma village through cable cars. The cable cars route takes visitors from the top of Soudah Mountain in Abha to Rijal Alma village.

Natural Analysis

The Abha region is characterized by mild weather during the year. On the other hand, climate of Abha considers as warm and temperate when it is compared with winter is the warmest month of the year is June, and the coldest month of the year is January. Also, the best months to visit Rijal Alma are May, June, July, August, September.

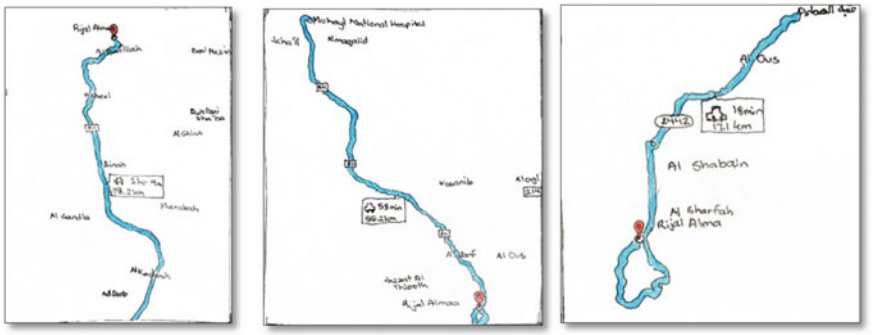


Fig. 4 Rijal Alma'S location. **a** Road that's between Al-Darb Province and Rijal Almaa Heritage Village source, **b** Road that connects the Muhayel Asir Province and Rijal Almaa Heritage Village, **c** Road that connects Aqabat al-Sama and Rijal Almaa Heritage Village. *Source* Author, based on google maps

Social Economic Aspects

The name of Rijal Alma is referred to a tribe name who lives in the village. The number of people who live in the village is around 150,000 people. The local people of Rijal Alma are proud of their heritage. In 2017 they did a great effort to restore 16 castles in the village (as shown in Figs. 5 and 6), and they won an award called Modon for its architectural heritage. A hand-woven towel with bright colors is the traditional custom of Rijal Alma. Also, the locals used to wear on their heads a crown of flowers with a local herb they are known by men of flowers which is considers as the most distinctive feature.

Fig. 5 Picture of one of the castles. *Source* Authors

Fig. 6 Close up picture of the bricks on the castles. *Source* Authors

Architectural Features

The main materials used to construct the buildings were local materials thus they were inspired by the environment itself such as, stone, mud, wood, and clay (Ali Alamaie 2019). By using these simple materials, the locals were able to build buildings that can reach up to 7 floors. Each floor in the building is considered as one apartment. The floor includes all the facilities for individual needs. The locals ensured that the building was strong enough to stand for a long time and even for the next generations by increasing the thickness of the walls, and in some buildings, it can reach more than 1 m.

The beauty of Rijal Almaa village does not end at the external envelope. It also shows in the interior spaces with colorful walls decorated with ornaments called Al-Qatt al-Asiri. This art is typically done by local women in Rijal Almaa.

2.2 Data Collection Tools

It is important to clearly state that the objective of this is to investigate different aspects of local tourism in Saudi Arabia, investigate the sources that people use to find places for local tourism and find out the factors that makes a place a suitable or not suitable candidate for local tourism with focus on Rijal Alma (location is shown in Fig. 7). This research will contribute to the vision 2030 of Saudi Arabia by raising awareness for that historic village to help preserve it.

Rijal Almaa is different from the rest of the places in the Asir province. The structures in Rijal Almaa are 1300 years old and the architecture of Rijal Almaa is a subcategory of the overall Asir architecture. This place is on the UNESCO tentative list but despite that it still does not receive its actual deserved number of visitors.

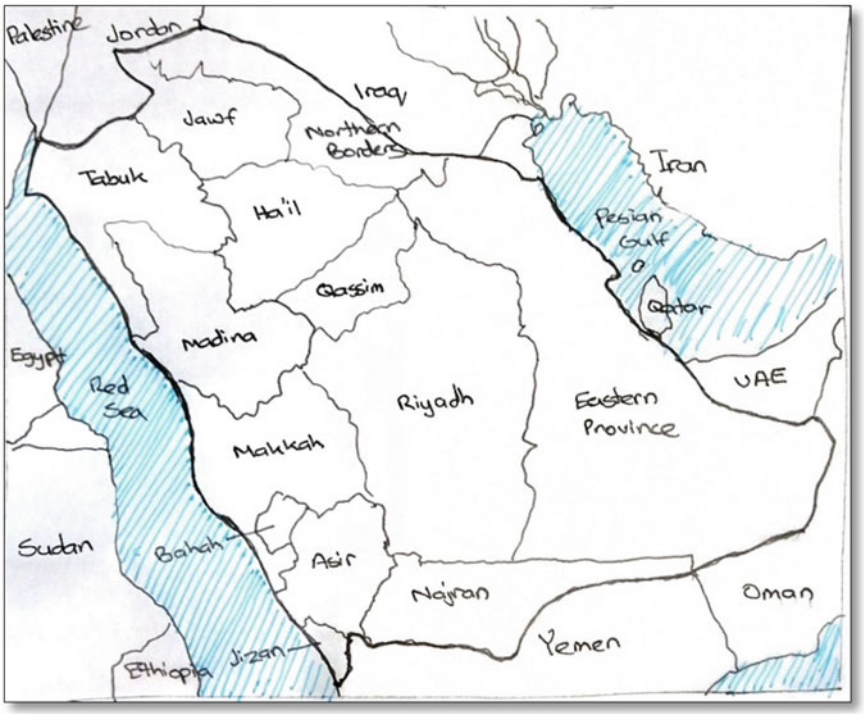


Fig. 7 Administartive map. *Source* Authors

Based on this, the methodology conducted is an action-ethnographic one using non-participative observation of the locals, urban, socio-economic surveys in addition to conducting interviews with different stakeholders. The interviews targeted people from inside Jeddah who did and did not go to visit local touristic destinations. The expected outcome is to study different perspectives about local tourism and on how to revive this rich heritage site. The authors tried to find academics mostly who are aware of heritage, vernacular architecture, philosophy, ancient history, and archaeology including architects, designers, and others since they tend to be more aware of the importance of human settlement, protecting history and historic sites.

The authors classified interviews into 4 categories. The interviews will target the people inside Jeddah who did and did not go to visit local touristic destinations. The expected outcome is to study different people's perspectives about local tourism and the sources that they use to find places for local tourism.

Figure 8 describes criteria one which is based on how long the interviewed person has been living in Saudi Arabia to determine how familiar they are with the country. Figure 9 describes citeria two which classifies the indivuals as academics/professionals or non academics, academics/professionals who are going to be asked another additional set of questions about revivalisim of heritage sites. Figure 10 describes criteria three which classifies the indivual as someone who is

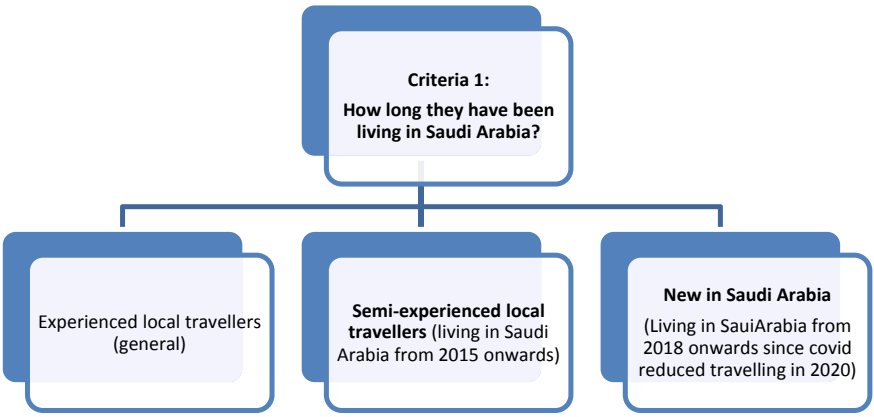
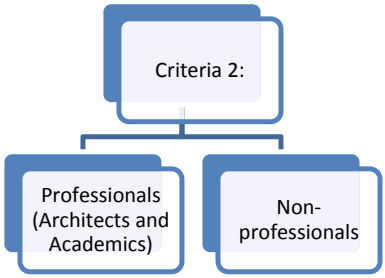


Fig. 8 Criteria 1 flowchart. *Source* Authors

Fig. 9 Criteria 2 flowchart. *Source* Author



familiar with Rijal Almaa, not familiar with Rijal Almaa and those who already visited Rijal Almaa. The ones that did visit Rijal Almaa will be asked another separate aditional set of questions which are specifically designed targething questions about their experience, accessibilty options, socio-economic aspects …,etc. of Rijal Almaa. Finally, Fig. 11 indicates how familiar the individuals particpant is with the different regions of Saudi Arabia specifically in terms of local tourism. There are 13 provinces in Saudi Arabia. Rijal Almaa is in the Asir Province at the South.

2.3 Data Analysis

This part will present the results of the interview. Table 1 presents the stakeholders interviewed and how they were selected.

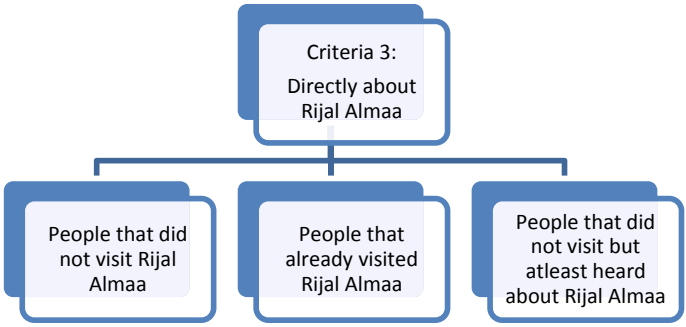


Fig. 10 Criteria 3 flowchart. *Source* Author

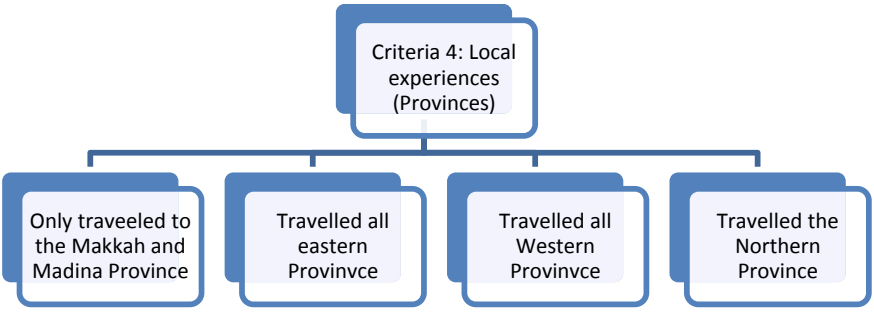


Fig. 11 Criteria 4 flowchart. *Source* Author

2.4 Discussion of Findings

It is clear from the interviews conducted that many important guidelines could be concluded:

- Developing the local community through encouraging the manufacturing of traditional goods and exporting them. This is in addition to improving their lives to give them a better exposure which will attract more tourists to the village and will also help them preserve it better.
- Launching a well-structured marketing campaign to raise awareness for Rijal Alma and involving the community into a tourism society which will give them more job opportunities, extra income and thus help in restoring the life of the community. This could also be done through websites and social media channels.
- Enhance educational sector especially for young generations who are so keen to promote for their heritage and culture.
- Plan for different training programs to help local community be ready for welcoming tourists.

Table 1 Analysis of interview results

Interview participants	Criteria 1	Criteria 2	Criteria 3	Criteria 4
Professor Dr. Mady Mohamed	Travels locally around twice annually	Academic and Architect	Did not Visit Rijal Almaa but is aware of the architecture of the Asir Province	Moved to Saudi Arabia in 2014 so decently aware of all the regions but was not familiar with Rijal Almaa
Analysis: Dr Mady Mohammad goes through the map of whichever country he is living in, selects a region then explores every single city in that region that has some kind of attraction. He googles every all the tourist attractions. Any place with an attraction however personally prefers places with a historical background with heritage sites since its related to his specialty, Architecture				
Dr. Ahmed Abdel Razik	Travels locally around twice annually	Academic, Interior Designer	Didn't know about Rijal Almaa	New to Saudi Arabia (moved to Saudi Arabia in Fall 2019) so not that aware
Recommendation from friends and family. However, Dr Ahmed Abdel Razik faced a lack of brochures and advertisement of touristic destinations from the Ministry of tourism. The government should have a system that arranges events, workshops and tours targeting new foreigners Having well preserved historical sites and museum, having seasonal festival or events or sports event that's international close to the heritage site that will attract tourists from all over the country and to an international level while keeping in mind that this event will not offend the morals of the locals. Treating the locals with respect and not as zoo animals. Encouraging the locals to increase the souvenir business of local goods and exporting handmade traditional things				
Professor Dr. Mohammed Kashef	Saudi and travels around once a year	Academic (Architect)	Is very aware of the Asir province but didn't know about Rijal Almaa	Is quite aware of all the regions of Saudi Arabia
According to Dr. Kashef the local tourism factors include well-preserved heritage without the need to be much organized to the extent that they look artificial. This was evident in his statement: "Heritage sites shouldn't be staged" since it makes the experience less appealing to the tourist He prefers to experience every place he visits like a local, he spends hours in unpopular places which are away from the tourist spots to experience the authentic feel of the city. He walks on the streets instead of using cars or any vehicles to observe the locals and their lifestyle closely, he prefers to eat traditional local foods instead of eating from known international food chains to again experience the authentic experience of the city and to support the local community. He avoids popular tourist areas since they tend to be very artificial According to the conclusion of Dr Kashef's interview Rijal Almaa can be revived by improving the lives of the locals, improving their lives will give them a better exposure which will attract more tourists to the village and will also help them preserve it better. Launching a well-structured marketing campaign to raise awareness for Rijal Almaa and evolving the community into a tourism society which will give them more job opportunities, extra income. Restoring the life of the community				

(continued)

Table 1 (continued)

Interview participants	Criteria 1	Criteria 2	Criteria 3	Criteria 4
Salma Shaker	Saudi and travels around 5 × a year	Nonprofessional (but with a design background)	Visited Rijal Almaa twice	Have Visited all the regions except AL Baha region
Salma Shaker is an active traveler; she opens the map of Saudi Arabia and checks out all the different provinces and googles the name of each city to find the tourist attractions. Most people in Saudi Arabia chooses to travel internationally during the summer break and locally in the winter breaks due to the mild temperatures however Rijal Almaa's temperature are mild all throughout the year and freezing during the winter which makes people shy away from visiting it. Depending on the season. During hot summer times Salma prefers sunny, coastal destinations and during the winter months she would travel to the rest of the cities since they are less hot in winter. Other than the season historic places are on her priority list from which we can conclude that increasing awareness of the historic significance of Rijal Almaa will improve the tourism rate This interview gave an insight about the socio-economic factor of the local community in Rijal Almaa. The people are very hospitable in nature, they like to have tourists in their village. Unlike other small villages of the region women in Rijal Almaa are heard, they can take initiatives and lead in their society. We can understand from this point that despite being in an almost remote village the people are not very conservative According to Salma Shaker the children over there are hustlers and are intelligent, they want to teach you more about their history and culture. From this we can deduce that they are all generally from a lower income status economically which makes their children work from a young age, however this point also shows that they are very aware of their culture, history, identity and are very well rooted which is a factor that helps a lot in the reviving aspect. They lack educational opportunities and will receive it well if offered considering how intelligent the children are Lastly the accessibility factor can be sorted by having well trained drivers who are familiar with the roads so they can offer transportation facilities to help people drive on these roads which will give the job opportunities. The locals are very interested in sharing their story so if trained properly and if they get some help then they can become an international tourist destination which will attract a huge number of tourists				
Dr. Haitham Hussein	Travel locally twice annually	Academic	Didn't visit Rijal Almaa but is very aware of Rijal Almaa	Very Familiar to all the regions
According to Dr Haitham the behavior of the local people affects the tourism "People plays an important role". Dr Haitham prefers to interact with the locals because interacting with people can teach you a lot about the culture, heritage, and history of a place. He prefers to use public transportation because he can chat with the people and explore their culture in 15 min apart from this he prefers places with a rich cultural background and heritage, and friendly. Dr Haitham uses social media and has been using google since 1995 to find out about places to travel Raising awareness of the environment, involving people in the process by first raising awareness so they can understand the importance of reviving and contributes to the process. Having governmental and non-governmental organizations help in the process of restoration, raising awareness				

(continued)

Table 1 (continued)

Interview participants	Criteria 1	Criteria 2	Criteria 3	Criteria 4
Dr. Mohammad Khalil	Travels very frequently in winter (every 2 weeks)	Academic (Professor of Political science, Archaeology, Intercultural Communication)	Didn't know about Rijal Almaa	Is moderately familiar to the western region of Saudi Arabia
Dr Mohammad Khalil prefers to travel depending on the season, like Salma Shaker because of the extreme heat during the summer people tend to avoid local tourism during this period. He tends to google "Site seeing in Saudi Arabia" and sometimes he looks for places to visit through social media especially Instagram since there are many traveling accounts that features local tourism in Saudi Arabia mainly One of the main concerns of Dr Mohammad Khalil was the economic factor, local tourism can be expensive to the extent that the cost might easily be equal to a trip abroad which makes many shy away from local tourism inside Saudi Arabia Rijal Alma can be revived by improving the lives of the locals and focus on their education, healthcare, infrastructure and not make the buildings the main priority of this place. The people are the ones that are going to continue saying these stories about these buildings and their histories so keeping them alive and improving their life here is very necessary. Making hotels and retails of different pricing to cover people of different incomes (economic side). Making different reasonable options because people tend to avoid local tourism in Saudi Arabia because of the steep pricing in the tourist places such as Al-Ula. They need a lot of government support for excavation, monumental restoration			

- Work on the accessibility challenges through training drivers that would also create more job opportunities for the local community, but this has to be parallel with a plan for integrating safe transportation through the mountains other than the cable cars.
- Establishing hotels and retails of different pricing to accommodate different categories of different income levels.
- Organizing events and festivals to help attract local and international tourism all through the different seasons of the year. This has already been started to be adopted by the Ministry of Culture along its plans.

3 Conclusion

This research analyzes the revivalism process of a heritage site which involves studying local tourism destinations and heritage sites. The objective of this research is to investigate different aspects of local tourism in Saudi Arabia, investigate the sources that people use to find places for local tourism and find out the factors that makes a place a suitable or not suitable candidate for local tourism. This research will contribute to the vision 2030 of Saudi Arabia by raising awareness for the Rijal Alma Heritage Village to help preserve it.

Many interviews were conducted with stakeholders with some limitations. The fact that Rijal Alma is one the potential sites to be listed in UNESCO makes it a significant tourism destination. Many suggestions have been presented from the interviews which include different guidelines. Basically, there must be a focus on integrating local community through providing educational and training programs, enhancing the manufacturing sector of traditional goods, and even integrating them in the design of the awareness and marketing campaigns which can include designing websites and promotions through social media channels.

Infrastructure and accessibility are another important factor to consider facilitating the connectivity to the different parts of Saudi Arabia and airports. Establishing hotels with different categories is also essential to help create the touristic context with all required facilities.

It could be concluded then those different factors and important touristic factors are missing and without working on integrating them in a planned framework in alignment with the Saudi Vision 2030 and through the Ministry of Culture, it would be very difficult to revitalize Rijal Alma as an important historic site. It is worth mentioning that the Ministry of Culture has initiated King Salman Charter to revitalize all traditional architectural features in Saudi Arabia which is a concrete step towards valorizing rich heritage sites in Saudi Arabia including Rijal Alma.

References

Arab N (2019) Asir, Saudi Arabia, touristic destination full of natural wonders, heritage. [online]. Available at: www.proquest.com. Last accessed: 15 Dec 2021

http://www.saudicolours.com/Saudi_Colours/mntqt_syr/Etries/2012/11/15_rjal_alm.html. Last accessed: 8 Dec 2021, last accessed: 15 Dec 2021

https://www.bayut.com/mybayut/heritage-village-abu-dhabi/. Last accessed: May 2022

https://www.visitsaudi.com/ar/see-do/destinations/abha/rijal-almaa-and-the-flower-men-of-asir. Last accessed: 15 Dec 2021

https://www.visitsaudi.com/en/see-do/destinations/abha/the-cable-cars-of-abha. Last accessed: 15 Dec 2021

Hussam A (2021) Soudah and Rijal Almaa: where Saudi Arabia's natural beauty, mild weather and cultural heritage converge. [online]. Available at: www.proquest.com. Last accessed: 12 Dec 2021

UN HABITAT (2008) Historic districts for all. https://mirror.unhabitat.org/downloads/docs/10362_1_594123.pdf. Last accessed: 4 May 2022

Taherkhani R et al (2021) Sustainable-resilient urban revitalization framework: residential buildings renovation in a historic district. J Cleaner Prod 286:124952, ISSN 0959-6526. https://doi.org/10.1016/j.jclepro.2020.124952. https://www.sciencedirect.com/science/article/pii/S0959652620349969

Ataöv A (2022) Empowering the community through participation and action in historic neighbourhood conservation planning. Front Architectural Res 11(3):492–508, ISSN 2095-2635. https://doi.org/10.1016/j.foar.2021.12.001. https://www.sciencedirect.com/science/article/pii/S2095263521000960

The Future of the City: Towards Establishing Intelligent Cities

Walaa Mohamed Metwally and Vitta Abdel Rehim Ibrahim

Abstract Technologies become more relevant nowadays in order to deliver different results and more meaningful to its residents. A smart city is an urban area that can use multi sorts of sensors and electronic means to collect its data for delivering the results needed to develop the quality of the life. When the city becomes smarter, it will be more responsive and more livable for its residents which effect on the quality of the urban design in many dimensions: as health, environmental quality, conveniency of the time, safety, the living's cost, and civic participation. Although that there is many information about the technology and its capacities, but there is a lack of information in terms of how to start, design and secure the smart city, therefore the Smart cities will be in risk if there is limited understanding in the implementation phase, and it will become vulnerable systems in the future. The research aims to study smart cities prospects and how technology is resolving confronts for better anticipate the future to make cites inclusive, secure, resilient and sustainable. To achieve these goals, the research will depend on the analytical application methodology, and it will focus on the characteristics of smart cities, and the ways to find relationship between people who are familiarity with the technology to improve the different life aspects. The findings contribute to develop the quality of the life and to acquaintance and practice by assisting smart solutions, underlying its role in sustainability development for the smart cities.

Keywords Smart city · Intelligent city · Quality of life · Information · Communication technology

W. M. Metwally (✉)
College of Architecture and Design, Architecture Department, Prince Sultan University, Riyadh, Kingdom of Saudi Arabia
e-mail: wmetwally@psu.edu.sa

V. A. R. Ibrahim
Architecture Department, Pyramids Higher Institute (P.H.I.) for Engineering and Technology, 6th of October, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_4

1 Introduction

When the United States Community Analysis Bureau employed records, aerial photography, and cluster inquiry to gather data, report issues, and allocate resources to direct services, minimize ruins, and decrease poverty, the smart city was born. A smart city employs information and communication technology (ICT) to increase operational efficiency, exchange information with the public, and deliver improved governmental life quality and service for the good of its citizens.

In the many sectors of urban systems, the environment and economics, the range of smart city application fields is very broad. The provision of real-time information regarding smart city components is critical for the operation of various useful apps and services, as well as for improving smart city performance and citizens' quality of life in the direction of a sustainable environment (Abou El Seoud 2019).

2 Methods of Research

2.1 Aim of Research

Smart cities should stipulate: an urban environment that provides citizens with a good quality of life while moreover producing economic progression. This is especially crucial in view of future urban population increase, which will necessitate more effective use of infrastructure and assets. Citizens will enjoy an improved quality of life as a result of this. The research aims to: highlight smart cities prospects, determine how technology is resolving confronts for better anticipate the future, provide an intellectual approach on how to establish a smart city towards better quality of life, make cites inclusive, resilient and sustainable.

The study explores the following questions:

- What are the benefits of smart cities?
- What are the implications of applying smart city approach?
- The possibility of benefiting from technology to better quality of life.

2.2 Methodology of Research

The research followed analytical application methodology.

It is divided into three main parts:

First part: theoretical part focuses on the characteristics of smart cities, and the ways to find relationship between people who are familiarity with the technology to improve the different life aspects, investigate smart city possibilities and how technology is addressing challenges.

Second part: global case studies were introduced and used to get lessons, focus on the characteristics of smart cities.
The third part: the research deducted and suggests a 3-d intellectual model, focuses on improving, practice by assisting smart solutions, underlying its role in sustainability development for the smart cities.

3 Definition of Smart City

A smart city retains information and communication technology (ICT) to increase operating effectiveness, sharing within the public all data, and develop government service and citizen welfare (https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city).

A smart city, is defined as: "a place where traditional networks and services are made more efficient via the use of digital and communications technologies for the benefit of its citizens and businesses," according to the European Commission.

Smart cities employ—Internet of Things "IoT" to collect real-time data in order to better understand how demand patterns are changing and respond with more efficient and cost-effective solutions. According to IoT trends, the number of linked devices globally will reach 75 billion by 2025 (Harmon et al. 2015). The growing number of interconnected things creates a massive amount of data that the city can evaluate locally to make better decisions about what modifications or new initiatives would benefit citizens the most (Fig. 1).

Smart cities can also be defined as cities that rely on electronic technologies developed during the information technology era, beginning with the digital city and progressing through the electronic city, virtual city, and finally knowledge city, given that knowledge is the most comprehensive framework for data and information (Al-Qadi et al. 2018).

A smart city is one that makes usage of information and communication technologies to enhance people's lives, in order to compete, cities must improve all elements of their operations and services (Toli et al.2020). These benefits should be represented in satisfying the economic, social, environmental, and cultural requirements of current and future generations (Lacinák et al. 2017). It has a number of benefits, which vary according on the technology utilized, the level of integration, the data collected, and how this data is used to offer the information needed to make the best decisions (Narh, 2018).

4 Importance of Smart City

The primary goal of a smart city is to improve city functions and stimulate economic growth while also improving people's quality of life through the use of smart tech-

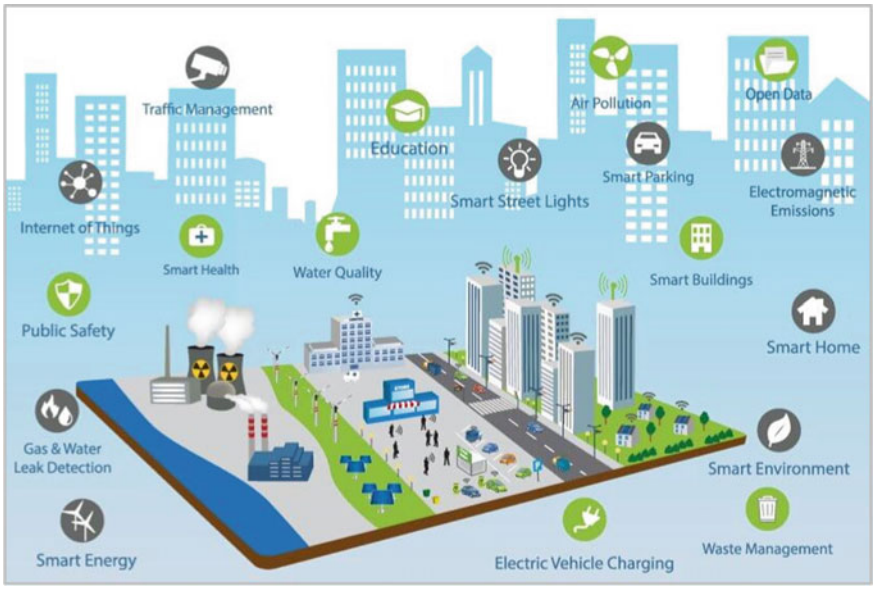


Fig. 1 Internet of Things (IoT) applications in the city (https://www.scnsoft.com/blog/iot-for-smart-city-use-cases-approaches-outcomes)

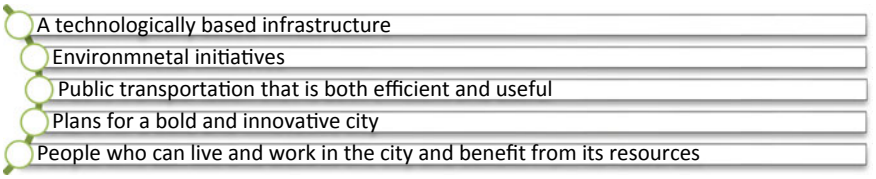


Fig. 2 Importance of smart city (https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city)

nologies and data analysis (Fig. 2). The value of technology is determined by how it is used rather than how much technology is available.

4.1 Aims of Smart Cities

- Improving the population's quality of life and delivering the greatest available services, whether in the areas of transportation, communications, the environment, information technology, or education.
- Governments must take full responsibility for turning this experiment into a genuine life model capable of lowering crises through the use of contemporary technology systems, in collaboration with city people and their cooperation.

- Massive population growth and significant pollution levels.

4.2 Challenges of Smart Cities

While the work of creating and maintaining a data-driven environment is outside the purview of local governments, the success of a smart city is dependent on collaboration between the public and commercial sectors. Furthermore, data analysts must assess the data generated by smart city technologies in order to discover any problems and make improvements (https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city).

Government officials enabling widespread civilian participation is one of the challenges to overcome. Residents must also collaborate with the private and public sectors so that everyone may contribute positively to the community.

5 How Smart Cities Work

In four steps, smart cities leverage a network of connected IoT devices and other technology to improve people's lives and spur economic growth (Fig. 3).

5.1 Smart Cities and Sustainability

The smart city concept is to use ICT to improve citizens' quality of life by improving city performance and increasing the city's level of sustainability (Ghonimi, 2021). The smart notion can be used to any form of sustainable city effort that aims to help the city achieve its long-term goals while also improving quality of life (Abou el Seoud 2019).

As smart cities strive to increase efficiencies in metropolitan areas and promote human wellbeing, sustainability is an important consideration. Cities have a number

Fig. 3 Characteristics of smart city. https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city

of environmental benefits, as smaller geographic footprints, but they also have certain drawbacks, such as the usage of fossil fuels to power them (Repko et al. 2012). One of important Smart solutions; the development of an electric transportation system to cut emissions, could help mitigate these detrimental effects. Developing sustainable solutions has the potential to help both the environment and society (Kumar, 2018).

6 International Case Studies

Cities all across the world are developing and deploying smart technology at various stages. However, there are a few who are ahead with this experience and are paving the way for truly smart cities (https://www.asme.org/topics-resources/content/top-10-growing-smart-cities).

This paper will present two international case studies: Singapore and Atlanta, the analysis of each case study will include: General city overview, Smart Nation vision, aims, and how to achieve this vision, and it will end with the advantages of each case to be as lessons learned in order to find the solutions to help sustainable development and to make smart cities successful to improve the quality of the life.

6.1 Case Study 1: Singapore, Republic of Singapore (Table 1)

Singapore has adopted a number of smart city initiatives, including the deployment of an autonomous fleet to assist the elderly and people with limited mobility (https://sustainabilitymag.com/top10/top-10-smart-cities-around-the-world).

According to the Smart Cities Index published by the International Institute for Management Development in Switzerland and the Singapore University of Technology and Design, Singapore is one of the most prominent countries that rely on modern technology to manage its affairs, making it the world's smartest city.

6.2 Case Study 2: Atlanta (Table 2)

The city's 'One Atlanta' policy aims to bring all of Atlanta's people together under one roof of 'accessibility to opportunity.' The endeavors are unfolded by the context provided ahead of time. Connecting Everyone, Street Lighting as a Data Hub, Access to Low-Cost, Clean Energy for All, and Affordable Housing (https://smartcity.press/equitable-smart-city-atlanta/).

Table 1 Case study 1. Singapore

General city overview	Singapore, called "Lion City," is one of the world's most densely inhabited autonomous countries. It boasts a multicultural population and a distinct cultural identity		
Smart Nation vision	As a response to growing urban challenges including ageing populations, urban density, and energy sustainability, it aims to use ICT, networks, and data to improve living conditions, expand possibilities, and build communities		
Aims	By fully utilizing technology, make the country the world's first smart nation; improve the country's quality of life; enhance enterprises; and create more opportunities (Lee et al. 2016)		
How to achieve this vision	Many international stakeholders, such as technology developers and entrepreneurs, are welcome to engage in this concept of using the country as a "living lab" to test novel ideas and smart solutions with global potential		
Advantages	Singapore has a well-structured basis on which to build its smart nation, thanks to its well-known infrastructure, technical innovation, and high-quality human resources. The smart services that are introduced are meant to be advanced and targeted at specific groups of people (Fig. 4 shows architecture character of the city and Fig. 5 shows smart applications strategy)		
	Most advanced smart services: the development of ITS has been going on for more than ten years in the transportation and urban mobility sectors	– Characteristics of smart nation: as a method of integration, it is necessary to develop an integrated data exchange platform among various government institutions	Needs to: create a platform for sharing data that allows all agencies to access data obtained from a common smart sensor network. Variations in data sensitivity are quite dangerous

Fig. 4 Architecture character in the city of Singapore. https://smartcitiesconnect.org/why-singapore-is-the-smart-city-of-2018/

(continued)

Table 1 (continued)

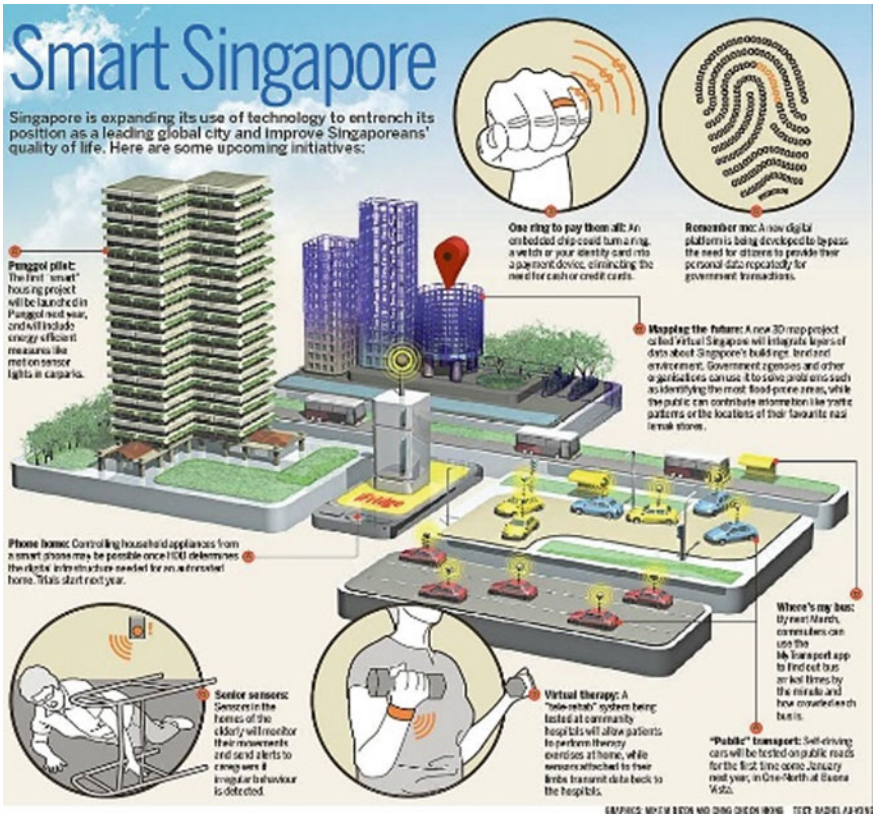


Fig. 5 Smart applications in Singapore city. (https://gregathanasius.blogspot.com/2015/01/2015-singapore-smart-nation.html)

The country set out on a mission to bring about E3A: everyone. Everywhere, all of the time

7 Towards Establishing Intelligent Cities

There is a shortage of knowledge about how to begin a smart city project. And while there is a lot of information on the technologies and their capabilities, there isn't much in the way of a defined beginning, middle, or end, and even less on how to secure each point along the route.

The study suggested three-dimensional intellectual sustainable approach, that can be employed to construct a smart city: Begin a smart city project with the use of technology and its possibilities, and secure each step along the way (Fig. 8).

Table 2 Case study 2. Atlanta

General city overview	The North avenue smart corridor, a 2.3-mile project that runs from Georgia Tech's Northside drive to freedom Parkway just past Ponce City Market, was presented as Atlanta's first smart city transportation project in 2017		
Smart Nation vision	The city is implementing smart city technologies, which are drawing international interest. Three recent developments are the North Avenue Smart Corridor, the city's huge camera network, and the first biometric terminal at a U.S. airport (Johnston 2019)		
Aims	The five main pillars on which Atlanta has decided to focus its Smart City efforts are multi-mode mobility, public safety, the environment, city operations efficiency, and citizen/business participation. Goals/Objectives: city services, public safety, and public services at a lower cost have all improved		
How to achieve this vision	Atlanta's Smart City strategic infrastructure initiative. A $250 million infrastructure bond is being used to fund a number of Smart City infrastructure projects throughout the city. As a result of these projects, the city anticipates cost savings, improved public services, increased public safety, and communications networks that meet the demands of residents and visitors (Fig. 6 shows architecture character of the city and Fig. 7 shows smart applications strategy)		
Advantages	Most developed smart services: adaptive traffic signals analyze traffic congestion in real time and adjust traffic light timing to move cars more effectively. Surveillance cameras allow traffic lights to be modified in reaction to persons crossing the roadway. A travel safely app provides aural alerts of potential threats by connecting to junctions, school beacons, and roadway users	– Characteristics of smart nation: Atlanta's Smart City strategy is built on a vast network of closed-circuit television (CCTV) cameras that are used for smart transit, crime prevention, and public safety	Needs to: Atlanta's operation shield program includes a citywide network of surveillance cameras and license plate scanners, as well as a predictive policing platform and criminal analytics software, "a network of innovative technology that create more efficient police

(continued)

Table 2 (continued)

Fig. 6 Architecture character in the city of Atlanta. https://atlanta.curbed.com/maps/map-midtown-atlanta-development-apartment-condo-office

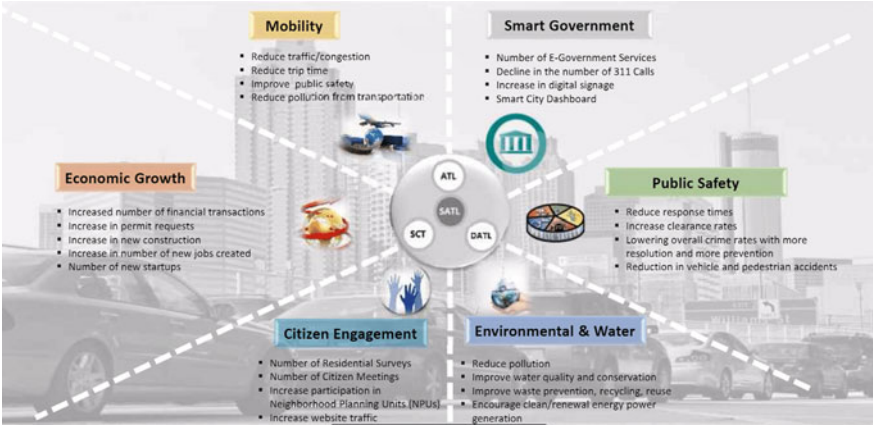


Fig. 7 Smart applications in Atlanta city. https://inform.tmforum.org/internet-of-everything/2016/09/developing-smart-city-roadmap-atlanta/

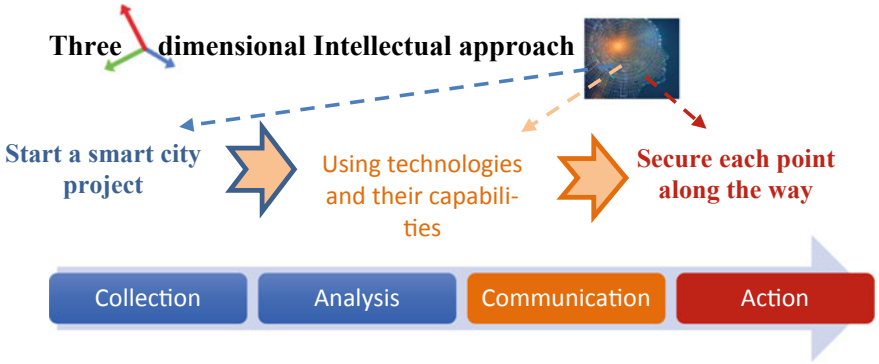


Fig. 8 Three-dimensional intellectual approach for intelligent cities (authors)

Steps will be discussed as follows:

7.1 Start a Smart City Project

- **The new way of living**

The new vision of the life which supports and improves its users' lives is looking for appealing city districts that use smart infrastructure to influence the lives of people and communities, the success of businesses, and the health of the planet around them, by providing a fully integrated, bespoke end-to-end solution. In order to create more caring, interconnected urban settings that are aware of and respond that changing situations (Abdoullaev, 2011).

This system integrates renewable and intelligent energy supply and efficiency, smart buildings, and e-mobility charging, and it should be considered the residents want a social and cultural fabric that appeals to them and gives them a sense of place (Vershinina et al. 2020). So the Infrastructure for education, residential infrastructure, health care, and security are the main needs for a new way of living.

- **The Innovation Strategy**

The innovation strategy is a company-wide strategy that supersedes all other strategies and plans, it should create a consistent and cohesive approach to projects, it lays out the city's roadmap which calls for innovation and creativity in all aspects in order to create a cultural shift for all community members, and it includes residents and employees to prepare them for the workplace and the changing workforce.

This can be accomplished by leveraging technology where opportunities for the digital economy exist, allowing for the transformation of service delivery with a new business model, developing company policies, and analyzing all processes, initiatives, and programs through a fresh lens (Vitalij et al. 2012). Furthermore, everyone should be permitted to comprehend the new direction in order to realize the concept of working together with the same goals.

7.2 Using Technologies and Their Capabilities

- **Creative and talented skills**

The ideal work-life balance needs necessitate flexible working hours with a daily pattern that is diverse, as it allows us to have new and exciting experiences every day. It can be achieved by finding smart solutions that may improve the lives of individuals and businesses (UN-Habitat, 2012). Smart cities are becoming more efficient and productive places to do business by using widespread information technology as well as resulting in the emergence of a new workforce reality.

- **Network's broadband** (Virtual collaborative spaces to succeed)

The existence of ICT as "the distinguishing factor of smart cities" is insufficient, and an overabundance of ICT has even been identified as a major flaw in a number of smart cities. Nonetheless, integrating ICT into a city can open up new possibilities and alter the city's landscape. It can be achieved by creating successful virtual collaborative spaces which required technological support ideas, such as sensor and internet of things concepts, Wi-Fi, intercommunicating microprocessors, and so on.

- **Potentials of Smart Cities**

They are the features that are available in the smart city which able to implement infrastructure management "water, electricity, information and communications, transportation, emergency services, public utilities, buildings, trash management, and sorting".

The smart city should be designed to achieve the followings:

– The existence of a wireless sensor network, which is a network of smart sensors that can measure a variety of data and broadcast it all at once to residents or authorities.
– The Internet speed in smart cities should be extremely fast.
– The citizen receives his home with all of the basics, including internet lines, a telephone network, a television network, and water and electricity meters, all of which are connected to the Internet.
– It is feasible to track any citizen's water or electricity consumption.
– Streets, as well as street advertisements, are monitored with cameras and managed over the Internet.
– The removal of negative phenomena such as robberies and crimes in smart cities, due to the existence of surveillance cameras in all streets and their co to a single room, as well as the ease with which the criminal may be identified.
– Using the Internet to obtain licenses and official documents in order to reduce direct contact between the applicant and the employee.
– Secure each point along the way (Fig. 9).
– A truly "smart" city should work for the benefit of all citizens which can be achieved by the implementation and ongoing assessment, although the commer-

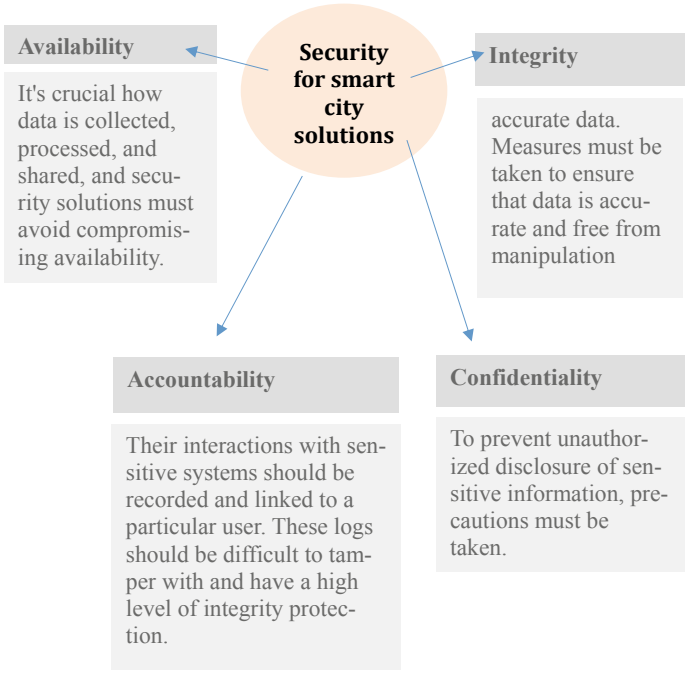


Fig. 9 Four core security objectives for smart city solutions

cial and public organizations are beset by constant change and a lack of clarity in terms of information security standards, governance, and legal duties, leaving them unclear of how to proceed with big development initiatives.

To maintain effective and efficient communication, these networks re-quire monitoring and administration, which can be achieved by an efficient smart city application, efficient networks, and integrate advanced monitoring and control technologies, the study suggested three-dimensional intellectual sustainable approach, that can be employed to construct a smart city and secure each step along the way (Fig. 10).

8 Conclusion

- Smart solutions can develop the lives of citizens, in adding to businesses.
- Smart city projects must be accessible to the general public via an open data portal or mobile app. Users can engage with the data and complete personal tasks like paying bills, finding optimal transportation options, and calculating home energy consumption. The most significant difficulty is connection, as thousands, if not

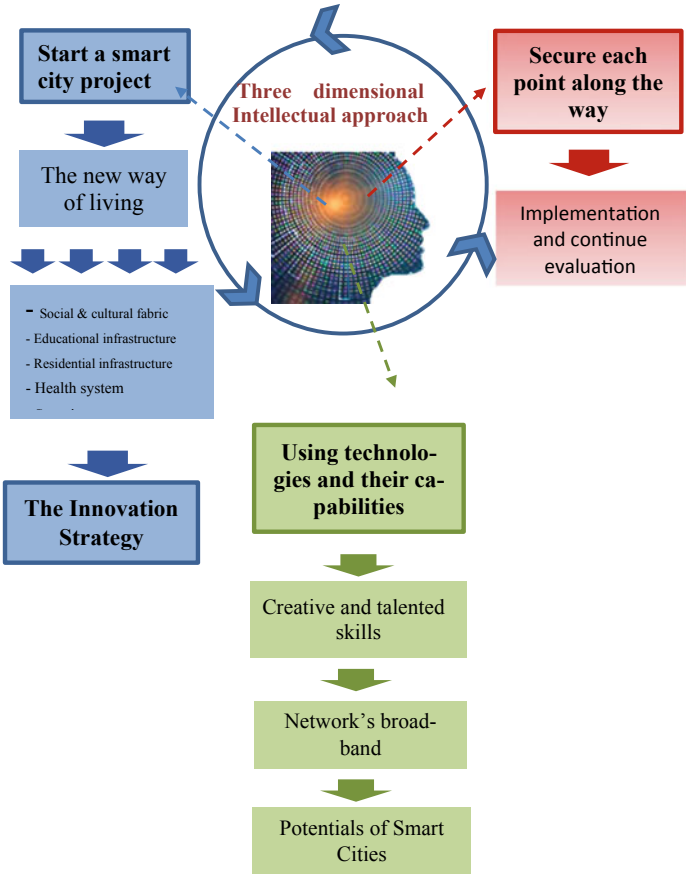


Fig. 10 Detailed suggested three-dimensional intellectual sustainable approach for establishing intelligent cities (authors)

millions, of IoT devices must connect and function together. As demand grows, this will allow services to be connected and continuing improvements to be made.

- Social elements that contribute to a cultural fabric that appeals to residents and offers a sense of place must be considered in smart cities.
- It's crucial to think about the technologies and data that will need to be collected and shared, as well as the tools that will be required to enable that experience.
- The study suggested three-dimensional intellectual sustainable approach, that can be employed to construct a smart city: Begin a smart city project with the use of technology and its possibilities, and secure each step along the way.
- The significance of appropriate policy initiatives. As a result, jobs created in smart cities must be accompanied by stronger policy in order to guide future approaches to economic development and assist workers in developing skills for the new world of work.

- Businesses in smart cities must ensure that their employees have the necessary skills.
- While technologies provide solutions and increase users' quality of life, more research is needed to evaluate the impact of excessive or reliance on technology on long-term hazards and how to avoid them in the future.

References

Abdoullaev A (2011) A smart world: a development model for intelligent cities—the trinity world of trinity cities. In: The 11th IEEE international conference on computer and information technology, The 11th IEEE international conference on scalable computing and communications, Pafos/Cyprus. http://www.cs.ucy.ac.cy/CIT

Abou El Seoud T (2019) Towards sustainability: smart cities in the Egyptian environment how much smart to be smart? J Urban Res 31

Albasri NARH (2018) The impact of technological progress in the spatial organization of the city elemnets. KnE Eng 3(4):103. https://doi.org/10.18502/keg.v3i4.2164

Al-Qadi ANAH, Al-Iraqi MI (2018) The characteristics of smart cities and their role in the transition to the sustainability of the Egyptian city. Academic Research Community, IEREK Press

Ghonimi I (2021) Smart city: a question of social sustainability in Urban Spaces? Assessing the impacts of ICT on changing urban behavioral patterns in urban spaces of madinaty, Egypt. J Urban Res 42

Harmon RR, Castro-Leon EG (2015) Smart cities and the Internet of Things. In: PICMET annual conference proceedings. https://doi.org/10.1109/PICMET.2015.7273174

https://atlanta.curbed.com/maps/map-midtown-atlanta-development-apartment-condo-office

https://gregathanasius.blogspot.com/2015/01/2015-singapore-smart-nation.html

https://inform.tmforum.org/internet-of-everything/2016/09/developing-smart-city-roadmap-atlanta/

https://new.siemens.com/global/en.html

https://smartcitiesconnect.org/why-singapore-is-the-smart-city-of-2018

https://www.asme.org/topics-resources/content/top-10-growing-smart-cities

https://www.scnsoft.com/blog/iot-for-smart-city-use-cases-approaches-outcomes

https://www.twi-global.com/technical-knowledge/faqs/what-is-a-smart-city

Johnston K (2019) A comparison of two smart cities: Singapore and Atlanta. J Comp Urban Law Policy 3(1)

Karunakaran K, Shanmugasundaram N, Pradeep Kumar (2018) Analysis of smart energy supply to smart city—review. Int J Pure Appl Math 118(20):757–762. ISSN: 1311-8080; ISSN: 1314-3395 (on-line version) http://www.ijpam.eu Special Issue (2018)

Lacinák M, Ristvej J (2017) Smart city, safety and security. In: TRANSCOM: international scientific conference on sustainable, modern and safe transport. Procedia Eng 192. www.sciencedirect.com

Lee SK, Kwon HR, Cho H, Kim J, Lee D (2016) International case studies of smart cities. IDB-KRIHS Joint Research, Inter- American Development Bank, Singapore, Republic of Singapore

Repko J, DeBroux S (2012) Smart cities literature review and analysis, emerging trends in information technology, IMT 598 Spring

Smart cities—new safety for the cities of tomorrow. Energy and Building Solutions Global, Bosch Sicherheitssysteme GmbH. https://www.boschbuildingsolutions.com/xc/en

Toli AM, Murtagh N (2020) The concept of sustainability in smart city definitions. Built Environ. https://doi.org/10.3389/fbuil.2020.00077

UN-Habitat (2012) Safer cities programme. [online]. Available at: http://unhabitat.org/urban-initiatives/initiatives-programmes/safer-cities/

Vershinina IA, Volkova LV (2020) Smart cities: challenges and opportunities. Rev Espacios 41(15). ISSN 0798 1015
Vitalij F, Robnik A, Alexey T (2012) Safe city—an open and reliable solution for a safe and smart city. Elektrotehniški Vestnik 79(5):262–267

Strategic Development Plan Proposed for the Future City NEOM

Abdulaziz Nasser Aldusari

Abstract This study will propose a strategic development plan for NEOM area emerged from the project launched by His Royal Highness Prince Mohammed bin Salman—Crown Prince and Minister of Defense—and Chairman of the Board of Directors of NEOM, The Line project, which is a smart stripe city project that begins From the site of the King Salman Bridge in the Gulf of Aqaba in the west and extends to the east for a distance of 170 km, this proposal comes to complete the success of the project in an integrated urban form in the short and long term, in line with the Kingdom's Vision 2030. This study aims to develop a strategic plan for the comprehensive spatial development of the entire NEOM area as a city for the future, in which the nucleus is The Line project for a balanced development spread over the entire region, considering the planning and environmental considerations and its potential for growth and development according to the stages and priorities of development in the area. The comprehensive strategic plan for the NEOM area includes three stages, the first of which is the development of the future vision for the NEOM area, followed by the development of the various sectoral strategies for the project, such as strategies for the environment, smart transportation, utilities, and other sectoral strategies related to the project, in which smart technical applications with artificial intelligence will be used in the project. Then the third important stage, which is the preparation of the structural plan for the entire NEOM area, is the missing study that will be clarified in this proposal. The study has adopted the case study method by reviewing the Neom area project to develop a comprehensive strategic proposal for a future city acquiring the kingdom Vision 2030.

Keywords Neom · Strategic plan · Structure plan · Future cities · Saudi vision 2030

A. N. Aldusari (✉)
King Saud University, Riyadh, Kingdom of Saudi Arabia
e-mail: adawsari@ksu.edu.sa

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_5

1 Introduction

The Saudi Arabian development is not a recent phenomenon, rather it is a stable aspect of modernization in which each generation is developed based on its antecedents. Over the years, Saudi Arabia has enhanced the lives of its citizens by using the wealth generated from the natural resources of the Kingdom for funding the social and economic development of the country (Farag 2019). Every aspect of human development has fostered drastically in the span of a single generation, including infant mortality, per capita income, life expectancy, literacy, etc. Saudi Arabia has massive promising opportunities and a rich combination of natural resources; however, the real wealth lies in the individuals and society (Hassan 2020).

The notion of development in KSA is not newer; however, it has been embarked on decades earlier with the aim of modernizing the generation, improving the people's standard of living, and tapping and optimizing the natural resources for the betterment of the people of KSA (Kinninmont and Kinninmont 2017). It is observed that generational transformation would start taking shape as the era approaches 2030. More interestingly, the Vision 2030 is envisioned to acquire the goals of social, economic, and political transformation, particularly with the green technologies, advancement in education, industry, digital governance, and promotion of art and culture (Kinninmont and Kinninmont 2017).

The oil revenue plays an important role in Saudi economy. The trend in oil revenue has also affected the country's gross domestic product (GDP) as the revenue from oil constitutes a large proportion of GDP. Oil revenue has also been used in financing government spending with the rise in price of oil in 2003 and thereafter, the proceeds of the government from oil increased and its share in government revenue increased from 78.8% in 2003 to about 92% in 2012. Again, with a recent dip in the price, its share goes down to 64.2% in 2016 (Alkhateeb et al. 2017). This shows that the economy of Saudi Arabia still relies on oil. The concern here is not regarding oil reliance but it is about the variation in oil prices over the span. In addition, an extreme reduction in oil prices can be destruction for economic growth. From this perspective, Crown Prince Mohammed bin Salman took an initiative by releasing Vision 2030 to end the dependency on oil (Aly 2019). Additionally, the announcement was also based on a mega-project for developing a new city: Neom, to be associated with Jordan and Egypt.

Vision 2030 is an all-embracing strategic plan that aims to lead Saudi Arabia for thriving in a post-oil era. The reliance of this vision is on three aspects: (1) an ambitious nation; (2) a vibrant society; and (3) a thriving economy (Dasari et al. 2020). The geological structure of Saudi Arabia comprises two major geological aspects. The eastern section is sedimentary strata dipping east and northeast; while, the western section is majorly comprised of ancient metamorphic and igneous rocks, called the Arabian Shield. In this region, natural water resources are restricted and relied on wadi flow and rainfall (Kahal 2020). On the contrary, prolific aquifers of the eastern sedimentary part possess large volumes of fossil groundwater. Also, the Saq aquifer, which is regarded as a major aquifer in the Arabian Shield (Lloyd and

Pim 1990), is based on groundwater while the area of the Tabuk aquifer has spread over 200 m bgl with groundwater (BRGM and Abunyan 2006).

The Vision 2030 and its National Transformation Program lays out the potential of associations between the Saudi state and its citizens while it intends to diversify the economy and strengthen a variety of sectors in the country (Alfawzan et al. 2020). Saudi Arabia prefers its rising youth population and emphasizes plans for fostering education and employment in the context of a global landscape associated with progressively competitive entrepreneurship. The initiatives intend to empower young Saudi citizens for carving out a platform for the Kingdom with respect to the conventional cultural values and a progressively interrelated world (Grab et al. 2018). The Kingdom is also investing majorly in research and development for strengthening the world-class technological universities of the country. This boost and promote the finest entrepreneurial notions among future generations. In addition, the social development of the Kingdom has led to the participation of women in the workforce (Alotaibi et al. 2019).

At present, the oil and gas sector totals 50% of gross domestic product (GDP) and 70% of export earnings. On the contrary, the reliance of Saudi Arabia on fossil fuels conducts significant risks that prompt the requirement for transformation. From a longer perspective, the global transformation represents a historical shift from hydrocarbon fuels to renewable and low-carbon energy (Alkeaid 2018). The need to circumvent the adverse effects of global climate change adds greater pressure on developing and deploying new technologies when mitigating hydrocarbon consumption even though the speed of this transition is currently insufficient (Albalawi and Eisa 2019). Failure to diversify its economy would leave Saudi Arabia susceptible to substantial modifications in energy markets globally. Therefore, linear projects should elevate domestic pre-requisite throughout the predictable future even though internal consumption has slowed since 2015.

This study aims to develop a strategic plan for the comprehensive spatial development of the entire NEOM area as a city for the future, in which the nucleus is The Line project for a balanced development spread over the entire region, taking into account the planning and environmental considerations and its potential for growth and development according to the stages and priorities of development in the area.

2 Methodology

The study methodology relied on the Basic Theoretical Research approach, according to the study's aim and directions, which were also supported by the descriptive research approach by describing the phenomena and current conditions of the Neom region, the Tabuk region, and the northwestern coast of the Kingdom of Saudi Arabia. The case study method has also been used as a methodology applied to the NEOM region and the application of a development model for the region that anticipates the future development of the region considering the planning, economic and social considerations, and the directions of the Kingdom's Vision 2030.

A case study approach was adopted as a research method in this study. Data collection for case studies entails sources such as archival records, direct observation, and documentation. A case study is an adequate approach for researching a field in which there were limited previous studies. The case study analysis was appropriately selected because of its appropriateness in real, complex, and actual circumstances.

The data used in this study is the historical and descriptive extrapolation of the study area of the natural and environmental components, and the importance of the location and history for reviewing the studies carried out in this region. This is because the process of sustainable development planning is a process to draw an estimate of the future development activity in a specific place and in the future.

3 NEOM Project

Saudi Crown Prince Mohammed bin Salman announced plans to build a new city on the Red Sea coast, promising a lifestyle not available in today's Saudi Arabia as he seeks to remake the kingdom in a time of dwindling resources. The prince said the city project, to be called "NEOM," will operate independently from the "existing governmental framework" with investors consulted at every step during development. The project will be backed by more than $500 billion from the Saudi government, its sovereign wealth fund and local and international investors (Shahine et al. 2017). Neom has a special consideration on the Red Sea coast, linking Africa, Asia, and Europe. In addition, it has a competitive advantage in transforming the Kingdom and branding a new image and value. It has been hypothesized that the innovative city of Neom will rise FDI into Saudi Arabia from 3.8 to 5.7% of GDP. The objective of this project is to use digital technologies for making Neom a major commercial and business hub in the Middle East.

The project is in the northwest of the Kingdom, with a total area of 26,500 km^2. The terrain includes mountains, desert areas and beaches stretching over 460 km on the Red Sea coast. Saudi Arabia has established a special body to oversee the project. The project, with investments of US $500 billion by the Public Investment Fund, is expected to have from 500,000 to 1.5 million inhabitant in 2030 (Fig. 1).

Fig. 1 An aerial maps of NEOM area project. *Source* NEOM Official Web Site (2017)

The Neom project aims mainly to address the issue of economic leakage in the Kingdom of Saudi Arabia, in addition, to activate the role of modern technologies such as robots, artificial intelligence, nanotechnology, government computing, biotechnology, and Internet objects in 11 major sectors as follows:

- Future of energy and water.
- The Future of Mobility.
- Future of Biotechnologies.
- The future of food.
- Future of advanced manufacturing.
- Future of Media.
- The future of entertainment.
- The future of technical and digital science.
- The future of tourism.
- The future of the sport.
- The future of lifestyle.

4 Optimal Utilization of Neom Area Resources

4.1 The Distinctive Location of the Future City NEOM

A planned location was chosen for NEOM city, within the country's red sea coastline, next to the lovely sights of the Gulf of Aqaba, which was adjacent to the Suez Canal where maritime trade routes are present. The rationale for choosing the location can be its plethora of exceptional development abilities that could present NEOM as a global hub for trade, origination, and information. The topographical location along with its geography and climatical features presented in Figs. 2 and 3 can contribute for picking up the new land for beginning NEOM, along with pristine nature, astonishing mountain backgrounds than can be shielded with snow in winters, the incessant coastline along with undamaged seashore, and coral reefs, many remarkable islands, nonviolent deserts, moderate temperatures, Red sea winds, and over the head of them can be the lovely sights across the Gulf of Aqaba and the Red Sea. The ex-chairman, CEO of AR conic Alcoa Inc., and Siemens AG. Klaus Kleinfeld is one of the revolutionary investors in NEOM has admired the new city's location in the announced conference for initiating NEOM. He disclosed the exclusive structures of the particular location which contained 26,500 km^2 available land with 500 km of beachfront having sand, coral reef, and the stirring and attractive mountains that go up to 2500 m can be bounded by much-steeped drops and likes an enjoyable climate where the breeze soothes every time. The new land can be placed in a worldwide central economic location. It can get held by an eight-hour flight with 70% of the people, everything can furnish to the project's achievement. Something that makes NEOM a different economic zone can be the knowledge of the exclusive location lies in the north-western region of Saudi Arabia that contains shared border areas with

Fig. 2 Maps of Saudi Arabia and Tabuk region with NEOM area. *Source* The Researcher after Tabouk Municipality Maps

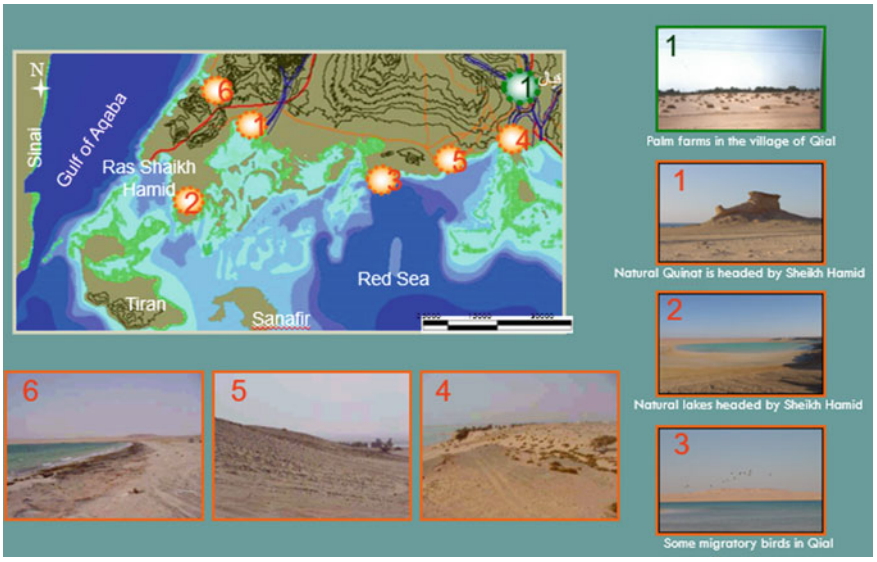


Fig. 3 Potential areas of development in Neom. *Source* The Researcher after Tabouk Satellite Image

Egypt and Jordan which is one of the world's boldest economic arteries, somewhere 10% of the world's trade can flow through the Red Sea.

4.2 Economic Aspects of Local Communities

The people residing in the kingdom have practiced many changes in terms of cultural, political, economic, and social aspects with sequential moments that differ between the pre-and post-oil areas. Before the oil discovery in 1970 (Alban 2016). The Saudi economy heavily relies on sectors thereof religious tourism, until the oil was found

in 1938, which has recognized Saudi Arabia as the major source of petroleum in the world. The significance of the Kingdom of Saudi Arabia's global economy has shown inclination in the field of oil products trading since 1960 (Holden et al. 1982).

The dependency of Saudi Arabia majorly lies on the oil income and their citizens rely more on the government support (Alban 2016). The requirement of the creative population which have turned out as a force to be reckoned with (Pfefferkorn 2005). The "Creative Citizen Group" can be referred to as the individuals whose economic value can be the new revolutionize ideas technology or creative content in a particular domain. This particular set has an important role in the branding of the city.

Neom is aimed to stay harmless, most effective, more concerned with the future, and would be the best place to live and work (NEOM Official Web Site 2017). Neom can be branded in this way on visual and social media. City branding is the procedure that has s purpose to link the city's image and values to the world in an imaginative way (Helmy 2008).

Elevating the Participation Rate of the Region

Forecasting future jobs is an important aspect of preventing inequalities among employees in larger segments and assisting them in benefitting from the available opportunities in the economy for generating future opportunities (OECD 2019). On the contrary, the rate of unemployment, social cleavages, and elevating discontent will be elevated by failure for planning and predict future jobs, harming productivity growth, wellbeing, and social cohesion. It is stressed by Pompa (2015) that the effective approach for reducing these challenges is to seriously engage in cross-sector collaboration. Academics, stakeholders, business leaders, policymakers, students, and employees themselves all must collaborate toward positive findings. The potential risk is a mismatch between the needs of the labor market and education consequences, incompetence for achieving domestically and internationally, and delayed economic development if future jobs are not forecasted (Riyadh Economic Forum 2020). A gap exists between the needs of the labor market and higher education consequences (Alzahrani 2018; Aref et al. 2018).

Modern technology is an aspect that affects the water and energy sector, as well as future jobs associated with this sector. According to Smith (2017), modern workers experience a substantial challenge in the energy and water sector since more than 80% of workers lack skills in the water sector. In addition, technological development is anticipated to construct additional jobs in renewable energy.

4.3 Branding NEOM as the Future City with Advanced Technology

Branding is utilized for identifying how much the sold products, goods, or services are different and competent for fulfilling with others. Branding intends to construct an emotional attachment, high-quality physical attributes, and a feeling of engagement.

When it comes to city branding, it is explained as shaping an urban imaginary for a place that reflects perceptions and feelings regarding urban life and image (Helmy 2008). It has been observed that the city branding became essential for survival globally which has been implied by economic fulfillment.

The different requirements of employment, housing, public transportation, recreational attractions, and industry are undertaken in a city function along with the values such as the experience of the city and its appearance from the people's perspective. The achievement in branding for each city can be emphasized on its comparative advantage either in attractions, lifestyle, tourism, economics, demographics, quality, and history (Pfefferkorn 2005). This might be an important enabler for the Kingdom for deliberating on the decision to establish NEOM, stressing strategic studies on the plan on the basis of urban, economic, and social situations.

Branding NEOM is an important aspect, and it is possibly intended for attracting the creative class and investors in the preliminary phase of this massive project. Due to the strong attraction of foreign labor, the dramatic change in the demographic structure enables the availability of jobs with lucrative salaries. Moreover, a strong economy and advanced technology have enforced the urban branding, whereas national projects have drawn an image of welfare and progress, all of that worked collectively for elevating the attractiveness of the city region as a place for living, visiting, or doing business for the investors, entrepreneurs, and international tourists (Helmy 2008).

The overriding rationale for creating Neom and transitioning to an AI-driven future has been highlighted by the Saudi elites; In addition, nearly $100 billion of new public spending with $36 billion packages of new jobless benefits, education, and housing subsidies was declared by the government. The economic transition towards a green economy will assist in diversifying GDP by shifting towards renewable energy resources (Atalla et al. 2018).

AI is required for allowing the leapfrog industrialization of Saudi Arabia (Daye 2019). Here, Neom plays an important role in moving the Kingdom towards advanced manufacturing. Moreover, the advent of AI has raised serious concerns about the effectiveness of governance systems. Particularly, the technologies, driven by AI such as traffic control and criminal investigation (Wright 2018). Regardless of the fact, AI technologies are developing by leaps and bounds across the globe and it imposes itself strongly on the branding of the modern cities of the future, such as NEOM.

NEOM will be a promising platform for Saudi Arabia with declining demand, insufficient investment opportunities, and falling oil prices (Altahtooh 2019). Asia and Africa will be connected with a bridge where solar panels will be paired with wind turbines for generating energy, and mobility across air, sea, and land. Media, digital sciences, and technology will join with state-of-the-art technology and advanced manufacturing. This futuristic city will be an independent zone, with its social norms

and own regulations created for its residents and their healthy lifestyle and in assumption to attract the top talent of the world. This strategic location is one of the dominant aspects of the world, which is destined for making NEOM branding a global commercial platform for innovation, knowledge, and trade (Muzafar and Jhanjhi 2020).

5 The Proposal: A Comprehensive Strategic Plan for the Neom Area

This proposed idea for a comprehensive strategic plan for NEOM emerged from the project launched by His Royal Highness Prince Mohammed bin Salman—the Crown Prince—and the Chairman of the Board of Directors of NEOM, The Line project, which is a smart linear city project starting from the site of the King Salman Bridge in the center of Sheikh Hamid on the Gulf of Aqaba in the west and extends to the east for a distance of 170 km. Therefore, it is suggested here to complete the success of the project.

Integrating it with the entire scope of the area that will be developed in the NEOM area, which has an area of 26,500 km^2, it is preferable to adopt a comprehensive strategic plan proposal for the entire NEOM area, including the approved The Line project, which will not change but will be the core of the structural plan for the entire NEOM area as well as for local structural plans For the different stages of the development of the Greater NEOM area, After that, it will draw a full development around the line project for the comprehensive development stages in NEOM, north and south, so that it is integrated and interconnected with it, which will support and confirm the success of the project in a sustainable economic, urban and environmental manner.

The comprehensive strategic plan for the Neom area includes three important components:

The first: is to develop a future vision for the NEOM area, and this has been completed before, and parts of it have been clarified in this study.

The second: are the sectoral strategies of the project, such as the strategies of the environment, transport, economy, utilities, public services, housing, and other sectoral strategies related to the project.

And the third: Is the structural plan for the entire NEOM region, which is the missing link, but it's presented by this proposal. This idea presents the general form of the structural plan for the NEOM region, which must also be followed by studies to make detailed local structural plans for each part of the region as a clear general vision when implementing according to the stages and procedures and project implementation programs.

The Line project is the heart and main axis of the idea presented here for the structural plan for the entire NEOM area, which represents a comprehensive vision of what the entire area will be like if all development stages are completed, given that The Line project is the first stage, then followed by the development of the areas north and south with the same planning thought, This means that the comprehensive development in the entire area will be in the form of linear urban development axes (similar to The Line), all of which radiate from the central area in the heart of the Neom project (Hub). This area is the starting point for the King Salman Bridge linking Asia and Africa, as well as all the axes of radiological development, converging there.

5.1 Neom Structural Plan Concept

The idea of the structural plan for NEOM was born from the data of the general location of the project, which is located on the Gulf of Aqaba, as well as from the main nucleus of the project, which is The Line project, which extends from the central area of the project at the beginning of the King Salman Bridge area, extending 170 km to the east. This pivotal pattern of development is repeated radially, starting from the heart of the project, which is the main center of the region by means of three land strip development axes—Land Lines—and two other coastal development axes—Sea Lines—(as shown in Fig. 4 of the concept of the structural plan of NEOM).

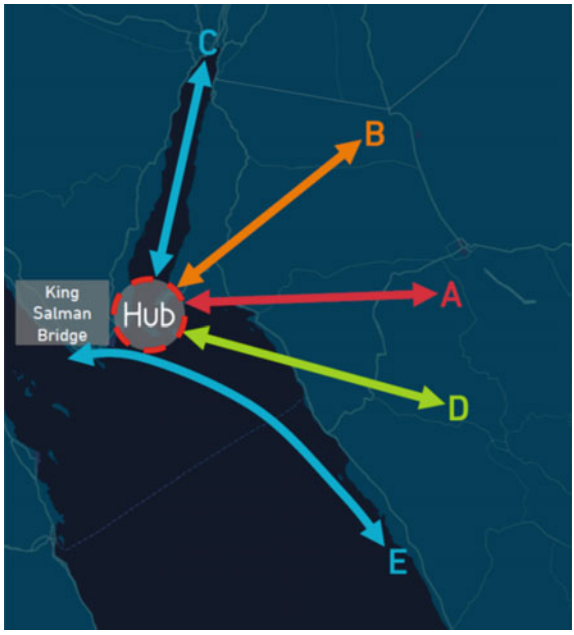


Fig. 4 The concept of the structural plan of NEOM. *Source* The Researcher

The structural plan of the NEOM region with its six components' will be summarized in the next sections.

First—Central Area: (Hub—H—Logistic)

It is the area of services and logistical facilities supporting industry, mining, and other activities in the central area presented in Fig. 5, from which the King Salman Bridge, which will connect the continents of Asia and Africa, and the location of this area is in the old Sheikh Humaid village, which is located at the beginning of the Gulf of Aqaba in the Red Sea in the west of the Kingdom, and from this central area the axes of Stripe development (The Line) in an integrated and interconnected radiative manner with the surrounding environment.

Second—The first strip urban development axis (Land Line 1—L. L1)

It is The Line project as the nucleus of the NEOM project (as shown in Fig. 6) and with the same planning considerations that announced the project that it consists of a 170 km long development axis with the means of transportation and services with artificial intelligence, and along it are urban communities with an urban area of no more than five minutes' walking distance, the centers of these complexes in this axis are (A1, A2, A3, A4).

Fig. 5 The central area of NEOM. *Source* Researcher

Fig. 6 The line project is the nucleus of the NEOM project. *Source* Researcher

Third—The Second strip urban development axis (Land Line 2—L. L2)

The development here is inspired in the same way in the first phase of The Line project (as shown in the figure HB) and extends from the central region from west to east with a length of 170 km, and the urban communities are formed around the axis with urban blocks within a five-minute walk, and the centers of these communities in this axis are (B1, B2, B3, B4).

Fourth—The Third strip urban development axis (Land Line 3—L. L3)

This is the third Land Line development axis in the same way as the first phase of The Line project (as shown in Figure H–D) extending from the central area from west to east with a length of 170 km, and urban communities around the axis are composed of urban blocks within a five-minute walk and centers These complexes in this axis are (D1, D2, D3, D4).

Fifth—The northern coastal strip urban development axis, (Land Line 3—L. L3)

This is the coastal strip development axis, Sea line N. (as shown in Fig. 7), and extends from the central area from the south to the north with a length of 170 km. The coastal development axis must make a detailed study and a detailed local structural plan that shows the path of the appropriate axis, whether by floating sea tube or smart rapid ferries or land smart transportation along the coast, where the most appropriate solutions are developed for the nature of the site and the required function, as well

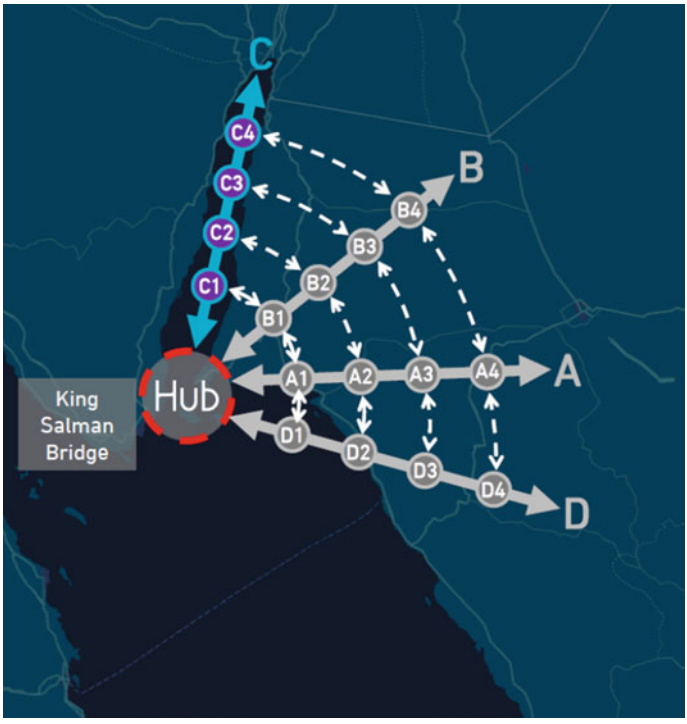


Fig. 7 The northern coastal strip urban development axis. *Source* The Researcher

as studying the locations of urban communities on this axis in a manner appropriate the conditions of the area and its integration with the structural plan. In principle, the locations of the centers of these gatherings in this coastal axis are (C1, C2, C3, and C4).

Sixth—The Southern coastal strip urban development axis, (Sea Line 2—S. L2)

This is the second coastal axis of development, and it is the axis of the southern coastal strip development, Sea line S. (As shown in Fig. 8) and extends from the central area—H—north to south along the coast from the side of Qayal and about 170 km in length. This coastal development axis needs a detailed study and a local structural plan showing the appropriate axis path, whether in the sea in the form of a floating tube or fast smart ferries or on land along the coast, where the most appropriate solutions for the nature of the site and the required function, as well as studying the locations of urban communities on this axis in a manner that takes into account the conditions of the area and its integration with the structural plan, as well. The urban communities around the axis will be in urban blocks within a five-minute walk, and the locations of the centers of these communities in this coastal axis are (E1, E2, E3, E4).

Fig. 8 The Southern coastal strip urban development axis. *Source* The Researcher

Finally: The Coherence and integration of the structural plan of the Neom area

By explaining the concept of the idea of the comprehensive structural plan of NEOM, which was clarified in the previous six points and presented in Fig. 9, an important conclusion can be drawn, which is the importance of integrating and interconnecting the project with each other through smart transport networks with the strip development axes, whether land or sea, in order to link urban communities and various activities within the area and the outer periphery, as well as It is important to clarify the connectivity and correlation orthogonal to the axes of strip development (such as A1, B1, C1, D1, E1) as well as (A2, B2, C2, D2, E2) and also (A3, B3, C3, D3, E3) and finally (A4, B4, C4, D4, E4) by using advanced means of connectivity, whether by autonomous planes or by any creative and innovative means of artificial intelligence.

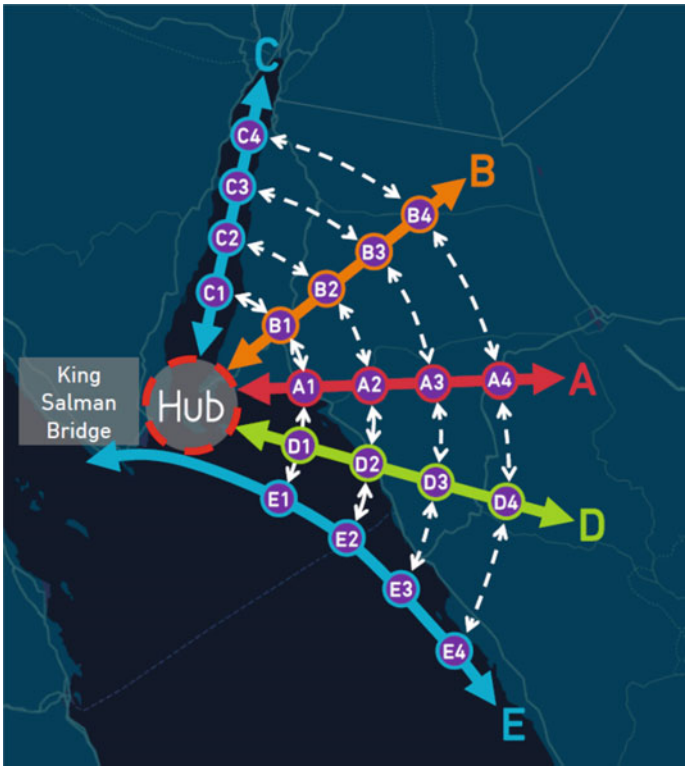


Fig. 9 The comprehensive structural plan of the Neom area. *Source* The Researcher

The Proposed Plan for the Implementation of the Structural Plan for NEOM

To ensure the success of the development of the NEOM project over its entire geographical area, it is necessary to study the priorities and stages of its development (as shown in Fig. 10), which will start with the first stage, which is the line project (A) with the central area (Hub), and then followed by the various stages (B-D-C-E), and this depends on the results of detailed economic, environmental and urban studies, which will determine the logical sequence and the realistic stages of project implementation. (It is possible to implement the third phase before the second phase, according to feasibility studies and development priorities).

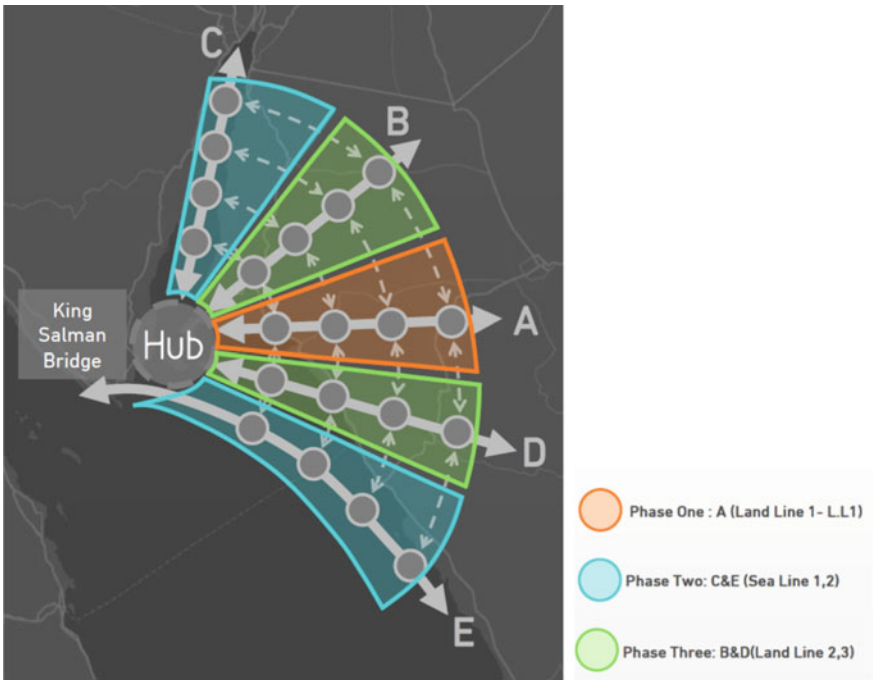


Fig. 10 The proposed plan for the implementation stages of the structural plan for NEOM. *Source* Researcher

6 Conclusion

This study adopted the development of a comprehensive strategic vision for the entire Neom region. It is a vision for the development of a comprehensive regional strategy for the future of this region according to the directions of the Kingdom's Vision 2030, in which the various sectoral and physical development features of the region appeared, as well as the temporal development stages, whether in the short term, which is the first stage represented by The Line project, or at the med-long term urban development. This calls for various detailed studies of the entire region at the regional, sub-regional, and local levels. These studies include economic, social, urban, and natural studies, especially regarding environmental and geological aspects, whether on land or in coastal and marine areas. The result of these detailed studies is the influencing factor for the development of this proposal, which has high flexibility that helps it adapt to the modifications and additions that will appear after obtaining accurate results with these detailed studies. Added to this is the impact of the importance of NEOM as a strategic location that connects the three continents through the King Salman bridge. This proposal resulted in a concept of a structural plan that clarifies the urban vision for the development of the entire NEOM geographical area, with a proposal for the executive stages of the urban development in the region,

including smart public transport networks and the various land uses and activities in a manner that depends on different applications of modern technologies in future city concept such as artificial intelligence.

References

Albalawi H, Eisa A (2019) Energy warehouse—a new concept for NEOM mega project. In: IEEE Jordan international joint conference on electrical engineering and information technology (JEEIT). IEEE, pp 215–221

Alban A (2016) Architecture, and cultural identity in the traditional homes of Jeddah. PhD dissertation, University of Colorado. ProQuest LLC

Alfawzan F, Alleman JE, Rehmann CR (2020) Wind energy assessment for NEOM city, Saudi Arabia. Energy Sci Eng 8(3):755–767

Alkeaid MMG (2018) Study of NEOM city renewable energy mix and balance problem. KTH Royal Institute of Technology, School of Architecture, and the built environment, Stockholm, Sweden

Alkhateeb T, Sultan Z, Mahmood H (2017) Oil revenue, public spending, gross domestic product and employment in Saudi Arabia. Int J Energ Econ Policy 7(6):27–31

Alotaibi DM, Akrami M, Dibaj M, Javadi AA (2019) Smart energy solution for an optimised sustainable hospital in the green city of NEOM. Sustain Energy Technol Assess 35:32–40

Altahtooh AA (2019) A model of the critical success factors for the Neom project in the context of a project management information system. J Manage Strategy

Aly H (2019) Royal dream: city branding and Saudi Arabia's NEOM. Middle East-Top Arguments 12:99–109

Alzahrani M (2018) Appropriateness of the King Saud University Art Education Program's outputs for the needs of the Saudi labor market in accordance with Vision 2030. J Educ Sci 30(3):427–451

Aref A, Hegazy A, Abdel-Hamid M (2018) The quality of learning outcomes in Saudi universities and their role in meeting the requirements of the Saudi labor market, in accordance with Vision 2030. J Sci Res Educ 19:683–741

Atalla TN, Gasim AA, Hunt LC (2018) Gasoline demand, pricing policy, and social welfare in Saudi Arabia: a quantitative analysis. Energy Policy 114:123–133

BRGM, Abunyan (2006) Investigations of updating groundwater mathematical model(s) for the Saq and overlying aquifers, vol 12. Report, Ministry of Water and Electricity, Saudi Arabia

Dasari HP, Desamsetti S, Langodan S, Karumuri RK, Singh S, Hoteit I (2020) Atmospheric conditions and air quality assessment over NEOM, kingdom of Saudi Arabia. Atmos Environ 117489

Daye AS (2019) Rising tourism in Saudi Arabia: implications for real estate investment. Cornell Real Estate Rev 17(1):22

Farag AA (2019) The story of NEOM city: opportunities and challenges. In: New cities and community extensions in Egypt and the Middle East. Springer, Cham, pp 35–49

Grab B, Geldmacher W, Ionescu R (2018) Managing the risks associated with the cyber city project-case study of the NEOM Project. In: 31st IBIMA conference in Milan proceedings. pp 25–26

Hassan O (2020) Artificial intelligence, Neom and Saudi Arabia's economic diversification from oil and gas. Polit Quart 91(1):222–227

Helmy M (2008) Urban branding strategies and the emerging Arab cityscape: the image of Gulf city. University of Stuttgart, Stuttgart

Holden D et al (1982) The house of Saud: the rise and rule of the most powerful dynasty in the Arab world, 1st edn. Holt Rinehart & Winston, New York

Kahal AY (2020) Geological assessment of the Neom mega-project area, northwestern Saudi Arabia: an integrated approach. Arab J Geosci 13:1–10

Kinninmont J, Kinninmont J (2017) Vision 2030 and Saudi Arabia's social contract: austerity and transformation. Chatham House

Lloyd JW, Pim RH (1990) The hydrogeology and groundwater resources development of the Cambro-Ordovician sandstone aquifer in Saudi Arabia and Jordan. J Hydrol 121:1–20

Muzafar S, Jhanjhi NZ (2020) Success stories of ICT implementation in Saudi Arabia. In: Employing recent technologies for improved digital governance. IGI Global, pp 151–163

NEOM Official Web Site (2017) Discover NEOM. KSA. http://discoverneom.com/

OECD employment outlook (2019) The future of work. OECD Publishing. Retrieved from https://www.oecd-ilibrary.org/sites/ef00d169-en/index.html?itemId=/content/component/ef00d169-en

Pfefferkorn J (2005) The branding of cities: exploring city branding and the importance of brand image. Syracuse University, Syracuse

Pompa C (2015) Jobs for the future. Overseas Development Institute. Retrieved from https://youtheconomicopportunities.org/sites/default/files/uploads/resource/ODI-JobsfortheFuture.pdf

Riyadh Economic Forum (2020) The Unified National Platform GOV.SA. https://www.my.gov.sa/wps/portal/snp/pages/nd-search q=the needs of the labor market and education consequences

Shahine A, Carey G, Nereim V (2017) Saudi Arabia just announced plans to build a mega city that will cost $500 billion. Bloomberg. https://www.bloomberg.com/news/articles/2017-10-24/saudi-arabia-tobuild-new-mega-city-on-country-s-north-coast

Smith H (2017) There are more jobs in renewable energy than in oil, gas, and coal combined. Grist. Retrieved from http://grist.org/business-technology/there-are-more-jobs-in-renewable-energy-than-in-oil-gas-and-coal-combined

Wright N (2018) How artificial intelligence will reshape the global order. Foreign Aff 10

The Social Development of Neglected Open Space: The Case of Jeddah City, (A Critical Review)

Wijdan Jamjoom and Ahmed M. Refaat

Abstract Due to the rapid urbanization, many cities around the globe experienced rapid growth, consequently, a lot of neglected open space and vacant land emerge in those cities' structures. These Nos represent vital assets that can contribute to enhancing the city's identity, and function. To develop these neglected open spaces, several dimensions should be addressed such as social, functional, visual, and temporal dimensions. In this paper, the author will focus on the social dimension of urban design as a tool to develop NOS. In this sense, this paper will start by giving an introduction about neglected open spaces, their characteristics, and types followed that presenting some theories and approaches to develop these spaces socially and concluding with a social framework to develop these spaces.

Keywords Neglected · Forgotten space · Urban voids · Jeddah

1 Introduction

During the past years, there were many vacant, unused, or neglected open spaces in many cities, including modern ones. The city of Jeddah is one of these modern cities facing the existence of these untapped areas because of the increasing population. Neglected open spaces have several negative impacts. According to Nermen and Engy (2019), Sung (2009), these impacts can be classified into Social, Environmental, and Economic impacts. Social impacts such as places for criminal activities, informal uses like places for homeless people, and illegal housing. These activities can affect public security. Environmental impacts such as visual pollution, and health risks, also can be rubbish dumps and rubbish-filled yards that lead to

W. Jamjoom (✉) · A. M. Refaat
Architecture Department, College of Architecture, Effat University Jeddah, Jeddah, Saudi Arabia
e-mail: wjamjoom@effat.edu.sa

A. M. Refaat
e-mail: arefaat@effatuniversity.edu.sa

A. M. Refaat
Assuit University, Asyut, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_6

air pollution. Economic impacts such as unused urban voids and abandoned buildings decay surrounding areas and prevent investment and development at the same time, it could decline in property values of the surrounding areas. Neglected open spaces appeared due to several reasons: Natural, Functional, urban management, and planning, economic, and cultural factors Nermen and Engy (2019). For example urban management and planning factors include urban renewal policies, building regulations, population shifts, and unsuccessful policies applied by the governments regarding urban design zoning and land use, ownership issues, inefficient decision making, poor land management, and poor coordination among decision-makers and designers for open space, Neelam K, Keshav R. Many untouched buildings in today's cities are empty because of speculation, with property, so owners are leaving them empty spaces rather than using them hoping that their value will increase Anja (2017). Economic factors related to the continuous economic demand caused the urban fabric of cities to become disorganized and detached (Nehad et al. 2019). Although neglected open space has negative impacts, however, they can have a potential positive role in enhancing the social, economic, and historical values of cities and cultures, and visual value (Sung 2009). This highlights the importance of developing (NOS). For example, Social value, Neglected open space has a great potential related to social benefits to the community in the city They can provide open spaces that accommodate a variety of uses, functions, and social activities including public open spaces, pocket gardens, community gardens, and a public plaza. These activities help in increasing the social interactions and sense of plaamongeen the residents. However, NOP can provide creative uses as social serveries such as entertainment activities, open restaurants, and cafeterias. In addition to these neglected open spaces can offer locations for temporary events such as seasonal celebrations, events, a place to buy and sell, and farmers' markets, as well as can provide shelters for people who need shelter or solve some housing problems resulting from lack of housing. This research aims to identify the appropriate framework to develop the neglected open spaces and integrate them with their surroundings.

2 Neglected Open Space Definition and Types and Characteristics

In Dictionary, neglected open spaces are defined as a space that has no proper or necessary care or attention (Meriam Webster). Neglected space implies giving insufficient attention to something that merits one's attention (urban dictionary). On the urban scale, neglected open spaces are more than just vacant lots; they can be any unoccupied spaces, and even an incomplete sidewalk (Sung 2009). According to Nehad et al. (2019), neglected urban open spaces are known as military sites, vacant plots, industrial sites, deteriorated waterfronts, leftover space, oversized streets, and socially inefficient green spaces. Research defined neglected open space under many terms such as urban voids, dead space, lost space, leftover (Huda et al. 2020), and

forgotten spaces. According to Nehad et al. (2019) neglected spaces can fall under many terms, such as urban voids, dead, forgotten spaces, and lost space. For example, Urban voids: Urban voids are spaces that are useless, underused, abandoned, or in-between spaces among public and private realms, Seog, J, Soewon, H, Donghae, L. Urban voids can be defined as a dead, abandoned spaces, or unused spaces that disrupt the urban fabric of the city, leaving some part of the city as incomplete spaces. These spaces can be interpreted as an urban area without permeability and a social realm. These spaces are often neglected or either forgotten in the eyes of people, Lama M, Marwa, N. Urban voids can be categorized into three categories plot, block, and community (Seog, J, Soewon, H, Donghae, L). These definitions highlight several characteristics of urban voids such as underutilized spaces, useless spaces, underused spaces, and abounded spaces.

Nevertheless, besides shown solidarity in practising the standard operating procedures (SOP) for COVID-19, a comprehensive food premises inspection must be done regularly in order to enhance a good awareness on food safety among the food handlers (Carmona and Tiesdell 2007). Most of the studies on food borne disease have analysed KAP among food handlers (Abeer 2012) https://www.urbandictionary.com/define.php?term=Neglected, https://planningtank.com/urbanisation/tactical-urbanism. Thus, to fill in the gap of the previous studies, this paper identifies the awareness of foodborne disease among food handlers in Malaysia before and during COVID-19 by using KAP. This study is to contribute to the enrichment of knowledge on the adoption of food handling regulation among them, thus increase the level of awareness on the food hygiene during food handling and regulation especially increasing trend of food business during Corona Pandemic 2019.

2.1 Categories of Urban Voids

See Fig. 1.

3 Characteristics of Neglected Open Space (NOS)

From the previous discussions of several types of neglected open spaces, the characteristics of the neglected open spaces can be classified into three categories: social, functional, and temporal. Regarding the functional category, the neglected open spaces are characterized as underutilized spaces, useless spaces, underused spaces, abandoned spaces, ill-defined spaces, spaces that had no significant, unnoticed spaces, surrendered old building yards, and dockyards, spaces of uncertainty, unutilized spaces. However social neglection refers, to spaces that are meaningless by a large segment of the community, spaces that do not have social interaction between people, unsafe spaces, that deter people from using them, spaces that are no longer in use, valid, effective, or relevant, and has the sense of loneliness, no man's

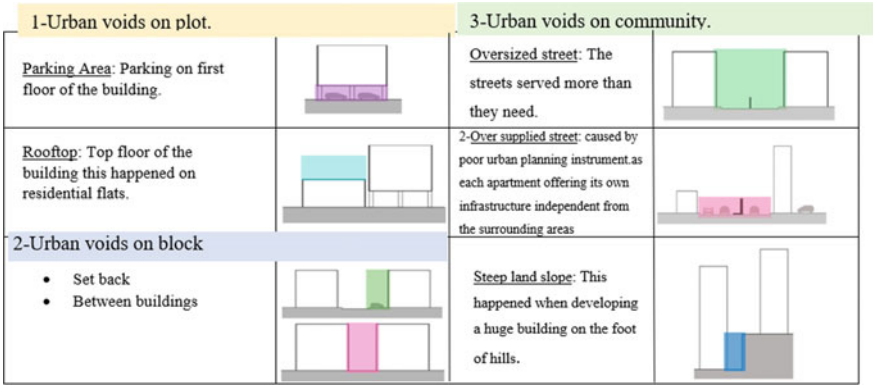


Fig. 1 Categories of urban voids. *Resource* Seog, J, Soewon, H, Dongha, L

land. From the researcher's point of view, there is a third type of neglection, which is temporary neglection, or it could be described as a seasonal neglection.

4 Theories and Approaches to Develop Neglected Open Space

To develop neglected Open spaces socially, several principles need to be applied or to be considered, so this section will discuss different theories and approaches that can be applied.

4.1 Gehl's Approach

Gehl reported that the quality of the physical environment such as regional, climatic, and societal could influence the types of activities that could happen in open spaces. Carmona and Tiesdell (2007), Gehl and Gemzoe (2001). He distinguished three types of activities open space such as necessary, optional, and resultant or social activities. Necessary activities include inevitable activities such as passing and normally do not depend on the quality of the physical environment. Optional activities: depend on the quality of the physical environment and include activities such as sitting and walking. Social activities are the result of both necessary and optional activities, such as meetings and conversations Gehl (1987). The crux Gehl argues that a good physical environment stimulates both necessary and optional activities to occur in approximate frequencies and intensity, while a poor environment allows only necessary activities to occur at a high-intensity Carmona and Tiesdell (2007).

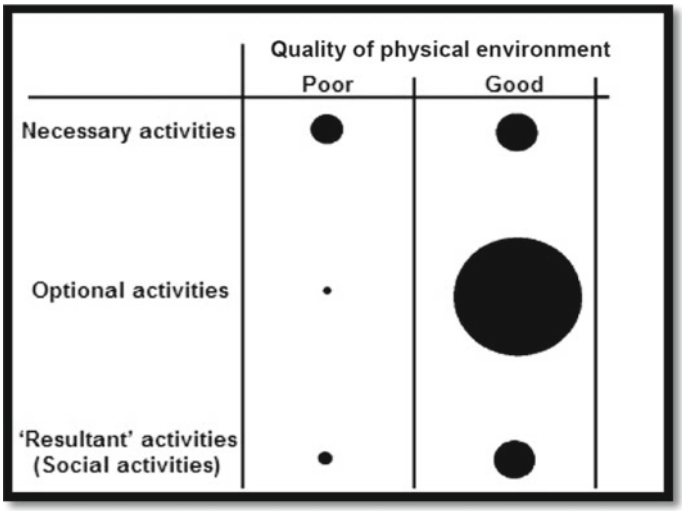


Fig. 2 Shows these differences between good and poor physical environments in terms of outdoor activities

Figure 2 shows the differences between good and poor physical environments in terms of outdoor activities. Gehl argued that when spaces are vast and impersonal, car traffic is the dominant which makes the open spaces are far from public buildings, so only necessary activities can happen while optional ones are inhibited, so to improve the quality of open spaces, Gehl asserted that open spaces should be designed at a human scale and adjacent and well connected to buildings, at the same time he argued that priority should be given to pedestrian, rather than vehicular movement, not only to create sociable public spaces but to have a sustainable city at the same time (Gehl 1987).

4.2 Jane Jacob Approach

According to Jacobs, a balanced mix of land use between, service and living activities mostly will provide a lively, stimulating, and secure public realm. Jacobs makes a distinction between mixed primary uses and mixed secondary uses. She means by the primary mix is the residential and major employment or service functions. These primary uses produce the demand for secondary uses such as shops, restaurants, and other small-scale facilities. The resulting movements between these uses will occur at various times, which will lead to a better distribution of demand over the day, rather than using these spaces only at a certain period during the day. Chely, Bramiana, Ratih Widiastuti.

4.3 Placemaking (PM)

The concept of place making in spatial planning has its origins in some authors Like Jane Jacobs, William White, and George Andrews. According to Zoe (2020) Placemaking is a process through which places that people want to live, work, or explore are created Placemaking is the process of creating places and focusing on transforming public spaces to strengthen the connections between people and places. Placemaking is a process that focuses on people and their needs, aspirations, desires, and visions, it is dependent on community participation. According to Mark (2014), "Placemaking is catching on as another way to improve the quality of various places in a neighborhood, and by extension, the community and region in which those places are located". There are four types of placemaking: Standard Placemaking, Strategic Placemaking, Creative Placemaking, and Tactical Placemaking. For example, strategic placemaking: This is the most universal type of placemaking Standard placemaking focuses on creating quality places where people want to live, work, and play. It includes the improvement of street facades, parks, and events in town squares. This type of placemaking seeks to create incremental change that will enhance the quality of life in the long term. Placemaking is focusing on four main categories including uses and activities, sociability, access and linkage, and comfort and image. For example, sociability includes diversity in activities and a welcoming environment (Fig. 3).

4.4 Tactical Urbanism (TU)

Tactical urbanism is a low-cost process. It is a temporary change to the built environment, usually, in cities, its goal is to improve local neighbourhoods and city gathering places (Wikipedia 2021). "Tactical urbanism" is a rapid/low-cost approach that can make a temporary change to the urban environment, especially in the areas of city gathering. According to Cspmgroup, Tactical Urbanism is a 'short term action for long term approach used by citizen groups, businesses, nonprofits, and governments'. It has a better result (economically, socially, and environmentally beneficial). Tactical urbanism is a low-cost process with a short-term approach. It is used to advance longer-term goals related to street safety and the design of public spaces. Tactical urbanism is temporary, using local materials with low prices and it has the potential for long-term change. Tactical urbanism has been created to enhance community participation, so it gives the community the chance to lead, fund, and implement design changes on their neighborhood streets through project review and approval with the city. The city of Atlanta, Department of transportation. According to Laura, P Tactical urbanism is an approach that is led by the city and citizens using short-term, low-cost, scalable interventions that lead to creating long-term change. To classify actions as a tactical urbanism project if they have a vision, local context, short-term commitment, low risk, high reward value, and community support.

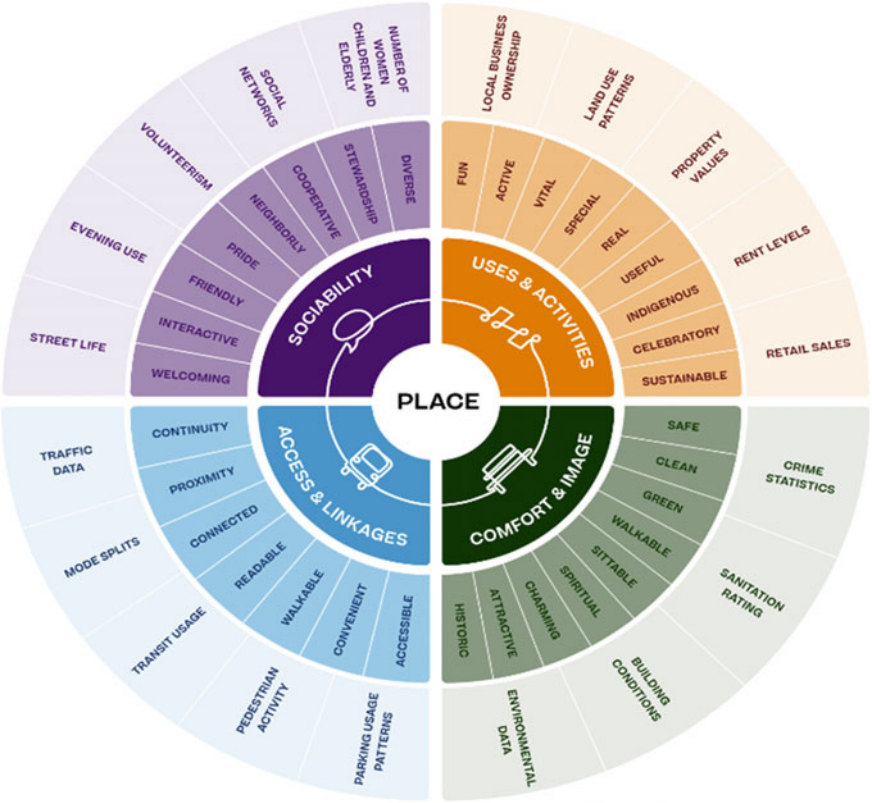


Fig. 3 Placemaking principles

4.5 Transit-Oriented Development (TOD)

Transit-oriented development (TOD) is the process of integration of urban spaces to connect people, activities, buildings, and public spaces in one space to reduce segregation, with easy walking and cycling between them, and near-excellent transportation to the rest of the city that is accessible for all the residents. This can be done by providing a more efficient commuting mode, at the lowest financial and environmental cost, with high resilience to disruptive events. TOD is an essential foundation for long-term sustainability, equality, shared prosperity, and civic peace in cities. ITDP. Transit-oriented development (TOD) is a process that aims to design and develop dense, attractive, and walkable urban environments that enhance the use of public transportation. TOD deals with synchronizing urban life—its growth and development, its everyday activities, and mobility patterns—with public transportation systems. Transit-oriented development (TOD) is a process that aims to design

and develop dense, attractive, and walkable urban environments that enhance the use of public transportation. Todor S, Tesad, A. According to Lloyd, A, there are eight principles of TOD which include:

- Walk|Develop neighborhoods that promote walking
- Cycle|Prioritize non-motorized transport networks
- Connect|Create dense networks of streets and paths
- Transit|Locate development near high-quality public transport
- Mix|Plan for mixed-use
- Densify|Optimize density and transit capacity
- Compact|Create regions with short commutes
- Shift|Increase mobility by regulating parking and road use.

4.6 New Urbanism (NU)

The New Urbanism (CNU) focuses on a planning and development approach based on the principles of how cities and towns had been built for several centuries: walkable blocks, streets, housing, shopping in proximity, and accessible public spaces. In other words, New Urbanism focuses on human-scaled urban design. Eman, A. Raffeollo, F. New Urbanism is an urban design movement that enhances environmentally friendly habits. This is done by creating walkable neighborhoods that combine a wide range of housing and job types. New urbanism attempts to address the ills associated with urban sprawl and post-Second World War suburban development. Wikipedia. According to Abeer, E New Urbanism has clear twenty-seven principles addressed by a charter CNU has twenty-seven principles. The twenty-seven principles are divided into three levels includes: region, neighborhood, and block each one has nine principles related to it. According to a literature review pursued at CNU, the principles of New Urbanism, at the level of the neighborhood, were modified to be ten principles instead of nine (Carmona 2010) (Fig. 4).

5 The Social Principles to Develop Neglected Open Space (NOS)

See Table 1.

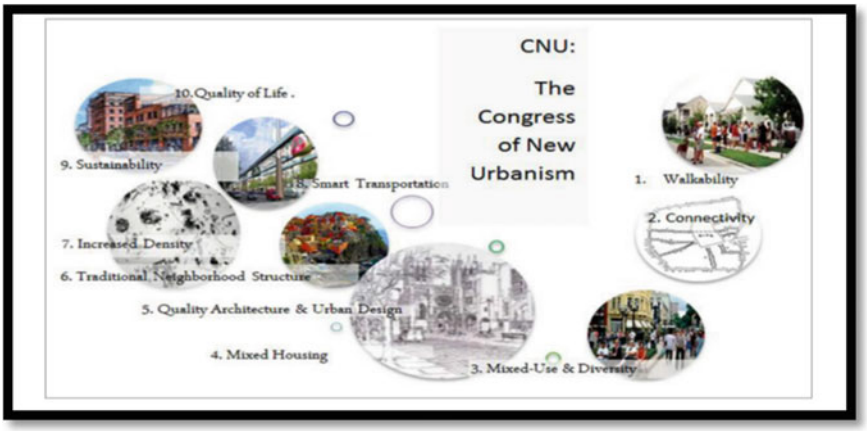


Fig. 4 Principles of new urbanism

Table 1 The social principles to develop NOS (Resource: Authors)

	Ghel's	Jane	PM	TU	TOD	New Urbanizm
human scale	■					
Connectivity	■	■				
Traffic M		■				
Mix used			■		■	■
Connectivity					■	■
Walkable	■				■	■
Mobility				■		
Pop-up				■		
C-P Community participation				■		
Flexibility				■		
legibile				■		
Safety				■		

6 Conclusion

In conclusion, Table 1 shows the important principles that have been collected from the previous theories and approaches to developing the neglected open spaces socially. These principles have been divided into three different categories. The first category is related to the space to be developed which includes: Human scale, flexibility, and Pop-up. The second category: is related to the relationship of the open space within the surrounding context which includes: Connectivity, legibility, and Mixed-use. The Third category is related to the surrounding context which includes: traffic management, walkability, mobility, safety, and mobility.

References

Anja G (2017) Why should we deal with abandoned urban spaces? https://www.urbanet.info/abandoned-urban-spaces/
Ansari A (2016) Rethinking urban voids. https://issuu.com/aamiransari/docs/finally_final
Carmona M (2010) Contemporary public space part two: classification. J Urban Des 15(2):157-173. https://doi.org/10.1080/13574801003638111
Carmona M, Tiesdell S (2007) Urban design reader. https://books.google.com.sa/books?hl=en&lr=&id=20Yzz44hAi8C&oi=fnd&pg=PR1&dq=.Carmona+and+Tiesdell
Elshater A (2012) New urbanism principles versus urban design dimensions towards behavior performance efficiency in Egyptian neighbourhood unit. https://pdf.sciencedirectassets.com/
Gehl J (1987) Life between buildings. https://books.google.com.sa/books/about/Life_Between_Buildings.html?id=5DpiQgAACAAJ&redir_esc=y
Gehl J, Gemzoe L (2001) New city space. https://adk.elsevierpure.com/en/publications/new-city-spaces-/
https://planningtank.com/urbanisation/tactical-urbanism
https://www.merriam-webster.com/dictionary/neglected
https://www.urbandictionary.com/define.php?term=Neglected
Huda M, Marwan H, Hiba M, Maged Y (2020) Exploring pooring potentials of LEF ALS of leftover spaces using urban CES using urban metamorphosis. https://digitalcommons.bau.edu.lb/cgi/viewcontent.cgi?article=1058&context=schbjourna/
Lama M, Al Nahlawi M, Al Khaled S, Mousally A, Hamdah KT, Al Shuweihi F (2018–2019) Rethinking urban voids: the case of Sharjah. United Arab Emirate. https://www.academia.edu/39048857/Rethinking_Urban_Voids_The_case_of_Sharjah_UAE/
Laura P (2020) Tactical urbanism: creating long-term change in cities through short-term interventions. https://parcitypatory.org/tactical-urbanism/
Mark W (2014) Article on four different types of placemaking. https://www.canr.msu.edu/news/lpis_mark_wyckoff_authors_article_on_four_different_types_of_placemaking/
Nehad S, El Gawada K, Dina M (2019) Placemaking as an approach to revitalize Neglected Urban Open Spaces (NUOS): a case study on Rod El Farag Flyover in Shoubra, Cairo. https://www.sciencedirect.com/science/article/pii/S1110016819300857/
Nermeen A, Engy H (2019) Urban voids as a potential resource for the city development
Seog JL, Soewon H, Donghae L Urban voids: as a chance for sustainable urban design. https://pdfs.semanticscholar.org/c50b/5fd207b69441f348f8a8ff57887c688d0c0b.pdf?_ga=2.162052532.989066035.1634496103-1471596103.1606434119
Sung Y (2009) New uses for neglected spaces. https://ttu-ir.tdl.org/handle/2346/10795
Susanna M What is placemaking. https://www.archdaily.com/961333/what-is-placemaking,article
Todor S, Tesad A, Marcus J (2014) Transit-oriented development (TOD): analyzing urban development and transformation in stockholm. https://www.researchgate.net/publication/289332069_Transit-Oriented_Development_TOD_Analyzing_urban_development_and_transformation_in_Stockholm
wikipedia.org, New urbanism (2021). https://en.wikipedia.org/wiki/New_Urbanism/
Zoe EM (2020) What is placemaking? Definition and examples. https://www.spacestoplaces.co.uk/blog/what-is-placemaking-definition-examples/

Reviving the Identity of Jeddah City Through Revitalizing the "Souq" in Al-Balad

Hatoon S. Alghamdi and Asmaa Ibrahim

Abstract Traditional Souqs are commonly located in the historical city centers. Albalad is one of the most famous ones in old Jeddah. However, through the last decades, it has encountered a lot of transformations due to the change of the community needs and moving more towards modernity. The presence of contemporary malls and changes in lifestyle led people to withdraw from traditional markets, which has caused a lot of deterioration in these old Souqs and left them to be subject to many informal and unplanned interventions destroying the historical essence of the place. Accordingly, this research aims to regenerate the old markets while satisfying the current needs of the community. This research will use the ethnographic strategy using triangulated methods of observations, and questionnaires. Also, some similar case studies will be analyzed to provide visionary guidelines for revitalizing Souqs in historic areas. The expected outcome will be in the form of guidelines that will be used to revitalize Souqs in historical sites with a focus on Al-Balad.

Keywords Traditional market · Jeddah · Al-Balad · Souq · Urban fabric

1 Introduction

The ancient Arab markets were not just places where buying and selling trade occurred. Accordingly, it has gained more importance. It was a gathering place for writers and poets from all over the Arab world. Jeddah Al-Balad, which is located in the center of Jeddah, includes a large number of ancient buildings and heritage

H. S. Alghamdi · A. Ibrahim (✉)
Effat University, Jeddah, Kingdom of Saudi Arabia
e-mail: asibrahim@effatuniversity.edu.sa

H. S. Alghamdi
e-mail: hasalghamdi@effat.edu.sa

A. Ibrahim
Cairo University, Giza, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_7

monuments, from walls, alleys, mosques, and historical markets. It is estimated that there are about 13 old markets that still attract many visitors to the city. (jeddah.gov.sa, last accessed: 2021, October 28).

The loss of the traditional urban fabric is linked to the contemporary development of many cities, causing challenges such as losing the city's identity. This paper presents a study of (Souq Al-Bado) and (Soaq Al-Jam'e) in Jeddah Al-Balad, that lost its cultural value and thus affected its expected economic revenue.

This research aims to help redesign old existing Souqs in resilience to the community needs and the other stakeholders' inspirations. To reach this goal, the author will start by deep analysis of souq renovations (Souq Waqif) and (Bab Al-Bahrain). This is followed by the empirical case study and ends up with recommendations for regenerating the souq area.

A case study will be analyzed to deduce practically what could be applied within the traditional Jeddah Souq, focusing more on (Souq Al-Bado) and (Soaq Al-Jam'e).

The research is going to employ a mixed approach using qualitative and quantitative methods for analyzing the data using observations and questionnaires to be conducted inside the Al-Mathloom neighborhood, mainly in (Souq Al-Bado) and (Souq Al-Jam'e). This will result in deducing guidelines that will help revitalize traditional markets by enhancing the main factors that attract people at present.

This paper will be divided into four main parts; the first part is the introduction that discusses the main argument, problem statement, and objectives. The second part will contain different ideas about the Islamic Souq's historical background, Old Jeddah urban fabric, and comparing the old and modern markets. It will also analyze case studies through the literature review. The third part will explain the empirical case study that demonstrates data collection and analysis of the studied area. Finally, the fourth part will contain the conclusion and discussion of the findings.

2 Overview of Old Souqs

The Islamic markets are well known for linking social life in the city and the market. Because mosques are the main attraction in Muslim cities, it is usually located near them.

> The traditional market (Souq) refers to the place where all kinds of goods were sold. The architectural archaeologist's market is a building that includes a centered large courtyard surrounded by a group of shops overlooking the road. (Hmood 2017)

Mosque was the center of most Muslim cities, followed by all the buildings and markets, then the vaulted bazaar connecting the mosque and the most important public buildings in a city. Markets offered a wide range of goods, including bookshops, "Attarin" shops that sold medicinal plants and perfumes, fabric shops, and food stalls (Hmood 2017).

2.1 Souqs in the Islamic World Within the Urban Fabric

Although Souqs in the Islamic world varied in size, they were usually set in two locations. Each site specializes in a specific type of goods within the city walls or outside the city walls. Early in the Islamic period, in Medina, the market was an accessible area near the mosque. Later, they developed into continuous shopping streets, and it was held weekly or seasonally in the Islamic cities.

The markets which were located within the city walls are often found in the heart of the Islamic city; they usually have one floor, and they are roofed most of the time. They appeared on the main roads or semi-main ones in the city. These markets served the main gates and city centers. Usually, these markets are famous for selling spices, traditional costumes, and different accessories.

However, the markets located outside the city wall were typically around the city's gates and separated from the housing areas due to smoke, odors, or security reasons. They provided equipment for trips and equipped stables. Both the case studies that will be analyzed are within the city walls.

2.2 Main Factors Affecting the Livability of Old Souqs

There are four leading indicators that affect the livability of old Souqs, specifically with regard to the design and location aspects. Each of them can be categorized into multiple sub-indicators, as shown in (Fig. 1).

- In-between space components
- Street location components
- Natural components
- Design components.

The in-between space components refer to the edges, details, and facades that separate indoors from outdoors. As those components are integrated from the outside to the inside of the building, they should create a hierarchical transition from public to semi-public to private, facilitated by effective edges. Street location components include several factors, such as the ability of the street and sidewalk to accommodate different activities, the variety of buildings providing more opportunities for users, and the length and ends of the roads. As natural components, trees and plants have a significant impact on how the street looks and functions, from protecting it from the elements to defining its topography and barrier. Lastly, design components incorporate visible street art and interactive calls for kinetic activities into the built environment, helping reduce congestion and environmental pollution, as well as maintaining public health (Ghazi and Abaas 2019).

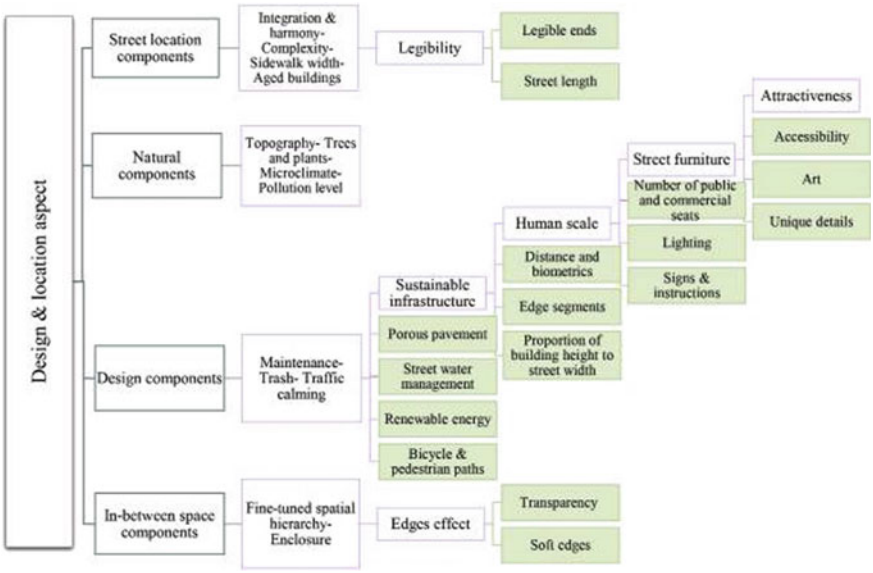


Fig. 1 Design and location aspect. *Source* Ghazi and Abaas (2019)

2.3 *Overview of Jeddah Historical Area and the Souq Development*

Jeddah's architecture is well distinguished from other Saudi Arabia cities due to religious tourism and trade routes, especially the historical city center (Al-Balad). It is located between the two holy mosques, Makkah and Medinnah (Al-Ban 2016). As in most Islamic cities, Jeddah's urban spaces accommodated commercial activities and religious practices, demonstrating the dialectic relationship between the central mosque and the Souq. Some of the markets within the city walls are still in operation; the four main markets in Al Alawi, Al Bado (Bedouins), Souq Qabel, and Al Nada were the backbone of the city's economy for many years.

Many travelers wrote about the wall, gates, and fortification towers after visiting Jeddah. The wall was built and destroyed several times. As a result of the topography in the area and parts of the urban fabric that existed before the wall was constructed, the wall did not follow a geometrical shape.

Its strategic location makes Jeddah a key commercial hub and a gateway to Makkah, bringing from all over the world merchants and people an infinite variety of goods, which led to the development of many souqs and markets in the old city.

The land use in Jeddah changed dramatically from 1964 to 2007 (Fig. 2). Among the five most significant land use classes, there has been a fast and active change in residential, commercial, industrial, and informal settlements. A significant change in commercial land use has also occurred along highways, main roads, and substantial secondary road intersections. According to these plans,

industrial land use took place on the sites proposed in 1962 and 1973 and had a dramatic change (Fig. 2).

Industrial land use followed a planning scheme that took place in the locations proposed by the master plans in 1962 and 1973 and also changed drastically (Fig. 2). As Jeddah grew, more formal and informal settlements arose in the city (Mandeli 2019).

Due to this, informal settlements developed along main roads to the east of Jeddah and around the airport to the north, with sprawling patterns of development. It has directly affected Jeddah's urban growth and the spatial structure of the city and has also posed enormous challenges to its municipal government. In addition, public places have also changed considerably (Fig. 2), with developments taking place at locations proposed in master plans created in 1962, 1973, 1981, 1987, and 2004 (Aljoufie et al. 2013).

3 Analytical Case Studies

The two souqs selected for the case studies are the most important public and commercial centers in the two cities. In both cases, traditional architecture and urbanism are evident. The first is in Doha, a souq called Souq Waqif, located in the city's heart. The second is in Manama, a souq called Bab Al Bahrain Souq, situated on the Gulf water edge and reaching into the inner city. A realistic comparison between Doha and Manama is possible due to the many similarities between them. In these case studies, we examine two important commercial and public cultural spaces in the capitals of Qatar and Bahrain, respectively. Their urban histories mark them as landmarks in the development of both cities.

3.1 Case Study 1: Souq Waqif

Souq Waqif is located in Doha (see Fig. 3). It was a weekly market mounted by the local Bedouins to sell goods, fish, and pearls to traders from southern Iran and other Gulf countries. The market was deserted as malls, and other modern shopping options were developed in the city. In the past, residential neighborhoods bordered Souq Waqif and blended into it (Major and Tannous 2020).

The "Souq" was rebuilt just in time for Doha's hosting of the Asian Olympic Games in 2006 and as part of Qatar's efforts to preserve its heritage in the face of globalization and modernization. The renovated Souq Waqif now displays traditional architecture, handicrafts, and folk art. It gives the feeling of conventional Qatari heritage. According to traditional Qatari architectural principles, Qatari architects and materials were used to renovate the building in 2004. Despite modern

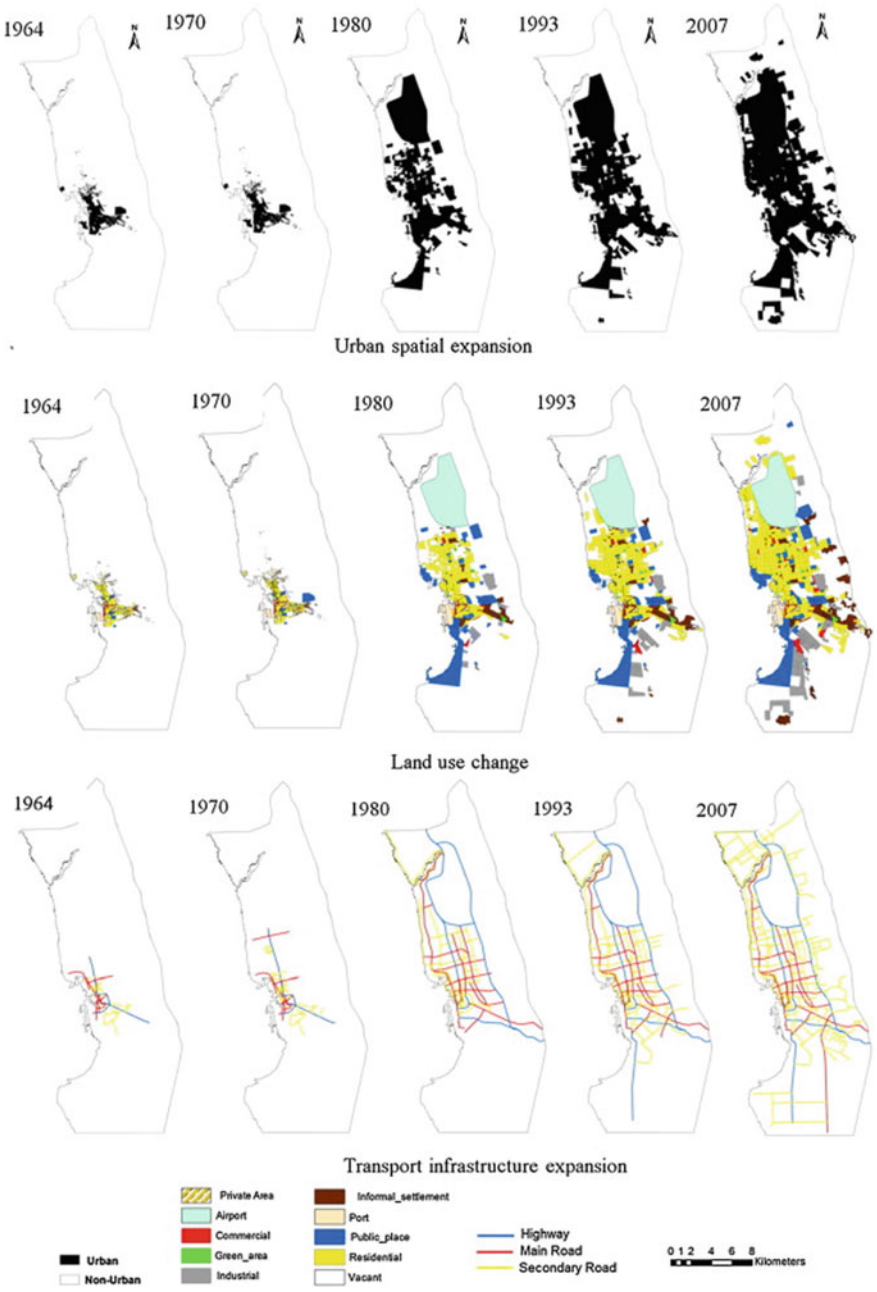


Fig. 2 Land use change between 1964 and 2007. *Source* Aljoufie et al. (2013)

Fig. 3 Souq Waqif maps. *Source* Furlan and AL-Mohannadi (2020)

construction devoid of any cultural identity, the successful renovation highlights the region's traditional architecture's nobility and wisdom (Alraouf 2012).

For locals, expatriates, and tourists, "Souq Waqif" is a must-visit for its traditional experience. It is a remarkable space. Walking along the souq streets and through the twisting alleyways of the Old Souq is an exciting experience; it connects you to Qatar's past and lets you experience the lives of its early ancestors.

Challenges in Revitalizing Souq Waqif (Case Studies)

Urban regeneration of the Souq Waqif focus on two aspects:

There is a direct relationship between (1) mapping (an on-site analysis based on graph theory) and (2) urban design proposals. Consequently, the proposed framework aims to address the gaps identified through the territorial analysis, which evaluates the area's performance in terms of the six indicators discussed already: diversity, density, travel distance, connectivity, design and destination, built heritage, and preservation (Aljoufie et al. 2013).

To renew any area, some challenges usually appear; in this case, those were some of them:

- Assemble old photos from the geographic department within the ministry of municipal to reconstruct the Souq from them.
- The government replaced 75% of the buildings from the 1950s with traditional buildings similar to those from the 1930s, while the others were demolished.
- Typology cannot handle heavy construction because Souq Waqif is a built-up area of water.
- The addition of new technologies in the electricity and water supply systems.
- Maintenance required 30 years after construction.
- Paint was not allowed on clay.
- Visitors usually get lost because the finding system is unclear.

3.2 Case Study 2: Bab-Al-Bahrain Souq

The Souq Bab Al-Bahrain is located within the old part of the city. This area is also known as Manama Souq. Being a traditional market, the Souq offers a broad selection of goods, such as; spices, fabrics, handicrafts, souvenirs, dried fruits, nuts, and other traditional goods. With its traditional architecture of narrow roads and little shops, visitors will find the Manama Souq after passing through Bab-Al-Bahrain. The gate was rebuilt in its new form in the 1940s by the British, and now it is one of Bahrain's historical sites. Bahrainis, as well as expatriates from India, Pakistan, Bangladesh, Egypt, and the nearby Gulf states, make up the crowd in the Manama souq as well as the traders.

The old port, Bab-al-Bahrain (Bahrain Gate), was a commercial pole that extended to the primary market. The Souq is a popular place for locals, expatriates, and tourists who enjoy the traditional atmosphere of a unique marketplace.

Renovation of Bab-Al-Bahrain Souq (Case Studies)

A gate was added to the structure of the building in 1945 as a landmark for the entrance to the historic market. There are two wings to the building, east, and west, connected by a corridor. At that time, Bab al-Bahrain was located in the middle of open land that faced the sea, with a direct road leading to Manama, the main port of the island. Figure 4 shows the main phases of renovation.

Fig. 4 Main phases of renovation. *Source* Alraouf (2010)

Over time, the building underwent several major renovations. However, the Ministry of Culture adopted this civilized facade. In 1986, they were able to restore the first Bab Al Bahrain Authority that existed within the site by adding Islamic touches. The tourism sector began its work on the site of Al-Bab itself, welcoming visitors through the information center there.

3.3 Comparison Between Case Studies

Comparing the two case studies according to the design and location livability aspects. Both case studies or located within the city and have their historical background. As for the design components, sidewalks were provided, and greenery wasn't available in both Souqs. Human scale aspects we're taken into consideration in both Souqs and also street furniture were not provided in the second case study. It is clear from both case studies that there is no clear integration between design components and functions of the historical Suqs. The main focus is always on the renovation of historical features rather than considering new contemporary needs and thus ensuring livability and usage of spaces, not just rebuilding a static image of historical facades and urban tissues without a complete perspective of integrating modern rising needs of the community.

4 Empirical Case Study

Considering the importance of traditional Souqs and their impact on the community, this paper seeks to assist in redesigning old Souqs in a way that meets the needs of the community and inspires stakeholders. Secondly, studying the community in this area in a way that helps revitalize (Souq Al-Bado) and (Souq Al-Jam'e) and understand what the missing factors are that are needed in this modern time will help in increasing the livability of the area. Figure 5 shows the methodological framework conducted for the empirical part.

4.1 Data Collection Method

This study will use a combination of qualitative and quantitative methodologies.

According to what was mentioned in the aim, a site reconnaissance was conducted, and a questionnaire. A sample of females and males aged 15 and up will be selected to answer the questionnaire on-site based on simple random technique method (Souq Al-Bado) and (Soaq Al-Jam'e).

They were asked about their nationalities, age, and educational level. Also, if they were working, living, or shopping in this area if working; what is their

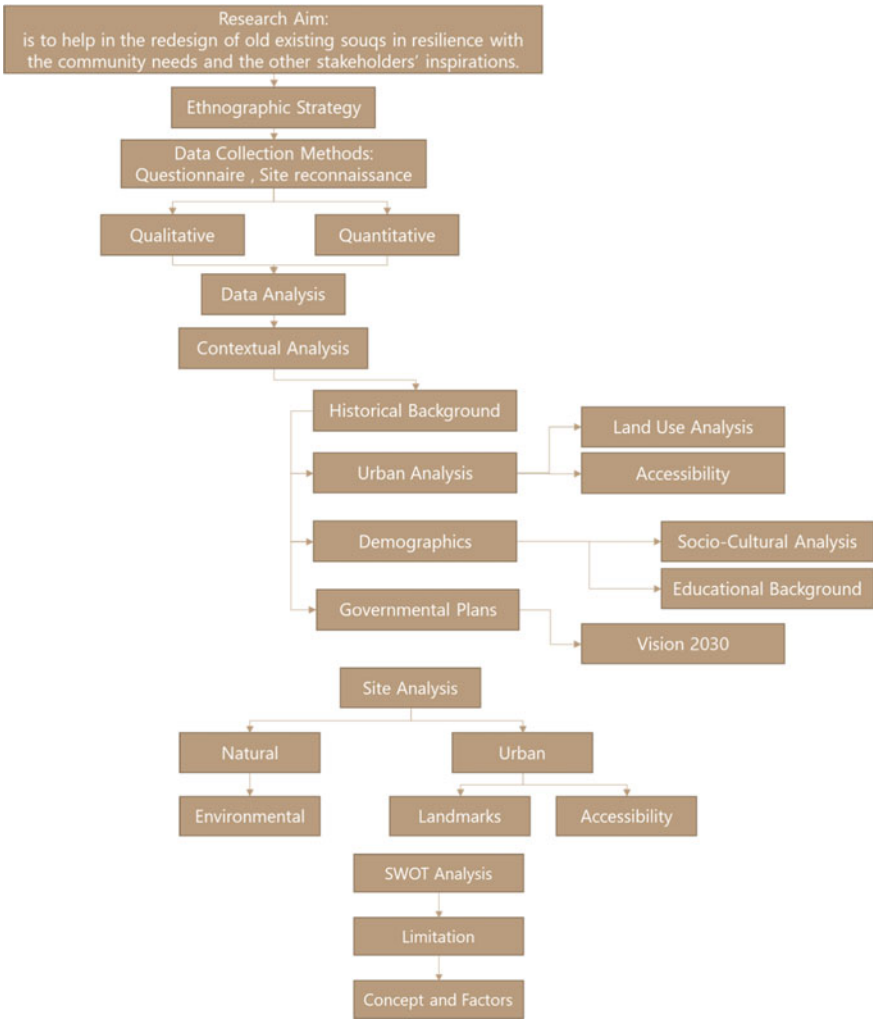


Fig. 5 The methodological framework conducted for the empirical part. *Source* Authors

profession, and how often do they visit the souq area. Other questions were asked about the accessibility and the safety of pedestrians in the area and if the area maintains a high level of communication. They were asked if they knew if the area used to be more active. Some questions were about the availability of resting areas, plant distribution, lighting, shading, and signage. The questionnaire had only two open-end questions. The first one was about what makes the area attractive to people. The second was about the changes that could be applied to enhance the livability of the souq area.

4.2 Historical Background

Jeddah was surrounded by a wall on all sides until 1947 AD. Sultan Abu al-Nasr Qansuh al-Ashraf built it in 1509 AD from Circassian Baybardi al-Ghouri to repel Portuguese invasions while seeking to control the Red Sea. The task has been assigned to one of its leaders, Saeed Al-Kurdi, who has asked the people, old and young, to help in building the wall.

In addition, there were seven gates that connected Jeddah to the outside world. These gates were constructed in stages according to need.

These gates used to close immediately after the "Isha" prayer and open at the first call to "Fajr" prayer of the next day. During the Saudi era, the practice was abolished. And a double eighth gate was added to allow cars to pass easily through the northern wall due to the narrowness of the city gate.

Souq Al-Bado is known as the Bedouin market (see Fig. 6), which refers to the shoppers mostly Bedouins and residents of the desert in and around the city. The most famous commodities sold in the Bedouin market in Jeddah, which is over 140 years old, are spices including cardamom, grains, incense, coffee, and fabrics of all kinds.

Souq Al-Jami is named after the Old Mosque Al-Shafi'i Mosque [(jeddah.gov.sa), Last accessed: 2021, December 5], the largest and oldest Juma'a mosques

سوق الساعات ويبدو في أقصاه مبنى المكتبة العامة

Fig. 6 Souq Al-Bado. *Source* jeddah.gov.sa

Fig. 7 Souqs Al-Jami. *Source* jeddah.gov.sa

(where Friday prayers are held) (see Fig. 7). It can be entered from the NE through Souq Al-Bado. The Bedouin and Al-Jami markets pass by a torrent stream heading west until it reaches the end of the Al-Jami' market at the house of Mr. Obaid Qurashi.

4.3 Site Analysis

According to the municipal of (Amanat Jeddah) 's map, Souqs Al-Jami is located within the historical area.

Accessibility

Similarly, to other Islamic cities, streets have been constructed based on the movement's needs. Streets have been built to accommodate both pedestrians and animals. Street widths have been calculated based on the movement of two loaded animals on the street.

Landmarks

Due to the historical background of the area, the area is surrounded by a lot of landmarks these are the closest landmarks to both souqs;

Fig. 8 Al-Shafi'i Mousqe. *Source* Author, Hatoon Alghamdi

- Al-Shafi'i Mousqe
  The shafi'i mosque (see Fig. 8) was established in 1250 ad by King Al-Muzaffar Soliman bin Saad al-Din Shahanshah II, an ayyubid king of #Yemen who was a shafei of ideology, and was dubbed shafi'i on this basis, and was repaired in 1533 by an Indian trader named Khawaja_Muhammad_Ali.
- Al-Falah School (see Fig. 9).
  The first regular school in the Arabian Peninsula is Al Falah School in Jeddah. On December 7, 1905, AD, Haji Muhammad Ali Zainal Rida, a well-known pearl merchant, created it, and six years later, it built a branch in Makkah Al Mukarramah. See Fig. 8.

Urban Analysis

- The Souq and city walls
  Several times, the wall was built and dismantled. We might claim that the wall did not follow a geometrical shape in general. This is due to the area's terrain and sections of the urban fabric that existed before the wall's erection. Bab Medina to the north, Bab Makkah to the east, and Bab Sharif to the south are the

Fig. 9 Al-Falah School. *Source* Author, Hatoon Alghamdi

city's historic gates. There were also many additional gates that no longer existed, such as Bab Al Bant on the city's west side, through which pilgrims and merchants would enter the city of Jeddah. Jeddah is well-known for its strategic location, which makes it a vital commercial crossroads.

It's also a gateway to Makkah, attracting people and merchants from all over the world with an unlimited variety of items, resulting in the creation of several markets. These markets were critical to the development of the old city. Furthermore, they exchanged commodities in a variety of ways and were stationed throughout the city wall. First, in the south region of the big mosque, a central market with one floor and several stores were built in an open area. Second, marketplaces were set up along major thoroughfares leading from the city center to the city gates. Third, there are open-air marketplaces on both sides of the city walls and gates. Fourth, there are seasonal/weekly markets in public spaces along key main thoroughfares. Finally, neighborhood centers or focal points included micro-markets, grocery stores, and tiny mosques across the city (Massoud 2020).

Governmental Plans

The historic Jeddah Project is under the supervision of the Ministry of Culture. It aims to invest in the historical, cultural, and urban elements in Historic Jeddah to achieve the Saudi Vision 2030 objectives:

- Investing in the region's history and cultural components and turning them into economic tributaries.
- Making the region's living space an appealing center for economic and cultural enterprises, as well as a significant destination for entrepreneurs.

- Achieving sustainable development through environmentally friendly urban development projects that include natural incubators for production as well as appealing living and working environments that contribute to economic growth.
- Create an integrated setting that includes waterfronts, green spaces, and open gardens, as well as natural elements.
- Emphasizing the region's distinctive urban significance by highlighting heritage monuments and historical landmarks to create a lively living environment with ample amenities.
- Investing in its cultural assets and heritage places.

5 Discussion of Findings

5.1 Site Reconnaissance

It was on December 14, 2021, from 6:45 pm (After Maghrib prayer) until 8:30 pm. Figure 10 shows the site reconnaissance path.

The area was not easy to access, either to find parking or to walk to (Souq Al-Bado); see Fig. 11, and the authors could not find any signage. They had to ask some people, and they were very welcoming and helpful. The authors walked through Shuayb lane to get to the Souq. All the shops were closing, people were getting ready for the (Isha) prayer, and visitors were trying to find a place to set up until the shops opened again, but there was none. However, the area seemed well lit and covered with shading devices.

The authors walked through the area till Souq Al-Jam'e. It was more developed and had some signage and guides (see Fig. 12). Due to the historical background of Al-Shafi'i Mousqe, the area was more occupied, and the mosque was open for visitors. An event was happening within the site, and there were many resting spots. The area was well lit, yet there were no shading devices. Unfortunately, both souqs lacked greenery and plants.

Fig. 10 Site reconnaissance path. *Source* Author, Hatoon Alghamdi

Fig. 11 Souq Al-Bado. *Source* Author: Hatoon Alghamdi

Fig. 12 Signage in Souq Al-Jam'e. *Source* Author: Hatoon Alghamdi

5.2 On-Site Questionnaire

To get accurate data, a questionnaire on-site was conducted during the site reconnaissance. The targeted sample was mature females and males above the age of 15 who are in the souq area, together with visitors and workers using the random sampling technique. A total of 30 responses was received in each Souq.

Demographic Characteristics

The following figures show the demographic statistics for the sample taken.

- 60% were females and 40% males.
- More than 60% were aged between 15 and 35 years, about 20% were from 35 to 45 years, and about 13% were more than 45 years.
- 93.3% of the sample were Saudis.
- About 33.3% had education less than secondary level, 53.3% held bachelor's degrees, and 13.3% had master's Degrees.
- According to the response to the questions, 100% of the people shop in the area even though they were workers, not just people who came to visit the place.
- 86.7% of the sample did not reside in the area.
- 73.3% work in the area.

Souq Livability

A very few people visit the site yearly, or it is the first time. Most of them visit weekly or monthly with average of 25%; however workers visit daily with average of 20%. 60% of the sample answered that the area is easy to access and safer for pedestrians. 80% agreed that the area is safe and 46.7% agreed that the area is attractive. Everyone agreed on the high level of communication and social life in the area. 60% in (Souq Al-Shafi'i) agreed on having resting areas and its signage, yet all of them agreed that the area was not shaded and without any plantation. People in (Souq Al-Bado) agreed that the area was well lit and well shaded.

More than 50% of the sample agreed that the historical background, good prices, and events are the main factors for keeping the Souqs attractive. 60% recommended a need for resting and shaded areas, and about 30% agreed that there is a crucial need for parking areas to facilitate mobility along with having better control for traffic. 20% also recommended having public toilets and more public services all around the area. It is worth mentioning also that about 50% recommended the need for having adaptive reuse for the historic buildings in a way to accommodate more functions such as exhibitions, cafes, restaurants, and others as per the need.

5.3 Discussion of Findings

From the analysis above, it is clear that there are certain design elements that need to be integrated to ensure the livability of the Souqs in accordance with the results of the questionnaire. These include:

- Better accessibility options and better control of traffic.
- Adding more shaded resting areas.
- Integration of adaptive reuse for buildings to ensure the full usage of all buildings having a rich historical identity while accommodating the contemporary needs of the community and thus protect them from being abandoned or having to include other modern unrelated elements.
- Adding more plantation and soft scape elements.
- Ensure the fair distribution of lighting all along with corners, not only on main paths.

6 Conclusion

To conclude, traditional markets represent the culture of the city. People admire shopping there, and everyone maintains being social with everyone. However, not all the facilities and services are provided in Souq Al-Bado and Soaq Al-Jam'e. Due to their historical and traditional significance, these traditional markets should be given more consideration. People on site agreed that some developments were made, yet some components were still missing, including parking areas, shaded resting areas, and more activities to maintain the liability of the spaces all during the day.

On another note, it is extremely important to solve the accessibility issue for the Souq to ensure safety for those walking, public transportation users, and car drivers.

Adaptive reuse is also another essential aspect that is much recommended to be integrated to ensure the livability of Souqs and, at the same time, accommodate the rising contemporary needs without sacrificing the cultural identity.

References

Al-Ban AZG (2016) Architecture and cultural identity in the traditional homes of Jeddah. University of Colorado at Denver

Aljoufie M, Zuidgeest M, Brussel M, van Maarseveen M (2013) Spatial–temporal analysis of urban growth and transportation in Jeddah City, Saudi Arabia. Cities 31:57–68

Alraouf AA (2012) A tale of two souqs: the paradox of gulf urban diversity. Open House International

Furlan R, AL-Mohannadi A (2020) An urban regeneration planning scheme for the Souq Waqif heritage site of Doha. Sustainability 12(19):7927

Ghazi NM, Abaas ZR (2019) Toward liveable commercial streets: a case study of Al-Karada inner street in Baghdad. Heliyon 5(5):e01652

Hmood KF (2017) Traditional Markets in Islamic Architecture: successful past experiences. In: Structural studies, repairs and maintenance of heritage architecture XV, WIT transactions on the built environment, vol 171. p 263. www.witpress.com

Major MD, Tannous HO (2020) Form and function in two traditional markets of the Middle East: Souq Mutrah and Souq Waqif. Sustainability 12(17):7154

Mandeli K (2019) Public space and the challenge of urban transformation in cities of emerging economies: Jeddah case study. Cities 95:102409

Massoud B (2020) "Patterns" of threshold spaces in the historical city of Jeddah, Saudi Arabia. WIT Trans Built Environ 197:153–165

"جدة تاريخياً". Accessed (2021). Jeddah Gov. https://www.jeddah.gov.sa/Jeddah/HistoricalPlaces/index.php

Smart Inclusive and Livable Cities

Promoting Social Interaction Through Jeddah's Neighborhood Parks Design

Hend Almohandes and Mady Mohamed

Abstract This research examines the design attributes with potential impact on social interactions in neighborhood parks. This includes accessibility, plants, maintenance, shading devices, lighting, walking paths, active and passive activities, seating, as well as water elements. It develops a theoretical framework of the neighborhood park design that promotes social interaction for assessing neighborhood park design and the level of social interaction in this park within the context of Jeddah city, KSA. It adopts the case study approach to investigate one study site in Jeddah city. It uses an array of qualitative strategies for data collection to test the validity of the theoretical framework in actual context including self-directed/closed-ended questionnaires, direct observation, and physical documentation. In addition to this, a non-participative, structured observation method will be used to record basic data about the level of social interaction in the selected case study. The main findings of this research contribute to generating design guidelines for neighborhood parks within the urban context of Jeddah City in Saudi Arabia to promote social interaction.

Keywords Neighborhood park design · Jeddah city · Social interaction · Attributes · Built environment · Quality of life

1 Research Problem

Jeddah municipality has recently developed some neighborhood parks. However, despite all these efforts, there are discrepancies between the design standards employed to improve these parks and the residents' needs that incentivize them to

H. Almohandes · M. Mohamed (✉)
Master of Urban Design, College of Architecture and Design, Effat University, Jeddah, Kingdom of Saudi Arabia
e-mail: Momohamed@effatuniversity.edu.sa

H. Almohandes
e-mail: Healghamdi@effat.edu.sa

M. Mohamed
Architecture Department, College of Engineering, Zagazig University, Zagazig, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_8

interact. This research will focus on exploring, investigating, and analyzing neighborhood park design principles and their attributes to solve the problem of social interaction, which is considered one of the main challenges within the Jeddah City context in Saudi Arabia. The authors' aims that the result of this research is to provide guidelines for neighborhood park design within the Jeddah City context to be socially active urban parks that meet people's needs and induce them to interact.

2 Neighborhood Parks Design Principles and Attributes

From the literature review on the socially active park design principles and attributes, these are several principles such as inclusiveness, multi-seasonal design, maximizing the efficiency of outdoor spaces, safety, pleasure ability …etc. While there are two main principles that significantly affect the level of social interaction in open spaces and most researchers, designers, and urbanists agreed with, such as Jacobs, Gehl, Carmona, & Carr. These are: (1) Inclusiveness and (2) Meaningful public open space, this is a theoretical framework for achieving social interaction through neighborhood park design as shown in (Table 1).

3 Research Methodology

The authors used a self-directed/closed-ended questionnaire as quantitative tool for the experts in the urban and landscape design fields within the Jeddah city context to validate the theoretical framework for neighborhood parks design that enhance social interaction before using them as judgment criteria to evaluate the performance of a neighborhood park in Jeddah city. After that, the authors will use the updated theoretical framework to subjectively evaluate the design of a neighborhood park in Jeddah, KSA through direct observation as a qualitative tool and physical documentation including photographs and taking notes. In addition to this, a non-participative, structured observation method will be used to record basic data about the level of social interaction in the selected neighborhood park through direct observations and physical documentation including drawings and taking notes to explore what extent, the design attributes of the selected park affect the level of social interaction.

4 Results and Discussions

The questionnaire included a set of questions with a deadline of ten days, from April 5 to April 14, 2022. The questionnaire has been distributed to many experts in the field. After analyzing the results, the total final number of considered questionnaires for final analysis was 20. Experts were asked to scale from 1 to 5 the priority and

Table 1 Theoretical framework for the design of neighborhood parks that promote social interaction

Principles	Attributes	Qualitative design criteria
Inclusiveness	Accessibility	• Access to neighborhood parks within a quarter or half-mile radius of residences, *which equals around 400–800* m.
		• Design continuous different modes of path use that access the park for all ages and user groups, such as pedestrians with a width of approximately 1.8–3 m and cyclists with a width of approximately 1.50 m, along both sides of the street and separate them from cars. They must be free of all obstacles during the walking and well-designed such as adding hard-soft scape elements.
		• Provide perpendicular curb ramps per corner of the sidewalk with optimum width of 1.2 m, a slope of 10% for people with disabilities, with soft and anti-skid materials, as well as detectable warnings for pedestrians with vision impairments.
		• Design one highly visible, distinct park entry with decorative fencing surrounding the park to establish the park's identity and sense of transition for residents.
		• Provide bicycle holders in the park.
	Walking paths	• Design paths in the park with different modes (pedestrians and bicycles) and with varying lengths and widths.
		• Design a primary loop or curvilinear uninterrupted path that connects the park's elements and zones with width of 2–3 m and all the curves should contain a radius of 3 m.
		• Design secondary paths that branch from the primary path and lead to different destinations in the park with width of 1.8 m.
		• Design tertiary paths located around the playground or picnicking seating with width of 1.5 m.
		• Paths should be visually appealing, shaded, unpaved, or paved with cost-effective and tolerant pavement materials.
	Active and passive activities	• Active activities area should consume roughly 50% of the park's total area. The remaining 50% should be used for passive activities and other facilities.
		• **Provide active activities** that serve different users' ages and needs, such as (playgrounds or sports courts e.g. football or basketball).

(continued)

Table 1 (continued)

Principles	Attributes	Qualitative design criteria
		• Design an inclusive playground with equipment that is suitable for different age groups (2–5) years with minimum area of 230 m and (5–12) years with minimum area of 420 or 460 m and compliance with people with disabilities. But designers should make sure to functionally separate the playground according to age. Thus, the minimum total area for the playground is around 650–690 m. • Provide a safe, solid, vandal-resistant, and low-maintenance playground. • Provide shade structures that are free-standing or attached to the playground structures with steel posts, and rigid metal roofing or shade fabric. • Provide seating within the playground for parental supervision and they could be in close proximity to the group picnic seating. • Design standards are around 14 m × 33 m, and the total area is around 460 m. • Football court design standards are around 14 m × 33 m, and the total area is around 460 m. Basketball court design standards are around 15 m × 20 m, and the total area is around 420 m.The materials used for sport facilities are asphalt, rubber, soil, colored concrete, or grass. • Provide 2 m on all sides of the sports court's perimeter. One meter (1 m) should be an unobstructed area with no trees, berms, planters, sidewalks, or lights, but beyond this additional unobstructed area, it should provide shaded spectator or seating. • Maintain a minimum distance of 4 m between the playground and sports court. • **Provide passive activities** that serve different users' ages and needs, such as (picnic seating, walking, and sitting). • Provide picnic seating with a shaded shelter e.g. gazebo or pergola, sufficient lighting, and seating that allows people to look at each other to encourage families and other neighbors to interact with each other. • The length of the picnic tables should be a minimum of (0.55 m). • Provide one wheelchair-accessible end in the picnic seating.

(continued)

Table 1 (continued)

Principles	Attributes	Qualitative design criteria
Meaningful open space	Seating	• Provide seating throughout the park at key locations including park entry, a primary path without obstructing pedestrians, and around playground or sports courts. • Provide different types of primary interactive seating that induce people to interact such as (*edges benches, benches at an angle and a small table, benches with open-angle, cluster benches with a table, wide backless benches, benches with right angles at corners, curving inward benches, movable chairs and tables, concave benches, and back armrests benches with comfort materials for elderly people*). • Seating should be accessible for people with disabilities and companion for them. • Use warm and comfortable materials, also appropriate for weather conditions. • Provide shaded seating or be located near trees where possible. • Avoid secondary seating like *steps, and ledges.* Or *straight benches, convex benches, circular benches around trees or flower planters, and a row of benches* because they allow social distancing between people • The minimum length of a seating section should be (5 m). • 10% of the total park area should be for interactive primary seating.
	Plants	• Preserve existing vegetation and healthy trees, and also remove unhealthy incompatible trees. • Select plants that offer shade, safety, visually attractive diversity, and biodiversity also, define the spatial quality of the park. • Select native tree species based on the site conditions and several qualities including (Visual, Environmental, Ecological, and Biological). • Plants' locations and spacing shall allow normal growth without undue crowding. • The use of grass is high recommended in the design of parks because the grass is relaxing, flexible, and provides options for people's movements. • Provide trees for the playground or sport courts, sunny paths, and benches to offer shade. • Small decorative grass areas are not allowed to use in the park. • 25% or 30% of the total park area should be for planting. • The height of the shrubs planted in open areas should not grow over (0.37 m).

(continued)

Table 1 (continued)

Principles	Attributes	Qualitative design criteria
	Shading devices	• Provide a variety of shading elements such as (plants as mentioned above, but also man-made shading devices including pergolas, gazebos, arches, and shading cloth or sails). • Provide shading devices within picnic seating and playground. • Provide shading devices within benches. • Offer choice-of sun, shade, or in-between for users. • Designers can choose between plants and shading devices based on the park's conditions and design.
	Lighting	• Lighting should be efficient, suitable, functional, visually distinctive, and distributed throughout the park. • Use high-efficiency lighting with low cut-off angles and down-lighting to not allow direct-beam exterior lighting. • Use high intensity of lighting on paths and active activities. • Use warm and colored lighting for quiet areas and passive activities. • Located the lighting poles of the sports courts outside the fenced play area. • Use low-maintenance lighting such as using (LED models, underground cabling, or luminaires with solar panels). • The height of the paths lighting source is around 4 m–5 m, but the maximum is 6 m. • Use a light pole of (0.55 m) around the playground if there is no fence. • The horizontal Illumination of the basketball is 30 Fc and uniformity is 3:1 or less. • The horizontal Illumination of the football is 20 Fc and uniformity is 4:1 or less.

(continued)

Table 1 (continued)

Principles	Attributes	Qualitative design criteria
	Water elements	• Located the fountains based on the fountain's type such as (in the center, close to the park's original axis, or within the sports court). • Provide splash pads or normal fountains to support active and passive activities. • Provide drinking water near to playground and sports court. • Provide night lighting in the fountains. • Fountains' design should be in line with the design of the park.
	Maintenance	• Surveillance and control over plants, furniture, pavements, and other facilities. • Ensure the elements' durability to reduce needed maintenance. • Focus on the design process of the park from the beginning such as the selection of plant species, furniture, and materials also the accessibility quality to these parks.

Source Done by the authors after (Addas 2018; ADA 1990; Ayuba et al. 2014; Bonenberg 2015; Bowler et al. 2010; Bueno et al. 2007; Burt 1997; Carmona 2018; Cattell et al. 2008; Cohen et al. 2017; Crankshaw 2009; Driessen and Quayle 1997; Free sport parks map 2017–2022; Gehl 2010, 2011; Gobster 1995; Greenwood 1999; Hadavi et al. 2015; Huang 2006; Jacinta et al. 2012; Jalaladdini and Oktay 2012; Jorgensen et al. 2002; Kaczynski et al. 2008; Mehta 2013; Mertes and Hall 1996; Mohamed 2019; Mohamed and Shawesh 2021a, b; Mohamed et al. 2019, 2021, 2022; Mohsenianrad 1995; Montgomery County Parks Park trails nodate; Mumcu and Yilmaz 2016; Nasution 2012; National Recreation and Park Association Safe nodate; Park and Trail Master Plan, City of Medina 2014; Park Standards and Classifications 2008; Parks, playgrounds and Active living 2010; Ricks 1992; Sarokhani 1993; Simões Aelbrecht 2016; Spooner 2014; Washington State Department of Transportation 1997)

Scale	1	2	3	4	5	Average	Importance
Accessibility	0	0	0	14.3	85.7	97.14	1
Walking paths	0	0	14.3	28.6	57.1	88.56	6
Activities	0	0	14.3	33.3	52.4	87.62	7
Seating	0	9.5	0	33.3	57.1	87.54	8
Plants	0	0	14.3	4.8	81	93.42	2
Shading devices	4.8	0	4.8	14.3	76.2	91.48	4
Lighting	0	4.8	0	28.6	66.7	91.5	5
Water elements	4.8	23.8	28.6	28.6	14.3	64.82	9
Maintenance	0	0	4.8	23.8	71.4	93.32	3

Fig. 1 The statistical equation for calculating the average of each design attribute's importance in designing a neighborhood park in Jeddah city from experts perspectives. *Source* Done by the authors

importance of the availability and designing of the nine attributes in a neighborhood park in Jeddah city as mentioned above in the literature review. The scale from 1 to 5 starts with "not important," "moderately important," "neutral," "important," and "very important." Hence, based on the results, the largest percentage of each design attribute was for a score of 5, which means very important, except for the water elements design attribute, which got the same percentage, which is 28.6% for a score of 3, which means natural, and 4 means important. The authors used a statistical equation to calculate the average of each design attribute's importance to set the final order on the importance of the availability and design of these attributes in a neighborhood park in Jeddah city (Fig. 1).

Based on this, the average importance of each design attribute ranged from 80 to 100, which means that the proposed framework for these attributes in designing a park that promotes social interaction, are necessary and important as design guidelines for a neighborhood park in Jeddah city to enhance social interaction in it. However, water elements had the lowest importance average, which means that they are important, but they are insignificant compared to other design attributes. The figure below shows the final order of these attributes during the design of a neighborhood park in the city of Jeddah (Fig. 2).

Experts were asked about the provision percentage of the design attributes in the park, including activities, seating, plants, paths, lighting, and water elements. In response to the activities provision percentage in the park, more than half of the experts' 52.4%, disagreed with the appropriate percentage of the activities, which is equal to 50% according to the literature review, and proposed 30% for the activities in a neighborhood park in Jeddah. However, the majority of the experts were agreed with provision percentage of the seating based on the literature review which is 10% and 25% or 30% for plants, and 10% or 15% lighting, paths, and water elements (Table 2).

After that, each of the eight design attributes has been analyzed and evaluated orderly according to their importance, as determined by the experts' questionnaire in "Al-Ansari Park" located in the second neighborhood in "Al-Manar" district in Jeddah

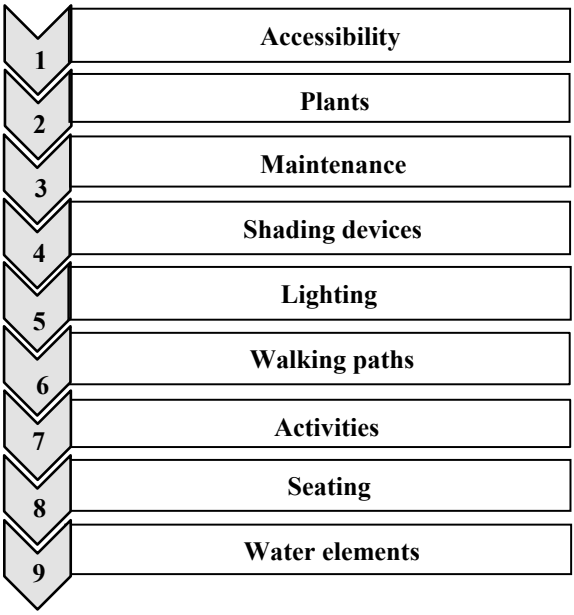
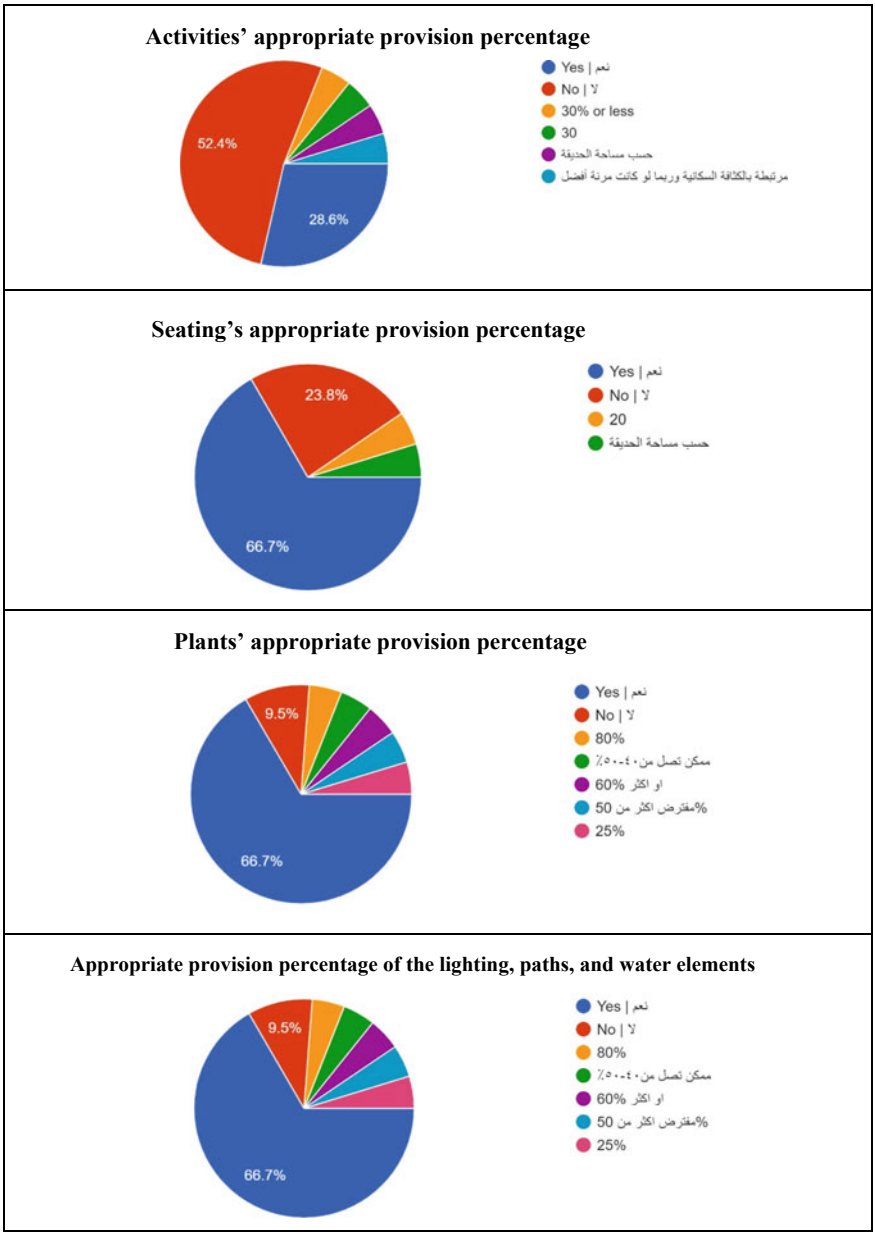


Fig. 2 The final order of the attributes during the design of a neighborhood park in Jeddah city

City. Furthermore, direct observation as a qualitative tool and physical documentation including photographs and taking notes have been used to evaluate subjectively the aspects of each design attribute as mentioned in the theoretical framework with a score from 1 to 5, where 1 means very low, 2 means low, 3 means medium, 4 means high, and 5 means very high. After sorting and evaluating each design attribute's aspects out of 5, the total evaluation score of the aspects was calculated and divided by the number of all aspects of a single attribute to get the average design success of each attribute in order to calculate the final total design success percentage out of 100% for the selected park. Moreover, a non-participative, structured observation method was used to record basic data about the level of social interaction in Al-Ansari park. The researcher used direct observations as a qualitative tool and physical documentation including drawings to count the number of interacted people and take notes. The main finding from the field study part was that it is evident that due to the design problems in the selected neighborhood park, where the total design success percentage of the park was 50%, the social interaction has been affected. The proposed theoretical framework of the park design that enhances social interaction is not given enough consideration, as although a lot of each attribute's design aspects have been achieved, there is a lot of lack of achievement in other design aspects of these attributes, such as accessibility design that shows that residents are using the same street with a width of 9 m for cars, pedestrians, and cyclists to access the park; the insufficient provision of trees that provide shade and the insufficient provision of the shading devices; the decrease in the number of available activities as there was only one playground and one picnic seating although the high demand by users on the activities during the direct observation that conducted in the field study, which goes against what has been

Table 2 Appropriate provision percentage of the (1) activities, (2) seating, (3) plants, and (4) lighting, paths, and water elements, in a neighborhood park in Jeddah city based on the experts' perspectives



suggested by the experts, that the percentage of providing activities should be only 30%. As well as the insufficient provision of the seating, besides their design that allows social distances between the users. In addition to this, the park's paths are not curved or looped to facilitate people's ability to move continuously, which supports the longer-duration recreational activity and enhances interaction. They do not have different modes for pedestrians and cyclists in the paths of the park. Furthermore, there was a huge lack of the hard and soft design elements in the park that could be provided in the accessibility, activities, seating, and park paths. Most importantly, the distribution used of these eight design attributes in the park had an impact on the total evaluation percentage of Al-Ansari park design. Also, people with disabilities were not considered at all in the design of the park. Additionally, it became clear that the number of people who interacted on the first day was 57, on the second day it was 39, and on the third day, it was 26. This means that the total number of people who were interacting in the park at the three peak times on the three days was 122. The researcher finds that this number, in the peak times of these three days in a park of 2400 m, is a small number of interactions, and this is related to the defects in the design of the park as mentioned.

5 Conclusion and Recommendations

The main aim of this research was to propose a set of design guidelines for the neighborhood parks within Jeddah City, KSA to enhance the level of social interaction in these parks and improve the quality of life for the residents. There are two principles that most researchers, designers, and urbanists agreed that they have a great impact on social interactions in parks. The first principle is inclusiveness, with three design attributes: accessibility, paths, and activities. The second principle is meaningful public space, with six design attributes; seating, plants, shading devices, lighting, water elements, and maintenance. According to the literature review, each of those nine attributes with their qualitative and quantitative design criteria was combined to conclude the theoretical study by proposing a set of active park design guidelines that enhance social interaction. A self-directed/closed-ended questionnaire for the experts in the urban and landscape design fields within Jeddah city context was utilized to develop the proposed principles and attributes. The updated proposed design attributes according to the experts' perspectives and based on their importance are: (1) accessibility, (2) plants, (3) maintenance, (4) shading devices, (5) lighting, (6) paths, (7) activities, (8) seating, (9) water elements. The proposed provision percentage for the design attributes in the park according to the literature review is consistent with the majority of the experts' perspectives except for the provision percentage of the activities, which according to the literature review was 50%, and the majority of the experts disagreed with it and they suggested 30%.

The research can recommend the following:

1. Design the neighborhood streets by providing different paths for pedestrians and bicycles on each side of the street and linking them to the neighborhood park.
2. Design a clear and attractive entrance to the park that serves the various needs of users so that users are given a feeling of access and transition.
3. The movement of the sun in the neighborhood park must be studied throughout the day.
4. Choosing the right types of native plants that offer shade and distributing them in activities, seating, and paths.
5. Knowing the correct choice of the types of shading devices and distributing them in activities, seating, and paths.
6. The distribution of trees and shading devices in the park must be balanced in a smart and studied method based on the conditions of the park.
7. The smart, attractive, and safe lighting distribution in the park, also takes into account that based on the needs, design, and function of the zones in the park, it must select the correct selection of the length of the light pole and light source.
8. Provide a primary curved or looped path that connects all the park's zones with a width of 2–3 m.
9. Support the park paths with hard and soft design elements. Furthermore, it is better to be paved in order to enhance physical activity and attract residents to the park.
10. Park paths should provide different modes for pedestrians and bikes to meet the needs of all users.
11. The largest provision percentage in the park should be for the activities. It is incorrect to provide only one playground and one picnic seating in a park ranging from 2000 to 4000 m, as it is happening in the majority of the neighborhood parks in Jeddah City.
12. Activities should serve different ages and needs of users, for example, providing a playground or a hill to climb or spin around on, as well as providing a football field for teenagers or a basketball field.
13. Provide sufficient picnic seating for adults or the elderly.
14. Provide grass and shaded areas to sell food to the users, or create a social activity together in these grass areas.
15. Activities should be designed taking into consideration the shade, lighting, and benches required for these activities.
16. Provide seating that includes interactive seats, which force people to interact and look at each other. In addition, these interactive seating must accommodate four people or more and be shaded, comfortable, resistant to weather conditions, and serve all the needs of users.
17. People with disabilities must be taken into account in all design stages.
18. Connecting the neighborhood park to the mosque will enhance social interaction because mosques are the active points in residential neighborhoods in an Islamic community.

19. The design of the park must have strong durability, less maintenance, and continuous observation and improvement of the used materials, seating, lighting, paths, playing equipment, and plants.

6 Future Work

Conduct a correlation study by testing and evaluating the eight design attributes of two neighborhood parks, which have the same income level, were built in the same year, and have similar locations e.g. they are connected to the neighborhood mosque or all of them are not connected to it, so the only difference is the design of these two parks in order to evaluate the level of social interaction and to what extent the design has affected it. This will be used to explore if other aspects affect the level of social interaction other than design in these neighborhoods in terms of planning and social or cultural aspects.

Study the appropriate distribution, criteria, and design guidelines of the right location of the parks in Jeddah residential neighborhoods in order to meet the needs of the community and enhance social interaction.

Study the provision percentage of the eight design attributes in the neighborhood park based on the population density in the residential neighborhood.

References

Addas AN (2018) Landscape architecture and the Saudi Arabia quality of life program. Emirates J Eng

Americans with Disabilities Act (ADA) (1990) Public law 226, 101st congress. [Online]

Ayuba SH, Abd Manaf N, Hamzahc MR (2014) Leadership: communicating strategically in the 21st century. Procedia Soc Behav Sci 155:502–506

Bonenberg W (2015) Public space in the residential areas: the method of social-spatial analysis. Procedia Manufact 3:1720–1727

Bowler DE et al (2010) A systematic review of evidence for the added benefits to health of exposure to natural environments. BMC Public Health 10:456. https://doi.org/10.1186/1471-2458

Bueno E, Salmador MP, Rodríguez O (2007) The role of social capital in today's economy: empirical evidence and proposal of a new model of intellectual capital. J Intell Capital 5 (4):556–574

Burt RS (1997) The contingent value of social capital. Adm Sci Q 42:39–365

Carmona M (2018) Principles for public space design, planning to do better. Urban Des Int 24(1):47–59

Cattell V et al (2008) Mingling, observing, and lingering: everday public spaces and their implications for well-being and social relations. J Health Place 14(3):544–561

Cohen DA et al (2017) The prevalence and use of walking loops in neighborhood parks: a national study. Environ Health Perspect 125(2):170–174

Crankshaw N (2009) Creating vibrant public spaces: streetscape design in commercial and historic districts. Island Press, Washington, 240pp

Driessen C, Quayle M (1997) Growing community: a case of hybrid landscapes. International Journal of Landscape and Urban Planning, Columbia

Free sport parks map (2017–2022) Basketball court dimensions and features|free sport parks map. freesportparks.hu. [Online]
Gehl J (2010) Cities for people. Island Press
Gehl (2011) Life between buildings: using public space. Island Press, Denmark
Gobster PH (1995) Perception and use of a metropolitan greenway system for recreation. Landsc Urban Plan 33:401–413
Greenwood J (1999) Guidelines for shade planning and design. In: Council NC (ed) NSW state government, NSW. [Online]
Hadavi S, Kaplan R, Hunter MCR (2015) Environmental affordances: a practical approach for design of nearby outdoor settings in urban residential areas. Landsc Urban Plann 134:19–32
Huang S (2006) A study of outdoor interactional spaces in high-rise housing. Landsc Urban Plan 78(3):193–204
Jacinta F, Billie C, Lisa W, Matthew K (2012) Creating sense of community: the role of public space. J Environ Psychol
Jalaladdini S, Oktay D (2012) Urban public spaces and vitality: a socio-spatial analysis in the streets of Cypriot towns. Social and behavioral sciences. Procedia—Soc Behav Sci
Jorgensen A, Hitchmough J, Calvert T (2002) Woodland spaces and edges: their impact on perception of safety and preference. Landscape Urban Plann 60(3):135–150
Kaczynski AT, Potwarka LR, Saelens BE (2008) Association of park size, distance, and features with physical activity in neighbourhood parks. Am J Public Health 98(8):1451–1456
Mehta V (2013) Evaluating public space. J Urban Des 19(1):53–88
Mertes JD, Hall JR (1996) Classifications for parks, open space, greenways. In: Park, recreation, open space, and greenway guidelines. National Recreation and Park Association
Mohamed M (2019) Green building rating systems as sustainability assessment tools: case study analysis. In: Bastante-Ceca MJ, Fuentes-Bargues JL, Hufnagel L, Mihai FC, Iatu C (eds) IntechOpen sustainability assessment at the 21st century. ISBN: 978-1-78984-977-6, Print ISBN: 978-1-78984-976-9, eBook (PDF) ISBN: 978-1-83880-079-6, https://doi.org/10.5772/intechopen.78105. Available from: https://www.intechopen.com/books/sustainability-assessment-at-the-21st-century/green-building-rating-systems-as-sustainability-assessment-tools-case-study-analysis
Mohamed M, Shawesh R (2021a) Post occupancy evaluation of outdoor thermal comfort in hot arid zone. Int J Low-Carbon Technol 16(1):50–60. https://doi.org/10.1093/ijlct/ctaa035, https://academic.oup.com/ijlct/advance-article/doi/https://doi.org/10.1093/ijlct/ctaa035/5856808, ISSN 1748-1317, EISSN 1748-1325
Mohamed M, Shawesh R (2021b) Assessment of outdoor thermal comfort in hot arid zone. J Urban Environ Eng 15(1):10–23. ISSN 1982-3932. https://doi.org/10.4090/juee.2021.v15n1.10-23
Mohamed M, Fatani KA, Al-Khateeb S (2019) Survey based sustainable socio-cultural guidelines for neighbourhood design in Jeddah. In: Presented at 4th international conference on research methodology for built environment and engineering 2019, 24–25 April 2019, Chulalongkorn University, Malaysia, and published at the IOP Conference Series: Earth and Environmental Science (ISSN: 1755–1315), Published under licence by IOP Publishing Ltd IOP Conf Ser: Earth Environ Sci 385(1). https://doi.org/10.1088/1755-1315/385/1/012050
Mohamed M, Othman A, Abotalib A, Majrashi A (2021) Urban heat island effects on megacities in desert environments using spatial network analysis and remote sensing data: a case study from Western Saudi Arabia. J Remote Sens 13(10):1941. https://doi.org/10.3390/rs13101941 (SI in Understanding Urban Systems Using Remote Sensing)
Mohamed M, Al Surf M, Kesmi S (2022) Critical insights into green urban sustainable system to achieve the concepts of smart cities. Res Innovation Forum Rii2020—Athens
Mohsenianrad M (1995) Study of communication (2rd ed). Sourosh Publishing, Iran
Montgomery County Parks Park trails. montgomeryparks.org. [Online]
Mumcu S, Yilmaz S (2016) Seating furniture in open spaces and their contribution to the social life. St. Kliment Ohridski University Press

Nasution A (2012) Public open space privatization and quality of life, case study Merdeka square Medan. Procedia—Soc Behav Sci 36:466–475
National Recreation and Park Association Safe routes to parks: improving access to parks through walkability. nrpa.org. [Online]
Park and Trail Master Plan, City of Medina (2014) Park and trail master plan—city of Medina, Minnesota. medinamn.us. [Online]
Park Standards and Classifications—City of Salin (2008). [Online]
Parks, playgrounds and Active living (2010) Active living research. Parks, playgrounds and active living. Active Living Research, San Diego
Ricks GR (1992) Native and introduced species for naturalistic landscape in Saudi Arabia. King Abdulaziz Univ Press Eng Sci 4:21–46
Sarokhani B (1993) Sociology of communication, 4rd ed. Etelaat Publishing, Iran
Simões Aelbrecht P (2016) 'Fourth places': the contemporary public settings for informal social interaction among strangers. J Urban Des 21(1):124–152. https://doi.org/10.1080/13574809.2015.1106920
Spooner D (2014) Enhancing campus sustainability through SITES and socially equitable design. Plann High Educ J 42(4):30–45
Washington State Department of Transportation (1997) Pedestrian facilities guidebook: incorporating pedestrians into Washington's transportation system. safety.fhwa.dot.gov. [Online]

Historic Significance and the Urban Ambiance of Public Open Spaces "*Barahat*" in Old Jeddah

Norhan Elsheny and Haitham Samir

Abstract Urban public spaces play an important role in the social life, culture, and traditions of old Jeddah. Urban public spaces are defined by their urban form and design which express the unique identity of historic cities. They contribute to the development of social bonds, the integration of local communities and the overall public realm experience. The historical significance of urban public spaces is a prerequisite for the space ambiance. The aim of this study is to explore how the historic significance and space ambiance can influence the space identity and particularity. Three urban public spaces (Barahat) within the UNESCO nominated property in Jeddah, Saudi Arabia were evaluated based on the existing condition. The goal was achieved by the use of a quantitative research method based on questionnaires and fieldwork. The result of the evaluation will be used to assist in the enhancement of the public realm within the historic context. The analysis framework has been proposed based on the historic significance and ambiance of the spaces.

Keywords Urban public spaces · Historic significance · Ambiance · Barahat · Jeddah

1 Introduction

Urban public spaces have contributed in reflecting the identity and role of towns and cities since the beginning of urban life. Urban public spaces have a distinct and long-lasting importance in this regard. Those spaces have been a consistent component

N. Elsheny · H. Samir (✉)
College of Architecture and Design, Effat University, Jeddah, Saudi Arabia
e-mail: Haitham.Samir@ngu.edu.eg

N. Elsheny
e-mail: nmelsheny@effatuniversity.edu.sa

H. Samir
School of Engineering, New Giza University, Cairo, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_9

in the creation of cities/towns and the life of urban communities since the ancient past, through the Middle Ages, and into the modern day (Zambon et al. 2017). Urban public spaces are defined as any urban ground space that must be freely accessible to the public, independent of public accessibility. Although they have many similarities, their form and function have changed considerably as a result of cultural changes (Stanley et al. 2012).

To make it easier to identify and analyze urban public spaces, they are classified into different categories, yet they all serve the public in a similar way. They also contribute to the city's environmental sustainability. Urban public spaces are important aspects of cities, including Jeddah, and must represent a variety of forms and experiences. They give 'breathing' in a dense urban environment, encouraging chances to engage in out-door activities, enjoy scenic vistas, access nature, and explore cities. On a regional scale, urban public spaces showcase the city's attractiveness. The attraction of public spaces, their multifunctional nature, and their ability to satisfy varied local needs, both material and spiritual, are all influenced by a variety of elements (Mamyan et al. 2016).

The public areas in the city's historic districts are strongly intertwined. Its design should encourage social interrelationships, wellbeing, and lifestyle habits by providing possibilities for physical, cultural, and social activities, as well as a connection to nature. In the social life, culture, and traditions of historic cities, urban public spaces play a unique and enduring significance. Through their urban layout and architectural design, they express the old city's distinct identity. They also help to build social relationships by bringing together local communities. As a result, social interactions influenced the historic nature of public open spaces, where the urban plan was adapted to local conditions and many cities progressed from existing human settlements. Buildings and structures, if not massive buildings, surround "urban open spaces" in general, especially when dealing with historic cities (Tuan 1977). Most historic downtowns are defined by historic buildings, which influence the spaces between them.

2 Literature Review

2.1 Historic Significance

The historical value of a public area is intangible, but it is a powerful contextual aspect that influences the ambiance. A sense of knowing that penetrates all of the other feelings about the area. A person or group, a series of events or a single event, an extended evolutionary process, or a great idea could all be part of space history. Often, historical significance is diverse and multilayered, beginning before there was a human settlement and continuing to the present day. History contributes to the

ambience by serving as a mirror through which people perceive the space's physical attributes. A building, a location in the space floor, a tree, or an element might all have historical significance. The spirits, memories, emotions, and sensations of history have suddenly disappeared, blending with and influencing current reality. What was and what is are both co-creators of environment. Then is blended with now, creating a then-now atmosphere.

The past of a place can either extend and strengthen current energy and mood, or it might contrast, even contradict it. The combination of yesterday and today can be entertaining, dramatic, inspiring, or tragic when history contrasts with present atmosphere. One's appreciation of atmosphere and place history is influenced by aesthetic tastes, political orientation, religious beliefs, and moral principles. People are difficult players for perceiving ambience since they have so many various lenses through which they view a place. It's no surprise that their perspectives and descriptions of urban areas differ.

As elements determining ambience, place popularity, symbolism, and name join role and relevance. These are concerns with a site's identity, or how it is known.

Reputation is the cumulative history of people's feelings about a place, and it has a big influence on what they anticipate to see and do in the space. An inclination to be on the search for certain aspects and attributes of a location. Ambience elements include symbolism and meaning. What does the location represent? To what does it refer? What comes to mind? Symbolism can be complex and multilayered, or it can be simple and concentrated.

Presence of historic elements. Historic architecture tells the city's story. Old structures stand as witnesses to a city's aesthetic and cultural heritage, providing a sense of place and a connection to the past. Recognizing the significance of historic structures to the people and the country's heritage. These locations require upkeep and tour guides.

Space historically recognized and used. Public spaces are the spaces that lead to the formation of a city, as the presence of public space determines the city's character. Historic spaces acted as multidimensional space that served various functions. They were yet known due to a phenomena, person, house, or political event. A space could also be recognized for standing structure, and aesthetically pleasing element or a historic pathway.

Surrounding buildings' classification level. Historic building classification to levels or types are essential for the historic significance and value of the buildings. They include all types of information on the buildings. Cities' historic monuments serve as economic, social, and cultural benefits. Thus, historic monuments must be acknowledged and valued.

Historic buildings intact and conserved. Preservation of historical monuments has a wide range of cultural and social benefits; it promotes civic pride, supports the social and cultural well-being of residents, and can also help communities achieve long-term economic goals such as city growth and revitalization, small business

development, and housing. As a result, this heritage must now be used as a tool to help future generations appreciate and preserve it.

Richness of aesthetic features. The aesthetics of a structure are one of the most significant aspects of architecture. The combined impact of a structure's shape, scale, texture, color, balance, unity, movement, emphasis, contrast, symmetry, proportion, space, alignment, pattern, decoration, culture, and context is referred to as its appeal.

2.2 Ambiance

The type and condition of the architecture forming the space, the activity and energy present, and a variety of surrounding conditions all influence the ambience.

Factors such as reputation, symbolism, and place name can all influence mood and atmosphere. Age has an impact on one's mood. A new location feels different from a historical location. Ambience is influenced by care, maintenance, and quality. The intensity and energy of activity contribute to the ambiance and feel of the area. The vitality of space activity is felt by all five senses. Action has an impact on emotions. People are attracted to the energy of a room, especially if it is strong, consistent, and all-encompassing. Whatever the location signifies becomes a component of the ambiance, which is just as important in shaping the emotional tone as the physical fabric. In terms of ambience and tone, a space name can be telling, powerful, and memorable. The name of a place tends to lead us to see it in a certain light, especially if we know the story behind it. People's names, buildings' names, events' names, functions' names, and ideas' names are commonly used to designate urban area. The name of a location could form a gap inside which meaning and mood might be experienced (White 1999).

Sense of enclosure. Changing environmental conditions and recent practices affects the perception of a space. Space oddity is minimized by the existence of scalable elements such as repetitions, linkages, and proportioning, etc. Also, human-scale structures have a favorable impact on people's impressions of public areas because they make them feel as though they were considered during the planning process.

Sense of belonging. They identify is a set of characteristics and values that distinguishes one individual or group from others (Knez 2005). The identity of a city can be compared to that of a person. Belonging can be felt through a historically significant monument made of local materials or a nostalgic remembrance evoked by a traditional song. A space's identity and character are intertwined with its history.

Sense of safety and security. It is impossible to overestimate the importance of generating a sense of security among people in public settings. In addition to being a basic human need, a lack of security in one's daily environment can have a variety of harmful outcomes (Jacobs 2007; Newman 1972). Anti-social behavior and attitudes,

as well as stress-related effects, can be costs of coping with fear or other feelings of insecurity.

Sense of comfort through shade. Shade and shadow influence the people's performance in public spaces. Shade can be achieved through three strategies: buildings shade, canopies shade and tree shade. Thereby, shaded areas enhance the individual thermal comfort, the space ventilation and the air quality in general.

Presence of diverse types of people. Public space serves a variety of societal purposes and features in order to foster connections between people and the rest of the world (Carr et al. 1992). Public spaces should be adaptive to accommodate a wide range of user activities, interests, and needs and wants and accessible to a wide range of human physical conditions without discrimination and meaningful have a connection between people, space, and the larger world (Kurniawati 2012).

2.3 Framework

Dimensions	Variables		Weight	Scoring criteria	Measuring criteria
Historic significance	1	Presence of historic elements		0 = None	Determined by observation
				1 = One	
				2 = Two	
				3 = Several	
	2	Space historically recognized and used		0 = Not at all	Determined by historic records
				1 = Somewhat	
				2 = Mostly	
				3 = Very much	
	3	Historic buildings intact and conserved		0 = Not at all	Determined by observation
				1 = Somewhat	
				2 = Mostly	
				3 = Very much	
	4	Surrounding buildings' classification level		0 = Not at all	Determined by historic records
				1 = Low	
				2 = Medium	
				3 = High	
	5	Richness of aesthetic features		0 = Not at all	Determined by observation
				1 = Low	
				2 = Medium	

(continued)

(continued)

Dimensions	Variables		Weight	Scoring criteria	Measuring criteria
				3 = High	
Sub-total			10	15 (max.)	
Ambience	1	Sense of enclosure	2.0	0 = Not at all	Determined by observation
				1 = Somewhat	
				2 = Mostly	
				3 = Very much	
	2	Sense of belonging	1.0	0 = Not at all	Determined by observation
				1 = Low	
				2 = Medium	
				3 = High	
	3	Sense of comfort through shade	2.0	0 = Not at all	Determined by observation
				1 = Somewhat	
				2 = Mostly	
				3 = Very Safe	
	6	Safety and security of users	1.0	0 = Not at all	Determined by observation
				1 = Somewhat	
				2 = Mostly	
				3 = Very Much	
	5	Presence of diverse types of people	2.0	0 = Limited	Determined by observation
				1 = Low	
				2 = Medium	
				3 = High	
Sub-total			10	15 (max.)	

3 Methods

To conduct this study, a quantitative research method strategy was used to quantify the collected data. The research relied on online questionnaires to experts, on-site observation, and historic data to gather the required information on the space ambiance and historic significance. The online questionnaires target experts in the urban and heritage fields seeking their evaluation on the dimensions and variables suggested in the framework. The on-site observation and historic data collection were conducted on three urban open spaces in the historic district, Al Balad. The spaces were selected based on their relatively similar sizes.

3.1 Online Questionnaires

The questionnaires were directed to a number of experts in the urban and heritage fields to: first, verify; then, weight the proposed dimensions and variable from the framework. The weights were rated based on their importance on a Likert scaling from 1 to 7.

3.2 On-Site Observation

The site was visited to observe and capture the urban life in old Jeddah public spaces. By observing the current occurring setting of the space the study could be investigated. Observations consist of monitoring the built environment and its role, the space usage, and the people interaction and behavior within the space. Observing closely the historic area and its surroundings, with an evaluative lens and an open mind.

3.3 Study Area

Three urban open spaces, barahat, within the UNESCO nominated property in Jeddah were selected for the study. The barahat are selected according to the size of the spaces and their presence within the historic quarter of the area. The analyzed barahat are and Amm Zakir (B1), Badeeb (B2) and Nassif (B3) (see Fig. 1). Urban open spaces were the main connectors between neighborhoods and the only way to move in-between the neighborhoods (Gehl 1987). Those aspects gave public spaces a great importance in the city.

B1: Barahat Am Zakir

This historical baraha is located in the in between the intersection of Harat al-Sham and al-Mazloum. It is among the largest barahat. It was a place for festive activities during Eid as well as other occasions such as weddings, funerals and other popular games (see Fig. 2).

B2: Barahat Badeeb

The first baraha when approaching Souq al Bado. It is surrounded by shops due to its location on a commercial path in the souq extension. It is named after Badeeb family that have their house overlooking the baraha (see Fig. 3).

B3: Barahat Nassif

It is the most well-known historic baraha which is located in Jeddah's heart between Harat al-Yemen and al-Mazloum. The baraha contains one of the oldest trees in

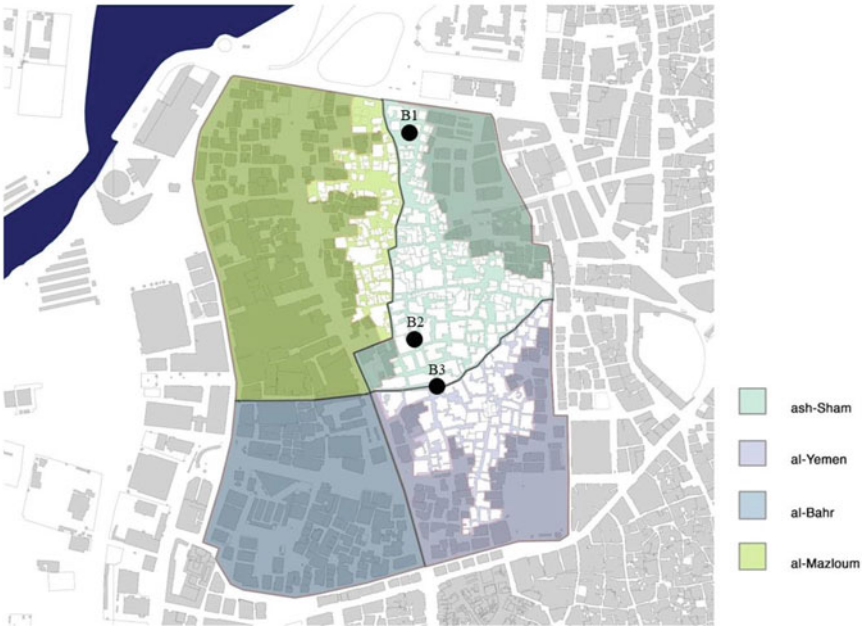


Fig. 1 Map of historic quarters. *Source* Jeddah Municipality, (2013)

Fig. 2 B1-Barahat Amm Zakir. *Source* by researcher

Fig. 3 B2-Barahat Badeeb. *Source* by researcher

Jeddah and was used to be occupied by peddlers and vendors; and caravans of pilgrims who gathered in or passed through on their way to Mecca (see Fig. 4).

4 Analysis

4.1 Questionnaire Analysis

As shown in Fig.5, the weighted variables are relatively close in their importance in the urban open spaces. The sense of belonging was weighed the highest with an average of 6.18 due to its influence on the users' perceptions and feelings. Yet, the sense of comfort weighed the least with an average of 5.68 implying that even if the users are not shaded, they still relate to the spaces and their identity while being fully aware of its value.

Fig. 4 B3-Barahat Nassif. *Source* by researcher

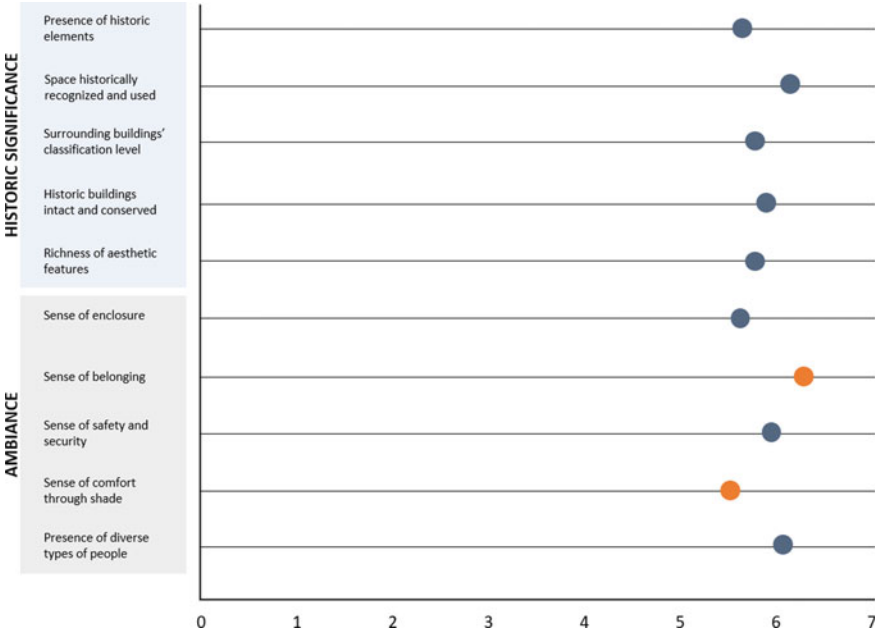


Fig. 5 Urban open spaces framework variables' weights. *Source* by researcher

4.2 Framework Analysis

The framework is proposed to analyze the historic barahat in Al Balad and quantify the historic significance and space ambiance to calculate the relation of each in the contribution to the space identity. The weight is obtained through the experts' questionnaires and the scores are based on the site observation and historic data collected.

Dimensions	Variables		Weight	Score	Total %
B1: Barahat Am Zakir					
Historic significance	1	Presence of historic elements	9.76	1	3.25
	2	Space historically recognized and used	10.41	2	6.94
	3	Historic buildings intact and conserved	9.89	2	6.59
	4	Surrounding buildings' classification level	9.98	3	9.98
	5	Richness of aesthetic features	9.89	1	3.30
					30.06
Ambience	1	Sense of enclosure	9.68	2	6.45
	2	Sense of belonging	10.47	2	6.98
	3	Sense of comfort through shade	10.03	1	3.34
	6	Safety and security of users	9.62	3	9.62
	5	Presence of diverse types of people	10.38	3	10.38
					36.77
B2: Barahat Badeeb					
Historic significance	1	Presence of historic elements	9.76	1	3.25
	2	Space historically recognized and used	10.41	2	6.94
	3	Historic buildings intact and conserved	9.89	1	3.29
	4	Surrounding buildings' classification level	9.98	3	9.98
	5	Richness of aesthetic features	1	9.89	3.29

(continued)

(continued)

Dimensions	Variables		Weight	Score	Total %
					26.75
Ambience	1	Sense of enclosure	9.68	3	9.68
	2	Sense of belonging	10.47	1	3.49
	3	Sense of comfort through shade	10.03	2	6.68
	6	Safety and security of users	9.62	2	6.41
	5	Presence of diverse types of people	10.38	1	10.38
					36.64
B3: Barahat Nassif					
Historic significance	1	Presence of historic elements	9.76	3	9.76
	2	Space historically recognized and used	10.41	3	10.41
	3	Historic buildings intact and conserved	9.89	2	6.59
	4	Surrounding buildings' classification level	9.98	3	9.98
	5	Richness of aesthetic features	9.89	3	9.89
					46.63
Ambience	1	Sense of enclosure	9.68	2	6.45
	2	Sense of belonging	10.47	3	10.47
	3	Sense of comfort through shade	10.03	1	3.34
	6	Safety and security of users	9.62	3	9.62
	5	Presence of diverse types of people	10.38	3	10.38
					40.26

5 Results and Discussion

5.1 Results

Framework Results. The results adopted from the framework analysis shows in Table 1 that Barahat Nassif (B3) has the highest total percentage in both the historic

significance with a 46.63% and the space ambiance with a total of 40.26% out of 100. Figure 6 illustrates that Barahat Nassif (B3) reflects the identity and particularity of the area more than the other spaces. This suggests the importance and the high value Barahat Nassif (B3) holds. Despite the difference in the total percentages all three barahat act as a cultural asset to the historic area, Al Balad.

Table 1 Percentage of urban open spaces analytical framework dimensions

Dimensions	Total %
B1: Barahat Am Zakir	
Historic significance	30.06
Ambiance	36.77
B2: Barahat Badeeb	
Historic significance	26.75
Ambiance	36.64
B3: Barahat Nassif	
Historic significance	*46.63*
Ambiance	*40.26*

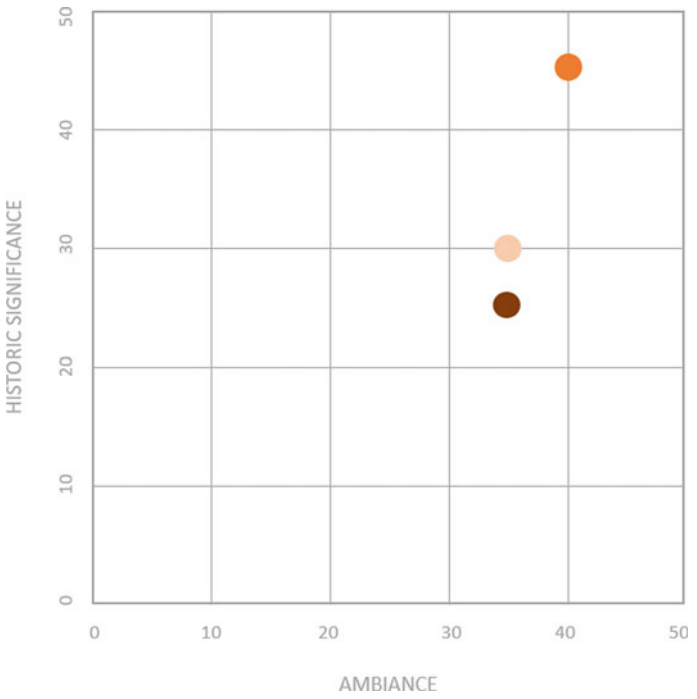


Fig. 6 Urban open spaces framework variables' weights. *Source* by researcher

5.2 Discussion

Public spaces are essential to providing the community's need of wanting to be in those spaces (Al-Ban 2016). Thereby, analyzing the framework through the collected data is beneficial when evaluating the urban open spaces. Through evaluating the three barahat it has been shown that various variables have a great impact on the spaces. For instance, in the historic significance the historic use and recognition of the space is essential for the valuable information it represents. As for the space ambiance the sense of belonging has the highest influence on how spaces are perceived and their performance.

6 Conclusion

The historic center of Jeddah's original form of open space "*Baraha*" epitomized the historical social occasions. The *Barahat* are important elements of the quality of life. They were the focal centers of historic towns' urban planning. Open spaces are a continuous record of the city's rich history, exhibiting distinct historical and cultural values reflected in the design and emphasizing the importance of historical memory as an intangible asset (Barchino et al. 2017). Cultural heritage preservation is on the rise in Jeddah, and the Baraha and the public realm in general are witnessing a dramatic transition, where heritage conservation overlaps or collides with development demands. Historic centers are experiencing rapid change nowadays. Managing an urban historic region as a whole requires spatial awareness and a sense of place (Mamyan et al. 2016).

References

Al-Ban AZG (2016) Architecture and cultural identity in the traditional homes of Jeddah. University of Colorado at Denver

Barchino AT, Verdú JL, Lluch JS (2017) Recovering chromatic space as a sign of identity in the historic city. Paper presented at the INTBAU international annual event

Carr S, Stephen C, Francis M, Rivlin LG, Stone AM (1992) Public space. Cambridge University Press

Gehl J (1987) Life between buildings. Using public space. Van Nostrand Reinhold, New York

Jacobs J (2007) The uses of sidewalks: safety. In: Urban design reader. Routledge, pp 146–151

Knez I (2005) Attachment and identity as related to a place and its perceived climate. J Environ Psychol 25(2):207–218

Kurniawati W (2012) Public space for marginal people. Procedia Soc Behav Sci 36:476–484

Mamyan Z, Aloyan A, Kartashyan T (2016) Evolvement of public open spaces in historical environments of Yerevan city. MATEC Web Conf 73:06005. https://doi.org/10.1051/matecconf/201673306005

Newman O (1972) Defensible space. Macmillan, New York

Stanley B, Stark B, Johnston K, Smith M (2012) Urban open spaces in historical perspective: a transdisciplinary typology and analysis. Urban Geogr 33:1089–1117
Tuan Y-F (1977) Space and place: the perspective of experience. U of Minnesota Press
White E (1999) Path, portal, place: appreciating public space in urban environments
Zambon I, Serra P, Bencardino M, Carlucci M, Salvati L (2017) Prefiguring a future city: urban growth, spatial planning, and the economic local context in Catalonia. Eur Plann Stud 25(10):1797–1817

What Factors Affect Livability? A Theoretical Review

Shahad Oyuni and Haitham Samir

Abstract Livability is an ambiguous term that has been used recently by different scholars in varied contexts despite its frequent appearance in the research and professional fields. In response, this article provides an in-depth understanding of this complex concept developed through a literature analysis. Moreover, this paper seeks to answer the question of what factors affect livability, which is derived from the fundamental livability spheres. This research suggests a framework that will theoretically investigate the concept of livability and different livability ranking tools to highlight livability factors in three dimensions: social, economic, and environmental. These factors will aid and assist urban designers and decision-makers to incorporate the livability factors in the current and future projects.

Keywords Livability · Livability index · Urban livability · Quality of life · Livable communities

1 Introduction

There is no consensus agreement on the definition of the term livability as it varies among different scholars and based in which context the term is used. Nonetheless, the increasing attention directed to the subject and the number of academics and professionals engaged in livability issues have highlighted the need for a clear under-standing of the concept. Interest in the concept emerged in the 1970s, and was emphasized by the U.S. Department of Housing and Urban Development, the U.S. Department of Transportation, and the U.S. Environmental Protection Agency

S. Oyuni · H. Samir (✉)
College of Architecture and Design, Effat University, Jeddah, Saudi Arabia
e-mail: Haitham.Samir@ngu.edu.eg

S. Oyuni
e-mail: ssalaewni@effat.edu.sa

H. Samir
School of Engineering, New Giza University, Cairo, Egypt

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_10

on June 16, 2009, in introducing the six livability principles of the agencies' Partnership for Sustainable Communities (Appleyard et al. 2014). Livability is used in different con-texts such as religion, gender studies, biology, survivability to climate change, subjective well-being, quality of life research, and engaged citizenry planning. Despite the lack of consensus, the livability concept includes a wide range of factors that affect the well-being of individuals and social groups. Livability refers to multiple views regarding the quality of life in any living environment besides optimizing human life performance and integrity (Ellis and Roberts 2016; Hagerty et al. 2001). The National Research Council 2002 illustrated the livability concept as relative to other notions such as quality of life, sustainability, the character of a place, and the health of communities. Furthermore, it is an "ensemble concept" that refers to a range of basic human needs starting from food, security to beauty, cultural expression, and the sense of belonging to a place or a community.

The dominant planning paradigm in the middle of the twentieth century, and the rise of several social, cultural, urban issues, created a substantial imbalance in the urban environment. As a result of these forms of development, many cities have lost their vital urban life. These issues have a significant threat to people's satisfaction and well-being, with different physical, health, social, and environmental consequences. In response, this article provides an in-depth understanding of this complex concept developed through literature analysis. Moreover, this paper seeks to answer the question of what factors affect livability. Which is derived from the fundamental livability spheres. This research aims to provide a preliminary framework for a better understanding of all factors that can be incorporated in the design to achieve livable cities. The methodology will rely on a literature review to explore the concept of livability and its relevant factors.

2 Literature Review

2.1 Livability Concept and Definition

Sustainability and livability help us understand how individuals and groups can contribute to the quality of life of future generations through their behaviors, activities, and choices. Sustainable communities would not have consumption practices that affect the coming generations. Therefore, livable communities cannot be maintained at the expense of its neighbors. Appleyard et al. (2014) argued that an individual's livability pursuit might degrade the livability of others; this concept further complicates the livability planning process. However, individuals should have equal opportunities in a just society, which is an enormous and complicated responsibility. Several other concepts are connected with livability; it refers to residents' satisfaction by meeting their social, economic, and cultural needs, promoting their health

and well-being, and protecting natural resources and ecosystem functions (National Research Council 2002). Alternatively, Appleyard et al. (2014), have provided a relatively concise definition of livability as "*The collection of opportunities available to people that they can use to achieve a satisfying level of quality of life for themselves and those they care about. (For commuting, work, education, rest, rejuvenation,* etc.)."

As a result, working conditions influence family and individual ability to secure decent housing and support adequate urban services and infrastructure, resulting in varying levels of livability. For instance, this situation is applicable particularly in transportation, despite the advantages of having access for some; it can have ad-verse effects on others, such as a split in neighborhoods, threats to pedestrians and cyclists, congestion, air and noise pollution. Consequently, disparities in livability between cities and suburbs contribute to social unrest, dysfunction, and reducing the overall quality of life.

Accordingly, when considering the impacts an individual's quality of life pursuits has on the larger community, it becomes evident that livability should not be viewed in an individualistic manner. A just society requires that all individuals have equal access to primary social goods such as housing, jobs, education, health, and medical services in order to realize livability. The economy and policies play a significant role in this dynamic; it can worsen the conditions of the vulnerable and the less fortunate communities, where there is an absence of equal access to livable opportunities (National Research Council 2002; Appleyard et al. 2014). In planning, design, and engineering fields, livability does not directly pertain to people but focuses on places, particularly the physical and spatial characteristics that make places livable. In general, livability found in literature tends to focus on the physical features of livable places over the benefits people can derive from these places. Moreover, some definitions also refer to the choices, opportunities, and quality of life, reflecting people's primary importance to livability, as shown in Table 1.

It is evident from Table 1 that livability is defined and covered from various perspectives under five categories: choices, opportunities, quality of life, design or land use, and reflects people's primary importance to livability. Accessing opportunities is a crucial element of livability. Briefly, communities are considered livable when people have significant possibilities (choices) to improve their quality of life. Nevertheless, an individual's ability to derive livability satisfaction depends largely on his perception of those opportunities affected by life circumstances and lifestyle. Moreover, livability must consider the issues of social equity, land use, and the physical characteristics of livable places. For example, in a diverse society, people will perceive environmental and social qualities differently that are typically associated with quality of life and seek different kinds of engagement; consequently, they will not seek the same modes of human living. Therefore, these definitions describe the physical and performance characteristics of a livable community and provide policies and programs to assist in developing such communities. Therefore, the livability concept could be defined as the ability of individuals of different ages to reach

Table 1 Livability as extracted from various scholars and agencies from Appleyard et al. (2014)

Agency or organization	Definition	Refers to				
		Design or land use	People	Opportunity	Choice	Quality of life
AASHTO	AASHTO's livability objective is to use transportation investments to improve standards of living, the environment, and quality of life for all communities, rural, suburban, and urban					Y
Washington State DOT	A "livable future" is one that is enduring, vibrant, and responsible (civil) and that offers a desirable quality of life. This livable future requires a balance of three key societal goals: vibrant communities, vital economy, and sustainable environment.					Y
Victoria Transport Policy Institute	"Community livability" refers to the environmental and social quality of an area as perceived by residents, employees, customers, and visitors. This quality includes safety and health (e.g., traffic safety, personal security, and public health), local environmental conditions (e.g., cleanliness, noise, dust, air quality, and water quality), the quality of social interactions (e.g., neighborliness, fairness, respect, community identity, and pride), opportunities for recreation and entertainment, aesthetics, and the existence of unique cultural and environmental resources (e.g., historic structures, mature trees, and traditional architectural styles)	Y	Y	Y		Y
Oregon DOT	Livability is 'the attributes of a community that affect its suitability for human living." Quality of life is "the effects of a community's livability on its residents."		Y			Y
AARP	A livable community is one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and the engagement of residents in civic and social life	Y	Y	Y		

(continued)

Table 1 (continued)

Agency or organization	Definition	Refers to				
		Design or land use	People	Opportunity	Choice	Quality of life
Partners for Livable Communities	Livability is the sum of the factors that add up to a community's quality' of life. These factors include the built and natural environments, economic prosperity, social stability and equity. educational opportunity, and cultural entertainment, and recreation possibilities	Y		Y		Y
Clinton-Gore	The livability agenda aims to help citizens and communities preserve green spaces that promote dean air and clean water, sustain wildlife, and provide families with places to walk. play, and relax Ease traffic congestion by improving road planning, strengthening existing transportation systems, and expanding the use of alternative transportation Restore a sense of community by fostering citizen and private-sector involvement in local planning, including the placement of schools and other public facilities Promote collaboration between neighboring communities, cities, suburbs, or rural areas to develop regional growth strategies ad address common issues, such as crime Enhance economic competitiveness by nurturing a high quality of life that attracts well-trained workers and cutting-edge industries	Y	Y	Y		Y

(continued)

Table 1 (continued)

Agency or organization	Definition	Refers to				
		Design or land use	People	Opportunity	Choice	Quality of life
American Institute of Architects	Livability is best defined at the local level. Broadly speaking, a livable community recognizes its own unique identity and places a high value on the planning processes that help manage growth and change to maintain and enhance community character. Livability 101 offers eight fundamental planning and design principles that must be considered as communities evolve over time: A sense of place Mixed-use development Density Effective planning for regional transportation Street savvy design Physical health and community design Public safety and personal security, and A sustainable approach to neighborhood and regional development	Y				
U.S. DOT	Livable communities are places where transportation, housing, and commercial development investments have teen coordinated so that people have access to adequate, affordable, and environmentally sustainable travel options	Y	Y		Y	
Partnership for Sustainable Communities	The partnership agencies incorporate six principles of livability into federal funding programs, policies, and future legislative proposals Provide more transportation choices Promote equitable, affordable housing for people of all ages, incomes, races, and ethnicities Enhance economic competitiveness Support existing communities Coordinate and leverage federal policies and investment; and value communities and neighborhoods	Y	Y	Y	Y	

their collection of opportunities equally and efficiently through the different scales of the community (neighborhood, city, or region), that enabling them to enhance their quality of life in different aspects (socially, environmentally, physically and economically).

2.2 Livability Concept and Definitions

Fundamental Livability Spheres. National Research Council (2002) mentioned that livability depends on three spheres of social life, including the economy, social wellbeing, and the environment. The economy supplies the resident's fundamental needs such as jobs, income, obtain food, clothing, and shelter, which are the physiological needs according to Maslow's Hierarchy of Needs. Also, consider higher-order needs like education, health care, and recreation. Additionally, the economy should use raw materials from the environment to ensure sufficient resources to meet the current and future generations' needs. The environment provides natural resources, waste assimilation capacity, and a connection between humans and nature. Additionally, justice/equity plays a significant role in social well-being, an equal distribution of the economic and environmental resources socially and spatially, and inclusive governance systems of all residents. Human settlements can rapidly deteriorate if any of these three spheres does not adequately function, leading to population loss, poverty, social conflict, and elevated levels of environmental and health problems (National Research Council 2002).

Performance and Prescriptive Livability Dimensions. On the other hand, Appleyard et al. (2014) argued that based on the review of livability definitions in literature and practices, two distinct dimensions had been released: performance and prescriptive. The performance dimension describes qualities and what should be measured to provide criteria for making communities livable. In comparison, the prescriptive dimensions describe end-state conditions and policy interventions to suggest strategies for achieving those conditions and provide guidance for implementation, such as delivering more transportation choices and more affordable housing. Although performance measures are useful for problem diagnosis, policy response, monitoring, and forecasting, on their own they are not sufficient. Accordingly, several performance-based livability definitions include prescriptive components.

2.3 Livable Cities: Indicators and Global Ranking

Over last three decades, numerous indices and tools have been developed to rank cities based on the amenities and opportunities available to their residents and visitors. Several factors have been incorporated to compare and rank these cities; it was classified under economic, social, and environmental categories. These factors

include safety and security, crime, climate, transportation, infrastructure, healthcare, public policies and services, business environment, cost of living, recreational amenities, education, housing, gross domestic product per capita, sanitation, culture, air quality, and natural capital (Kashef 2016). In addition to livability rankings, the Economist Intelligence Unit (EIU) and the Mercer Quality of Living Survey are some of several ranking tools published annually, along with the OECD Better Life Index (BLI) of the Organization for Economic Cooperation and Development (OECD). For instance, many cities have topped these livability rankings lists over the last few years, such as European urban centers of Vienna, Zurich, Copenhagen, Helsinki, Munich, Perth, Melbourne, and Sydney (Australia); Auckland (New Zealand); Vancouver, and Toronto (Canada).

Economist Intelligence Unit (EIU) Livability Ranking. The Economist Intelligence Unit (EIU) livability ranking is probably the most comprehensive tool among other livability ranking systems. In the EIU's livability ranking, cities are rated according to over 35 qualitative and quantitative factors classified into five weighted categories includes stability (25%), healthcare (20%), culture and environment (25%), education (10%), and infrastructure (20%). The livability measures are used to rate cities to provide a score of 1–100, where one is considered (intolerable), and 100 is (ideal), as shown in Table 2. Crime rates and threats of civil unrest, military conflicts, and terrorism are included in the stability measure. In the healthcare category, cities score higher if they provide affordable private and public medical services, including access to over- the-counter drugs and preventive care. Climate, air quality, traveler satisfaction, corruption, recreational amenities, food and drink, social/religious tolerance, freedom and level of censorship and availability of consumer goods, sports venues, and cultural institutions are under the category of culture and environment. Furthermore, evaluating the quality and provision of private and public educational institutions over different learning levels is determined according to the education category. Last, the infrastructure category evaluates the quality of local road networks, mass transit, regional and international connectivity, telecommunications, energy, sanitation, availability of water, and housing.

Mercer Quality of Living Survey. Mercer's Quality of Living Survey ranks over 460 cities worldwide based on their quality of living. The purpose of this survey is to assist companies and expatriate professionals in evaluating incentives and allowances for relocation. Mercer releases annually its Mercer Quality of Living Survey, which compares 231 cities based on 39 criteria clustered in 10 classifications. The ten classifications are including, health (private and public services, air quality, sanitation, and waste disposal), sociopolitical environment (crime, safety, and stability), education (private and public), economics (banking regulations and services), sociocultural environment (media, censorship, and personal freedom), market (availability of goods), housing, natural environment (climate, natural calamities, and weather extremes), utilities (transportation, traffic, and services), and recreational facilities (restaurants, theaters, sports, and leisure).

Table 2 Top ten livable cities in 2019: 100 = idea, 1 = intolerable (Economist Intelligent Unit 2014)

Country	City	Rank	Overall rating	Stability	Healthcare	Culture and environment	Education	Infrastructure
Austria	Vienna	1	99.1	100	100	96.3	100	100
Australia	Melbourne	2	98.4	95	100	98.6	100	100
Australia	Sydney	3	98.1	95	100	97.2	100	100
Japan	Osaka	4	97.7	100	100	93.5	100	96.4
Canada	Calgary	5	97.5	100	100	90	100	100
Canada	Vancouver	6	97.3	95	100	100	100	92.9
Canada	Toronto	7	97.2	100	100	97.2	100	89.3
Japan	Tokyo	8	97.2	100	100	94.4	100	92.9
Denmark	Copenhagen	9	96.8	95	95.8	95.4	100	100
Australia	Adelaide	10	96.6	95	100	94.2	100	96.4

OECD Better Life Index (BLI). The Organization for Economic Co-operation and Development OECD was formed in 1961, and the Better Life Index BLI was launched in 2011 to compare and measure the quality of life amongst 40 OECD member countries. The BLI offers an interactive tool for examining and comparing countries' performances based on people's preferences for improving quality of life. The tool allows individuals to determine their level of life satisfaction by assigning weights for each dimension based on multiple parameters. National records, United Nations statistics, and surveys of public opinion (Gallup Poll) are the main sources of data (Kashef 2016). The OECD has identified 11 dimensions as essential in the area of quality of life and living conditions, including housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety, work-life balance.

Other Livability Ranking Tools. A number of other livability measures have been introduced, such as the Monocle's Quality of Life Survey, the EU (European) Urban Audit, Deutsche Bank Livability Survey, Numbeo's Quality of Life Ranking, Global Finance's World's Best Cities to Live, and a variety of other regional livability indexes. For example, Monocle's Quality of Life Survey is a lifestyle magazine, has created a ranking system for the 25 most celebrated capitals in the world. A number of criteria are important to this survey, including safety/crime, international connectivity, climate/sunshine, quality of architecture, public transport, tolerance, environmental issues, and access to nature, urban design, business conditions, and pro-active policy development.

2.4 Urban Livability

The urban environment is composed of a variety of interconnected elements. Blocks, plots, streets, buildings, trees, trails, furniture, and several other elements act as physical components of cities, causing change and reshaping urban life constantly. The relationships between the physical parts can identify the spatial patterns of cities; these patterns impact the livability of urban spaces. Despite the lack of consensus around the definition of urban livability, it generally can be described as cities' ability to fulfill the expectations of its residents for the quality of life and well-being (Martino et al. 2021). The urban livability concept has been used in the architectural and urban design fields broadly, where it is recognized as a creative design process to design timeless physical models that contain the economic and social functions of cities (Alexander 1977; Bacon and Walduck 1967; Krier 1993; Massengale et al. 2014). According to Holanda (2013), and Kashef (2016), urban livability depends on urban form since urban life is a consequence and driver. Therefore, decision-makers must understand how policies affect urban forms, such as maximum allowed densities and land-use requirements for developments. Literature refers to population density as the concentration of individuals living or working in a particular geographical

area. However, it can also refer to morphological density (the intensity of built environments in a specific area), where there are clear relations between urban form, density, and livability. The increase in population and building density might affect the housing costs, inhabitants' health due to agglomeration (Sullivan & Von Wachter 2009; Florida 2020), and diminishing the sense of human scale (Sim and Gehl 2019). Contrastingly, compact and dense urban design is widely recognized for the environmental benefits and used as an effective tool for reducing cities' carbon footprint and providing urban residents with access to amenities (Senbel et al. 2014). The consequences of such design decisions may include urban overpopulation, reduced green spaces per capita, traffic and air pollution (Martino et al. 2021). On the other hand, Kashef (2016) refers to urban livability as the way in which urban spaces function, the interface between public and private realms, their relationship with the natural environment, and the cultural values, such as built and social heritage.

3 Preliminary Framework of Livability Factors

The future of livable communities requires a balance of the three spheres discussed previously under (1.2 Livability Dimensions), all of which facilitate the individual's independence and participation in civic and social life. Various factors were analyzed under the economic, social, and environmental fundamental dimensions in measuring livability. These factors include safety and security, crime, climate, transportation, infrastructure, healthcare, public policies and services, business environment, cost of living, recreational amenities, education, housing, gross domestic product per capita, sanitation, culture, air quality, and natural capital. Based on the previous discussion, a holistic framework can be proposed by synthesize all dimensions and factors (see Fig. 1).

3.1 Society (Social Well-Being) Factors

Community livability refers to the perception of an area's social quality by residents, employees, customers, and visitors. The following are social factors that affect community suitability for human living and its quality of life.

1. Safety, security and comfort: Provide social quality includes public safety, personal security, and public health.
2. Social interactions: Adequately quality of social interactions such as neighborliness, fairness, respect, community identity, and pride.
3. Recreation, entertainment and cultural Opportunities: Provide recreational and entertainment opportunities, aesthetic value, and the availability of unique cultural resources such as historic structures and traditional architectural styles.

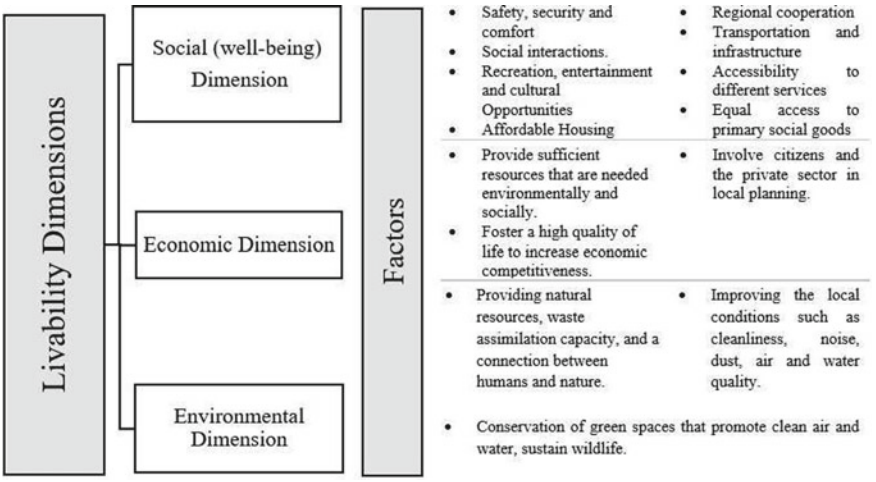


Fig. 1 Preliminary framework of livability factors in three dimensions: social, economic, and environmental (*source* adapted from National Research Council 2002; Appleyard et al. 2014)

4. Affordable housing: Promoting equitable and affordable housing for all ages, income levels, races, and ethnicities.
5. Regional cooperation: Promote regional cooperation between neighboring communities, cities, suburbs, or rural areas to develop strategies to identify common issues such as crime.
6. Transportation and infrastructure: Improve road planning, strengthen existing transportation systems, and provide adequate and alternative mobility options to ease traffic congestion.
7. Accessibility to different services: Provide mixed-use developments and supportive community features and services that increase residents' accessibility to different opportunities.
8. Equal access to primary social goods such as housing, jobs, education, health, and medical services.

3.2 Economic Factors

Generally, the economic dimension plays a significant role for the two other dimensions (social and environment). It should ensure to provide sufficient resources that are needed environmentally and socially for more equal access to livable opportunities.

1. Foster a high quality of life that attracts well-trained workers and cutting-edge industries to increase economic competitiveness.
2. Involve citizens and the private sector in local planning, including the placement of schools and other public facilities, to restore the sense of community.

3.3 Environment Factors

1. Providing natural resources, waste assimilation capacity, and a connection between humans and nature are all components of the environmental dimension.
2. Improving the local environmental conditions such as cleanliness, noise, dust, air and water quality.
3. Conservation of green spaces that promote clean air and water, sustain wildlife, and provide families with places to exercise, play, or relax.

4 Conclusion

In conclusion, the study's main question explores the factors that affect livability. The research shows that livability factors are classified under three categories social, economic, and environmental, derived from the fundamental dimensions of livability. The preliminary framework reflects the author's view as a result of the theoretical review for the livability concept, definitions, and global ranking. These factors will aid and assist urban designers and decision-makers to use them for the current and future projects. The proposed framework could be developed and expanded through future studies by addressing and investigating the measures for these factors to assess cities' existing conditions to reach a comprehensive framework to understand the concept of livability and could be used for ranking cities or specific urban conditions.

References

Alexander C (1977) A pattern language: towns, buildings, construction. Oxford University Press
Appleyard B, Ferrell CE, Carroll MA, Taecker M (2014) Toward livability ethics. Transp Res Record J Transp Res Board 2403(1):62–71. https://doi.org/10.3141/2403-08
Bacon EN, Walduck K (1967) Design of cities
EIU (Economist Intelligence Unit) (2014) www.economistgroup.com
Florida R (2020) What we know about density and the spread of coronavirus. Bloomberg.com. https://www.bloomberg.com/news/articles/2020-04-03/what-we-know-about-density-and-covid-19-s-spread
Hagerty MR, Cummins R, Ferriss AL, Land K, Michalos AC, Peterson M, Sharpe A, Sirgy J, Vogel J (2001) Quality of life indexes for national policy: review and agenda for research. Bull Sociol Methodol/Bull De Méthodologie Sociologique 71(1):58–78
Holanda F (2013) 10 Mandamentos da Arquitetura. FRBH
Kashef M (2016) Urban livability across disciplinary and professional boundaries. Front Architectural Res 5(2):239–253. https://doi.org/10.1016/j.foar.2016.03.003
Krier R (1993) Urban space. Rizzoli, New York
Martino N, Girling C, Lu Y (2021) Urban form and livability: socioeconomic and built environment indicators. Build Cities 2(1)
Massengale JM, Karol, Kunstler JH, Dover V (2014) Street design: the secret to great cities and towns. Wiley
Mercer Quality of Living Survey. www.mercer.com

National Research Council (2002) Community and quality of life: data needs for informed decision making. The National Academies Press, Washington. https://doi.org/10.17226/10262
Senbel M, Giratalla W, Zhang K, Kissinger M (2014) Compact development without transit: life-cycle GHG emissions from four variations of residential density in Vancouver. Environ Plan A 46(5):1226–1243
Sim D, Gehl J (2019) Soft city: building density for everyday life. Island. https://islandpress.org/books/soft-city
Sullivan D, Von Wachter T (2009) Job displacement and mortality: an analysis using administrative data. Q J Econ 124(3):1265–1306

Modeling Tactical Urbanism: A Contemporary Approach for Urban Regeneration

Tarek Saad Ragab

Abstract Urban regeneration aims, among other objectives, to revive the city's declined and sluggishly animated public spaces. Nevertheless, most of these projects target the city's principal public spaces, such as central parks, squares, downtown, and waterfronts. Whether selectively, consecutively, or collectively carried out, the magnitude of these projects usually drains the city's budget as they consume extended times, resulting in a few numbers being implemented in those primary spaces and fewer directed to the city's secondary spaces. This paper focuses on developing a strategic multi-tiered framework to revive underutilized public spaces considering the time and cost layers. Such a framework builds on the employment of "local events" as a viably flexible and low-cost "Temporary Urbanism" tactic to revive poorly utilized city spaces of different grades. The research employs a qualitative and a desktop analysis approach to develop a framework to assist the city's stakeholders in taking necessary and efficient actions to activate the city's spaces as a parallel tool for traditionally used urban regeneration approaches.

Keywords Urban development · Public spaces · Temporary urbanism · Local events · Public spaces animation

1 Introduction

Creating vibrant places has been a consensus among urban designers, city planners, and urban managers. Nevertheless, over time many public spaces surface as sluggish, inactive, and deserted. The contemporary urban theory discourse provides urbanism approaches that bring forward the terms "*Temporary Urbanism*" and "*Tactical Urbanism*," asserting the need for blending temporary usage as a viable measure for better used and more successful spaces with low-cost stakeholders sponsoring and focused short-term urban intervention (Haas and Olsson 2013). Temporary urbanism

T. S. Ragab (✉)
Alexandria University, Alexandria, Egypt
e-mail: tragab@effatuniversity.edu.sa

Effat University, Jeddah, Saudi Arabia

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_11

is introduced as the effective use and occupation of a place within time limitation and consideration (Lehtovuori and Ruoppila 2012). Such time-related intensity of use contributes to he activation and revival of poorly functioning spaces. With the challenges that the city faces, especially the inadequate limited budgets and the long time needed for implementation, most of the redevelopment projects target the significant city's public spaces such as the main parks, the central squares, the major streets, the downtown, the historical quarters, and the waterfronts. Moreover, the magnitude of these particular projects and the high cost, resulting in a few allocated projects, and fewer projects are directed to the secondary public spaces of different grades.

This work focuses on developing a multi-tier framework managing the revival of inactive and underutilized public spaces. The framework builds on the employment of "local events" as a low-cost, short-term, collaborative, and flexible "Temporary Urbanism" tactic. While the Temporary Urbanism approach's validity has been tested, the research works on the framework for implementation. Firstly, through the investigation of the historical evolution of the outdoor public events as a base for defining the city's events typologies and systems of management, focusing on local events and their contribution to the revival of underutilized spaces. Secondly, addressing the correlation of the two critical principles for revitalizing public spaces: the efficiency and appropriability of the public space elements and local events' success. The research employs a qualitative and desktop analysis to develop a framework that helps stakeholders make necessary and efficient decisions to activate inactive public spaces.

2 Temporary Tactical Urbanism

The concept of temporary urbanism goes hand-in-hand with the 'temporary use' of the space. The term stirs the very notion of what types of urbanism have evolved organically over many urban development cycles (Momora 2005). Its origin is traced back to civilization's beginning, based on the flexibility and user's responsive behavior to the surrounding context. The scholarly attention rose in the early 2000s, though examining European cities and space production by the social act in Latin America and the Middle East and South Asia (Martin et al. 2019). Cities adopt short-term strategies to enhance the inception of Temporary Urbanism, which will result in the integration of temporary actions situated within the permanent plans (Bishop and Williams 2012). Based on Beekmans and de Boer (2014), these short-term interventions are called "momentum-oriented urban interventions" that allow for attraction in an area that is not within the urban planning project. As a result, Temporary Urbanism could be part of an ongoing permanent development or area until permanent planning is decided (Lehtovuori and Ruoppila 2012). Temporary-use significance can be presented in terms of social, economic, and placemaking. The strategy aims to prevent the misuse or foster activities that threaten the community, provides a better quality of life for residents and visitors, and increases community participation.

Depending on the popularity of temporary use and success, it can have an economic return, such as the support of local and new businesses. The clustering of shops or kiosks around a temporary use or event encourages more public spending, thus more financial returns for businesses and residents. Other benefits directed at the placemaking, such as diversity of activities, revive underutilized spaces, increase the land value, and achieve a potential development goal, such as utilizing infrastructure and protecting the green area (Kotval et al. 2010; Lehtovuori and Ruoppila 2012).

According to Martin et al. (2019), the rising international trend investigating temporary use can be divided into ordinary or extraordinary measures. The former indicates an ad hoc development such as car parking, storage area, or construction compounds. Whereas the latter deals with the innovative/creative use of space such as building, reuse, or events (pop up street market, urban farming, musical event, street festivals, and street vending).

3 Outdoor Public Events as a Temporary Development Tool

According to Smith (2016), events in public spaces are a temporary phenomenon in the city, therefore considered part of Temporary Urbanism. It is not only an interim use to stop the gap, but it is oriented towards creative cultural activities and public participation. Martin and Hincks (2016) described events as spectacular temporary use to provide a more efficient, creative use of the space.

3.1 Chronological Evolution of Outdoor Events in Cities' Public Spaces

Throughout history, public spaces were used for carnivals, fairs, circuses, and sports and markets. The evolution of outdoor public events start as cities designed around event spaces, for example, agora in ancient Greek cities. Then medieval cities and industrial cities planned formal zones and spaces to host public events. Contemporary cities used to hold events on the city outskirts; however, now the city festival's image is encouraged, and events are being staged and hosted in central public spaces (Fig. 1).

3.2 Local Events Typology

Throughout the theoretical discourse, events can be divided into several categories based on size, theme, and duration. The size of the event is reflected in the location in which the event will be hosted. According to Getz (2008), Smith (2012), there are four main types of size-based classification: Mega, Hallmark, Major, and local

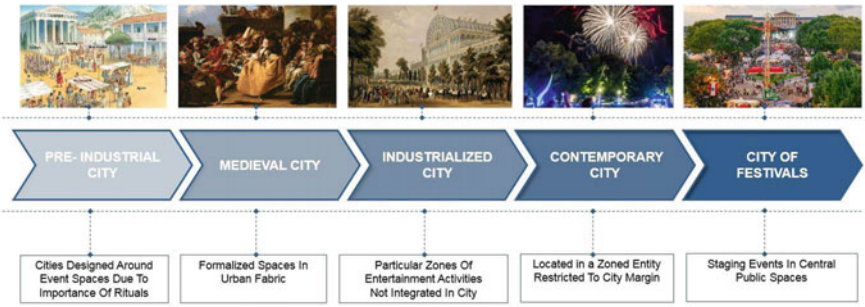


Fig. 1 Leisure activities spatial configuration timeline. *Source* Smith (2016), Richards and Palmer (2010)

events. Local events target the residents and communities within one neighborhood or several ones (Getz 2008), and each type differs in the number of participants in a city or a neighborhood. They are based on local social values and reflect their wants in terms of entertainment and social networking. Additionally, they enhance the overall sense of belonging and attachment to the community. The expected number of participants ranges from 50 to 5000 and typically occurs in neighborhood parks, pocket parks (parklets), streets, connecting alleyways (Getz 2008).

4 Key Criteria for Revitalizing Public Spaces

Many studies stress the idea of the revitalization of the sluggish public spaces as a needed strategy to create a balance between urban development and maintaining place identity, culture, and traditions. Recognizing a thriving place's criteria would help identify the space's quality keys' criteria and the needed measures required to revive it.

4.1 Successful Public Spaces Versus Successful Events

The concept of Place-Making originated from the work of Jane Jacobs and William H. Whyte in 1960. Project for Public Spaces (PPS) developed the "**Place-Making**" approach, which focuses on the place's activities and connecting people through a collaborative process in the place diagram (Fig. 2). The four main criteria of evaluating the Place-making diagram: sociability, uses and activities, access and linkage, comfort and image, are being used as a targeted factor for reviving the sluggishly animated inner neighborhood spaces, being achieved by the employment of successful outdoor local events.

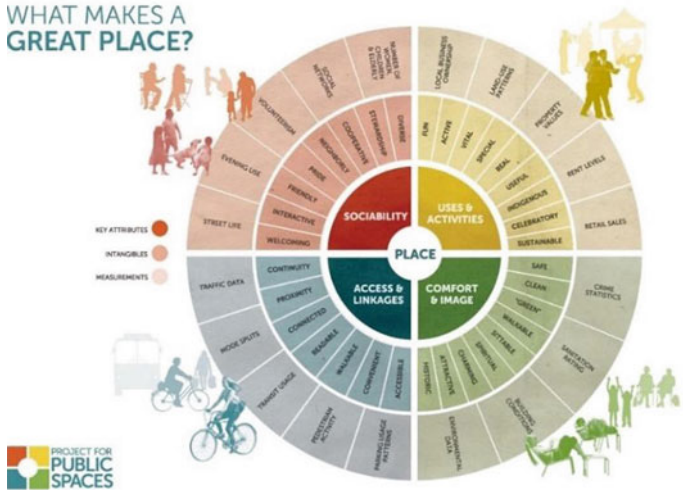


Fig. 2 What makes a great place

Using public space events as a temporary revival and animation tactic emphasizes the space's flexibility via new uses, activities, and inviting new users in public spaces. However, the events need to be successful to attract more people and enliven the spaces. Richards and Palmer (2010) stated the crucial factors to the success of events, including context, physical, power, social, resources, and planning, (Fig. 3).

Content

The context is the city's program, reflecting the city branding strategies, whether economic, social, cultural, or historic. The theme, location, public consent, political approval, and monetary fund reflect the context (Smith 2016). Space's culture and identity should be reflected on the event theme and space to ensure a high social interaction level. The context can be based on the current image and enhanced it or part of a new image. For example, Trafalgar square events were targeted to remove hostility due to the history of demonstrations.

Physical

Events' physical location needs to be considered to ensure efficiency and reduce negative impacts. Four essential spatial characteristics, enclosure, axiality, centrality, and permeability, are found essential. The event creates a lasting festive effect of freedom and adaptability (Stevens and Shin 2012).

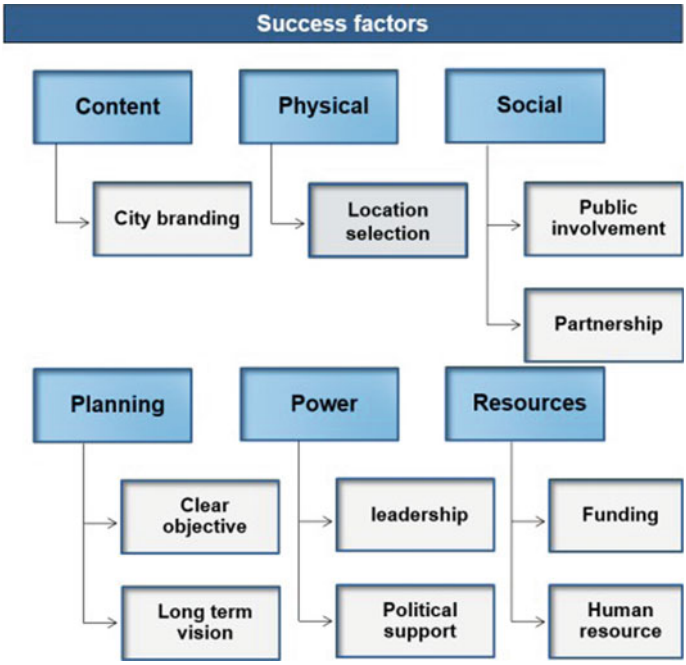


Fig. 3 Factors of successful events. *Source* Richards and Palmer (2010)

Social

Some common keywords are associated with the word "Event," which are a social gathering, occasions, competition, or adventure, all of which describe the lived experience and reflect the quality of life (Lunga and Mihaela 2012). Also, they are a platform for citizens to express their culture, talents, and creativity. The most important outcome is social participation and experience; events are unique once missed; it will not be repeated with the same experience again and would be a lost opportunity (Richards and Palmer 2010).

Planning

Planning is an essential factor to ease decision-making and contribute to city programs and future visions. Events should have a clear objective and a plan in the city development process. Different scales of the event affect the long (15–25-years)—medium (5–15-years)—short (3–5-years) term plans. For example, mega-events require improved infrastructure (roads, supporting facilities, and buildings); therefore, such events' participation is part of long-term plans to accommodate events. In contrast, events on local districts' scale are part of short-term plans since they offer measurable short-term gains (Jeddah Gardens 2020).

Governance Power

The successful use of government power is crucial for effective decision-making and coordination between stakeholders. There is the top-down approach, by which the municipal or higher authority dictates the formation of the basic guidelines. While the bottom-up involves the community and people's ideas and considers the social and cultural norms. The management team is another critical influencer since strong leadership and a committed team will make a smooth plan during the event.

Resources

Resources indicate the funding level from private investors and public municipalities' grants. Cities are cautious with allocating public funds to events, so alternative funding from community and sponsors support is often a viable solution. Other significant resources are human resources and volunteers.

5 Discussion

Which tactic of Temporary Urbanism is best employed to transform an inactive public space into an attractive, animating, and livable one? and how to develop a contextual decision-making framework to instigate such a tactic and space selection process? Answering these questions necessitates identification of the critical attributes contributing to link revitalization theory to temporary urbanism and tactical urbanism. This includes the public spaces' physical and spatial characteristics, suitable temporary tools, and the appropriate management technique. Such a framework will aid decision-makers to ensure their optimum selection for a particular public space for a specific event. The framework combines two tiers: (a) The space selection decision-making section which provides criteria for city stakeholders to locate the appropriate locations for events, and (b) The event management platform which provides a set of recommendations for municipalities and officials to follow which relates to event nature with space characteristics and can help keep track of the individual incidents for control and monitor.

5.1 The Framework Process

Developing the framework involved linking three main areas of knowledge, temporary urbanism, successful placemaking theories, and events typology. A questionnaire was used to identify the context, the preferences, and the underutilized spaces. These criteria were reviewed and arranged in a recommended sequence followed by measurable indicators and attributes for an easy process, and decision-making validation of

the model was conducted; to weigh the importance of the aspects through an expert survey. The validation is an essential step to verify that no factors were misplaced. The process is summarized in the following diagram (Fig. 4). The proposed model criteria and indicators are listed below, their relationship, sequence, and measurable indicators are explained in the final framework in (Fig. 10).

Criteria 1: The Geo-physical

Indicators 1.a: Location within city

The provision of a location (public space) within the neighborhood allows for maximum accessibility and participation and adds life to the neighborhood public space.

Indicators 1.b: Area of space

The neighborhood population and the type of event, and the expected number of participants are variables that affect the location choice and area. The number of occupants can be calculated based on the type of event. For example, the standing spectator 0.3 m^2/person-market or festivals 2.5 m^2/person ("What considerations need to be made when defining occupant capacity?" n.d.). Besides, the distribution of functions affects the area required. The market requires a prep, display, sales interaction, and social area (Fig. 5). While farming area depends on the number of a family member. The garden of an average area of 55–74 m^2 caters for a family of 5 or more.

Indicators 1.c: Accessibility

A degree of accessibility to the target location would indicate the ease of access by participant and range that this event serves, whether it is the whole neighborhood or cluster of houses. It is also a reference to pedestrian access and public transit access.

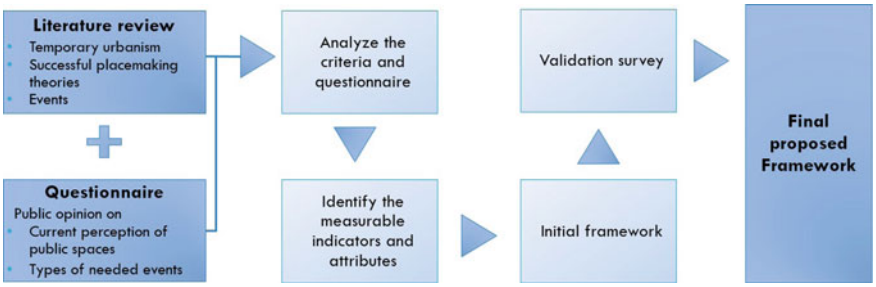


Fig. 4 The researcher's process of devising the framework. *Source* Author

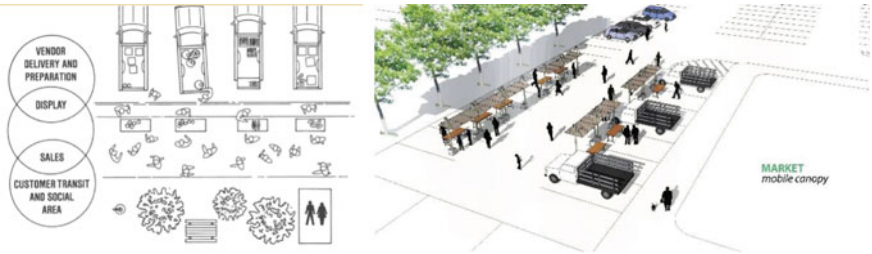


Fig. 5 Market function distribution. *Source* Sommer (2012)

Indicators 1.d: Enclosure

It is vital to have a defined zone; either space is enclosed by building (Fig. 6) or temporary measures such as; moveable barriers, barricades, signs, or streets' enclosure.

Indicators 1.e: Axiality

This axial flow of spaces (Fig. 7) maximizes the exposure to people in the crowd alongside. This also encourages 'secondary activities.'

Indicators 1.f: Centrality

Events should utilize the central nodes in the neighborhood's public spaces to cover a wide range for the pedestrian to commute (Fig. 8). This could be determined following the "5 min walk" rule or "10 min walk," also referred to as "Pedestrian Shed." The 5 min walk is 400 m walking range (0.25 mile) while the 10 min walk covering a more extensive range of 800 m (0.50 mile), ("The 5-min walk," 2020).

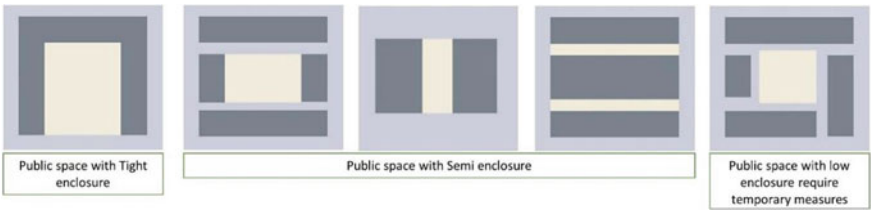


Fig. 6 Types of enclosures in public space . *Source* Author

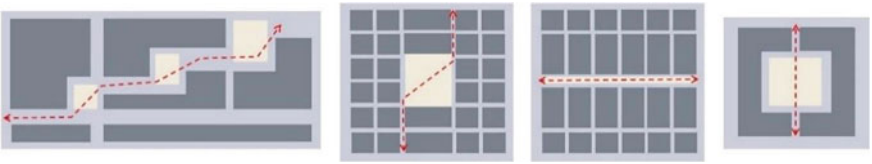


Fig. 7 The degree of axial flow in spaces . *Source* Author

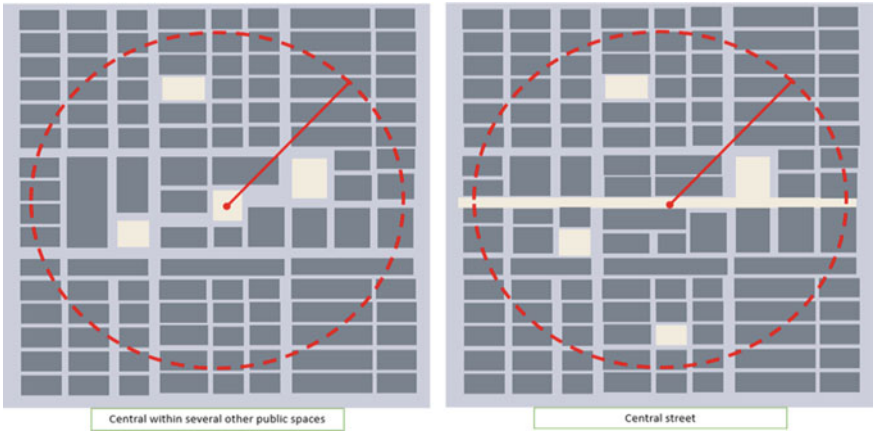


Fig. 8 Centrality within 5 min walk. *Source* Author

Indicators 1.g: Permeability and connectivity through space and time

This describes the extension of the social atmosphere beyond the immediate time and space of the event. And the penetrable of the space within the neighborhood (Fig. 9).

Indicators 1.h: Site physical condition

It indicates the site's clearance and absence of obstacles, such as an existing structure or landscape or greenery availability.

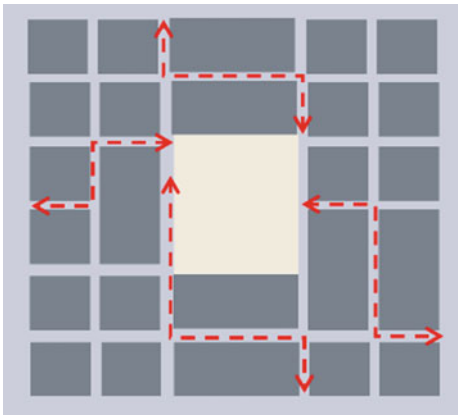


Fig. 9 Permeability and connectivity in small-scale public space. *Source* Author

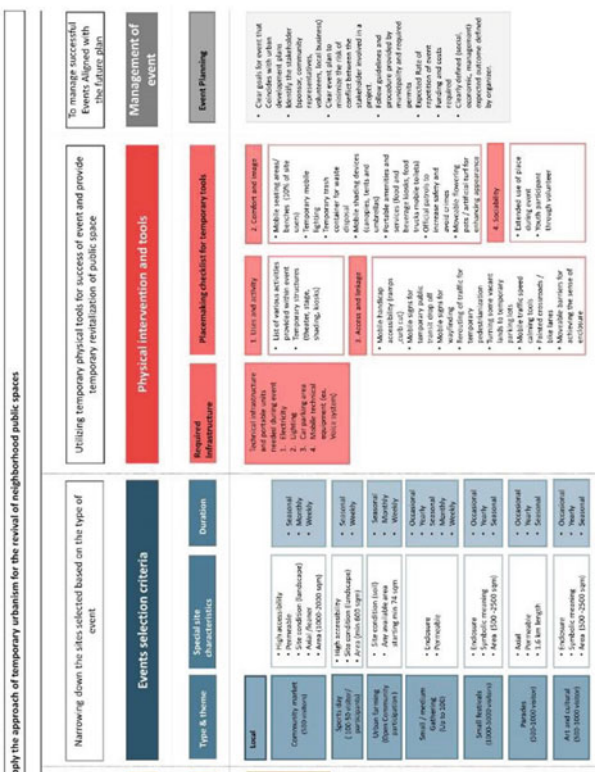


Fig. 10 The completed framework. *Source* Author

Criteria 2: Lived experience

Indicators 2.a: Type of Event (Theme and aesthetic)

Local events within neighborhoods that target the residents and communities are the focus of this research. They reflect the locals' wants and social values in terms of entertainment and social networking. The local events can have many themes. However, the following themes are based on local preferences:

(i) Small Festival/community celebration
Customarily staged based on a local community's unique aspect. They provide entertainment and activities for visitors and residents.

(ii) Parade
Public march that can celebrate a special occasion. They are held in the city streets, accompanied by music and dance routines to encourage the residents' participation.

(iii) Community market/Pop-up Street stalls or street Bazar
These are weekly or monthly markets that provide the need for community and takes advantage of the seasonal demands.

(iv) Sports Events
Introducing themed Event that Promotes healthy lifestyle through encouraging the residents and visitors to participate in competitive sports

(v) Urban farming
A sustainable activity that encourages residents to explore the ideas of urban farming within their public spaces and form a social network for agricultural lovers

Indicators 2.b: Special site characteristics

Characteristics can be required for each theme or type of event.

Indicators 2.c: Duration and repetition

The duration of the event that will liven up the public space and intensify the lived experience.

Indicators 2.d: Symbolic meaning

Social, economic, political, and physical contexts all reflect on the neighborhood's identity, which must be represented in the event. Events can reflect the existing or new identity.

Criteria 3: Short term tools for place-making

Indicators 3.a: Required infrastructure

These include the entire necessary infrastructure required to establish the event, such as electricity (portable generator or provided on-site), existing lighting (which will help decide the additional lighting location).

Indicators 3.b: Uses and activities

List of various activities that the event provides, such as food kiosks, children's inflatable games, and food kiosks. As well as any temporary structure such as theater, stage, shading, kiosks.

Indicators 3.c: Comfort and image

Require listing the needed amenities that would provide comfort for the event-goers such as mobile seating areas/benches (such cover min of 10% of the expected site users), moveable lighting to provide safety. As well as movable trash containers for waste disposal, the Event organizer should dispose of any waster according to the municipal procedure without overload the existing system. Also mobile shading devices, (such as canopies, umbrellas, tents), moveable flowering pots/artificial turf for enhancing the appearance and portable amenities (food trucks/kiosks, toilet). The need to request official patrols to increase safety and avoid crimes.

Indicators 3.d: Access and linkage

Require listing the needed amenities that would ease the site accessibility such as onsite handicapped ramps, signage for public transit to the event location or wayfinding, or for rerouting traffic. The allocating or painted parking spaces, speed calming tools and crossroads, and moveable barriers for enclosure.

Indicators 3.d: Sociability

The social level can be indicated by the extended use of place during the event and the Public volunteering and youth participant.

Criteria 4: Management system and procedure

Indicators 4.a: Political support and procedure

The political procedure should provide a quick approval system to encourage the repetition and start of the temporary Events within several neighborhoods. That would entail a clear and understandable procedure to follow by applicants of different backgrounds and speedy and swift processing time for the application to obtain the necessary legal permission.

Also, Producing a user's guide and regulations for all categories of stakeholders (community members, private sector) and permits for the use such as Public Space Construction Permit, Public Space Occupancy Permit, Property Owner Approval, Parks and Recreation Permit and Public Gathering Permit. And producing a user's guide for each type/theme of event/sites allowed for temporary urbanism and a user's guide for precaution and safety measures needed. As well as the availability of the official vendors for temporary place-making tools.

Indicators 4.b: Planning and long term vision

The long-term plans that could be taken into consideration include monitoring of spaces for maintaining the cycle of demand and supply. The reflection of any Permanent measures to be taken as a result of the temporary event, as observed from the case studies, some of the case's events allowed for the municipality to permanently enclose the streets to allow for easier access to the public space. Most importantly is engaging the public to decide their needs and involve them in decision making.

Indicators 4.c: Event Management and planning

Event management has a major role in stating clear goals for events that coincide with urban development plans for the neighborhood on a micro-scale and the city on a macro scale. They can play a role in identifying the stakeholder, funding, and costs (sponsor, community representatives, volunteers, local business) and identify event plans to minimize the risk of conflict between the stakeholders involved in a project. Following guidelines and procedure provided by the municipality and required permits and clearly defined (social, economic, management) expected outcome defined by the organizer. Rate of repetition of an Event and future implication or development and its reflection on the urban city planning.

5.2 The Final Framework

The proposed framework (Fig. 10) is divided into four sections; each section serves a purpose. The first part is for municipal officials to decide the location and encourage the community to participate in outdoor activities. The second is a tool for location selection and spatial analysis of event spaces by all stakeholders, and the third represents the tools that would be implemented by event organizers and designers for the success of public spaces. The fourth part is for the management of successful events. The framework model is a guideline to benefit the community and enhance the overall quality of life and public spaces.

6 Conclusion

In conclusion, temporary urbanism is used to achieve quick-though temporary-results in public spaces. The approach helps to attract and engage people in positive ways. This paper presented the approach based on the employment of public events in neighborhood public spaces. This main finding of this paper is the proposed framework. The research discussion of the framework building process through stages that included understanding the temporary urbanism literature review, identifying the temporary tools to revive public spaces, developing the criteria and indicators that contribute to the success of events and public spaces, finally developing and

validating the sequence of framework. The generated framework would be advantageous to help the city stakeholders to employ the temporary urbanism approach through the event-based tool, which includes spatial, and management criteria. As well as a guideline to benefit the community and enhance the overall quality of life and public spaces.

References

Al Banawi W (2019) Few people are capable of evaluating Saudi social change. I am one of them. Al Arabiya. Retrieved from https://english.alarabiya.net/en/views/business/economy/2019/03/19/Few-people-are-capable-of-evaluating-Saudi-social-change-I-am-one-of-them-.html

Beekmans J, de Boer J (2014) Pop-up city: making in a fluid world. BIS Publishers. ISBN: 978-90-6369-354-1

Bishop P, Williams L (2012) The temporary city, Oxon, Routledge. ISBN 9780415670555 ISBN 9780415670562

Getz D (2008) Progress in tourism management event tourism: definition, evolution, and research. Tour Manage 29:403–428. https://doi.org/10.1016/j.tourman.2007.07.017

Haas T, Olsson K (2013) Transmutation and reinvention of public spaces through ideals of urban planning and design. Space Cult 17:59–68. https://doi.org/10.1177/1206331213493855

Jeddah Gardens (2020) Retrieved 28 March 2020, from https://www.jeddah.gov.sa/english/gardens/index.php

Kotval Z et al (2010) Transformative temporary use. WIT transactions on ecology and the environment, vol 142, WIT Press, ISSN 1743-3541

Jeddah Population (n.d.) Retrieved 28 March 2020, from https://worldpopulationreview.com/world-cities/jeddah-population/

Lehtovuori P, Ruoppila S (2012) Temporary uses as means of experimental urban planning. Serb Archit J

Lunga T, Mihaela O (2012) Major special events: an interpretative literature review. Manag Mark 7(4):759–776

Martin M, Hincks S (2016) Temporary urbanism in England's core cities: looking beyond the iconic. Austria. Retrieved from https://vbn.aau.dk/en/publications/temporary-urbanism-in-englands-core-cities-looking-beyond-the-ico

Martin M, Deas I, Hincks S (2019) The Role of Temporary Use in Urban Regeneration: Ordinary and Extraordinary Approaches in Bristol and Liverpool. Plan Pract Res. https://doi.org/10.1080/02697459.2019.1679429

Richards G, Palmer R (2010) Eventful cities: cultural management and urban revitalisation. J Financ Stab. https://doi.org/10.4324/9780080940960

Smith A (2012) Events and urban regeneration: the strategic use of events to revitalise cities. Taylor & Francis. Retrieved from https://books.google.com.sa/books?id=h1XFBQAAQBAJ

Smith A (2016) Events in the city: using public spaces as event venues. Routledge advances in event research series. Routledge, New York

Sommer R (2012) Public places and spaces. Retrieved 20 March 2020, from https://books.google.com.sa/books?id=M_kqBgAAQBAJ&pg=PA61&lpg=PA61&dq=open+space+farmer+market+visitors+count&source=bl&ots=1pIcw0cOxJ&sig=ACfU3U2wrA2LR8iphqa1KsPaS7YzozcQEw&hl=en&sa=X&ved=2ahUKEwj5h4mq3pDoAhWMYsAKHZUgAkMQ6AEwCXoECA0QAQ#v=onepage&q=opens

Stevens Q, Shin H (2012) Urban festivals and local social space. Plann Pract Res 29(1), 1–20. https://doi.org/10.1080/02697459.2012.699923

Child-Friendly Open Spaces: Towards Safety in Residential Neighborhoods

Hala I. Masri and Mohamed Fekry

Abstract The rapid urbanization, high traffic density, and lack of open spaces are noticeable challenges that impose several repercussions on children within the urban context and restrict them from living a normal childhood. Independent mobility is reduced according to the spatial deprivation of children from pedestrian experiences through urban environments. Consequently, children's opportunities for active engagement and participation in social life will be diminished. Residing in safe environments is a fundamental right that should be granted to all children around the world. Recently, child-friendly urban design has gained a lot of attention due to its remarkable advantages as it brings children's needs and desires into practice. Creating safe child-friendly open spaces contributes to protecting children from traffic injuries and crimes while at the same time stimulating their imagination and nurturing communication skills. This paper addresses the topic of safe child-friendly open spaces in residential neighborhoods which can significantly improve the life, health, and growth of children with a focus on social and traffic aspects within the urban context. Identifying the design principles of safe child-friendly open spaces is the main aim that will be tackled. To achieve this goal; the research will follow a theoretical approach by applying a qualitative research methodology through historical interpretation and understanding of the main characteristics and design principles of child-friendly open spaces. This would be followed by an evaluative analysis of a related case-study. The expected results of this research are planned to introduce an adapted design model for safe child-friendly open spaces in residential neighborhoods for the local context of Saudi cities with more focus on both social and traffic safety aspects.

Keywords Child-friendly open spaces · Safe streets · Traffic safety · Urban childhoods · Urban safety

H. I. Masri · M. Fekry (✉)
College of Architecture and Design, Effat University, Jeddah, Saudi Arabia
e-mail: mfekry@effatuniversity.edu.sa

H. I. Masri
e-mail: hmasri@effat.edu.sa

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_12

1 Introduction

Several characteristics contribute to promoting children's gratification within urban open spaces. Safety and sociability are two fundamental principles of designing child-friendly open spaces that have been acknowledged in numerous studies (Oloumi et al. 2012; Acar 2013; Goosen 2014; Mousavi and Joneidabad 2015). Accessibility is another important dimension that supports easy and safe reach to open spaces (Oloumi et al. 2012; Acar 2013; Goosen 2014). Furthermore, the principles of scale, availability of natural areas, and variety develop child-friendly open spaces in urban contexts (Broberg et al. 2013).

Living in safe environments is the most important psychological need for all children around the world. Safe child-friendly neighborhoods encompass the aspects of social and traffic safety. On one hand, social safety deals with securing children against crimes, violence, and strangers. On the other hand, traffic safety ensures that pedestrians and cyclists are protected from traffic injuries and car accidents.

This paper begins by introducing the concept of safe child-friendly neighborhoods to highlight the main principles that contribute to creating safe, convenient and comfortable environments. Then, it addresses social and traffic safety in urban open spaces. The first section of this paper handles the topic of social safety which tackles urban wayfinding systems and crime prevention through environmental design (CPTED) principles. The second section of this paper highlights the topic of traffic safety with all the correlated strategies that sustain safety in urban streets. These strategies include speed and traffic flow, size and layout of streets, traffic-calming measures, and sustainable Mobility.

To sum up, this research focuses on the principles that create safe open spaces and, at the same time, encourage children to walk and interact with their environments. It concludes by providing a set of guidelines for designing safe-child friendly open spaces in residential neighborhoods.

2 Principles of Safe Child-Friendly Neighborhoods

Urban children face multiple challenges in cities such as rapid urbanization, high traffic density and lack of open spaces. These challenges threaten the life of children while restricting them from living a normal childhood. Urban environments spatially deprive children of the pedestrian's experience and this situation decreases their opportunities in safe mobility. Consequently, parental concerns upsurge and impose several limitations for children's independent mobility in urban areas (Brady 2013; Burton et al. 2014). In reality, parents favor safe pathways that are distinguished with wayfinding systems. Allocating landmarks, signage and elements along the pedestrian paths will allow children to easily recognize and remember routes and develop a sense of safety where they can retrace directions by recalling their collective imagery (Giraldi et al. 2017). There are numerous principles that sustain children's

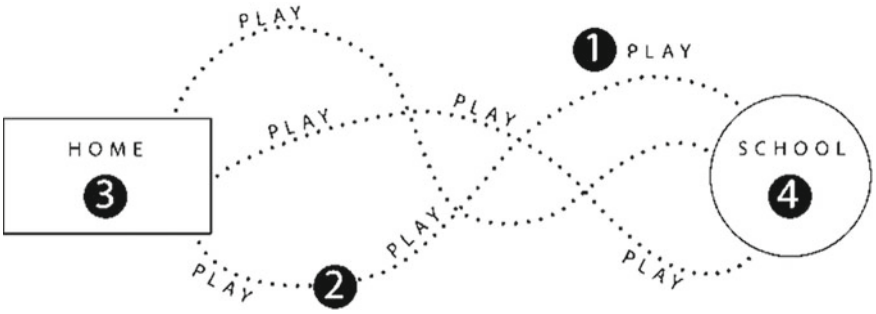


Fig. 1 Creating pedestrian networks for children in residential neighborhoods (Krysiak 2018)

safety in urban neighborhoods. Firstly, improving natural surveillance by allowing the surrounding houses to view the neighborhood's parks and playgrounds. Jacob's concept "eyes on the streets" can be introduced through the housing design by incorporating low fences and windows facing the streets. Additionally, houses with open porches allow parents to relax and enjoy the fresh air and, at the same time, see their children playing in open spaces. Secondly, the neighborhoods' streets should have high connectivity and low traffic levels. For instance, urban designers can create protected pathways or green corridors for children which are separated from car lanes. Thirdly, maintaining the aesthetical qualities of neighborhoods and reducing visual disorder will nurture greater perceptions of safety among children (Burton et al. 2014). As claimed by Nasar, Holloman, and Abdulkarim, parents prefer their children to walk on the streets that have less physical disorders (Nasar et al. 2015). Safe neighborhoods should create pedestrian networks and crossing points between houses, schools and public parks to improve walkability and promote urban safety (Fig. 1). Last but not least, incorporating mix-land uses in residential neighborhoods will ensure proximity to multiple destinations and locations (Burton et al. 2014).

Social safety and traffic safety are two aspects that build safe neighborhoods for children (Gencer and Karagoz 2017). On one hand, social safety allows children to feel secure and comfortable by protecting them from crime and violence. On the other hand, traffic safety ensures that children can securely and independently mobilize in urban contexts.

3 Social Safety

Social safety is one of the important determinants of children's independent mobility. It deals with reducing crimes and violence in urban open spaces while allowing pedestrians to walk confidently in urban contexts without getting lost.

3.1 Urban Wayfinding

The concept of wayfinding aims to create readable and legible environments where individuals can successfully follow routes and get to their destinations. Wayfinding process and associated elements improve people's experience and navigation within cities while allowing them to orient themselves in urban contexts (Lu 2016). Buildings, landscapes, and physical structures are three factors that define the wayfinding process within cities. These elements contribute to simplifying the external environments and make them clear to the users so they will not get lost (Badger 2012).

Urban Wayfinding was early discussed by Kevin Lynch in 1960. The process of wayfinding depends on the mental images that are developed through the interaction between observers and external surroundings. Natural and artificial structures contribute to building the image and visual quality of the city. Lynch proposed five elements of cognitive maps: paths, edges, districts, nodes, and landmarks. These elements identify the urban scenarios and represent the mental images of the urban settings which help people to effectively operate within their environments. Paths such as streets and walkways are the most essential elements in the wayfinding process as they shape the urban mobility and allow individuals to observe the city. Edges are considered as linear boundaries that separate two different phases and points such as shores and railroads. The importance of edges lies in outlying the image of the city. Districts are areas of the city that are characterized by shared features. Moving forward, nodes represent the focal point and strategic core in districts such as public squares. Landmarks are physical structures that allow urbanites to orient themselves and develop memorable cues within their environments. Finally, these five elements of mental images can directly improve the way-finding abilities among individuals (Lynch 1960).

Unlike adults, children perceive urban environments differently as they are more conscious about details, colors, and shapes (Acar 2013). Giraldi et al. have reviewed Lynch's studies and claimed that special features and details could be added to urban wayfinding systems to encourage children's mobility and interaction while developing a sense of safety and comfort. Walkways and sidewalks should be designed with irregular shapes and different colors to stimulate children to walk and enjoy the pedestrian's experience (Giraldi et al. 2017). Moreover, using alternating pavements and colors improves traffic safety among children as they will be more attentive (Krishnamurthy et al. 2018a). Child-friendly nodes are appealing points located at intersection areas that allow children to orient and direct themselves in urban areas such as public squares, pedestrian crossings, and intersections. Landmarks should be characterized by multiple colored elements to attract children and encourage them to build memorable mental images about their urban settings. Additionally, using graffiti in neighborhoods would help children to memorize and sign their daily routes (Fig. 2). The previous elements develop the wayfinding abilities among children and allow them to feel safe, confident and comfortable while walking in urban environments (Giraldi et al. 2017). To conclude, improving the aspect of urban wayfinding

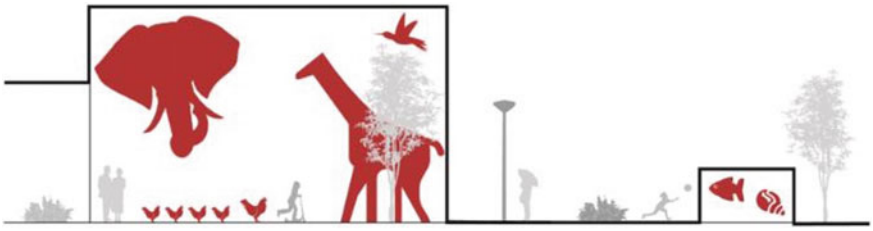


Fig. 2 Applying graffiti and street art to orient children in urban contexts (Krishnamurthy et al. 2018b)

will play a major role in promoting a sense of safety and security among children. Creating legible neighborhoods that are characterized by clear architectural buildings and pathways can positively enhance urban safety and reduce wayfinding anxiety (Dogrusoy and Zengel 2017).

3.2 CPTED Strategies

The design of open spaces plays a major role in preventing crimes and increasing safety for users. The CPTED program refers to a set of principles that are concerned with designing safe places that are characterized by better qualities (Russ 2009). Moreover, this program incorporates multiple concepts to minimize the fear and occurrence of crime by manipulating physical, social and management variables of the environment.

Therefore, the interaction between individuals and external environments will be positively improved (Fennelly and Crowe 2013). The strategies of CPTED were earlier highlighted by Jacobs through the concept of "eyes on the street". She encouraged the incorporation of mixland uses within communities to improve the surveillance of urban open spaces (Iqbal and Ceccato 2016).

Access Control

Regulating and controlling access to urban open spaces help to decrease crime opportunity and restrict the movement of offenders. Physical access to neighborhoods' parks can be restricted by barriers and enclosures such as bollards, fences, and portals. This strategy enhances the sense of safety and security. However, it may negatively affect the aesthetical qualities of neighborhood parks (Iqbal and Ceccato 2016). Narrowing intersections, using "S" curves in streets, installing traffic calming measures and designing one-way streets, are considered as effective strategies to control traffic along residential streets (Russ 2009). The main concept behind

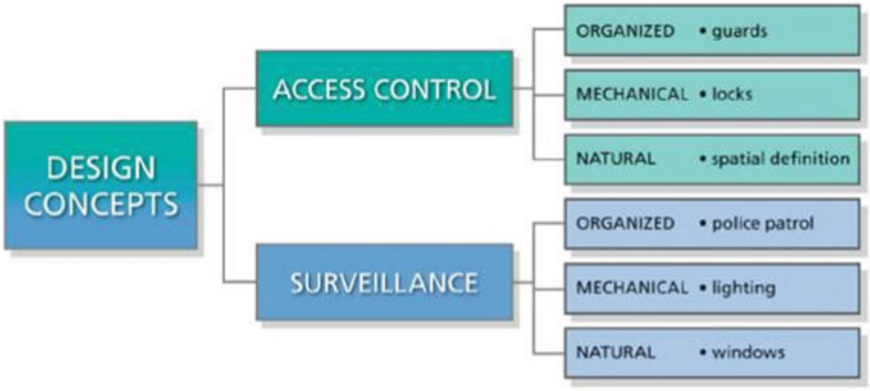


Fig. 3 Design concepts of surveillance and access control (Fennelly and Crowe 2013)

controlling the access is to harden the target of criminals by raising perceptions of risk (Russ 2009; Fennelly and Crowe 2013).

Natural Surveillance

The strategy of surveillance facilitates the observation process to prevent the incidence of crimes. Formal surveillance is supported by security guards and shopkeepers, while informal surveillance is held by local residents (Russ 2009; Fennelly and Crowe 2013). Natural, mechanical and organized surveillance are considered as three classifications that assist the ability to see and being seen (Fig. 3). Organized surveillance is similar to the concept of formal surveillance where police officers are responsible to sustain the safety of communities. Windows and doors that face the outdoor areas improve natural surveillance as they encourage individuals to observe streets and public spaces. Providing effective lighting will help to develop mechanical surveillance and ensure clear sightlines along streets and public spaces (Fennelly and Crowe 2013).

Territory

Territorial reinforcement develops a sense of proprietorship that is generated by the physical design of open spaces. The strategies of access control and natural surveillance support the process of reinforcing territory by encouraging residents to protect their communities, create common values and react immediately against offenders (Fennelly and Crowe 2013; Iqbal and Ceccato 2016). Territorial reinforcement deals with the concept of establishing distinctions between spaces. These distinctions could be achieved by changing textures of pavements and heights of each area (Russ 2009).

4 Traffic Safety

Child-friendly streets protect children from traffic accidents while allowing them to use active modes of transportation such as walking and cycling. Enjoy-ability and playability are two characteristics of child-friendly streets that attract children and boost their imagination by providing multiple activities along the pathways (Tandogan and Ergun 2013).

4.1 Speed and Traffic Flow

The speed of vehicles is a major factor that endangers the life of children. It is responsible for rising the number of traffic accidents. Unexpected accidents increased the number of deaths among children at the age of 1–4 years old (Senda 2015). The maximum speed of automobiles in residential streets should be restricted to 20 km/h with maximum traffic flows of 100 vehicles during the rush hour (Tandogan and Ergun 2013). Other researchers claimed that the speed of automobiles should not exceed 15 km/h with maximum traffic flows of 30 vehicles per hour. Many European cities created the program of "zone 30" where the speed of automobiles in local streets and community roads is limited to 30 km/h (Senda 2015).

4.2 Size and Layout of Streets

According to a recent study, parents preferred their children to walk in narrow streets. They claimed that narrow streets are safer for children than wide streets (Nasar et al. 2015). The ultimate length of child-friendly streets should not exceed 400 m, while the width can be 3.7 m and above. Minimizing on-street parking can boost urban safety in residential neighborhoods (Tandogan and Ergun 2013). If the street is long, plazas, parks, and squares could be allocated to break the continuity and create tolerable walking distances (5–7 min walk) for all individuals. Establishing a proportion between the height of buildings and the width of streets helps to create balanced urban settings. As streets become wider, higher buildings are required and vice versa (Ekawati 2015). Narrowing the traffic lanes and designing two way-streets are considered as two main aspects of designing child-friendly streets that will reduce the speed of automobiles. Adding trees along the streets will attract children to walk, promote clean environments and improve the aesthetical qualities of streets (Chachra et al. 2019).

4.3 Traffic Calming Measures

Traffic calming measures refer to a set of strategies that reduce the speed of vehicles to ensure traffic safety for pedestrians, motorists, and cyclists. It is important to create a traffic calming plan for each neighborhood with the involvement of public participation (Gonzalo-Orden et al. 2018; ITE et al. 2016). There are three categories of traffic calming measures: non-physical, speed and volume control measures (ITE et al. 2016).

Non-physical Measures

Raising public awareness is considered as an effective strategy that would help to reduce the speed of vehicles without changing the layout of streets. Residents should be encouraged to participate in the process of initiating traffic calming plans in their neighborhoods. Non-physical treatments could be added to instruct and encourage people to drive at lower speeds such as speed-limit signage, lane lines, radar speed trailer and speed legend pavement marking (ITE et al. 2016). Moreover, changing the texture of streets assist in lowering the speed of vehicles and make the drivers more attentive. Several pavements force drivers to slow down such as concrete pavers, cobblestone, bricks and stamped pavements (Ekawati 2015).

Speed Control Measures

Speed control measures are physical and vertical elements that are used to lower the speed of vehicles to a moderate level (Fig. 4). Motorists tend to drive slowly at these elements because of the uncomfortable ride. Speed humps, raised intersections, speed tables, speed cushions, and chockers are considered as effective examples of speed control measures that promote safety and livability in urban contexts (Ekawati 2015; Chachra et al. 2019; ITE et al. 2016).

Volume Control Measures

Volume control measures refer to the physical elements that are installed to address and regulate the flow of vehicles (Fig. 5). These measures organize traffic mobility and minimize cut-through traffic to ensure safety for pedestrians and cyclists (ITE et al. 2016). According to a recent report of designing streets for children, pinch-points, chicanes and lane shifts, corner radii, and curb extensions are considered as effective physical elements that characterize child-friendly streets (Chachra et al. 2019). Allocating medians, refuge islands and diverters along streets will control the traffic volume and promote a smooth flow of automobiles (Chachra et al. 2019; ITE et al. 2016).

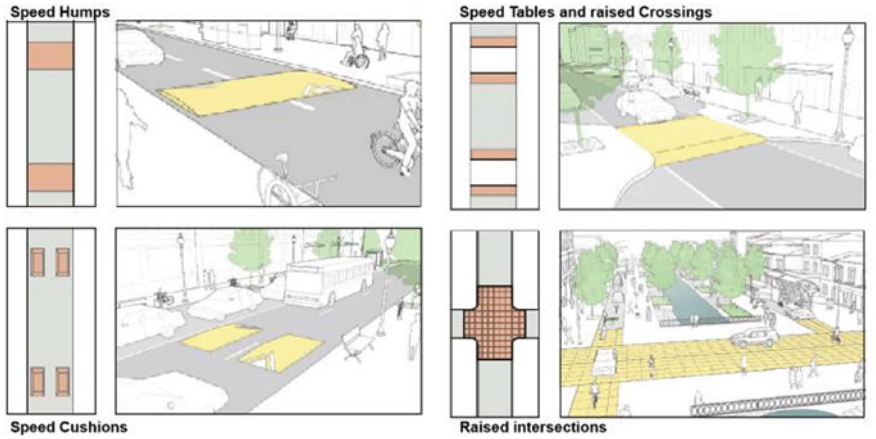


Fig. 4 Speed control measures (Chachra et al. 2019)

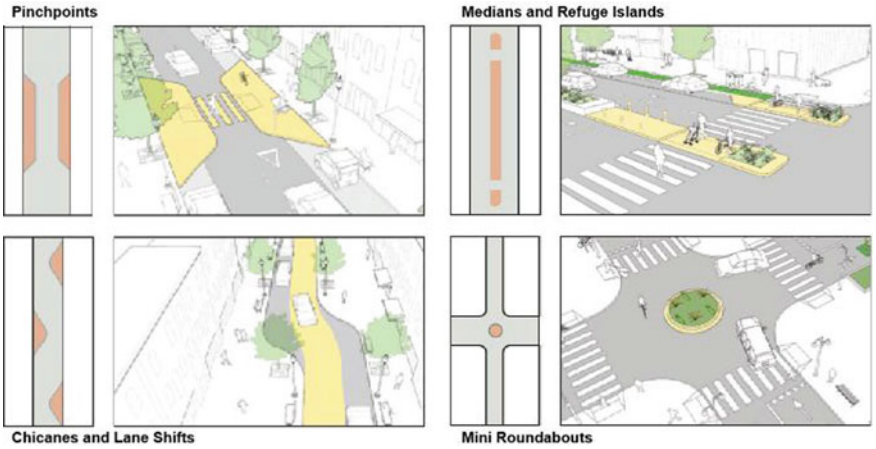


Fig. 5 Volume control measures (Chachra et al. 2019)

4.4 Promoting Sustainable Mobility (Active Transport)

Sustainable mobility allows people to mobilize safely in urban contexts while paying attention to protect natural environments and ecosystems. It includes a shift from the traditional modes of transportation (private automobiles) to active modes of transportation (walking, cycling and riding public transportation). The main aim of sustainable mobility is improving the health and lifestyles of citizens (Morency 2013). Child-friendly streets should improve the accessibility of streets by introducing multiple modes of transportation. Incorporating different lanes that support walkers, cyclists, transit riders and motorists, will boost safety, convenience and

comfort in urban contexts. The layout of streets must consider handicapped people while directing and facilitating their movements (Chachra et al. 2019).

5 Principles of Safe Child-Friendly Open Spaces

This paper explored the main design principles of safe child-friendly open spaces (Fig. 6). These principles could be used to promote safe residential streets and neighborhood parks that protect children and make them feel comfortable and secured. Social safety and traffic safety are two major dimensions of creating safe child-friendly open spaces. The first dimension "social safety" includes two main strategies: urban wayfinding systems and CPTED principles. The second dimension "traffic safety" incorporates four aspects: speed and flow, size and layout of streets, traffic calming measures and active transport.

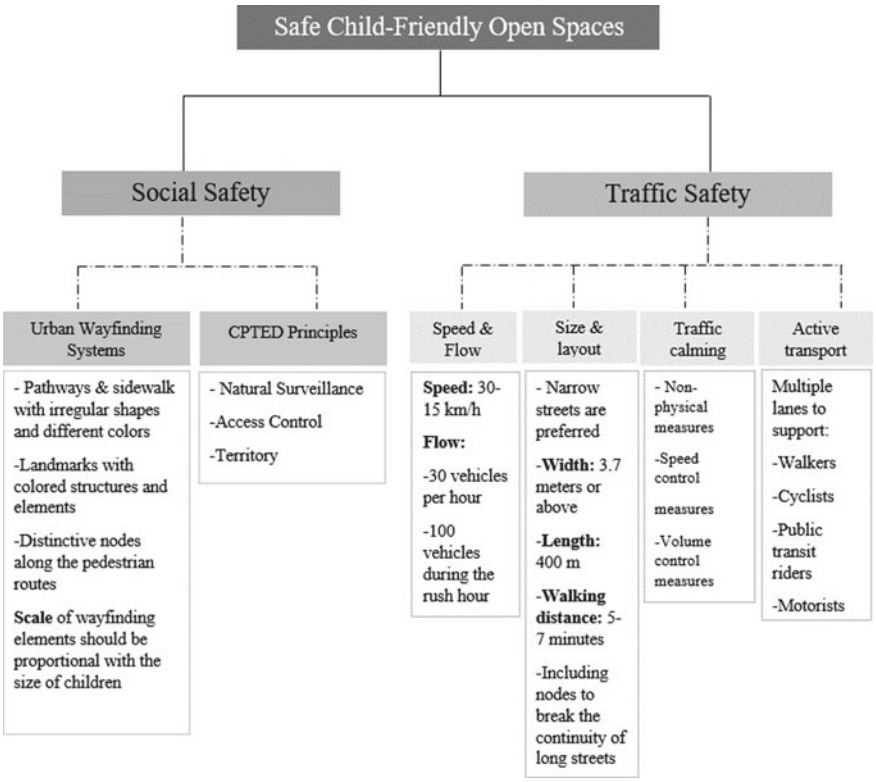


Fig. 6 Principles of designing safe child-friendly open spaces in residential neighborhoods, adopted by author

5.1 Case Study: Child-Friendly Neighborhood at Princess Nora University in Riyadh

Princess Norah Bint Abdulrahman University (PNU) is located in Riyadh, Saudi Arabia (Fig. 7). It is considered as one of the largest educational campuses for women at local and global scales. The percentage of females is 72.8%, compared to 27.2% for males. Total area of the university is 3 million square meters which integrates multiple facilities such as health sciences and research campus, academic campus, schools, academic medical campus, sports, and recreational amenities. Moreover, administrative centers, residential zones, infrastructure, services, and monorail systems are situated in this university. Noteworthy, many of the buildings in PNU are registered with the USGBC's LEED rating system (Arab Urban Development Institute 2015).

Almost 50% of Riyadh's population is under the age of 20 years. Additionally, the percentage of citizens under the age of 15 years is 34%. In collaboration with the Arab Urban Development Institute (AUDI), a proposal to build child-friendly urban environments at Princess Nora University was initiated. Three workshops were conducted to involve the students in the design process and development of their communities. Firstly, students were invited to explore the principles of child-friendly cities and healthy living. Afterward, they were requested to investigate their local surroundings and document any constraints or issues by mapping and photography. Secondly, the findings of the first workshop were discussed by highlighting the main urban problems that face their communities such as traffic safety, lack of green open spaces, and sports facilities.

Fig. 7 Location of PNU in Riyadh (Google Maps n.d.)

This step was done to strengthen the concept of civic participation among children. Subsequently, students were encouraged to focus on one urban problem and propose recommendations in collaboration with their parents or stakeholders. Later, children can present and share their solutions with their classmates. Thirdly, students were asked to reflect their actions and plans into small-scale 3D models for better imagination of child-friendly environments (Arab Urban Development Institute 2015).

The Design Proposal

Arab Urban Development Institute (AUDI) has developed the zones of married senior staff housing (Fig. 8). These zones incorporate residential and community buildings. Pedestrian movement and activity patterns were analyzed by using the Space Syntax program (Fig. 9). Apparently, the existing play spaces for children are not linked to safe routes with pedestrian crossings (Arab Urban Development Institute 2015). Prioritizing pedestrians and encouraging walkability is not strengthened through the existing design. Moreover, there is a lack of accessibility to play spaces which can impose multiple dangers on children and discourage them from walking. Many outdoor spaces are not well-used. Thus, activating these neglected areas is crucial to promote safety and enjoyment among children. Additionally, the areas of children's playgrounds are restricted and need to be maximized.

AUDI has created design proposals to promote child-friendly environments at PNU. The new design includes zebra crossings, speed limits, lighting fixtures to improve the pedestrian experience. These crossings are also situated along a new pathway that links children with the zone of schools. Tactile tiles are installed to facilitate the movement of disabled children. The playing areas are expanded along the main horizontal axis and the two vertical spines. Linear green corridors are designed to host children's playgrounds while promoting safety and enjoyment. New parking spaces are added at the outer perimeter of this layout to limit vehicular movement. Last but not least, the Cul-De-Sac street layout is integrated to ensure pedestrian safety among children and to create more walkable areas in the middle of this neighborhood (Arab Urban Development Institute 2015). The design proposal includes multiple playing elements and structures that are characterized by vibrant colors which could attract children and stimulate their imagination (Fig. 10).

Analysis: Effectiveness of the Design in Relation to Safety Principles

Table 1, generated according to the researchers' theoretical study, examines the design proposal that is created by Arab Urban Development Institute (AUDI) at Princess Norah University in Riyadh. It evaluates the effectiveness of the design proposal regarding safety principles of child-friendly neighborhoods.

Fig. 8 The existing land use of married senior staff housing (Arab Urban Development Institute 2015)

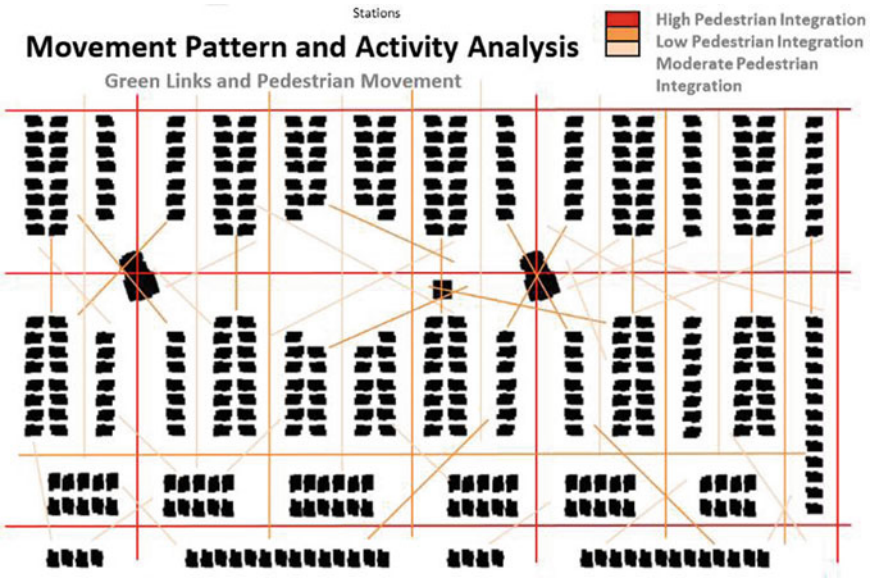


Fig. 9 Analyzing the existing pedestrian movements in the zone of senior staff housing (Arab Urban Development Institute 2015)

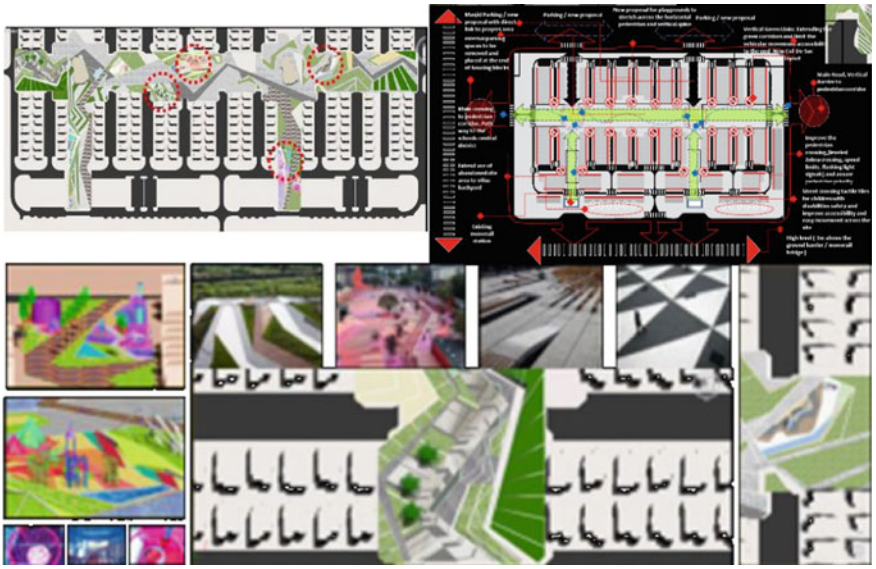


Fig. 10 The proposed design of married senior staff housing at PNU, (Arab Urban Development Institute 2015)

6 Remarks and Conclusion

The examined case showed that the designer primarily focused on designing safe child-friendly open spaces in the married senior staff housing at Princess Norah University in Riyadh. The presented experiment succeeded to introduce a good example to enhance the capacity of an urban development to be considered as child friendly project in terms of safety for children and reduce the dominance of vehicles in the residential neighborhood. Horizontal and vertical axes of green corridors are added to maximize the playing areas and promote social interactions among children. Additionally, children's needs and desires are reflected in the design proposal while taking into consideration the local climatic conditions. For instance, shading devices are integrated around the children's playgrounds to improve the microclimate. Several equipment and games are situated along the playing areas to attract various ages and interests. Children with disabilities are also involved by adding inclusive and sensory play elements that can facilitate their access while stimulating their imagination. Children's night-time experience is improved by including various lighting fixtures to promote social and traffic safety among children. Multiple urban furniture is distributed along the outdoor spaces to create convenient environments such as public benches and recycling trash cans. Benches are allocated near playing areas to promote natural surveillance and around trees to take advantage of the natural shading. Using the Cul-De-Sac Street layout would limit vehicular movement and promote walkability among residents. On the other hand; the project lacked

Table 1 Analysis of the design proposal of child-friendly neighborhood at PNU regarding safety principles

Safety principles	Availability	Comments
Wayfinding systems		
1. Pathways and sidewalks with irregular shapes and different colors	●	The design includes pathways that are characterized with different shapes and colors which can stimulate the imagination among children and improve their wayfinding abilities
2. Landmarks with colored elements	⊖	There is no landmarks that can orient children and allow them to build memorable mental images
3. Distinctive nodes along the pedestrian routes	●	Playgrounds act as remarkable nodes along the horizontal green corridor
4. Scale in proportion with the size of children	●	Humanized scale is incorporated to create friendly outdoor spaces for children
CPTED strategies		
1. Access control	◒	• Bollards, fences, and portals are not used which can decrease the level of social safety • Cul-De-Sac street layout is integrated to limit the vehicular movement while promoting safety for walkers
2. Natural surveillance	●	• Allocating benches around children's playgrounds would allow parents to watch their children while playing • Some of the residential buildings are overlooking the open spaces to maximize the level of social safety
3. Territory	●	• Generating a sense of proprietorship by allowing the children to participate in the workshops • Changing the texture of pavements and heights of each area to create distinctive zones
Speed and Flow		
1. Speed: 30–15 km/h	●	The vehicular speed is restricted to 20 km/h
Street size and layout		
1. Narrowing travel lanes	●	Travel lanes are narrowed to limit the vehicular movement and promote traffic safety

(continued)

Table 1 (continued)

Safety principles	Availability	Comments
2. Walking distance 5–7 min	●	The open spaces and children's playgrounds are located to create tolerable walking distances
3. Two-way streets	●	Two-way streets are designed to reduce collisions and promote walkability
Traffic calming measures		
1. Non-physical measures	●	• Lane lines are used to separate traffic lanes to reduce collisions • Speed-limit signs are added to increase the awareness of drivers
2. Speed control measures	●	Raised intersections are used to reduce the speed of vehicles
3.Volume control measures	●	• Curb extensions are included to maximize the pedestrian's visibility at intersections • Medians are included to separate travel lanes
Active transport		
Cyclist, pedestrian, motorists, public transit riders	●	The design encourages multiple modes of travel as it is located near the monorail station while promoting safe experiences for walkers and drivers

Fully available ●; partially available ◒; not available ⊖

landmarks such as art sculptures that could be used to orient children and develop their wayfinding abilities are not incorporated in the residential neighborhood. Thus, these elements should be considered to promote independent mobility among children. Additionally, the design proposal does not include fences, portals, and bollards. However, the existence of these elements can control access and promote social safety in the residential neighborhood. In summary, this paper explored the main design principles of safe child-friendly open spaces. It concluded with a list of guidelines that can be used in designing safe residential neighborhoods. Social safety and traffic safety are two major dimensions that contribute to creating child-friendly open spaces in urban contexts. Furthermore, these principles are used to analyze the child-friendly neighborhood that is proposed by the Arab Urban Development Institute (AUDI). Eventually, the aforementioned guidelines and the evaluative analysis of the related case-study could be adapted to promote safe environments in urban settings and, at the same time, improve the life, health, and socialization of children.

References

Acar H (2013) Landscape design for children and their environments in urban context. Retrieved 5 Sep 2019, from: https://www.intechopen.com/books/advances-in-landscape-architecture/landscape-design-for-children-and-their-environments-in-urban-context

Arab Urban Development Institute (2015) Child friendly city: urban design framework. AUDI

Badger E (2012) The surprisingly complex art of urban wayfinding. Retrieved 2 Oct 2019, from: https://www.citylab.com/design/2012/01/surprisingly-complex-art-wayfinding/1088/

Brady T (2013) Third of parents won't let their children walk to school because of fears about speeding cars. Retrieved 28 Sep 2019, from: https://www.dailymail.co.uk/news/article-2327328/Third-parents-wont-let-children-walk-school-fears-speeding-cars.html

Broberg A, Kyttä M, Fagerholm N (2013) Child-friendly urban structures: Bullerby revisited. J Environ Psychol 35:110–120. https://doi.org/10.1016/j.jenvp.2013.06.001

Burton E, Cooper R, Cooper CL (2014) Wellbeing: a complete reference guide, volume II, wellbeing and the environment. Wiley Blackwell, Chichester

Chachra A, NACTO, GDCI (2019) Designing streets for children. Retrieved from National Assoc of City Trans Officials website: https://www.childhealthinitiative.org/media/460827/ankita-chachra.pdf

Dogrusoy IT, Zengel R (2017) Analysis of perceived safety in urban parks: a field study in Büyükpark And Hasanağa Park. METU J Fac Archit 63–84. https://doi.org/10.4305/metu.jfa.2017.1.7

Ekawati SA (2015) Children—friendly streets as urban playgrounds. Procedia Soc Behav Sci 179:94–108. https://doi.org/10.1016/j.sbspro.2015.02.413

Fennelly L, Crowe T (2013) Crime prevention through environmental design, 3rd edn. Elsevier, Amsterdam, Netherlands

Gencer TE, Karagoz D (2017) The relationship between child and urban safety: child-friendly safe cities. Online J Sci Technol 7(4):229–233

Giraldi L, Benelli E, Vita R, Patti I, Filieri J, Filippi F (2017) Designing for the next generation. Children urban design as a strategic method to improve the future in the cities. Design J 20(1):68–78. https://doi.org/10.1080/14606925.2017.1352814

Gonzalo-Orden H, Pérez-Acebo H, Unamunzaga AL, Arce MR (2018) Effects of traffic calming measures in different urban areas. Transp Res Proc 33:83–90. https://doi.org/10.1016/j.trpro.2018.10.079

Goole Maps (n.d.) Princess Nourah Bint Abdul Rahman University. Retrieved 27 Dec 2019, from: https://www.google.com/maps/place/Princess+Nourah+Bint+Abdul+Rahman+University/@24.8466526,46.7233299,17z/data=!3m1!4b1!4m5!3m4!1s0x140e8f02757ea8c9:0x2ae023476577aa2b!8m2!3d24.8466526!4d46.7255186

Goosen Z (2014) The planning and development of child-friendly green spaces in urban South Africa (Master's thesis, North-West University, Potchefstroom, South Africa). Retrieved from: https://dspace.nwu.ac.za/handle/10394/15248

Iqbal A, Ceccato V (2016) Is CPTED useful to guide the inventory of safety in parks? A study case in Stockholm, Sweden. Int Crim Justice Rev 26(2):150–168. https://doi.org/10.1177/1057567716639353

ITE, Wolshon B, Pande A (2016) Traffic engineering handbook, 7th edn. Wiley, Hoboken, NJ

Krishnamurthy S, Steenhuis C, Reijnders D, Stav T (2018a) Child-friendly urban design: observations on public space from Eindhoven (NL) and Jerusalem (IL). Retrieved from Bernard van Leer Foundation website: https://bernardvanleer.org/app/uploads/2018/05/Child-friendly-urban-design.pdf

Krishnamurthy S, Steenhuis C, Reijnders D (2018b) Mix and match: tools to design urban play. Retrieved from Bernard van Leer Foundation website: https://bernardvanleer.org/app/uploads/2018/05/Mix-Match-Tools-to-design-urbanplay.pdf

Krysiak N (2018) Where do the children play: designing child-friendly compact cities. Retrieved from cities for play website: https://www.citiesforplay.com/portfoliowhere-do-the-children-play

Lu Y (2016) Creating a successful wayfinding system: lessons learned from Spring-field, Massachusetts (Master's thesis, University of Massachusetts Amherst, Massachusetts, England). Retrieved from: https://scholarworks.umass.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1089&context=larp_ms_projects

Lynch K (1960) The image of the city. The Massachusetts Institute of Technology and the President and Fellows of Harvard College, Massachusetts

Morency C (2013) Sustainable mobility: definitions, concepts and indicators. Retrieved 5 Oct 2019, from: http://en.forumviesmobiles.org/video/2013/02/12/sustainable-mobility-definitions-concepts-and-indicators-622

Mousavi SM, Joneidabad EZ (2015) Design principles of residential open spaces to promote children's satisfaction. Indian J Fundam Appl Life Sci 5(3):261–270

Nasar JL, Holloman C, Abdulkarim D (2015) Street characteristics to encourage children to walk. Transp Res Part A Policy Pract 72:62–70. https://doi.org/10.1016/j.tra.2014.12.004

Oloumi S, Mahdavinejad M, Namvarrad A (2012) Evaluation of outdoor environment from the viewpoint of children. Procedia Soc Behav Sci 35:431–439. https://doi.org/10.1016/j.sbspro.2012.02.108

Russ T (2009) Site planning and design handbook, 2nd edn. McGraw Hill Professional, New York, NY

Senda M (2015) Safety in public spaces for children's play and learning. IATSS Res 38(2):103–115. https://doi.org/10.1016/j.iatssr.2015.02.001

Tandogan O, Ergun N (2013) Assessment of the child-friendliness of the Küçük Ayasofya neighborhood in Istanbul, Turkey. Child Youth Environ 23(3):164. https://doi.org/10.7721/chilyoutenvi.23.3.0164

Smart Environmental Solutions

Role of Literature in Environmental Conservation Towards Better Future: A Critical Analysis of the Poetry of Sheikh ul-Alam

Tawhida Akhter

Abstract Literature has always been a mirror to society. Since ancient times, literature has performed two functions. To some, it is art for the sake of art, while to others; it is a reflection of modern society. These two ideas are always at the foundation of great literature. The planet (Earth) has suffered much as a result of global ecological catastrophe, mostly as a result of human atrocities against nature. As a result, literature cannot turn its back on this. A new field of study for literature emerged at the close of the previous century. The present article seeks to explore the Ecocritical issues as represented by a great environmentalist and a poet of Kashmir-Shaikh-ul-Alam. His poetry, written in Kashmiri and translated into other languages, is the apex of literary and environmental excellence. Sheikh ul-Alam has created a large body of poetry that covers a wide range of topics, from cultural to ecological sustainability. The purpose of this study is to see how literature has helped and will always inspire people become more aware of hazards like deforestation and its repercussions. We witness a gradual change in our attitude toward nature, while reading his poetry. In his poems, the interconnectedness of human nature is at the heart of Ecocriticism, is emphasized.

Keywords Eco-criticism · Human atrocities · Ecological sustainability · Sheikh ul-Alam · Ecocritical issues

1 Introduction

The whole world is facing the all-time biggest problem of environmental crises in these days. Though man has made his life very comfortable and luxurious but it is all at the cost of life supporting environment. Mother earth which is the only life supporting planet in the universe is now at the verge of extinction, not because it makes the capacity to hold fresh life but because of the misuse and adulteration of life supporting organs. At present we are in the rat race of materialism and in the

T. Akhter (✉)
College of Sciences and Arts Sajjir, Shaqra University, Shaqra, Kingdom of Saudi Arabia
e-mail: tawhida@su.edu.sa

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_13

pursuit of worldly wealth we are destroying the ecological balance of nature. Kashmir which is considered the most beautiful part of the world owing to the pure waters, lush green forests and pure and clean mountains and valleys but now the scenario is different. Ecocriticism as a literary criticism emerged recently. This theory emerged only a few decades back, though the elements of it are traced in the works of several writers from earlier periods particularly poetry is one of the major area in which the perspectives of ecocriticism are found. Sheikh ul-Alam in this regard and his poems popularly known as 'Sheikh Shrukh' written in the Kashmiri language deserves due attention. Sheikh ul-Alam has written a vast poetry, discussing multiple issues ranging from socio-religious to nature, and environment. The paper is an attempt to outline the theory of Ecocriticism, followed by the ecological crisis and solutions offered by Sheikh-Ul-Alam in his poetry. It will analyze and deconstruct some of the best 'Shrukh' composed by him, providing evidence of his love and concern for nature and environment. It will highlight the teachings of this great Sufi which he propagated throughout his life for the conservation of nature and environment.

The valley of Kashmir was blessed with sufis, saints, scholars, and renowned personalities in art and literature. And one of the most eminent sufi poets that this valley produced towards the end of fourteen century was Shaikh ul-Alam. Shaikh Noor-ud-din Noorani (1378–1438), popularly known as Shaikh ul-Alam is one of the most venerated and well-acclaimed sufi saints of Kashmir. His poetry is famously known as 'Shaikh Shrukh' and is fully packed with the metaphors and imagery of nature and the environment.

Environmental education is a process of recognizing values and clarifying concepts in order to acquire the skills and tools needed to comprehend and support the interdependence and interplay between man, his culture, and his biophysical surrounding. It recognizes that the natural and man-made environments are intertwined and interdependent, making environmental education a lifetime activity that begins in preschool and continues through all phases. It should be multidisciplinary and look at important environmental challenges from local, national, and global perspectives. It should employ a variety of educational methods to educate and learn about and from the environment, with a focus on hands-on activities and first-hand experience. It is through this process of education that people can be sensitized about the environmental issues. It can be understood by this verse.

Without the aid of a sailor, I did sale my ship, By suppression of greed, jealousy, arrogance, Lust, pride and anger, Then I realized what I am. U crave to embrace lustly wives of others, What madness! U cannot purchase for any price (Assad 2017).

2 Concept of Eco-criticism

The concept of ecocriticism came to being in 1970, at a meeting of The Western Literature Association, a body whose field of interest is the literature of the American West. In his introduction to a series of brief position papers all entitled 'What is Ecocriticism?', Michael P. Branch traces the word "ecocriticism" back to William

Ruckert's 1978 essay 'Literature and Ecology: An Experiment in Ecocriticism'. In literature there are several writings which carry the bearings of ecocriticism, such as William Words Worth (1770–1850), Ralph Waldo Emerson (1803–1882), Henry David Emerson (1817–1862) etc. and many other.

The Objectives: The paper has following objectives:

To know the ecological conditions of Kashmir division of J and K State.

To high light the sufi teachings of Sheikh Noor ud din Wali (R A).

To find out the relation of sufi teachings with ecological conservation.

To identify ecofriendly technologies for sustainable development.

3 Sheikh Noor-ud-Din as an Ecologist

At the time when Sheikh Noor-u-din Wali was preaching his message into pros and cons of Kashmir the surroundings were completely virgin and greatly un-interfered by the destructive human activities. Kashmir was a real scene of Paradise. The present cities of Kashmir especially the Srinagar city round the Dal Lake were covered by the dense forests; pure land, fresh air and crystal clear water were their characteristics. Historians have mentioned that when Sheikh Noor-u-din along with his close companion Naseer-u-din in his journey to Srinagar reached near present Dalgate he stopped there and cautioned his disciple not to proceed ahead. Baba Naseer-u-din asked for a reason and Sheikh replied that it is the paradise and they have yet to make sufficient meditation to get themselves entitled to enter the heaven.

After two centuries, the Mughal aesthetics discovered this paradise and they beautified it with their rich architecture, the present Mughal gardens in front of Zabarwan hills on the western bank of the Dal Lake are the examples of such architecture. There is no doubt that the Sheikh Noor-u-din's Kashmir was paradise which had all the bounties of nature undisturbed. Inspite of that Sheikh Noor-u-din had Saintic vision about the future that he was aware that this natural beauty will get disturbed and tarnished by the irresponsible acts of uncultured, uneducated and ignorant inhabitants of Kashmir.

Sheikh Noor-u-din who was having ecological vision has explained the importance of ecological balance some six hundred years before. The following verse is as famous as a universal truth and is respected by people with letter and spirit the universe will sustain only if the forests (trees) sustain, " Ann poshi teli yeli wann poshi" meaning "Food will last as long as forests last" (Amin 2008).

Man was made out of the earth And his frame was cast in clay
It is all out of the earth, that all bounties grow
It is earth, were man cooks his food
When life goes out, body transfers into the earth
And earth gets mixed with earth for good. (Amin 2008)

The sayings of the great Saint are at present used as a motto by the Jammu and Kashmir Forest Department for spreading awareness for afforestation. Sheikh made Conscious efforts for maintaining ecological balance both by his literary work and teachings, Sheikh Noor-ud-din has practically avoided any Carnivorous diet only to safeguard other creatures of the God.

Sheikh Noor-ud-din has explained the dependence of humans on the nature in a very nice way, and made us clear that at every stage of development we are dependent on the bounties of nature in one way or the other. After the breast feeding we take milk from the domestic animals, which they (animals) generate from wild and domestic grasses, we start taking food, the food also mainly comes from field and plants so we are dependent on nature, we need clothing and shelter in the form houses. Shaikh ul-Alam never accepted any type of devastation or harm to either man or the environment. He utilized his poetry work to protect the environment, wildlife, forests, and any other different biological component of nature. It can be found in this verse, "The sustenance precedes the and death follows. The word is the environment movement of breathing in and out" (Amin 2008).

These necessities are also obtained from the forests, and other natural resources and when we become helpless at old age nobody helps us even the nears and dears leave us at that time and it is nature which helps us at that time as well. Plants provide us a Stick which becomes our support. Sheikh Noor-ud-din has treated these obligations of nature as the nature's debt and not as free gifts. According to the Sufi Sect of Muslim jurisprudence, the debt is the first liability to be discharged from the assets of the deceased believer. No any believer should die without clearing his/her debt whether of his companion or nature borrowed by him/her even of a single penny, lest he dies under the obligation. According to Muslim law based on mandatory provisions of Quran, Hadith or the preaching of great Muslim Saints the sin committed by disobedience of God's orders may be forgiven if the Sinner Consciously goes for penance. On the other hand, according to the principles of the Muslim ethics, the debt from a fellow being or even from nature is a mutual transaction between the two and such debt if not discharged cannot be forgiven by any manner of Penance unless the creditor forgives the debt. This indicates that no any human being is free to pollute the environment and if he utilizes a tree he should implant another so that the debt of nature gets credited and a balance will be maintained in the nature.

4 Sheikh Noor-ud-Din as an Environmentalist

This Sheikh Noor-ud-din was a great environmentalist as he respects not only the Creator but all the creatures. Recognizing the importance of the flowering plants and the natural topographical features of land Sheikh said that those light houses who have bedecked themselves with roses, who have ingrained capacity to comprehend

their Sweet words. Have adorned the hilltops and mountain cliffs as their thrones, Can one evaluate the worth of those Jewels? It is the nature through which man develops communication with his creator and receives eternal inspiration from Him (Haq 2020).

Sheikh Noor-ud-din was critically examining the life of people and their way of dealing with the nature. In his poetry he had time and again warned the people not to misuse the natural resources for their Selfish needs. The Sheikh Clearly demonstrates in his teaching and expressing his concerns about the life style problems and the way people are performing their work while harming the nature.

While plucking the fruit (almond, walnut, apple, etc.) from the trees we recklessly damage the branches of the trees, thereby reduce their productivity, damaging nature and disturbing its balance why are you using wood (extra) in your houses by destroying trees, why have you decorated your house by the wastage of timber. He has consciously made the commitment with the nature and protection of natural surroundings as an inalienable part of Muslim moral Code.

Sheikh was a pure naturalist, he was so dedicated and involved with the delicacy of Jasmine flowers and its soft petals that he wishes to become shield to defend this delicacy against the natural process itself, he is equally angry with the Sunshine for the role it plays in destroying the dew drops resembling the pearls.

It is not only Sheikh Noor-ud-din Wali who was considered to be a great ecologist but his disciple and followers were also examples in themselves. The four great friends of Sheikh and the pillars of Reshi Movement were also living in the jungles among the wild animals. One of the Reshi, Baba Neek Shah was feeding the wild animals and it is said if sometime any animal showed some wild behaviour the Reshi were talking to them like the family members.

The need of hour is that our present day educationist should understand the need of high lighting the teachings of the Sufism regarding the ecology so that our people will understand the importance of the nature and its resources. It is also the need of hour that our politicians and policy makers may learn a lesson from the teaching of the great ecologist Noor-ud-din and the Reshi Movement.

Nature plays a great role in progress and prosperity of humans that is why today the world is so highly concerned about the environment and its conservation, though the world powers are all in a rat race to overpower others and to develop very sophisticated weapons which are a great threat to the environment. Today we are trying to minimize the degeneration of natural resources but at the same, the developmental works are going on a high speed and the population of the world is also increasing arithmetically. It is unwise to think that we can increase our comforts of life, develop weapons of mass destruction, provide modern facilities to every individual and at the same time safeguard the environment. The progress and development are inevitable but to conserve the nature and its resources are equally important. Man should be educated and informed about the teachings of great saints like Sheikh Noor-ud-din and other environmentalists about the importance and necessity of the nature and natural resources especially the exhaustible ones.

5 Sheikh Noor-ud-Din as a Conservationist

More Conservation of nature has become the primary concern of everyone in the modern world. It is the most important function of literature to redirect human consciousness to full consideration in a threatened natural world, and the theory of ecocriticism has gained a momentum and has a lot to do with it. The natural disasters in recent years have cautioned everyone that these actions against nature will yield the destruction of humanity at large. The ecocriticism theory emerged in recent times, the elements of it are found in the works of several earlier writers. Shaik ul-Alam's poetry and teachings are testimony to the fact about nature, environment, and earth written six hundred years ago.

The commitment of Sheik ul-Alam (R.A) is carefully controlling our ethics and disposition towards the earth. He was a preservationist, botanist, and spiritualist. In spring the slugs will play truant And won't go field-ward at sowing time. In autumn the corn will dance in the breeze. The stacks will be majestic, the shaves glorious (Shah 2010).

He was a cognizant admirer of ecosystem; he expressed these words six hundred years prior the present idea of natural parity was conceived and the U.N. plans transformed into frenzied endeavors for keeping up the natural equalization and maintaining the eco-framework. He gave an idea as to the qualities and advantages of woods like as cooling of temperature by the green ranger service and invigorates the air. Due to the timberlands, the common water cycle finishes. Backwoods help us to forestall soil disintegration and fast progression of downpour water down the inclines. Wastelands keep the air cool and in this manner, guaranteeing a standard quantity of water. His teachings explain that essential commodities of life are directly dependent upon plants which are part of forests. There is no verse in his poetry which is not contextualized with ethical, cultural, social, and topographical meaning. His verses carry the message of harmony with nature and man.

Sheik-ul-Alam was a multidimensional personality, his value base biological practices and moral considerations for nature have expected unique essentialness in the contemporary emergency of worldwide change. The valley of Kashmir is wealthy in regular legacy and a rich decent variety associated unequivocally with social legacy through worth based on conventional social texture.

Shaik ul-Alam has imperishably impressed his stamp on almost all the domains of knowledge and evolved a symbol of understanding. He is credited with several titles 'Alamdar-e-Kashmir', 'Sheikh-ul-Alam', and 'Nund Reshi'. He is highly revered by different religions and is regarded as the patron saint of Kashmir. His poetry contains the seeds of growth, development, peace and harmony. It also contains the holdings that man and universe are one. His poetry reveals the fact that earth is endowed with rich valuable varieties of life, governed by some supreme power. His famous and often quoted aphorism had become the slogan of nature, and the environment. *Ann pooshteliyeliwaunn posh*, translated into English as "food is subservient to forests" or "so long as the forest last, food too will last." Using the synecdoche of "tree" the sufi poet warns the man that till you will care for the environment, you are rejoicing

its benefits in different forms. Of his foresight, he was aware of the importance of natural resources and environment for the survival of humans some six hundred years ago. His verse carries the bearings of environment consisting of its biotic and abiotic factors, he had fully realized that man is highest biological creature who can control and judiciously utilize the nature for his righteous purposes (Shah 2009a).

Man was made out of the earth and his frame was cast in clay. It is all out of the earth, that all bounties grow It is earth, were man cooks his food. When life goes out, body transfers into the earth and earth gets mixed with earth for good.

Using the metaphors of landscape, bounties, clay, and other picturesque scenes of nature in his 'Shrukhs' speaks voluminously from green studies or ecocriticism perspectives. His poetry carries a highly valuable ecological friendly vision. Mahjoor (1887–1952), another romantic and revolutionary poet of Kashmir was also too much worried about this modern man, who has lost the basic conduct of humanity, as his most famous couplet goes.

In the form, I am human, in substance from humanity, Subject me not to trials, shame not my human form Sheikh ul-Alam's poetry is filled with metaphoric and figurative voices with the touch of the common man's language. He believed in the oneness of all and preached to all religions Hindus as well as Muslims. He wants to promote harmony with nature. He is one of those philosophers, Sufi poets, and preachers of friendly attitude towards all things, even to insects or to plants, and preached that not to kill or cut any of nature's component. Reading his poetry from the lens of ecocriticism comes to sum up that his poetry is that environment should be protected, nurtured, cared, and not destroyed or devastated. Shaikh ul-Alam never tolerated any form of destruction or injury concerning both man and the environment. He used his poetry as a tool preserving environment, wildlife, forests, or any biotic or abiotic component of nature. Here comes the following couplet handy:

The sustenance precedes the and death follows

The word is the environment movement of breathing in and out. (Shah 2009b)

The main motive of his teachings and poetry was to correct reform and spiritualize people and to show them the right direction in conservation of environment. Besides the concern of nature, his poetry depicts the cultural, moral, social, and religious preaching. And when one is reformed socially, culturally, or morally will never harm any living creature whether it is man or environment. It is only through his poetry that one comes to know about numerous kinds of plants and animals, and several other natural entities existing in the world and especially in Kashmir.

It is incumbent upon all the researchers, scientists, biologists, and environmentalists to carry out serious research on ecological and biological aspects of Sheikh-ul-Alam studies through his poetry to understand flora and fauna of Kashmir, one

comes to know about various plants such as vopal-hawk (wild vegetable leaf), sotsal (mallow), hand (chicory) (Amin 2008; Haq 2020).

The mystic poet in another quatrain says:

> Will diamonds be found in marshy land? Will birds chirp when caught in meshes? Will the narcissus bloom in the midst of a desert? Will pearls be available in glassware stalls? (Shah 2010)

Apart from the charismatic beauty of nature, the valley of Kashmir has been endowed with sufis, *darveshs*, poets, reformists, and renowned personalities in art, literature, and religion. Sheikh ul-Alam, the most cherished and adored of the sufi-saints who have ever lived in Kashmir, was one of the most prominent sufi poets that Kashmir produced towards the end of the fourteenth century. Rishi (R.A) brings to light the importance of building a botanical garden of flora described in Sheikh ul-poetry. Alam's Local residents and stakeholders must actively participate in motivating others by honoring their traditional knowledge and ecological principles, as well as elevating the environment. As a result, before the ecological crises, we needed to understand Sheikh-ul-Alam. Mysticism gives a strong ideological foundation for ecological practice. It is past time for an integrated effort to be put in place as soon as possible to promote Sheikh ul-(R.A) Alam's environmental teachings. The simple people regard his poems as sacrosanct. His Shruks are revered by the people of the valley. His Shruks and other lengthier poems are repeated from the pulpit in religious sermons, and everyone, regardless of faith or creed, enjoys and adores them (Shah 2010). Many of his lyrics are referenced in everyday speech by ordinary people, earning them the status of proverbs, wise sayings, and parables. Great personalities are mirrors, and everyone is compelled to see his own reflection in one.

6 Conclusion

The last stage of Sheikh's life was very important and vital, as during this phase he spread the message of Sufism and Rishyat to the pros and cones of Kashmir valley. This phase of his life has seen a large number of challenges and difficulties as he started a new sect of thought and tried to spread it among the masses, as this school of thought was based on truth and reality and as opposed to the misguidance of superficial monks of that time. It was opposed by Mullahs and Gurus of that time but despite all opposition and difficulties, Sheikh has been successful in spreading the message of peace and harmony in the Kashmir. He himself visited every part of Kashmir and benefited people by guiding them to the right path. Sheikh propagated such teachings which not only helps to conserve environment but the balance of nature as well. It is not only Sheikh Noor-ud-din Wali who was considered to be a great ecologist but his disciple and followers were also examples in themselves, they all were ready to sacrifice their personal tastes for the wellbeing of Environment. As educationists and as scholars of environmental education it is our duty to safeguard our environment and everybody should understand the need of high lighting

the teachings of the Sufism regarding the ecology so that our people will understand the importance of the nature and its resources. If one is concerned about his environment and is fond of locating in poetry than one should look forward to Sheikh ul-Alam's poetry. The so-called modern man has to take lessons from the poetry of Shaik-ul-Alam. For accomplish the objective of woods protection for maintainable improvement in the valley of Kashmir. The job of local people groups is of basic significance for centering basically on the crumbling environment of woodlands we have expected to dispatch a battle to play a key job in the reclamation of the portrayal of Sheik-ul-Alam as an eco-researcher in the valley of Kashmir. Moreover, to this, the plant experiences of Sheik ul-Alam bringing to spotlight to setting up a greenhouse of the plants referenced in the verse of Sheik-ul-Alam. The neighborhood individuals and partners should be included effectively in the inspiration of others by regarding their customary information and environmental morals and inspire the economy of the valley of Kashmir. Therefore we have required to decipher Sheik-ul-Alam's message before the environmental emergencies happened. Supernatural quality gives the legitimate ideological system for rehearsing a sound environment. His poetry carries the message that if a man would not stop the unfriendly relation with nature; he has to pay the havoc.

References

Amin M (2008) Gleanings from Shaikhu'l-Alam: a selection of ninety-nine shruks. University of Kashmir, Kashmir

Assad S (2017) The message of social reformation in the poetry of sheikh-ul-aalam ra. Int Res J Commer Arts Sci 8(9):19–23

Haq AUL (2020) Nature and environment in Shaikh-ul-Alam's poetry: an eco-critical reading. Literary Miscellany 9(1–2). ISSN: 2230-7451

Shah M (2009a) Plants in the poetry of Shaikh-ul-Alam. Alamdar 2:49–65

Shah M (2009b) Shaikh-ul-Alam: the alamdar of ecology and biodiversity. Alamdar 2:37–50

Shah M (2010) Applying Shaikh-ul Alam to contemporary ecological scenario of Kashmir: some proposal. Alamdar 3:51–66

Development Priorities of Housing Sustainability in Saudi Arabia: An Overview

Omar S. Asfour

Abstract Housing is not merely the construction of housing units, but also the creation of an adequately planned living environment. In this environment, green building, economic viability, and social well-being come together under the umbrella of sustainable housing. This study aims to offer an overview of housing sustainability considering these three main pillars in the Saudi housing sector. This study conducted a literature review and identified 30 aspects that are used to address the environmental, economic, and social sustainability of housing. To prioritize these aspects, the study approached a group of experts in the field with a structured online questionnaire. The study concluded some aspects that are needed in Saudi Arabia to enhance housing sustainability according to these three main domains, including resource efficiency, housing affordability, and respect for local cultural values and identity. The study also concluded that, although several major achievements could be seen in the environmental and economic aspects of sustainable housing, many development opportunities remain in the social sustainability domain.

Keywords Housing · Economic sustainability · Environmental sustainability · Social sustainability

1 Introduction

Access to adequate housing for all is a basic human right that is stated in the UN's International Covenant on Economic, Social and Cultural Rights (CESCR) (2021). This includes several aspects such as room size, sanitation, daylight, ventilation, general state of repair, thermal comfort, etc. To meet this challenge, there is a need to establish and maintain housing development strategy that ensures an adequate and

O. S. Asfour (✉)
Architecture Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia
e-mail: omar.asfour@kfupm.edu.sa

Interdisciplinary Research Center for Construction and Building Materials, King Fahd University of Petroleum and Minerals, P.O. Box 2483, Dhahran 31261, Saudi Arabia

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_14

responsive housing sector. Housing sector in Saudi Arabia has went through different stages of development. From 2016 onwards, the main driver of this growth has been the Housing Program, which is one of the Vision 2030 programs adopted by the Saudi government. This program aims to provide housing solutions and opportunities that improve housing ownership, provide housing financial support to the eligible families, improve residents' satisfaction with the offered housing services, improves the contribution of this sector to the Gross Domestic Product (GDP) of Saudi Arabia. To implement this program, the Ministry of Municipal, Rural Affairs and Housing offers several housing services and initiatives. This includes Sakani (to offer housing financial support), Ejar (to regulate real estate rental sector), Idle Lands (to improve urban land supply), and Cooperative Housing (to organize and support the local housing cooperative societies) (Ministry of Municipal 2022).

However, many challenges face the implementation of these programs including the rapid increase in population and housing demand. This increases the demand for natural resources and requires additional housing units to bridge the gap between housing supply and demand. This requires long-term strategic planning, which should be done within the framework of sustainability to ensure effective and continuous development. Saudi Arabia depends on fossil fuels, namely oil, to secure energy supplies and achieve revenue. However, there is growing concern over the sustainability of the current rate of oil consumption. One major challenge in this regard is the promotion of sustainability practices to save our cities and improve our well-being and quality of life. This includes sustainable housing, which is based on the three domains of sustainability similar to any sustainable development process. Sustainable housing may be defined as "housing that creates sustainable communities in a resource-efficient manner" (Edwards and Hyett 2002). This definition comprises multiple aspects that are essential to achieve sustainable housing. The first focuses on resource efficiency, such as energy, water, urban land, and building materials. These are major issues of environmental sustainability. The second aspect addresses social and economic sustainability by creating and maintaining resilient, sustainable communities that can grow and prosper.

This notion is consistent with the Sustainable Development Goals (SDGs) stated in the UN Agenda 2030. This is a universal call to action to improve people's well-being and protect the planet and its natural resources. This has been detailed a 15-year plan that includes 17 SDGs starting from 2015. Among these SDGs, Goal 11 aims to promote sustainable cities and communities and includes several objectives, such as access to adequate and affordable housing for all, the upgrading of slums, enhancement of sustainable urbanisation, supporting the participatory planning and management of human settlements, cultural and natural heritage protection, reducing the negative environmental impact of cities, green and public spaces provisions, and the construction of sustainable and resilient buildings using green materials (United Nations 2021). The variety of these targets clearly indicates that energy-conscious housing alone is of limited value in the comprehensive context of sustainability. In addition to environmental and economic sustainability, sustainable housing should satisfy people's social needs for dignity, privacy, and well-being. Thus, this study

aims to summarize and prioritize the different aspects of sustainable housing, considering these three dimensions of sustainability, in the Saudi housing sector. Some recommendations to improve this sector further through the promotion of different sustainability practices will be presented as well.

2 Materials and Methods

The concept of sustainable housing is part of the comprehensive concept of sustainable development. This is based on three sustainability pillars: environmental, economic, and social sustainability. To analyse these three pillars in the context of housing development, the study relied on a descriptive, analytical approach using two methods:

- A desk study to summarise the most important aspects of sustainable housing using published secondary data. To do so, some studies that addressed sustainable housing as a comprehensive sustainability issue were reviewed (Narvydas 2014; Hamizah et al. 2012; Ibem and Azuh 2011; Abu Bakar and Cheen 2011). Thirty aspects that are used to address environmental, economic, and social sustainability were identified (Tables 1, 2 and 3).
- A structured questionnaire to survey the opinions of 9 sustainability experts at King Fahd University of Petroleum and Minerals (KFUPM) and outline the most important aspects of sustainable housing development in Saudi Arabia.

The respondents were asked to rate each aspect on a five-point scale, where 1 reflects the least priority and 5 reflects the highest one. The questionnaire included an introductory section to gather the respondents' details. This was followed by three parts concerning the importance of several environmental, economic, and social sustainability aspects of housing development in Saudi Arabia (as shown in Tables 1, 2, and 3). The questionnaire concluded with four questions in which we asked the respondents to mention strengths, weaknesses, opportunities, and threats that affect sustainable housing development in Saudi Arabia. The collected data were analysed with the Statistical Package for the Social Sciences (SPSS) and Excel. The study used one-sample T-test to compare the weighted means of the environmental, economic, and social domains with the midpoint of the priority scale, i.e. 3.0, at a significance level of 0.05. The study also used the Relative Importance Index (RII) to determine the rank of each sustainable housing aspect using Eq. 1:

$$\mathrm{RII} = \Sigma \mathrm{w}(\mathrm{A} * \mathrm{N}) \tag{1}$$

where w is the weighted total score of each housing aspect, A is the highest weight on the scale, and N is the total number of respondents.

Table 1 Sustainable housing aspects considering the environmental domain of sustainability

No.	Housing environmental sustainability aspect	Weighted mean (out of 5)	RII	Rank
1	Passive energy solutions (e.g. natural ventilation and daylighting)	3.89	0.78	2
2	Renewable energy integration (e.g. photovoltaics)	4.11	0.82	1
3	Water efficiency and storm water management	3.11	0.62	8
4	Materials efficiency and use of green building materials	3.78	0.76	3
5	Land conservation (density)	3.33	0.67	6
6	Open and green spaces	3.56	0.71	4
7	Protection of biodiversity	3.44	0.69	5
8	Pollution control	3.89	0.78	2
9	Waste management (reduce, reuse, recycle, and recover)	3.56	0.71	4
10	Site proximity to reduce reliance on cars	3.22	0.64	7

Table 2 Sustainable housing aspects considering the economic domain of sustainability

No.	Housing economic sustainability aspect	Weighted mean (out of 5)	RII	Rank
1	Legislative framework to manage housing market	3.22	0.64	6
2	Offering proper housing finance solutions	3.33	0.67	5
3	Housing availability in the market	3.78	0.76	3
4	Affordability of available housing units (including initial and running cost)	3.78	0.76	3
5	Reasonable cost of living within the neighbourhood	3.78	0.76	3
6	Labour employment in housing development	3.11	0.62	7
7	Local sourcing of building materials	3.33	0.67	5
8	Security of tenure (e.g. ownership)	3.89	0.78	2
9	Flexibility and design for future needs	3.56	0.71	4
10	Durability to reduce maintenance cost	4.00	0.80	1

3 Results and Discussion

This section shows the questionnaire results related to the priority ranking of the investigated housing sustainability aspects considering the three domains of sustainability. In general, the weighted means of the environmental, economic, and social

Table 3 Sustainable housing aspects considering the social domain of sustainability

No.	Housing social sustainability aspect	Weighted mean (out of 5)	RII	Rank
1	Privacy and respect for local cultural values and identity	4.44	0.89	1
2	Social network and solidarity	3.78	0.76	4
3	Enhancement of community feeling	3.89	0.78	3
4	Community participation in housing design	3.44	0.69	5
5	Social integration through mixed tenure housing types	3.33	0.67	6
6	Community health and wellbeing	3.78	0.76	4
7	Indoor space quality and occupants' comfort	3.22	0.64	7
8	Security and safety	4.33	0.87	2
9	Walkability	3.89	0.78	3
10	Availability and accessibility of service facilities	3.89	0.78	3

domains were 3.59, 3.58, and 3.8, respectively, out of 5. Using one sample T-test, we found that these three values are significantly higher than the midpoint of the priority scale, i.e. 3.0, at a significance level of 0.05. This shows that the respondents consider all these domains highly important components of sustainable housing development. However, more importance was given to the social domain. The following sections discuss the questionnaire findings regarding each domain of sustainable housing.

3.1 Environmental Sustainability

Table 1 shows the questionnaire results related to environmental sustainability aspects. As deemed by the respondents, one of the most important issues in environmental housing sustainability is resource efficiency. This includes energy (RII = 0.78 for passive solutions, and 0.82 for renewable energy), where reducing domestic energy demand should be a primary target of housing development. This has economic and environmental benefits through reducing the negative environmental impact of the consumption of fossil fuels and emission of greenhouse gases. Although Saudi Arabia is one of the world's most oil-rich countries, there is growing concern over the sustainability of the current rate of oil consumption to produce non-renewable energies (Taleb and Sharples 2011). This is reflected in the recent Saudi Vision 2030, which aims to diversify the country's income sources and ration oil consumption (Vision 2030 webpage 2021). The role of the housing sector in this

regard is significant. Buildings in Saudi Arabia consume about 75% of the produced electrical energy, with an annual increase of 5% (SEEC 2021). Over 50% of this amount is used in residential buildings (Felimban et al. 2019). This increases the need for green construction strategies for sustainable housing.

Building materials are another resource that should be preserved (RII = 0.76). This also includes land conservation through improving urban density (RII = 0.67). This is not related to the limited availability of land, which is not a concern in Saudi Arabia, but rather the high cost of urban land development, including streets and other infrastructure components in addition to house construction. Although it received the lowest importance rating, freshwater is also an important resource that should be saved (RII = 62). Saudi Arabia relies on water desalination stations to meet its freshwater need. However, these stations are heavy energy consumers. A two-fold strategy is required here:

- To encourage water-efficient strategies and practices in the built environment, including housing. Some common strategies include (Al-Qawasmi et al. 2019): Storm-water management, greywater recycling and reuse, water metering to control consumption, the use of efficient fixtures and fittings, and the use of efficient irrigation systems.
- To use renewable energy to produce a significant share of the energy needed to run these stations. For example, the Al Khafji desalination plant uses electricity produced by a solar power plant that provides 10 MW of electricity per day. This program will be expanded in other planned strategic projects, such as NEOM City (Vision 2030 webpage 2021).

3.2 Economic Sustainability

Table 2 shows the questionnaire results related to economic sustainability aspects. The highest importance was given to durability to reduce maintenance costs (RI = 0.80) and the security of housing tenure (RI = 0.78). A sustainable housing tenure cycle is recommended to address this (Fig. 1), including housing units for singles, newly married couples, small families with one child, mature average families, and the elderly. This will improve people's ability to have a decent housing unit at different stages of their lives. One main aspect of economic housing sustainability that attracted respondents' attention is affordability (RII = 76). Housing affordability means that potential purchasers can purchase housing. A lack of affordability is a major element of the persistent global housing problem that affects almost all countries. This is due to the rising standard of living compared to the past and modern housing having become an expensive commodity.

Thus, in the context of housing sustainability in Saudi Arabia, different economic housing solutions that suit the needs of all income categories are needed. Three indicators should be considered (Asfour 2017):

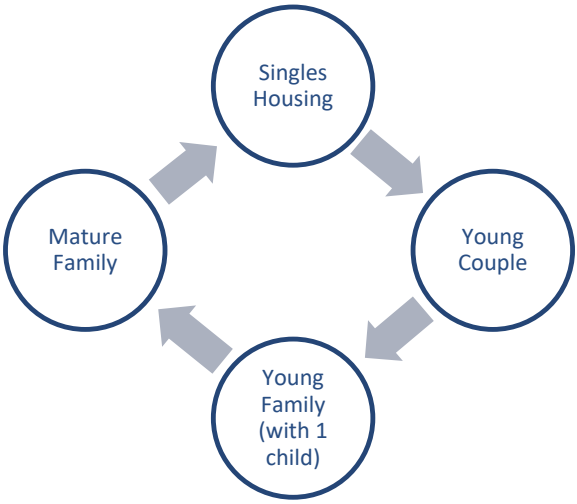


Fig. 1 Family life cycle consideration in housing development including housing unit size and tenure type (owned/rented)

- Housing need: Measured using the current and projected population estimations.
- Housing demand: Measured using the actual number of units that were demanded in the market.
- Housing supply: Measured using the actual number of units offered in the market with different tenure options.

A lack of strategic planning considering these three indicators can produce unexpected results. For example, a lack of housing affordability means that housing need will not be converted into housing demand. This leads to a situation in which people need houses but cannot access them, despite their availability in the market, and leads to housing market recession on one hand and many social problems, such as housing overcrowding, on the other hand. Based on the questionnaire findings, the following actions are also recommended to improve housing affordability in Saudi Arabia:

- To introduce detailed building specifications for economic housing, including area, building materials, finishing, and potential locations.
- To develop and expand the currently available housing finance solutions, such as Sakani and Ejar, to increase their coverage and make them more comprehensive.
- To promote compact housing typologies for families to reduce the initial and ongoing cost dramatically. Attached or semi-attached units are commonly accepted alternatives to single detached units in this regard. In addition, maintaining high density can effectively reduce land costs and support public transportation.

3.3 Social Sustainability

While environmental and economic housing sustainability has attracted considerable attention in practice, less attention has been paid to social sustainability (Eizenberg and Jabareen 2017). This includes non-physical aspects such as social cohesion, a sense of belonging, diversity, respect for local culture and values, safety and security, and the collaborative management of the housing development process. This also includes certain physical aspects such as access to decent housing and community-based services, the provision of green spaces and public transportation, and the satisfaction of sustainable urban design requirements such as walkability (Paidakaki and Lang 2021; Hatipoğlu 2017). Despite the active housing development process in Saudi Arabia, there is a need to develop clearly defined social quality criteria to offer more socially-orientated housing projects. Without this socially-oriented housing development process, the benefits of environmental and economic sustainability will be limited.

Sustainable housing development is about creating sustainable communities, which makes social sustainability a fundamental requirement. This is consistent with the questionnaire's findings presented in Table 3, where respect for local cultural values and identity received the highest ranking (RII = 0.89). This includes many issues, such as privacy, in addition to the innovative reflection of the local architectural identity through housing design. Security and safety (RII = 0.87) were ranked second, and then the enhancement of community feeling, walkability, and availability and accessibility of service facilities (RII = 0.78) in the third rank. Based on the questionnaire findings, the following actions are recommended to improve the social sustainability of housing in Saudi Arabia:

- To enhance community health and well-being and maintain social networking.
- To improve the quality of the urban environment by providing open spaces, green areas, and recreation opportunities.
- To offer more diversity in housing units' design to satisfy peoples' different needs and avoid monotony in new housing projects.

3.4 SWOT Analysis

Based on the above discussion, Table 4 presents a summary of the Strengths, Weaknesses, Opportunities, and Threats (SWOT) that could be considered to enhance housing sustainability in Saudi Arabia.

Table 4 SWOT analysis of sustainability status in the Saudi housing sector

Strengths	**Weaknesses**
• A dedicated housing and quality of life programs in Vision 2030, in addition to the Sustainable Saudi Vision • A governmental will to establish new cities and develop sustainable housing sector including energy efficiency issues • Availability of funding • Availability of resources including urban land • Availability of housing finance solutions to improve housing ownership	• Lack of sufficient public awareness about housing sustainability • More comprehensive legislative frameworks and sustainability regulations are required • Limitation of the local market of green construction products and technologies • The harsh climatic conditions in many provinces • The high consumption rate of domestic energy
Opportunities	**Threats**
• The high potential of solar energy • UN Sustainable Development Goals as a comprehensive development framework of sustainable housing • International and regional supportive environment of sustainability practices • Availability of potential international investors in sustainable housing sector	• Covid-19 and its impact on economy and supply chains, which may affect strategic development plans of sustainable housing • Uncertainty about oil prices, which may affect funding availability • Lack of sufficient investment in sustainable housing

4 Conclusion

This study aimed to offer an overview on the challenges and opportunities that face housing sustainability considering its three main pillars with reference to the Saudi housing sector. This comprehensive perspective of housing sustainability aspects is essential to introduce a detailed and realistic sustainable housing development framework. A literature review of related previous studies was conducted and 30 aspects that were used to address the environmental, economic, and social sustainability of housing were identified. To prioritize these aspects, a group of experts in the field were asked to complete a structured online questionnaire. In the environmental sustainability domain, the highest three ranks were given to the following housing sustainability aspects: renewable energy integration, passive energy solutions, and building materials efficiency including the use of green materials. In the economic sustainability domain, the highest three ranks were given to the following housing sustainability aspects: durability to reduce maintenance cost, security of tenure, housing availability in the market, affordability of available housing units (including initial and running cost), and reasonable cost of living within the neighbourhood. Finally, the highest three ranks in the social sustainability domain were given to the following housing sustainability aspects: privacy and respect for local cultural values and identity, security and safety, walkability, and availability and accessibility of service facilities. Despite several major achievements in the environmental and economic aspects of sustainable housing in Saudi Arabia, many development opportunities remain in the social sustainability domain. Further study is

required to establish a comprehensive rating system of housing sustainability that encompasses the local conditions of Saudi Arabia. This system may also be expanded to assess the entire housing development process, including the quality of the spatial and managerial processes.

Acknowledgements The author would like to thank King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia, for funding this study.

References

Abu Bakar AH, Cheen KS, Abu Hassan R (2011) Sustainable housing practices in Malaysia housing development: towards establishing sustainability index. Int J Technol 2(1):84–93

Al-Qawasmi J, Asif M, El Fattah AA, Babsail MO (2019) Water efficiency and management in sustainable building rating systems: examining variation in criteria usage. Sustainability 11(8):2416

Asfour OS (2017) The role of land planning policies in supporting housing affordability: the case of the Gaza Strip. Land Use Policy 62:40–48

Edwards B, Hyett P (2002) Rough guide to sustainability. RIBA, London

Eizenberg E, Jabareen Y (2017) Social sustainability: a new conceptual framework. Sustainability 9(1):68

Felimban A, Prieto A, Knaack U, Klein T, Qaffas Y (2019) Assessment of current energy consumption in residential buildings in Jeddah, Saudi Arabia. Buildings 9(7):163

Hamizah Y, Fatimah Y, Hazlina H (2012) Land use regulations towards a sustainable urban housing: Klang Valley conurbation. Soc Behav Sci 68:578–589

Hatipoğlu HK (2017) Understanding social sustainability in housing form the case study "Wohnen Mit Uns" in Vienna and adaptability to Turkey. Int J Architect Plann 5(1):87–109

Ibem EO, Azuh DE (2011) Framework for evaluating the sustainability of public housing programmes in developing countries. J Sustain Develop Environ Prot 1(3):24–39

Ministry of Municipal, Rural Affairs and Housing website. https://momrah.gov.sa/ar. Last accessed 2022/04/18

Narvydas A (2014) Trends of sustainable residential architecture. Archit Urban Plann 9:33–42

Paidakaki A, Lang R (2021) Uncovering social sustainability in housing systems through the lens of institutional capital: a study of two housing alliances in Vienna, Austria. Sustainability 13(17):9726

SEEC, Saudi Energy Efficiency Center, Building Sector, https://www.seec.gov.sa/en/energy-sectors/buildings-sector, last accessed 2021/12/26.

Taleb HM, Sharples S (2011) Developing sustainable residential buildings in Saudi Arabia: a case study. Appl Energy 88:383–391

United Nations Human Rights, International Covenant on Economic, Social and Cultural Rights. https://www.ohchr.org/en/professionalinterest/pages/cescr.aspx. Last accessed 2021/12/15

United Nations, Department of Economic and Social Affairs, Sustainable Development. https://sdgs.un.org/goals. Last accessed 2021/9/10

Vision 2030 webpage. https://vision2030.gov.sa/en. Last accessed 2021/10/4

Vision 2030 webpage. https://www.vision2030.gov.sa/v2030/v2030-projects/water-desalination-project-using-solar-power. Last accessed 2021/12/15

Investigating the Effect of Urban Form on Heat Island Phenomena: Case Study of Jeddah, KSA

Amani Ahmad Aburuzaiza, Mady Mohamed, and Tarek Saad Ragab

Abstract This study is to debate urban forms embraces urban heat island adaptation and mitigation actions. It also aims to investigate the effect of urban design impacts, to develop strategies for reducing urban heat island influences with a good preparation for climate change adaptation, and to contribute in improving quality of urban life. In order to achieve the objectives of this study, the scientific methodology was used due to its suitability to the nature of the research, which depends mainly on three stages; record facts from the field build a preliminary theory from the literature review, and experimental situations. Several approaches have been used: data collection, literature review, preparation through data bases, probability analysis using SPSS program, and Space Syntax analysis. The study investigates two districts in Jeddah which are Al-Balad and Al-Basateen. The results show differences in temperature between the two districts at the same time schedule. The factors impacting this urban heat island's result were attributed to different urban fabric between the two districts. The study recommends decreasing urban heat island by using robust structures, increasing the use of plants in design, and implementing an effective urban design. Design Strategy Properties of urban materials, particularly, solar, reflectance, thermal emissivity and heat capacity, also influence the development of urban heat island as they determine how the suns energy is reflected, emitted, and absorbed. The contribution of this study is the formulation of asset of strategies and principles that can help directing designers to transform these defunct downtowns into sustainable urban cores for people to live, work, play and visit.

Keywords Urban design · Urban features · Urban fabric · Built up · Urban heat island · Thermal comfort · Urban design guide lines · Jeddah · KSA

A. A. Aburuzaiza · M. Mohamed (✉) · T. S. Ragab
Master of Science in Urban Design, College of Architecture and Design, Effat University, Qasr Khuzam St., Kilo. 2, Old Mecca Road, P.O. Box 34689, Jeddah 21478, Saudi Arabia
e-mail: momohamed@effatuniversity.edu.sa

A. A. Aburuzaiza
e-mail: aaburazeza@effatuniversity.edu.sa

T. S. Ragab
e-mail: tragab@effatuniversity.edu.sa

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_15

1 Introduction

Climate change is the definitive development challenge of our time. In Arab countries and across the world, it already damages people's livelihoods and well-being. Climate change can be a threat to financial condition reduction and process and will unravel many of the event gains created in recent decades. Every presently and over the long-term, climate variability and alter threaten development can be done by limiting the fulfillment of human potential, disempowering both individuals and communities and limiting their ability to protect and enrich their livelihoods (World Bank 2010; Fatani et al. 2019; Mohamed 2021).

It is also a change in the statistical distribution of weather patterns when this change lasts for an extended period of time. Climate change may refer to a change in average weather conditions, or in the time variation of weather within the context of longer-term average conditions. Climate change is caused by various factors such as biotic processes, variations in solar radiation received by Earth, plate tectonics, and volcanic eruptions. Certain human activities have been identified as primary causes of ongoing climate change, often referred to as global warming.

Scientists actively work to understand past and future climate by using observations and theoretical models. A climate record extending deep into the Earth's past has been assembled, and continues to be built up, based on geological evidence from borehole temperature profiles, cores removed from deep accumulations of ice, floral and faunal records, glacial and per glacial processes, stable-isotope, gather analyses of sediment layers, and records of past sea levels. More recent data are provided by the instrumental record. General circulation models, based on the physical sciences, are often used in theoretical approaches to match past climate data, make future projections, and link causes with effects in climate change.

The notion of urban resilience as a nonstop method of adjustment and response to disturbances focuses on building the capability for adaptation and alter and might be understood as a dynamic action. Albers and Deppisch (2013), Pendall et al. (2010), and Noriss et al. (2008) analyzed the assorted definitions of resilience to verify two necessary characteristics: dynamics and flexibility. The dynamics of resilience concern the cities and regions that still modify throughout the course of history (Pickett et al. 2004). The ability refers to the method of assorted sectors connecting to carve out a replacement flight to adapt or maintain their performance within the face of a disturbance (Noriss et al. 2008).

Though there are potential suggests that to limit climate change, nevertheless constant are robust to execute due to its complicated causative nexus. One of the most visible impacts of climate amendment may be seen in alteration of various eco-system services such as failure in accommodating climate calming may turn out urban heat island effect (Zhou et al. 2013); another impact of climate change argued to be higher uncertainty in rain pattern (Almazroui et al. 2012). Whereas the Climate amendment is triggering alterations in ecosystems two major methods

have been emerged as solution: Adaption and Mitigation; each is persuasive problem of concern the later should be synchronized worldwide, the earlier demands native actions (Sharp 2011).

The KSA government engages in various mitigation and adaptation measures to cope with adverse impacts of climate change as well as with response measures especially by the Annex 1 parties of the UNFCCC, which are expected to have diverse both economic and social impacts on the country. However, a great deal remains to be done to contribute in the mitigation programs in order to face this global and national challenge.

Thus, the need to debate urban climate resilience lies within the threat against the continued prosperity of cities. Thriving cities are closely related to human society's development, progress, and growth, and urban heat island is taken into account a disturbance that endangers our continued advancement. Although cities typically possess associate inherent capability to survive, they are not proof against the large gravity of external changes, associate inertia that interferes with the method of general shifts, despite some basic cognitive process that cities already possess a good degree of resilience (Satterthwaite and Dodman 2013). As urban areas develop, changes occur in the landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist generally become impermeable and dry. This development leads to the formation of urban heat islands, the phenomenon whereby urban regions experience warmer temperatures than their rural surroundings. Therefore, this study aims to investigate the effect of urban design impacts, develop strategies for reducing urban heat island influences with a good preparation for climate change adaptation and contribute to improve quality of urban life in Jeddah's neighborhoods.

2 Research Methodology

This study based on the scientific methodology and qualitative method. Which depends mainly on three stages; record facts from the field, build a preliminary theory from the literature review, and experimental situations. Several approaches have been used such as data collection, literature review and preparation through data bases, probability analysis using SPSS program, and Space Syntax analysis.

The study chose two thermal areas in Jeddah one from the old districts in the downtown and the other one is from the new urban planning and compared between them, in order to realize the factors and influences that resulted in the increase or decrease urban heat island by using satellite images from Saudi Geological survey in Jeddah, for the distribution of urban heat island in Jeddah city.

Qualitative method was implemented in this study. The utilized qualitative approach in this project was the literature review in addition to the conducted case study, which is utilized in order to create a theoretical background for the research topic.

This study gets also on the factors of urban fabric, to know which one is in relationship to factors affecting in urban heat island. Finally, this study will suggest appropriate solutions to force people to take the requirements that help in relieving urban heat island.

3 Case Studies

This study considered two sites for case studies, the case studies locations are at Al-Balad (Fig. 1) and Al-Basateen (Fig. 2). Reasons for choosing the site are the climate information is available; it is often easy communicated as the formats are helpful and potential parameter ranges clearer. Second reason is the sites have rapid population growth in Jeddah, which led to speedy urbanization. Besides that, the regional conditions in this city are arid and energy consumption and CO_2 emissions' level are high, causing Climate Change. Lastly, the urban resiliency in Jeddah is fairly poor to future climate change.

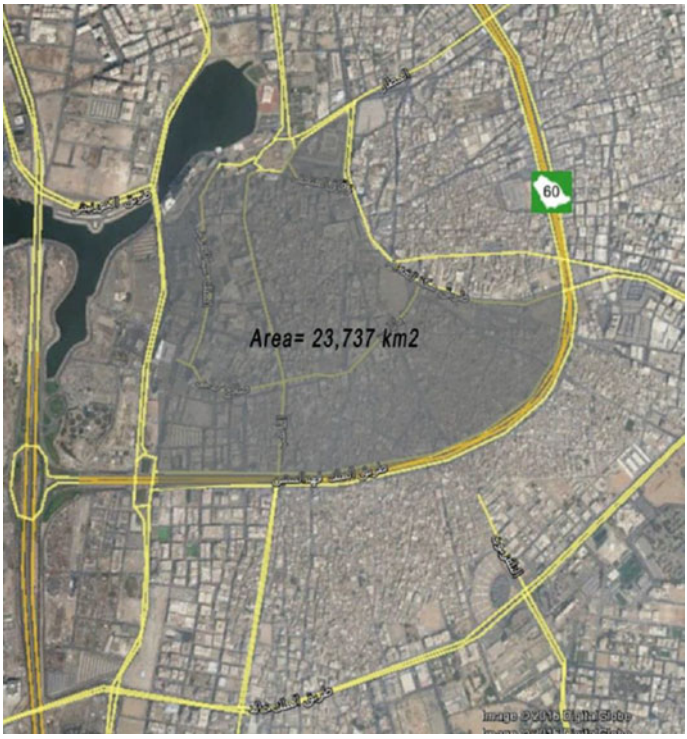


Fig. 1 Area of Al Balad (old Jeddah)

Fig. 2 Area of Al Basateen

3.1 Zone One: Al-Balad

Jeddah has a wet climate and solar heat in the old town; all buildings are resolved in a sustainable manner to reduce heat and humidity. They also have a system to save cold air in the winter and reduce it in the summer, showing sustainable architectural features on the building. Good weather comes from the northwest, and bad weather comes from the southeast.

In Al-Balad, negative solar heating is applied better on the buildings they use for cooling in their buildings, to reduce heat but in the direction of cretin of the building which solves this problem, in the east and west side, especially because of the direction of the sun. They use thick walls, small windows and ventilation system to reduce solar heat. The urban design of Al-Balad is characterized by narrow streets and high buildings. Each building overlooks the other which creates a shadow.

Most residential buildings have thick walls of coral stone taken from the beach to reduce heat. The windows and openings made of Rawashin (Roshan are made of many kinds of wood, it's not ordinary wood it's carved) the main element you use to cover the openings (Masoud 2012; Mohamed 2010, 2018).

Kinds of wood which make Roshan Saudi Arabia has fascinating architectural heritage which can be found in its coastal cities and towns along the shores of the Red Sea. In Jeddah, the gateway to the holy cities of Makkah and Madina the main cities of Hejaz, traditional, buildings walls were built with red sea coral Mangbi stone with lime rendering and plaster and their facades are adorned with beautifully carved wooden bay window Rowshan. However; neglected and abandoned for long periods in the past, those buildings became subject to decay and collapse.

Recently, interest in preserving Hejazi traditional buildings have soared due to increased awareness of Saudi authorities and general public who are initiating renovation and revitalization programs for old Jeddah's heritage building as a unique example of red sea basin traditional architecture.

Al-Balad area is characterized by the structure of the traditional buildings, a large-scale restoration program, managed by the Historical Area Preservation Department, was established in 1990 and aims to protect the city's architecture and heritage. And the country is divided into four main neighborhoods are (Masoud 2012):

I. Harat Alsham (The Sham Neighborhood), facing north.
II. Harat Al-Yaman (The Yemeni Neighborhood), facing south.
III. Harat Mazloum (The Aggrieved Neighborhood), facing east.
IV. Harat Al-Bahr (The Sea Neighborhood).

The old settlement of Jeddah is called as 'Al-Balad'. The orientation of the buildings is random, wherever possible to allow the movement of air around the building freely. The complex street pattern may also appear to have significant planned control over the climate. Overall the streets are narrow and surrounded by some high-rise buildings providing good shade in the daytime, which is good for a warm wet climate. Streets also vary from 2 to 4 m (secondary), or 4–10 m (primary), or 12–20 m (main) houses stretching 15–18 m, the influence of the street is mostly like a ditch that the maximum shade is achieved.

3.2 Zone Two: Al Basateen

Al Basateen are located between Prince Sultan and King Roads on the Northern side of Jeddah, and is set in 38,660 km^2 of exquisitely landscaped gardens and elegant. AL Basateen is one of the most unique residential complexes in Jeddah. It is specially designed to accommodate all residential needs. Al Basateen commenced on 2000.

I. Broad streets, usually take the north–south direction at angles located on the road of the sun, making it in the shade most of the day. The narrow side streets contain many bends and changes, which are designed to achieve maximum shade. The intersection points are the only spaces that are open enough to receive sunlight for a longer period of time. Open spaces at intersections, as well as providing a focal point and community space (Kamal 2014).

II. Al-Basateen Neighborhood 1: The most beautiful neighborhoods of Jeddah "Al Basateen", The Emir of the region of Mecca, contains Prince Khalid Al Faisal Palace, where Al Basateen district is characterized by the existence of many special entrances.
III. Al-Basateen Neighborhood 2: Reality north of the square of the verse west Kubri Royal Hall. More than 80% of it is vacant.
IV. Al-Basateen Neighborhood 3: The orchard district has special entrances and a unique layout design, with area 21, 5 km^2.

4 Result and Analysis

This section presents and compares the result of micro-climate of Al-Balad and Al-Basateen. Next, the characteristic of the urban planning of Al-Balad and Al-Basateen were determined. Also, the factors impacting on UHI in Al-Balad and Al-Basateen were identified.

4.1 Micro-climate of Al-Balad

Figure 3 shows the Al-Balad image was taken from the satellites in Geological survey in Jeddah, on 14-Jun-2016 at 01:00 pm. to analyze temperature for Al-Balad and relate it to urban planning factors. The average temperature of Al-Balad in 14-Jun-2016 at 01:00 pm is 38.95 °C. The maximum temperature is 42 °C and the minimum is 37 °C in al-Balad.

4.2 Micro-climate of Al-Basateen

Figure 4 shows the Al-Basateen image was taken from the satellites in Geological survey in Jeddah, on 14-Jun-2016 at 01:00 pm, to be analyzed temperature for Al-Basateen and relate it to urban planning factors. Al-Basateen area was divided into three areas, and shows the distribution of temperature in each area, and the shape of the UHI in the Al-Basateen 1, 2 and 3. Note that the Al-Basateen area 3 has differences in temperature, and it is the largest areas in terms of area.

Al-Basateen 3 was chosen for its suitability for the area of Al-Balad where the area of whole Al-Basateen is double the area of Al-Balad, therefore Al-Basateen 3 was chosen because it is similar to the area of Al-Balad. On the other hand, Al-Basateen 1 contains a large palace to Prince Khaled AlFaisal, and Al-Basateen 2 has more than 80% vacant lands, which would make changes from average temperatures.

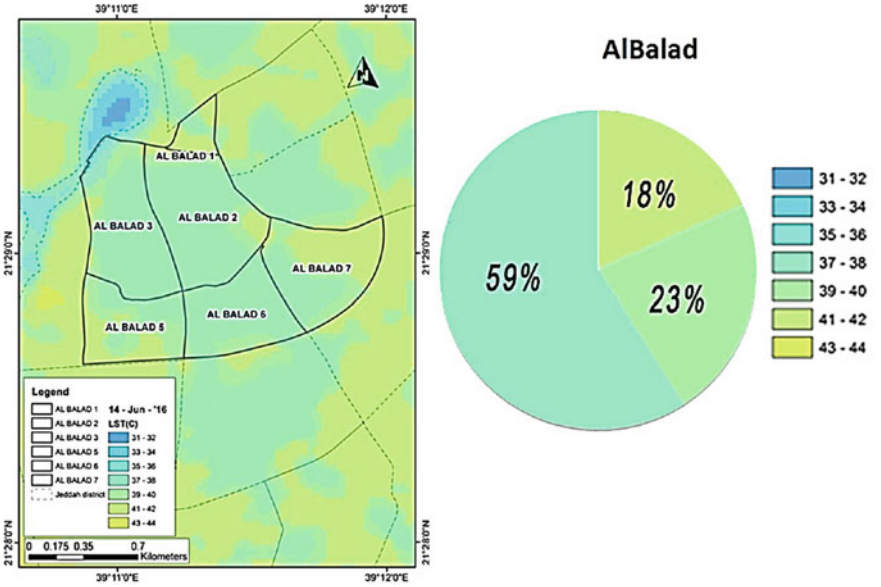


Fig. 3 Chart of the area of spatial distribution of the average temperature (°C), 14-Jun 2016, 1:00 pm in Al-Balad (GS in Jeddah)

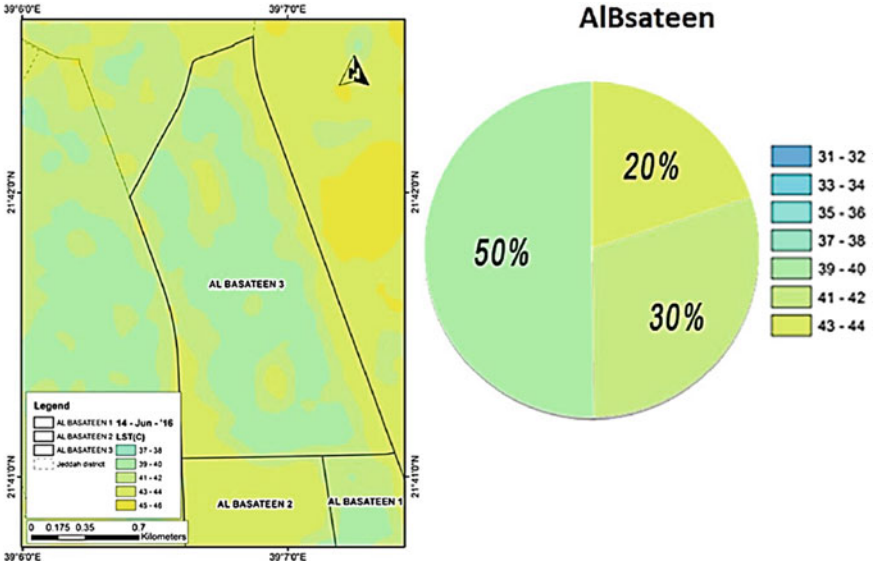


Fig. 4 Chart of the area of spatial distribution of the average temperature (°C), 14-Jun 2016, 1:00 pm Al-Basateen 3 (GS in Jeddah)

The average temperature of Al-Basateen is 40 °C. The maximum temperature was 42 °C and the minimum was 39 °C in Al-Basateen. About 50% of Al-Basateen area temperature range between 39 and 40 °C, while the other 50% is between 41 and 44 °C, this area suffers from high temperatures.

4.3 The Characteristic of the Urban Planning of Al-Balad

Al-Balad area is characterized by its narrow streets as shown in Fig. 5, with a width varying between 2 and 5 m for pedestrian and 8–18 m for cars, and the height of buildings ranges from one to ten levels.

Dwellings of Al-Balad have an economical use of local construction resources and respond to climatic conditions using low-energy design principles. Also, perforated facades of decorative wooden screens were created to ventilate buildings. For street design in Al-Balad, the broad streets in Al-Balad take the north–south direction at right angles on the road of the sun making it in the shade most of the day. The narrow side streets contain many bends and this design lead to maximize shade. The streets network's area is 3750 km^2, which constitutes 8% of the total area of Al-Balad, and not all the buildings have accessible street.

Fig. 5 A street network of Al-Balad (space syntax program)

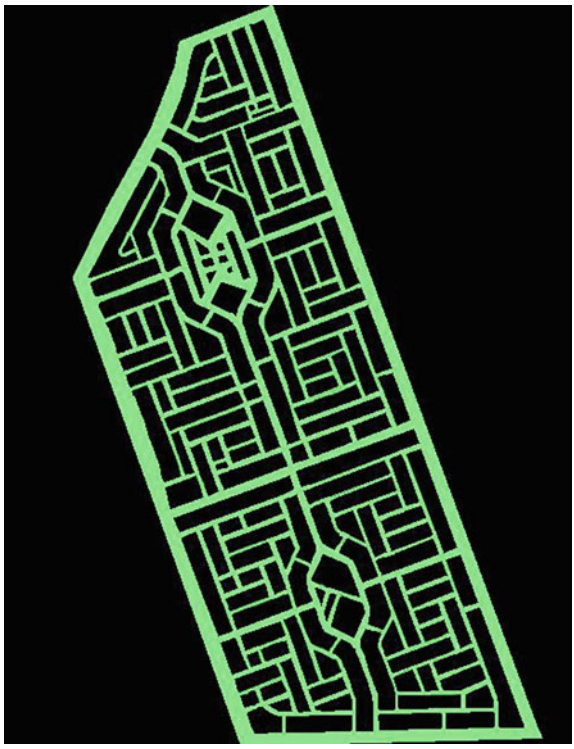


Fig. 6 A street network of Al-Bsateen (space syntax program)

4.4 The Characteristic of the Urban Planning of Al-Basateen

Al-Basateen is located in the north part of Jeddah, which represents the modern urban layout of Jeddah. Its consists of two stories detached villas and apartment buildings, and such consists of parallel alignments, simple geometrical shape patterns of streets designed for adequate vehicle movement, with width ranges from 12 to 20 m (Fig. 6). The streets network's area of Al-Bsateen, it is 6174 km^2, that means this constitutes 26% of the total area of Al-Bsateen, and meets the new design ordinance which is every building should access at least one street.

4.5 Comparison Between Al-Balad, and Al-Basateen in Terms of Different Micro-climates

The images of UHI distribution were divided into longitude and latitude lines and then numbered these squares. Then temperature values were introduced in the SPSS version 22 program to analyze and extract the average temperature in each district.

Table 1 Average temperatures in Al-Balad and Al-Basateen 3

Area	Minimum (°C)	Maximum (°C)	Average (°C)
Al-Balad	37.00	42.00	38.95
Al-Basateen 3	39.00	44.00	41.1231

The obtained average temperature in Al-Balad and Al-Basateen 3 are tabulated in Table 1.

The average temperature trend rate was 38.95 °C in Al-Balad, while it was hotter in Al-Basateen 41.12 °C. In Al-Basateen district, more than 50% of the areas with a temperature of 42 °C and above, while Al-Balad district is more than 60% of its area have a temperature of less than 38 °C. Figures 7 and 8 demonstrate the distribution of average temperature tendency rate that executed by SPSS version 22 program in the Al-Balad region and Al-Basateen 3 region respectively.

The study found a clear variation between the temperatures of Al-Balad and Al-Basateen district in 14-June-2016 at 01:00 pm. The results of the mapping indicate that most spaces in Al-Balad and Al-Basateen exhibit lower temperatures than other areas.

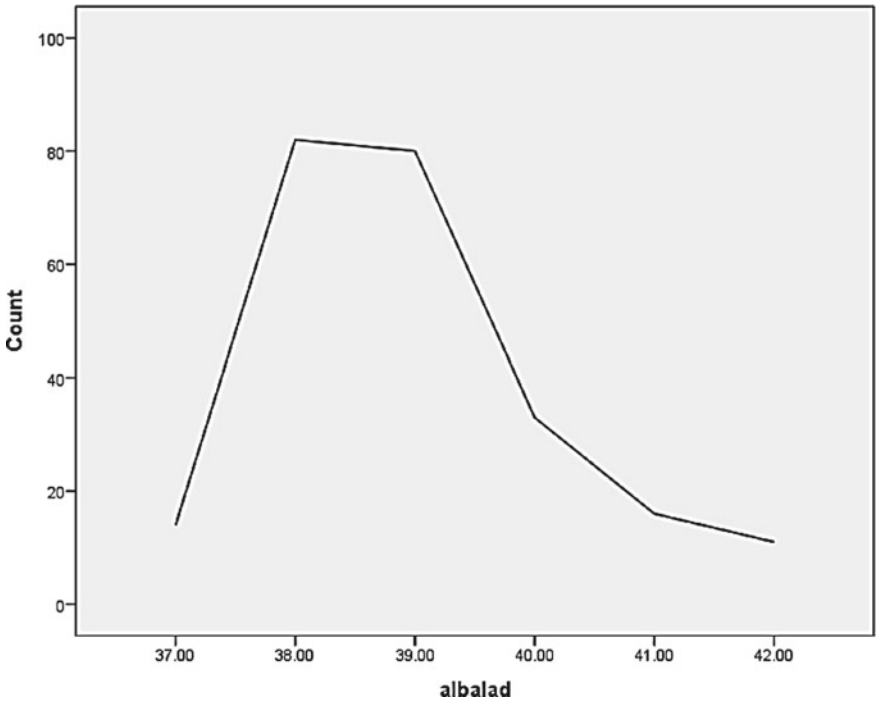


Fig. 7 Distribution of average temperature tendency rate in the Al-Balad region (SPSS version 22 program)

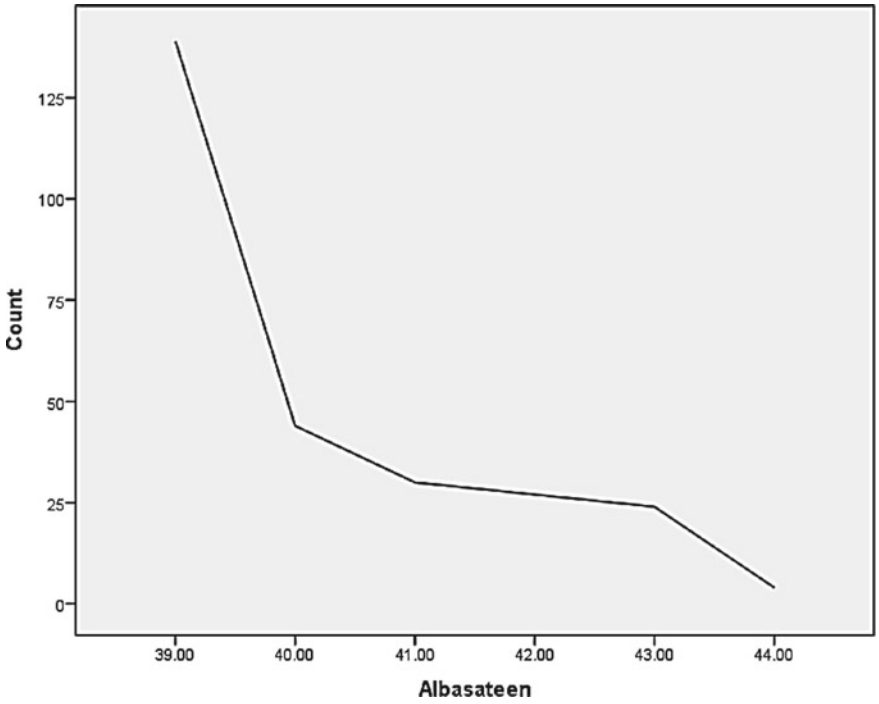


Fig. 8 Distribution of average temperature tendency rate in the Al-Basateen 3 region (SPSS version 22 program)

In addition, there is a difference in temperature within Al-Balad and Al-Basateen variation, attributed to different land uses largest areas covered with asphalt and cement surfaces and density parameters, and attributed also, to construction materials, a lack of trees and vegetation, and huge roof areas.

4.6 Factors Impacting on UHI in Al-Balad and Al-Basateen

At cities level, there are two factors impacting on UHI namely human activities and natural factors. The human activities such as expansion of uncontrolled urbanization, deforestation and excess utilization of fuel wood would impact on UHI. Human activities result causing changes in Earth's atmosphere through emissions of greenhouse gases, such as CO_2, CH_4 and other gases. Besides that, natural factors, such as direction of prevailing winds, sea currents, proximity to the equator and distance from the sea (Mady Mohamed et al. 2019; Mohamed et al. 2021; Mohamed and Shawesh 2021; Shawesh and Mohamed 2021; Elsayed 2012).

There are many factors impacting on urban heat island, being unique to Jeddah city in general and especially found in Al-Balad and Al-Basateen, that control the urban climate and hence the urban heat island formation. The factors are reduced vegetation in urban regions, properties of urban materials, street width, building heights as well as building and street orientation.

Reduced Vegetation in Urban Regions

Deforestation and excess utilization of fuel wood thus reduces the natural cooling effect from the shade and evapotranspiration. The green areas have a positive effect on the temperature of the city. In Al-Basateen case, it was calculated the proportion of green areas through AutoCAD program, where it reached 12%. In contrast, the proportion of green areas 3% in Al-Balad, it is an area which has some high temperature due to uncultivated spaces.

Properties of Urban Materials

The finishing materials contribute to the absorption of solar energy, causing surfaces, and designing streets are important for an urban design that directly influence the airflow and significantly influences the diurnal, to be warmer in urban areas than those in rural surroundings.

Al-Balad, most of the buildings made of bricks, mud and wooden Rawashin, were used in its construction (Fig. 9a and b). As for the floors, they were designed of pavement, and the use of asphalt was few in its streets, and was replaced by tiled. As for Al-Basateen, its streets totally covered with asphalt. And for the buildings, the modern materials such as marble, stone and glass were used in the façade (Fig. 10a and b).

Fig. 9 Buildings in Al-Balad (Photos taken by the author)

Fig. 10 Buildings in Al-Bsateen (Photos taken by the author)

Street Width

Designing streets are important for an UHI that directly influence the airflow and significantly influences the diurnal. Al-Balad streets are narrower than Al-Basateen, with a width varying between 8 and 18 m, either Al-Basateen ranges between12 and 20 m.

Building Heights

The building heights and the insufficient ratio between building heights and street widths would impact on UHI. The height and spacing of buildings affect the amount of radiation received and emitted by urban infrastructure and also the effect on the shade and shadow areas.

Active transportation, mixed-use developments, environmentally sustainable development, a variety of housing types, and access to parks and open spaces are essential urban design elements to ensure residential development, to integrate them the existing built fabric, and conducive to pedestrian-supportive environments.

Majority of the buildings in Al-Basateen area are designed in the form of two-story villas, and have wide streets cannot shade with 2 floors heights. On the other hand, Al-Balad has narrow streets and variety in the heights of the building between 2 and 10 m.

Fig. 11 Street orientation of Al-Bsateen and Al-Balad (space syntax program)

Building and Street Orientation

In urban environments, the microclimate and personal comfort are strongly influenced by the wind conditions, which in turn are influenced dramatically by orientation of streets and building to direct the airflow. The street orientation of Al-Bsateen and Al-Balad executed by Space Syntax Program is illustrated in Fig. 11.

In Jeddah, the good wind is coming from northwest, few of Al-Balad streets are directed with the wind. Al-Basateen liner streets are close to be oriented to the wind direction.

Explore innovative techniques for waste management, water use reduction and waste water technologies for the operation of the home. New construction should use resources efficiently, integrate appropriate materials, reduce internal and external impacts on the environment, and reduce operating costs. Furthermore, the summary of the factors affecting UHI in Al-Balad and Al-Basateen is demonstrated in Table 2.

5 Solutions for the Urban Heat Island

The study also proposed several solutions for urban heat islands from the perspective of environmental designers and engineers (Satterthwaite and Dodman 2013; Mohamed et al. 2010, 2021; Majeed et al. 2020; Mohamed 2014). The proposed

Table 2 Summary of the factors affecting UHI in Al-Balad and Al-Basateen

Factors	Al-Balad	Al-Basateen
Vegetation in urban regions	The proportion of green areas 3%	The green area reached 12%
Properties of urban materials	Most of the buildings made of bricks, mud and wooden windows, the streets between asphalt and tiles	Its streets totally covered with asphalt. And for the buildings, the modern materials such as marble, stone and glass were used in the façade
Street width	A width of Al-Balad streets are varying between 8 and 18 m	Al-Basateen's streets widths are between12 and 20 m
Building heights	Variety in the heights of the building between 2 and 10	All Al-Basateen buildings are in two-story
Building and street orientation	Few of the streets and buildings are oriented to the wind direction	Not oriented to the wind direction

solutions are use of light-coloured concrete and white roofs, green roofs and vegetation cover, planting trees in cities, green parking lots, as well as implementation and sensitization of heat reduction policies and rules.

5.1 Use of Light-Coloured Concrete and White Roofs

The use of light-colored concrete and white roofs has been found to be effective in reflecting up to 50% more light and in cutting down the ambient temperature. These strategies have been shown to offer great solutions in reducing the urban health island effect. Black and dull colors absorb copious amounts of solar heat resulting in warmer surfaces. The use of light-colored concrete and white roofs can as well reduce the overall air conditioning demands.

5.2 Green Roofs and Vegetation Cover

Green roofs present a great method of lessening the impacts of urban heat island. Green roofing is the practice of planting vegetation on a roof, just like they are planted on a garden. Plants on the roof are excellent insulators during summer and decrease the overall urban heat island effect. Plants also cool the surrounding environments thereby reducing air conditioning demands.

Furthermore, air quality is improved as the plants absorb carbon dioxide and produce fresh air. Other practices that can be used include open space planting, street trees and curbside planting. All these practices produce cooling effect within the urban areas and lower the costs of temperature reduction.

5.3 Planting Trees in Cities

The practice of tree planting within and around cities is an incredible way of reflecting solar radiation while at the same time decreasing the urban heat island effect. Trees provide shade, absorb carbon dioxide, release oxygen and fresh air, and provide a cooling effect. Deciduous trees are the best for urban areas because they provide cooling effect in summer and they don't block warmth during winter.

5.4 Green Parking Lots

Green parking spaces utilize green infrastructure strategies to limit the impacts of urban heat island effect. In precise, it cushions against the elevation of pavement temperatures which can considerably prevent thermal pollution resulting from storm water runoff. With this in place, the danger posed to aquatic systems is reduced.

5.5 Implementation and Sensitization of Heat Reduction Policies and Rules

The state implementation of environmental policies such as Clean Air Act, Low carbon fuel standards, uses of renewable energy, and clean car rule standards can impressively regulate the anthropogenic inducers of urban heat island effect. With fewer emissions, level of greenhouse gases in the atmosphere can be reduced thus decreasing the effects of climate change and global warming. Education and outreach can also be done to ensure communities are aware of the economic and social benefits of planting trees and eco-roofing.

As overall, the temperature of two zones might vary from 15 °C in the dead of night to 25 °C within the afternoon. Climate data from meteorological stations located in Jeddah area were used to analyze the temperature. This study shows the factors affecting the temperature differences and the relationship between urban fabric, planning, and design and their relation to the urban heat island. It was found that temperature differences exist between Al-Balad and Al-Basateen of Jeddah.

The results of the study showed differences in temperature at the same time schedule in two districts in the same region, this is attributable to change urban design in the region and the factors influencing the change in temperature. And that the temperature difference in Al-Balad and Al-Basateen is the result of the urban fabric design factor.

6 Conclusion

The aim of this study is to investigate the effect of urban design impacts and develop strategies to reduce urban heat island influences with a good preparation for climate change adaptation, and contribute to improve quality of urban life. To reduce building related to environmental impacts while creating places that are healthier and more satisfying for people, the suitable concept that can be used is green building which is more systematic approach to create, sustain, and accelerate changes in practice, technology, and behavior. Green building also can reduce operating cost by increasing productivity and using less energy and water, improved public and occupant health due to improved indoor air quality and can reduce environmental impacts. In order to achieve the objectives of the study, scientific methods were used due to its suitability to the nature of the research, data analysis were collected using SPSS program, and Space Syntax analysis. In the light of the results of the study, it can be concluded that the rising temperatures caused by urban planning affect Al-Balad and Al-Basteen areas disproportionately, aggravation of this phenomenon as known is the urban heat island (UHI) impact.

References

Albers M, Deppisch S (2013) Resilience in the light of climate change: useful approach or empty phrase for spatial planning? Eur Plan Stud 21:1598–1610

Almazroui M, Islam MN, Jones PD, Athar H (2012) Recent climate change in the Arabian Península: seasonal rainfall and temperature climatology of Saudi Arabia for 1979–2009. Atmos Res 111:29–45. https://doi.org/10.1016/j.atmosres.2012.02.013

Elsayed ISM (2012) Mitigation of the urban heat island of the city of Kuala Lumpur Malaysia. Middle-East J Sci Res 11(11):1602–1613

Fatani K, Mohamed M, Al-Khateeb S (2019) Survey based sustainable socio-cultural guidelines for neighbourhood design in Jeddah. IOP Conf Ser: Earth Environ Sci 385:012050

Kamal MA (2014) The morphology of traditional architecture of Jeddah: climatic design and environmental sustainability. GBER 9(1):4–26

Mady Mohamed AA, Noureddine Z, Soufiane F (2019) Predicting the limits of the oasis effect as a cooling phenomenon in hot deserts, an applied study on the Sahara oases. J Arid Environ 24(2):255–266

Majeed FSA, Shokry M, Mohamed M (2020) Changing the urban foodscape: gastronomic center for food education and agrotechnology. J Crit Rev 7(8):215–219

Masoud B (2012) Al_Mazloum heritage project in ALBALAD conservation and buildings reuse, architecture department. EFFAT university, Jeddah, Saudi Arabia

Mohamed M (2010) Traditional ways of dealing with climate in Egypt. In: Lehmann S, Waer HA, Al-Qawasmi J (eds) The seventh international conference of sustainable architecture and urban development (SAUD 2010), The Center for the Study of Architecture in Arab Region (CSAAR Press), Amman, Jordan, pp 247–266
Mohamed M (2014) Lessons from the past to enhance the environmental performance of primary school classrooms in Egypt. Environ Ecol Res 2(6):221–233
Mohamed M (2018) The mastery of the Takhtabush as a paradigm traditional design element in the hot zone climate. EQA—Environ Qual/Qualité de l'Environnement/Qualità ambientale 28:1–11
Mohamed M (2021) Human poverty in rural communities in Egypt—a case study of Al-Sharkia Province. J Sociologia Urbana e Rurale XLIII(124):33–61
Mohamed M, Shawesh R (2021) Assessment of outdoor thermal comfort in hot arid zone. J Urban Environ Eng 15(1):10–23
Mohamed M, Gado T, Osman M (2010) Investigating the intelligence of the low-tech earth architecture of the Sahara: a feasibility study from the western desert of Egypt. Intell Build Int (IBI) 2(2):179–197
Mohamed M et al (2021) Urban heat island effects on megacities in desert environments using spatial network analysis and remote sensing data: a case study from Western Saudi Arabia. J Remote Sens 13(10):1941
Noriss FH, Stevens SP, Pfefferbaum B, Wyche KF, Pfefferbaum RL (2008) Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. Am J Commun Psychol 41:127–150
Pendall R, Foster KA, Cowell M (2010) Resilience and regions: building understanding of the metaphor. Camb J Reg Econ Soc 3:71–84
Pickett STA, Cadenasso ML, Grove JM (2004) Resilient cities: meaning, models and metaphor for integrating the ecological, socio-economic, and planning realms. Landsc Urban Plan 69:369–384
Satterthwaite D, Dodman D (2013) Towards resilience and transformation for cities within a finite planet. Environ Urban 25:291–298
Sharp EB (2011) Understanding local adaption and implementation of climate change mitigation policy. Urban Affairs Rev 47(3):433–457. https://doi.org/10.1177/1078087410392348
Shawesh R, Mohamed M (2021) Post occupancy evaluation of outdoor thermal comfort in hot arid zone. Int J Low-Carbon Technol 16(1):50–60
World Bank (2010) Development and climate change: world development report. World Bank, Washington, D.C.
Zhou B, Rybski D, Kropp J (2013) The statistics of urban heat island intensity. Geophys Res Lett 40(20):5486–5491. https://doi.org/10.1002/2013GL057320

Sick Neighborhood Syndromes in Hot Dry Climate

Widad Elessawi, Mady Mohamed, Mervat El-Shafie, and Husam Alwaer

Abstract The neighborhood has become the focus of attraction of urban planners, designers and architects. Over the last two decades, the field of study of the neighborhood and its relationship with health has witnessed an explosion of interest. Several researchers investigated neighborhood problems and its impacts on well-being. Different urban problems vary in mental and physical health impacts. A lot of longitudinal and cross-sectional research linked the characteristic of neighborhood whether physical or social to the health condition of the community. Furthermore, heart disease, skin disorder, cancer diabetes, depression and drug use are some of the health problems that an individual might face while living in an insufficient neighborhood particularly in harsh climate conditions. In desert climate, thermal low performance can lead to urban problems such as the well-known phenomenon "Urban Heat Island (UHI)". The later can lead to several illness syndromes for residents. Reviewing the literature revealed a gap in the knowledge on the detailed relationship between the urban design elements and the sick health syndrome. This paper discusses the negative impact of the neighborhood design elements and its interconnection with illness syndromes. Similar to the Sick Building Syndrome (SBS), the paper introduces a new term to define the relationship between the urban design elements and the sick health syndromes which is "Sick Neighborhood Syndrome" (SNS).

W. Elessawi · M. Mohamed (✉) · M. El-Shafie
Master of Science in Urban Design, College of Architecture and Design, Effat University, Jeddah, Kingdom of Saudi Arabia
e-mail: Momohamed@effatuniversity.edu.sa

W. Elessawi
e-mail: Welessawi@effat.edu.sa

M. El-Shafie
e-mail: Melshafie@effatuniversity.edu.sa

M. Mohamed
Architecture Department, College of Engineering, Zagazig University, Zagazig, Egypt

H. Alwaer
Dundee University, Dundee, UK
e-mail: H.AlWaer@dundee.ac.uk

M. Mohamed et al. (eds.), *Cities of the Future*,
https://doi.org/10.1007/978-3-031-15460-7_16

Keywords Neighborhood · Health · Mental health · Physical health · Urban heat island · Neighborhood problems · Neighborhood design

1 Introduction

The urban environment is considered a significant factor that determines the mental and physical health condition of the users which may include positive and negative impacts (Pineo et al. 2018). The neighborhood is a type of environment that plays a big role in society's well-being. It is considered as the connection destination of social, economic, physical and environmental aspects (Dehghanmongabadi and Hoşkara 2014). A lot of research talked about the impact of the urban fabric on health that may consist of building, streets, open spaces, and vegetation (Talen and Koschinsky 2013; Chan and Liu 2018; Beydoun 2018; Xu 2017; CCOHS 2019). physical activities that are found in open spaces and streets such as walking can decrease the percentage of obesity and diabetes among people and enhance mental health (Talen and Koschinsky 2013). Moreover, the existence of open spaces and greenery in the neighborhood promotes better physical health with a reduction of mental problems and physical diseases (Chan and Liu 2018). Building high, geometry and orientation with the street width can increase heat island effect which impacts the physical and mental health (Beydoun 2018; Xu 2017; Givoni 1998). Headache, sweating, dry skin, Nausea are some of the physical problems effected by the high temperature of the environment. The Canadian center of occupational Health and safety added that heat symptoms can vary from person to person. Heat rash, cramps, stroke, chronic diseases, and minor injuries are some of the found symptoms (CCOHS 2019). Reviewing the literature revealed a gap in the knowledge on the detailed relationship between the urban design elements and the sick health syndrome. Similar to the Sick Building Syndrome (SBS), this resarch introduces a new term to define the relationship between the urban design elements and the sick health syndromes which is "Sick Neighborhood Syndrome" (SNS).

2 Neighborhood Problems

Neighborhood problems are related to the defect or disorder of the thermal visual and aquatic performance of an area. Neighborhood disadvantage, decline and disorder are types of neighborhood problems that directly affect the health of the residents (Fig. 1). This part will discuss separately each type of these neighborhood problems.

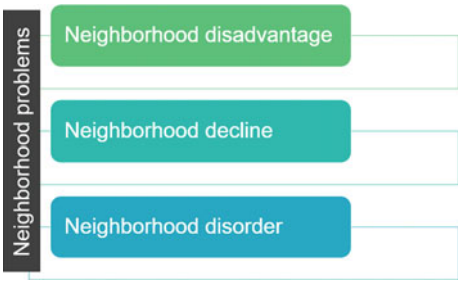


Fig. 1 Neighborhood problems. *Source* Author

2.1 Neighborhood Disadvantage

Neighborhood disadvantage is referring to the poor quality of neighborhood that is driven by the lack of economic and social resources which affect negatively the social and health condition of the residents (Ross and Mirowsky 2001). The low socioeconomic condition influences the efficiency of a neighborhood (Rudolph 2013). It is characterized by a lack of accessibility to food, infrastructure, services, education, and jobs. In addition, Transportation Disadvantage is referring to the limitation of access to services and opportunity which affect the daily participation of the socioeconomic and political life (Xiao et al. 2018). People facing this problem are more likely to experience social and environmental threats. Another key feature that is found in the disadvantaged neighborhood is the absence of safety (Kind and Buckingham 2018). The disadvantaged neighborhood has a direct negative threat to physical and mental health (Ross and Mirowsky 2001; Kind and Buckingham 2018; Durfey et al. 2019). The physical health problem may consist of diabetes, cardiovascular disease, blood pressure, heart disease, cholesterol and chronic disease. Hypertension, depression, and stress are mental issues that are found in the disadvantaged neighborhood.

2.2 Neighborhood Decline

Neighborhood decline is the negative development of a neighborhood due to the decrease in the average household income (Oakerson and Clifton 2017). It is mainly affected by the socio-economic status of the city. The neighborhood decline phenomenon started in 2008 due to the global Financial Crises (Zwiers et al. 2016). In addition, people who suffered from the economic crises are more likely to less maintain their house and their surrounding neighborhood. The neighborhood decline has social and health impacts (Oakerson and Clifton 2017; Hunter et al. 2018). Vandalism and crime are some of the social problems. Those problems may lead to having and insecurity feeling. Furthermore, sleep disorder is affected by the neighborhood cognitive decline. People with sleeping problems are more likely to have mental issues

such as anxiety and depression (Letter 2019). Another study showed that depression can increase obesity percentage.

2.3 Neighborhood Disorder

Neighborhood disorder is the social and physical characteristics of a neighborhood that lead to a break down (Ross and Mirowsky 1999). Physical disorder, low maintenance, and litter are features that increase the disorder. The physical disorder may consist of abundant land or cars, vandalism and graffiti and noise are some of the physical disorders. Lack of social control is found in the disorder neighborhood. It has a major impact on the social and health of individuals. The social problems may consist of public drinking, crime, danger, and drug use. The neighborhood disorders affect the mental and physical wellbeing of residents (Ross and Mirowsky 2001). The mental problems could vary from fear, insecurity, depression, anger and anxiety (Gerber and Sievert 2018). Moreover, people living in a disordered neighborhood are less likely to practice activity and walking due to an unsafe environment. Walking and physical activity play a big role in decreasing the risk of chronic disease, cancer, obesity, diabetes and high blood pressure (Ross and Mirowsky 2001).

2.4 Comparison and Criticism

All the neighborhood problems have a negative impact on physical and mental health. Neighborhood disadvantage, disorder and decline have some similarities and differences (Fig. 2). It includes a variety of diseases of the most common illnesses that leads to mortality. The socio-economic status of the neighborhood is major issue that examine neighborhood satisfaction and level of disorder.

Furthermore, a study showed that neighborhood socioeconomic status, infrastructure and services accessibility have a direct influence on physical and mental health

Fig. 2 Comparison between neighborhood problems. *Source* Author

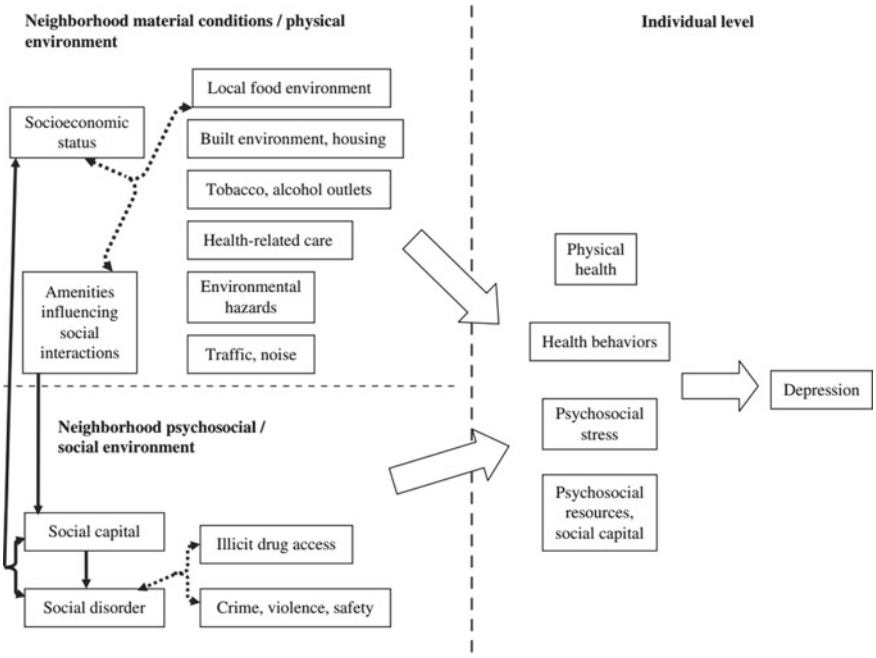


Fig. 3 Neighborhood health impact. *Source* Kim (2008)

(Kim 2008) (Fig. 3). Diversely, there is no specific research that investigates the direct connection between the physical environment and the individual level. Design elements may consist of buildings, streets, open spaces and boundaries (Fatani 2016). Each of them has different effects on the environment and health. The relationship between each element of neighborhood design and health will be discussed further in this Paper.

3 The Effect of Buildings on the Neighborhood Performance

Few studies investigated the interaction between the indoor environment and the urban morphology (Chan and Liu 2018; Pineo et al. 2018; Wang et al. 2014). Buildings are always designed with a set of codes and regulations that sustain the users' comfort. It considers ventilation and air temperature and noise factors in relation to the surrounded neighborhood environment (Chan and Liu 2018). Building heights, density, green spaces, and cleanness are some of the focused aspects of the codes and regulations. For instance, the regulation of the building height should consider the indoor and outdoor environment by encouraging access to the sunlight and preventing the atmospheric pollutants. Moreover, one of the Urban Heat Island factors is the

building design and urban construction material which impacts the health of the well-being (Kaboré et al. 2018).

Thus, the outdoor and indoor environment quality has a strong relation to providing individual comfort. Moreover, another urban issue that influences the indoor environment quality is the air pollution that is emitted by vehicles (Chan and Liu 2018). An additional study investigated the effect of green infrastructure on the indoor environment (Wang et al. 2014) (Fig. 4). Reduce air pollution, noise level, solar radiation exposure is some of the impacts of green infrastructure. It also affects personal behavior by increasing productivity and decreasing stress and anxiety.

Depending on the royal institution of charter surveys, there is a strong relationship between the urban environment and health (Pineo et al. 2018). The health impact could be visualized in three interconnection scales. These are building, street and

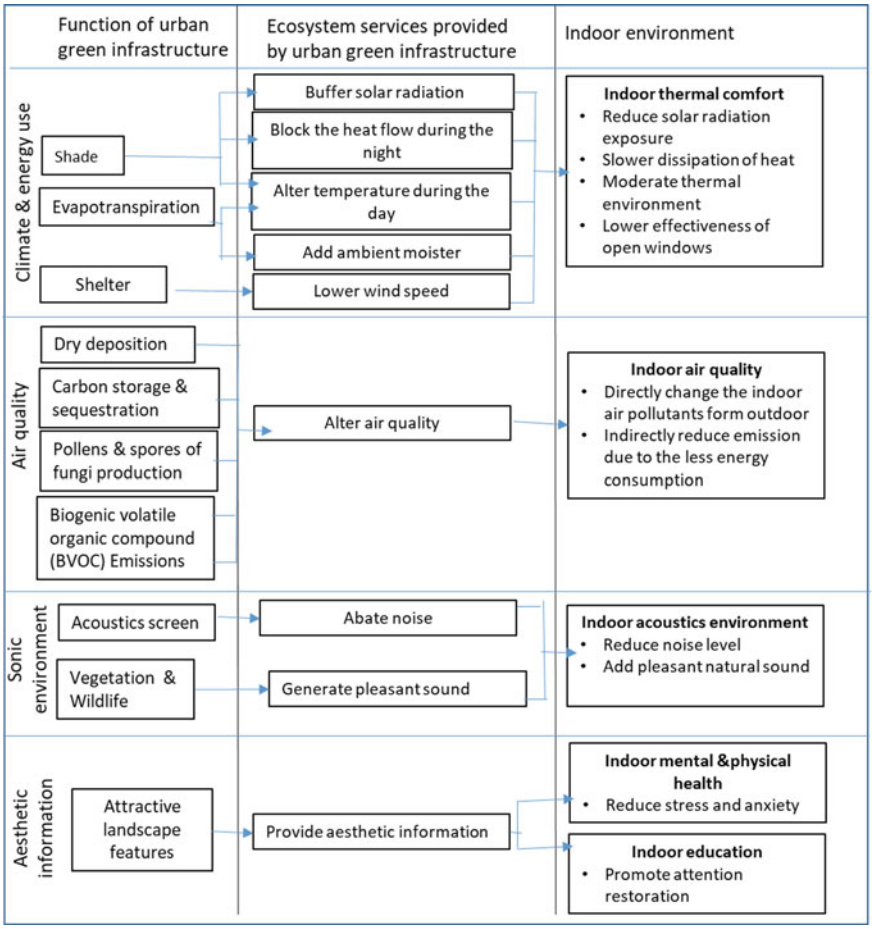


Fig. 4 The effect of green infrastructure on indoor quality. *Source* Wang et al. (2014)

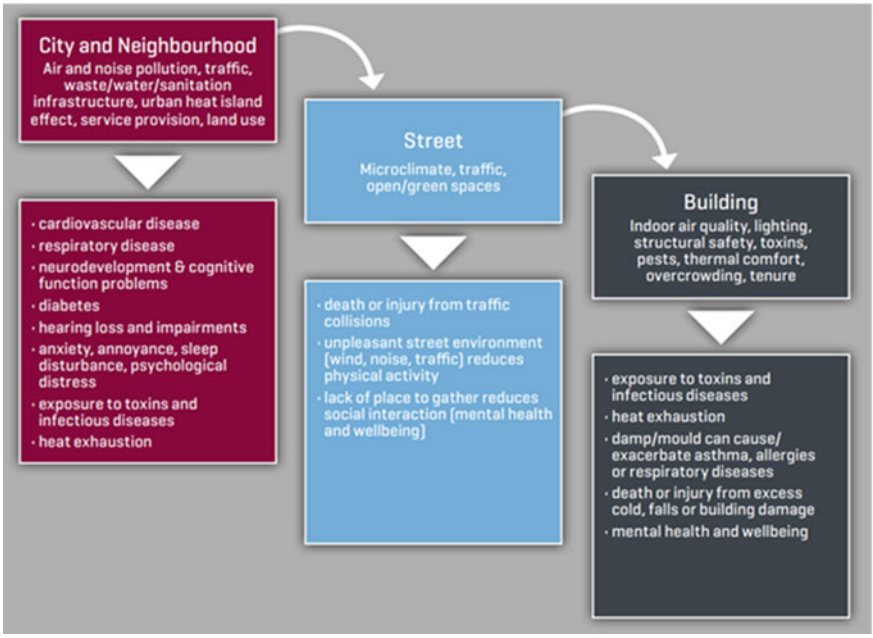


Fig. 5 The relationship between neighborhood, street, and building and its impact on health. *Source* Pineo et al. (2018)

open spaces, city and neighborhood (Fig. 5). Heat exhaustion, injuries, diabetes, chronic disease, and mental problems are some of the health problems that could be found in the indoor and outdoor environment. The neighborhood design which may consist of streets, open spaces and buildings have a direct impact on the indoor environment of a building. To conclude, the indoor and outdoor environment are two factors that could not be separated for having a better comfort and health.

Diversely, there are no specific research that investigated the relationship between building syndrome and neighborhood syndrome. In the next section, the research will try to identify the different aspects of health problems in relation to urban design elements. Before reaching this end, it will review the same relationship on the building level which is well known as (SBS).

4 Sick Building Syndromes

Sick building syndrome is a medical situation where occupants are exposed to the number of nonspecific symptoms which is associated with the time spent on a building (Ghaffarianhoseini et al. 2018). Those symptoms could vary from fatigue, headache, skin irritation, nausea, asthma, dry eye, dizziness, runny nose, tiredness (Babatsikou 2011; Nooh and Sick 2016). All those symptoms have a direct impact on the level of

productivity and concentration of the occupants. The main factors affecting the sick building syndrome are physical, chemical, individuals, the biological and psychological conditions of the building and occupants (Ghaffarianhoseini et al. 2018; Nooh and Sick 2016; Mohamed and Ecresh 2012; Majeed et al. 2020) (Table 1). The physical factors of a building consist of the air temperature, humidity, lighting, ventilation, and noise. Furthermore, chemical pollutants are coming from tobacco, smoke, or dust (Babatsikou 2011). The biological factor which is referring to the molds and fungus that could be found in a building. In addition, the individual factor is referring to the personal characteristics that affect the SBS on users. Such as age, gender, and genetic features. Stress, especially in the working environment, is considered as one element of the psychological factor.

Based on the previous investigating the sick building syndrome is a direct result of the surrounded urban context. Therefore, it is vital to identify the sick syndromes on the neighborhood level. The sick neighborhood syndrome could be defined as a medical condition where people in a neighborhood suffer from physical and mental health problems while living or visiting the neighborhood. The symptoms may arise depending on the timing spent on the neighborhood and how poor it is. To investigate more about the new term each design principle should be studied with its relation to the health.

5 The Influence Heat Island on Health

The UHI is when an urban area is significantly having a higher temperature than the surrounding which is affected by the built environment. The increase in temperature has a direct relation to increasing sick syndrome. The different governmental sectors, institutions, and researchers investigated those syndromes (WHO 2019; CCOHS 2019; Mohamed and Shawesh 2021). It can differentiate from mental and physical problems. The heat gain in the individual body is affected by environmental and personal factors. The exposure to a hotter area in relating to the average surrounding increases the body heat gain which compromises the ability of the body to control temperature leading to several syndromes. It consists of direct and indirect impacts. Heat cramps, stokes, chronic disease, diabetes and mental problems are some of the direct impacts. Moreover, heat conditions could affect health indirectly. The indirect feature could be seen as the health behavior, the air and water quality, increase of risk accidents (Fig. 6) (WHO 2019). The level of health impact may vary mostly depending on duration, intensity and adaptation. Depending on the Canadian Center for Occupational Health and Safety, exposing to heat may cause the following syndrome Heat edema, heat rashes, heat cramps, heat exhaustion, heat syncope, heat stroke (CCOHS 2019; Mohamed et al. 2021). Heat edema is relating to the swelling which is noticeable mostly in the ankles m while heat rashes could be seen as red spots in the sensitive skin. Furthermore, sweating from exposing to the heat causes the body to lose water and salt which is known as heat exhaustion. Headache, vomiting, weakness, diarrhea are some of the signs of heat exhaustion. Heat cramp is related

Table 1 Factors effecting the sick building syndrome

Contributor			Effects
Physical	Temperature	Deviation from the thermal comfort threshold (hot or cold). 21 °C is recommended for better performance and health	Distraction, lowering the rate of productivity
	Humidity	Temperature above 32 °C and RH above 60%	Growing mildews and moulds, muscle cramps, fainting, heat stroke, exacerbation of medical conditions
	Ventilation	Poor ventilation, less than of 8l/s per person ventilation rate	Lowering the rate of productivity, nose and throat irritation, headaches, fatigue, asthma, rhinitis and a susceptibility to colds and flu
	Illuminance level	Poor quality of light, poor illumination levels, 1000 lux is suggested for better performance and health	Disruption of sleep pattern, lowering the rate of productivity, increased possibility for occurring hazardous events
	Noise	Low frequency noise (20–100 Hz), Noise exposure during night	Distractions, affecting occupants' performances, behavioural problems and cardio vascular effects, hearing issues, headaches, increasing blood pressure
	Air quality	Poor quality of indoor air, CO_2, SO_2, O_3, PM_{10}	Respiratory diseases, lowering the rate of productivity, tiredness, decision-making
Biological	ER	Protracted exposure to the budding materials emitting Moulds, fungi and mites, *6-pentyl-2-pyrone*	Respiratory diseases and lung cancer respiratory and allergic diseases, mucosal and skin problems, nose irritation
Chemical		Building materials, MVOCs. formaldehyde, plasticizer texanol, fine dust, C14 3–OH, C18 3–OH CO_2 concentrations	Mucosal, optical, nasal, gular, ocular and rhinitis symptoms, respiratory issues
Psychosocial		Monotonous work environment occupational stress	Anxiety, depression, environmental discomfort, job strain and reduction in performances
Individual		Gender, genetic tendency to develop allergy, atopy, parental asthma/allergy, smoking status and psychological state	Individual with these characteristics are more likely to experience different types of SBSs

Source Ghaffarianhoseini et al. (2018)

to the muscle pain that occurs because of the heat stress disorder. Furthermore, exposing to heat can increase dizziness and fainting that is affected by inadequate blood flow. Heatstroke is considered as the most fatal heat exposure syndrome. High body temperature, sweating, fainting is major signs of having a heat stroke.

The relative humidity and temperature heat index investigate the level of danger that an individual could experience depend on heat exposure. It could be seen as four-level: Extreme danger, Danger, extreme caution, caution. Each level is characterized

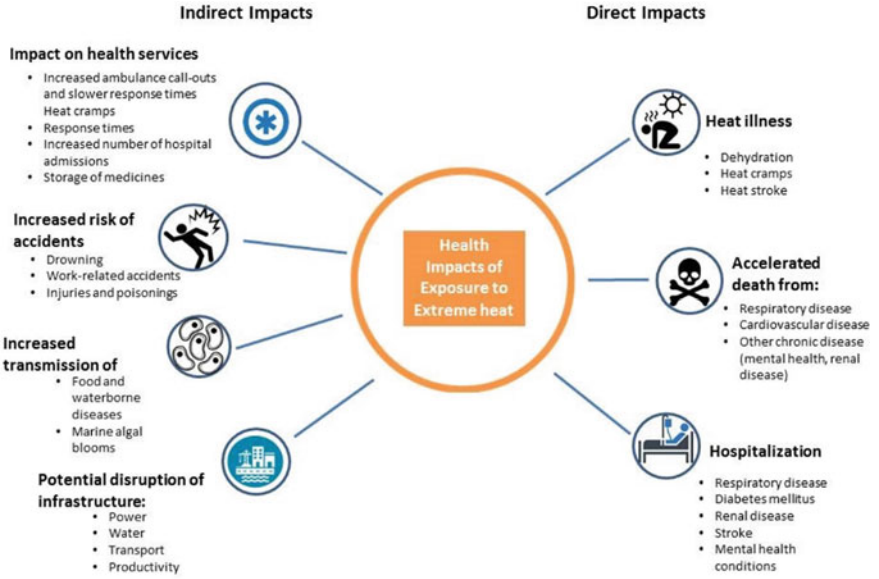


Fig.6 The direct and indirect health impact of exposing to heat. *Source* WHO (2019)

by specific syndrome depending on the given value (Fig. 7). Fatigue may be a result of the first level which is caution. The extreme caution level syndrome may consist of sunstroke, heat exhaustion and cramp. The danger level syndromes are sunstroke, heatstroke, muscle cramps, and heat exhaustion. The last level which is the extreme danger includes all the previous syndrome with a higher possibility of happening.

After investigating a variety of organizations, institution and research reaching to the conclusion that urban heat island has a major impact on health that varies in syndromes (Fig. 8). It could be seen as two categories which are a mild and high effect. Having more than one syndrome from the mild category will lead to having a major syndrome from the high effect category.

6 The Relationship Between Design Principles and Sick Syndrome

The main design elements that have a great impact on the neighborhood environment and health are building, street, and open spaces. Each design element consists of a set of principles. This section will discuss the sick syndromes that are created by each design element.

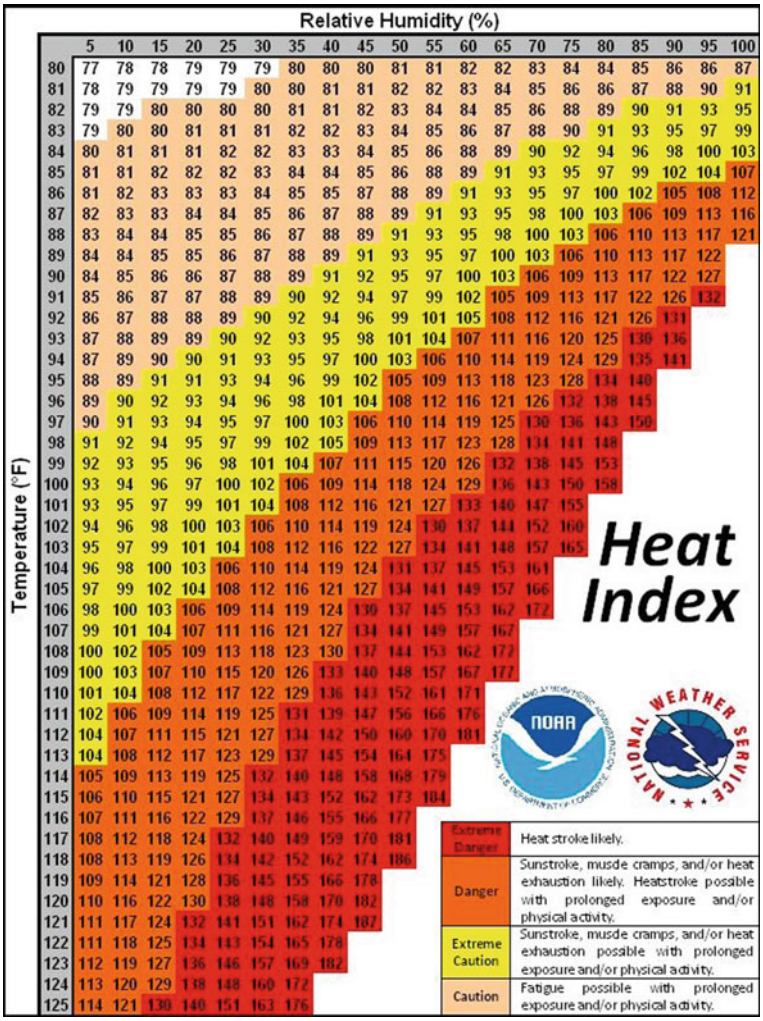


Fig. 7 The relative humidity and temperature heat index

6.1 Building

Building orientation, geometry, height, materials have an impact on the environment and wellbeing. The building orientation should be located depending on the interaction of the sun and wind movement (Koch-Nielsen et al. 2002). Orienting the bigger width of the building toward the wind direction will lead to lower the air movement around the building that rises the surrounded temperature (Beydoun 2018; Givoni 1998; Mohamed et al. 2019) (Fig. 9). Furthermore, for solar radiation, the horizontal surface of a building is more likely to receive a huge amount of solar radiation which

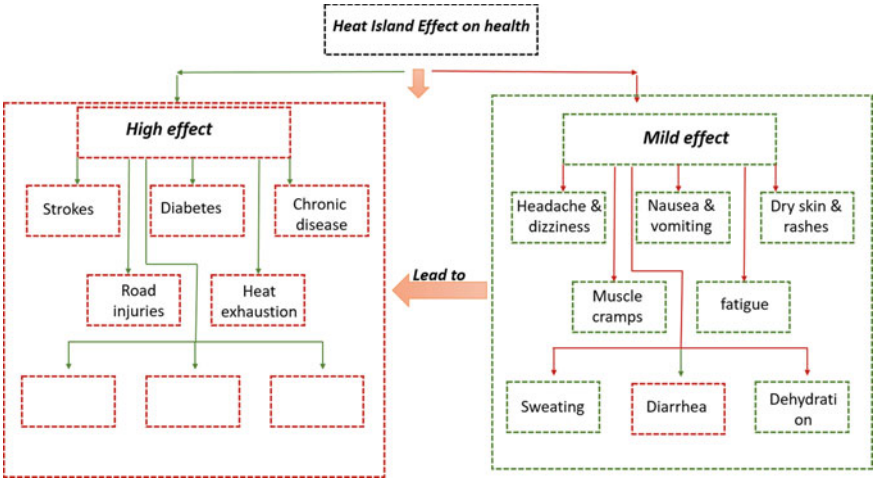


Fig. 8 The heat island effect on health. *Source* Authors

works to increase the temperature (Fig. 10). Besides, for vertical surfaces, the east and west façade obtain the greatest intensity of solar radiation (Koch-Nielsen et al. 2002).

The material that is used in the building envelope could vary in absorbing the heat. Each material has its own feature that may consist of density, specific heat and thermal conductivity (Wonorahardjo, et al. 2019). The block type building material

Fig. 9 Air movement in relation to the building width. *Source* Shawesh (2019)

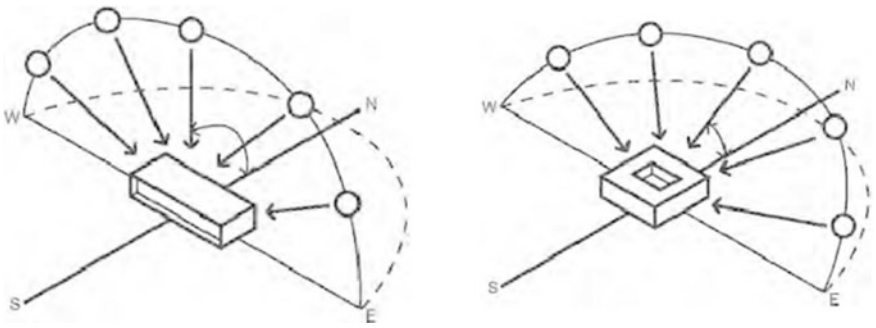


Fig. 10 Radiation in relate to the shape of the building. *Source* Koch-Nielsen et al. (2002)

that may consist of concrete and brick has a high thermal performance that works in raising the temperature of the surrounding (Table 2).

Furthermore, having high rise building with similar heights with the surrounding prevent the wind movement and raise the temperature (Givoni 1998). Another study showed that building density has a direct impact on temperature (Luo et al. 2014). It examines different modules of building density that shares the same height of buildings, width of the streets, materials, and environmental temperature (Fig. 11). Each module covers a specific area of the grid which varies from 10 to 50. The result showed that when the building density range between 20 to 30% the heat island effect is maintained in a low percentage. In this range of percentages, adequate ventilation and shading will be found. Diversely, when the building density exceeds 31% an increase in the temperature will be observed. The high-density module that covers 45.4% of the land has a higher regional temperature. To conclude, the increase in building density works in increasing the heat island effect (Table 3).

The Insufficient orientation, geometry, height, material, and density of building work in rising the UHI which increases the health syndromes. The Syndromes and diseases that are caused by the phenomenon could vary from dizziness, nausea, dry skin, diabetes, chronic disease, strokes, muscle cramps, fatigue and more as discussed previously in the research (Fig. 8). Moreover, the absence of the human scale on the building could increase the mental health syndrome in users (Aburuzaiza 2017) (Fig. 12). The feel of weakness and lost will be found in a large building, while the human-scaled building will increase the comfortable and dominant feeling. Rosewood tower in Jeddah city is an example of a high rise building that spread the feel of smallness and weakness.

In addition, the quality of the building is another key factor that impacts the wellbeing. Declined and disordered neighborhood society suffers from different syndromes. As an example, south Jeddah has a lot of poor neighborhoods that consist of low maintained and abundant building (Fig. 13). Chronic diseases, diabetes, and obesities are some of the physical diseases. Depression, anger, anxiety, sleep disorder is some of the mental disorders. To conclude, an inadequate building has a great impact on health (Table 4).

6.2 Street

The street is referring to the leaner access between two parallel rows of building (Beydoun 2018). Street design and quality have a great impact on well-being. The design principles that are responsible for the efficiency of the street are connectivity, accessibility, walkability, and safety. Moreover, the width of the street, orientation, and material are other factors that influence the performance of the street. The wide street allows more exposure to the sun with less shading areas and low wind performance, while the narrow street can improve the wind and temperature conditions (Beydoun 2018; Givoni 1998). A study examined a comparison between two canopy design and its thermal performance (Jamei and Rajagopalan 2018; Mady Mohamed

Table 2 Types of materials in relation to thermal conductivity

Material	Density		Specific heat		Thermal conductivity	
	ρ (kg/m^3)	References	c [kJ/(kg K)]	References	κ [W/(m K)]	References
Brick	1600–1800	Mohamed et al. (2019)	0.879–0.974	Mohamed et al. (2019)	~ 0.60–0.73	Mohamed et al. (2021)
Concrete/cement plaster	2000	Mohamed et al. (2019)	0.880	Mohamed et al. (2019)	0.61	Mohamed et al. (2021)
GRC	2000–2400	Shawesh (2019), Wonorahardjo et al. (2019)	~ 0.880	Shawesh (2019), Wonorahardjo et al. (2019)	0.8–2.8	Shawesh (2019), Wonorahardjo et al. (2019)
Gypsum	~ 700–800	Luo et al. (2014), Aburuzaiza (2017)	0.7–1.00	Luo et al. (2014), Aburuzaiza (2017)	0.25–0.31	Luo et al. (2014), Aburuzaiza (2017)
Aerated concrete	~ 500–850	Jamei and Rajagopalan (2018), Mady Mohamed et al. (2019)	~ 1.0–1.256	Jamei and Rajagopalan (2018), Mady Mohamed et al. (2019)	0.13–0.18	Jamei and Rajagopalan (2018), Mady Mohamed et al. (2019)
Wood	~ 300–700	Mohamed et al. (2019), Esch et al. (2012)	1.3–2.4	Mohamed et al. (2019)	~ 0.10–0.17	Esch et al. (2012)
Multiplex	400–630	Esch et al. (2012), Yilmaz (2008), Ross and Mirowsky (2009)	~ 2.1	Esch et al. (2012), Yilmaz (2008), Ross and Mirowsky 2009)	0.11–0.19	Yilmaz (2008)
Glass-wool	30–34	Ross and Mirowsky (2016)	~ 0.84	Gaglioti (2018)	0.03–0.06	Ross and Mirowsky (2016)

Source Wonorahardjo et al. (2019)

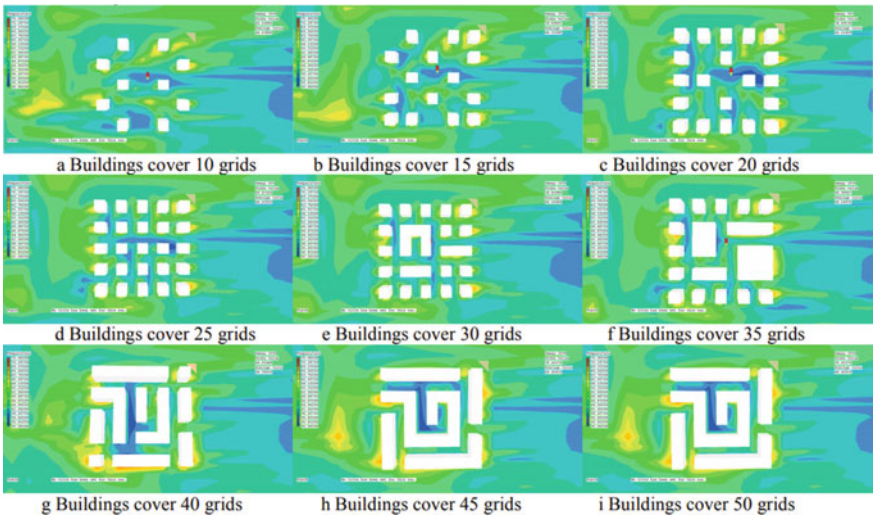


Fig. 11 The simulation analysis of different building density. *Source* Luo et al. (2014)

Table 3 Building density in relation to the average temperature

	Grids covered	Building density (%)	Average temperature (°C)
1	10	8.26	46.3
2	15	12.45	47.1
3	20	16.50	47.9
4	25	20.66	48.1
5	30	24.79	47.9
6	35	28.93	49.4
7	40	33.06	49.4
8	45	37.19	49.8
9	50	41.32	50.1
10	55	45.45	50.3

Source Luo et al. (2014)

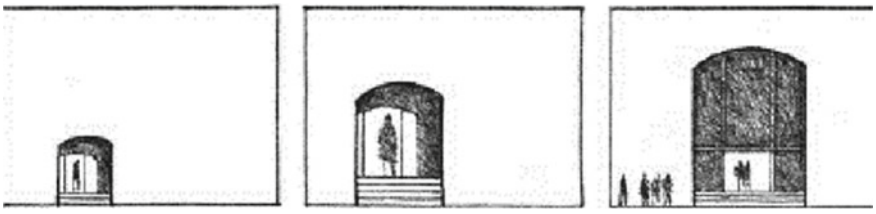


Fig. 12 Different scales in relation to the human level. *Source* Aburuzaiza (2017), Mohamed et al. (2021)

Fig. 13 Low maintained building in south Jeddah. *Source* Author

et al. 2019). They suggested that the first proposal is a wide canopy with less vegetation and more pavement, while the other proposal has a good width to the high ratio that includes narrower streets, more vegetation, and less pavement. The result was that the module with the wider street has a higher temperature than the module with the narrower street (Fig. 14).

The orientation of the street is another factor that affects the physical environment. The air temperature and wind speed could be increased through the inadequate orientation of the street. A scholar analyzed the relationship between street parameters (width and orientation) and solar access (Esch et al. 2012). He investigated different street width and orientation in relating to solar radiation. The result was that narrow streets that oriented to the prevailing winds have less solar access and heat from the wide street (Table 5).

Moreover, pavement materials play a big role in environment thermal performance (Jamei and Rajagopalan 2018). Another study compared the temperature differences between the asphalt concert, soil, and greenery surface (Table 6) (Yilmaz 2008). The asphalt concert has the highest average mean radiant temperature. Furthermore, the heat island effect is well observed in the insufficient streets and roads that are affected by different factors. These are the width, material, and orientation. The UHI has a several of syndrome such as dry skin, strokes and more that has been mentioned

Table 4 The effect of building on health

Physical syndrome															Mental syndrome	
Factors	Stokes	Diabetes	Chronic diseases	Road injuries	Heat exhaustion	Obesity	Cancer	High blood pressure	Heart disease	Headache and dizziness	Nausea and vomiting	Dry skin and rashes	Muscle cramps	Fatigue	Weak	Depression, anger, sleep disorder, anxiety
Design element: building																
Geometry	•	•	•	•	•					•	•	•	•	•		
Width	•	•	•	•	•					•	•	•	•	•		
High	•	•	•	•	•					•	•	•	•	•		
Orientation	•	•	•	•	•											
Density	•	•	•	•												
Material	•	•	•	•	•											
Scale		•	•			•	•	•							•	
Maintenance		•				•	•	•								•

Source Authors

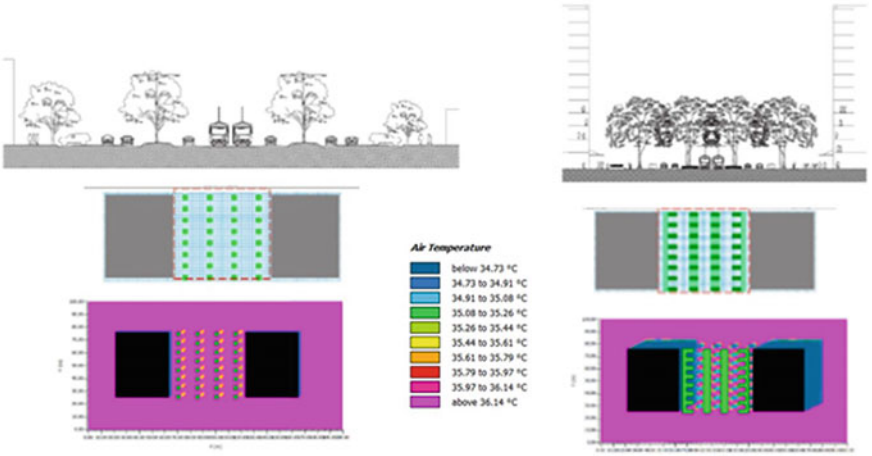


Fig. 14 Comparison between two canopy designs. Jamei and Rajagopalan (2018 *Source*)

Table 5 Street width and orientation in relation to the total absorbed radiation

Street width (m)	December 21st	March 21 st	June 21st
E-W street orientation			
10	13.6	57.8	124
15	16.0	68.0	146
20	18.5	78.6	169
25	21.0	89.2	193
N-S street orientation			
10	13.8	56.6	124
15	16.1	66.8	147
20	18.5	77.2	170
25	20.9	87.6	193

Source Esch et al. (2012)

previously in Fig. 8. Furthermore, the absence of connectivity and accessibility to infrastructure, services and facilities with low quality and maintenance of streets would increase the sick syndrome. It contributes to the neighborhood disadvantage and disorder that were previously discussed in this research (Ross and Mirowsky 2001, 2009, 2016). People living in a poor, disadvantaged, and disordered neighborhood are likely to experience physical and mental health problems (Ross and Mirowsky 2001; Gaglioti 2018; Kowaleski-Jones et al. 2018). Obesity, cancer, high blood and pressure are some of the physical syndromes. Moreover, the unsafe poor environment society experience threat and fear which lead them to walk less (Robinette et al. 2016). The lack of walking and activity increases the syndrome and disease that an individual may experience. South Jeddah is an example of a neighborhood

that includes poor street and pedestrian lanes (Fig. 15). Furthermore, Pollution is another major aspect that impacts health. It may consist of air, noise. Vehicles are the main source of air and noise pollution in a neighborhood. Air and noise pollution may lead to a different illness that may consist of Heart diseases, strokes, chronic diseases, and lung cancers, diabetes, asthma and migraine (Niemann and Maschke 2004). Furthermore, the absence of noise control may arise the probability of facing illness and diseases (Niemann and Maschke 2004). All in all, poor street design and quality has a major impact on increasing sick syndrome (Table 7). Each design element and factor has varied symptoms.

6.3 Open Spaces and Vegetation

Public open spaces are considered as an outdoor zone that consists of different active and passive activities such as seating and walking (Beydoun 2018). It is mainly designed for recreational reasons. The open spaces could be seen in two main categories which are active and passive open space. The planned active public space includes the sport and physical activities fields. Parks, squares, trail, and promenade are passive public open spaces. It encourages unplanned active activities such as cycling and jugging Moreover, the public open space is a main design element for the neighborhood as mentioned in research 2. The absence of open spaces will decrease the capability of people to practice physical activity. Furthermore, the low quality of the surrounding area decreases practicing physical activity (Ross and Mirowsky 1999). Lack of walking and physical activity impact negatively the society health as cited previously. Diversely, access to open spaces can decrease mental and health problems (Braubach and Kabisch 2017). Depending on world health organization the urban green open space work in Thompson and Oliveira (2016):

1. Improve mental health: people who interact with nature are more likely to be relaxed with less stress and depression.
2. Improve physical health: when mental health is restored, the physical health will improve. Enhancing the immune system is associated with access to nature. In addition, the green open spaces aid to reduce blood pressure, irritated skin, muscle cramps, cortisol, and heart diseases. Moreover, practicing physical activity that is found in open spaces work in improving fitness and decreasing obesity.
3. Improve the social capital: more social interaction found in public open space that aids to enhance social cohesion and a sense of belonging. It also focuses on building trust, values, friendly relationship among the community.
4. Control noise pollution: the green spaces work as a buffer zone to reduce noise pollution and enhance the soundscape.
5. Control air pollution: vegetation works in improving the air quality through decreasing carbon dioxide emission, storage, and sequestration.

The air and sound pollution increase the sick syndrome among society. Furthermore, vegetation and material are elements that affect the thermal efficiency of the

Table 6 Surface mean temperature value

Temperature (°C)			
Hours/surfaces	AC	Soil	Grass
0	19.81	14.28	11.66
1	19.00	13.55	10.03
2	18.31	12.58	9.21
3	15.57	9.28	8.54
4	14.89	8.23	7.82
5	14.52	7.88	6.94
6	15.99	12.53	7.28
7	20.52	18.18	9.58
8	26.41	23.51	14.34
9	32.47	27.25	17.79
10	37.93	30.01	19.32
11	42.22	32.16	21.51
12	45.12	33.90	22.53
13	46.51	35.30	23.53
14	46.01	35.50	25.24
15	44.27	35.09	25.77
16	41.46	33.83	25.91
17	37.57	31.66	25.84
18	32.34	26.68	24.93
19	27.50	21.18	21.18
20	24.96	19.75	18.69
21	23.52	18.94	17.58
22	22.12	17.12	16.74
23	20.82	15.48	14.83
Mean	28.74	22.24	16.95
Differences	AC-Soil	Soil-Grass	AC-Grass
	6.50	5.30	11.79

Source Yilmaz (2008)

space. Lack of green area and insufficient pavement increase the possibility maximize the surrounded temperature. A study showed that green area such as parks has a lower average temperature than the surrounding built environment. The scholar investigated and examined various Location Park, Lake Front, and market lane through different days. The conclusion was the increase of the built environment and the absence of natural element aid to rise the surrounding temperature (Ali and Patnaik 2017) (Table 8).

Fig. 15 Poor and low maintinded pathways. *Source* Authors

Furthermore, materials and pavements should be chosen depending on their thermal performance. A research studied different pavement to understand their features and heat absorbance (Siti Halipah et al. 2018) (Table 9). The outcome was that the surrounded temperature may vary from 1 to 2 °C depends on the used pavement.

The arrangement of the tree should depend on specific guidelines such as the width, space, orientation. Moreover, a study examined three different species of vegetation and its thermal performance (Sanusi et al. 2017). These are *P. acerifolia*, *U. procera* and *E. scoparia* (Table 10) the location of the study was three canopies that include one or two types of the mentioned species. This research provides proof that the canopy and leaf features of vegetation enhance the thermal comfort and it varies from one species to another. Moreover, this research provides proof that the canopy and leaf features of vegetation enhance the thermal comfort and it varies from one species to another (Table 11).

In conclusion, the absence of open space will rise health problems. Physical activity, quality, and safety are some of the elements that have a direct impact on health. Finally, the materials and vegetation have a direct impact on heat exhaustion which rises the UHI. The increase of heat will grow health syndrome that is mentioned in Fig. 8. Table 12 shows the effect of the design elements including, buildings, streets, and open sapces and vegitation on human health.

Table 7 Street and its relation to sick syndrome

Physical syndrome															Mental syndrome	
Factors	Stokes	Diabetes	Chronic diseases	Road injuries	Heat exhaustion	Obesity	Cancer	High blood pressure	Heart disease	Headache and dizziness	Nausea and vomiting	Dry skin and rashes	Muscle cramps	Fatigue	Weak	Depression, anger, sleep disorder, anxiety
Design element: street																
Width	•	•	•	•	•					•	•	•	•	•		
Orientation	•	•	•	•	•					•	•	•	•	•		
Material	•	•	•	•	•					•	•	•	•	•		
Accessibility		•	•			•	•	•	•							•
Connectivity		•	•			•	•	•	•							•
Walkability		•	•			•	•	•								•
Maintenance		•	•			•	•	•								•
Safety		•	•			•	•	•								•

Source Authors

Table 8 Comparison between the temperatures of different locations

Summary of micrometeorological measurements during the survey						
Location	Average (°C)			Daily max (°C)		
	Ta	Tmrt	PET	Ta	Tmrt	PET
Park (green/vegetation)	38.1	38.6	38.5	40.7	42	41.1
Lake front (water)	38.5	39.6	39.9	39.5	41.6	42.4
Market-lanes (built-up)	41.2	41.8	41.8	43.6	45.5	44.9
Control (open grassland)	44.8	47	46.7	46.3	49.8	48.9

Source Ali and Patnaik (2017)

Table 9 Pavement surface temperature

Pavement types	Findings
Asphalt	• Absorbs more heat than the other types of pavements • Has lower albedo than concrete pavement • Has higher density than concrete pavement • Highest recorded temperature is 47.3 °C
PCC	• Absorbs less heat than asphalt pavement • Has higher albedo and reflective properties than asphalt pavement • Has lower density than asphalt pavement • Highest recorded temperature is 38.1 °C
Porous/permeable	• Absorbs less heat than asphalt pavement • Permits water to filter m to the ground • Undergoes higher convective losses • Highest recorded temperature is 39.8 °C
IBS StormPav	• Absorbs less heat than asphalt pavement • Possesses similar characteristics to normal concrete pavement • Highest recorded temperature is 38.5 °C

Source Siti Halipah et al. (2018)

7 Conclusion

To conclude, the inadequate neighborhood design leads to an increase in the Sick Neighborhood Syndromes. The SNS are identified as a medical condition where the residents of the neighborhood suffer from sick syndromes while living in the area. Building, streets and open spaces are the main design element that affects, directly and indirectly, the health. This paper confirmed that buildings, streets, and open spaces are three interconnected elements that provide the neighborhood environment, social and health conditions. Mental and physical diseases are found with the insufficient and absence of appropriate design elements. Each element consists of a set of principles and factors. Moreover, every factor has its own effect on health (Table 12). Heart diseases, chronic disease, strokes, diabetes, dizziness, fatigue, vomiting are some of the physical symptoms. Depression, anger, and anxiety are considered as mental syndromes.

Table 10 Tree species and canopy features

Description	Species		
	Platanus × *acerifolia*	*Ulmus procera*	*Eucalyptus scoparia*
Canyon (building) height (m)	7.57	5.86	5.57
Canyon width (m)	29.94	21.52	28.52
Height: width ratio	0.25	0.27	0.20
Street orientation	North–South	North–South	North–South
Nature strip	Yes (East)	No	Yes (East and West)
Canyon: width (m)	7–10	5–12	6–10
Canopy shape	Spherical, spreading, closed	Spherical, spreading, closed	Parabolic, spreading, open
Height (m)	13–19	11–17	15–25
Foliage	Large horizontally held deciduous	Small horizontally held deciduous	Small vertically held evergreen
Plant area index	06.5.2	2.1–7.6	1.3–3.1
Leaf shape			
Canopy silhouette			

Source Sanusi et al. (2017)

Table 11 The tree species and its thermal performance

Date	Species	Air temperature (°C)	Relative humidity (%)	Solar radiation (W/m^2)	Wind speed (m/s)
18/12/2013	*P. acerifolia, U. procera, E. scoparia*	25.3	54.5	1135	1.026
10/01/2014	*P. acerifolia, U. procera, E. scoparia*	34.4	32.6	1052	1.362
13/01/2014	*P. acerifolia, U. procera, E. scoparia*	30.0	52.6	1040	1.190
17/01/2014	*P. acerifolia, U. procera, E. scoparia*	43.9	13.6	1099	1.670
01/02/2014	*P. acerifolia, U. procera*	32.0	46.5	1115	0.519
02/02/2014	*E. scoparia*	40.9	27.6	1041	0.650
06/02/2014	*P. acerifolia*	38.1	20.5	1020	0.770
07/02/2014	*U. procera, E. scoparia*	36.8	22.4	1032	1.500

Source Sanusi et al. (2017)

Table 12 Design elements in relation to health

Physical syndrome															Mental syndrome	
Factors	Stokes	Diabetes	Chronic diseases	Road injuries	Heat exhaustion	Obesity	Cancer	High blood pressure	Heart disease	Headache and dizziness	Nausea and vomiting	Dry skin and rashes	Muscle cramps	Fatigue	Weak	Depression, anger, sleep disorder, anxiety
Design element: Building																
Geometry	•	•	•	•	•					•	•	•	•	•		
Width	•	•	•	•	•					•	•	•	•	•		
High	•	•	•	•	•					•	•	•	•	•		
Orientation	•	•	•	•	•											
Density	•	•	•	•	•											
Material	•	•	•	•	•											
Scale		•	•			•	•	•							•	
Maintenance		•	•			•	•	•								•
Design element: Street																
Width	•	•	•	•	•					•	•	•	•	•		
Orientation	•	•	•	•	•					•	•	•	•	•		
Material	•	•	•	•	•					•	•	•	•	•		
Accessibility		•	•			•	•	•	•							•
Connectivity		•	•			•	•	•	•							•
Walkability		•	•			•	•	•								•
Maintenance		•	•			•	•	•								•
Safety		•	•			•	•	•								•

(continued)

Table 12 (continued)

Physical syndrome															Mental syndrome	
Design element: Open spaces and vegetation																
Material	•	•	•	•	•											
Vegetation	•	•	•	•	•											
Physical activity		•	•			•	•	•	•							•
Safety		•	•			•	•	•	•							•
Maintenance		•	•			•	•	•	•							•

Source Authors

References

Aburuzaiza AA (2017) Investigating the effect of urban form on heat island phenomena: case study of Jeddah, KSA, in architecture 2017, Effat University Jeddah, Saudi Arabia

Ali S, Patnaik S (2017) Thermal comfort in urban open spaces: objective assessment and subjective perception study in tropical city of Bhopal. Urban Climate, India

Babatsikou F (2011) The sick building syndrome (SBS). Health Sci J 5:72–73

Beydoun ZJ (2018) Design guidelines for health-based promenades in Jeddah, in architecture. Effat University: Jeddah, Saudi Arabia

Braubach M et al (2017) Effects of urban green space on environmental health, equity and resilience. In: Kabisch N et al (eds) Nature-Based solutions to climate change adaptation in urban areas: linkages between science, policy and practice. Springer International Publishing, Cham, pp 187–205

CCOHS (2019) Hot environments—health effects and first aid. Canadian centre for occupational health and safety Canada

CCOHS (2019) Hot environments—health effects and first aid. Canadian Centre for occupational Health and safety, Goverment of canada Cnada

Chan IYS, Liu AMM (2018) Effects of neighborhood building density, height, greenspace, and cleanliness on indoor environment and health of building occupants. Build Environ 145:213–222

Dehghanmongabadi A, Hoşkara Ş (2014) Introduction to achieve sustainable neighborhoods. Int J Arts Commer

Durfey SNM et al (2019) Neighborhood disadvantage and chronic disease management. Health Serv Res 54(Suppl 1):206–216

Fatani (2016) Sustainable socio-cultural for neighborhood design in Jeddah in college of architecture and design. Effat University Jeddah

Gaglioti A et al (2018) Neighborhood environmental health and premature death from cardiovascular disease. Preventing Chronic Dis 15

Gerber LM, Sievert LL (2018) Neighborhood disorder, exposure to violence, and perceived discrimination in relation to symptoms in midlife women. Womens Midlife Health 4:14

Ghaffarianhoseini A et al (2018) Sick building syndrome: are we doing enough? Archit Sci Rev 61(3):99–121

Givoni B (1998) Climate considerations in building and urban design. United State of America a division of international Thomason publishing, Inc.

Hunter JC et al (2018) Neighborhoods, sleep quality, and cognitive decline: does where you live and how well you sleep matter? Alzheimers Dement 14(4):454–461

Jamei E, Rajagopalan P (2018) Effect of street design on pedestrian thermal comfort. Archit Sci Rev 62(2):92–111

Kaboré M et al (2018) Indexes for passive building design in urban context—indoor and outdoor cooling potentials. Energy Build 173:315–325

Kim DA (2008) Blues from the neighborhood? Neighborhood characteristics and depression. Epidemiol Rev 30:101–17

Kind AJ, Buckingham WR (2018) Making neighborhood-disadvantage metrics accessible—the neighborhood atlas. N Engl J Med 378(26):2456–2458

Koch-Nielsen H (2002) Stay Cool: a design guide for the built environment in hot climates. London, United Kingdom: Routledge

Kowaleski-Jones L et al (2018) Walkable neighborhoods and obesity: evaluating effects with a propensity score approach. SSM Population Health 6:9–15

Letter HMH (2009) Sleep and mental Health. Harverd Health Publishing

Luo XY, Ge J, Zhang Y (2014) Simulation study about impact of building density on heat island effect. Appl Mech Mater 590:353–357

Mady Mohamed AA, Noureddine Z, Soufiane F (2019) Predicting the limits of the oasis effect as a cooling phenomenon in hot deserts, an applied study on the Sahara oases. J Arid Environ 24(2):255–266

Majeed FSA, Shokry, M, Mohamed M (2020) Changing the urban foodscape: gastronomic center for food education and agrotechnology. J Crit Rev 7(8):215–219
Mohamed M, Shawesh R (2021) Assessment of outdoor thermal comfort in hot arid zone. J Urban Environ Eng 15(1):10–23
Mohamed M et al (2021) Urban heat island effects on megacities in desert environments using spatial network analysis and remote sensing data: a case study from western Saudi Arabia. J Remote Sens SI Underst Urban Syst Using Remote Sens 13(10):1941
Mohamed M, Ecresh A (2012) Measuring and diagnosing the human and urban poverty in some communities of al- Sharkia Governorate. Nat Rev Soc Sci 49(1)
Mohamed M et al (2019) Quantifying the effectiveness of mass proportions and the orientation for buildings on thermal performance in Tebessa, Algeria. In: IOP conference series: earth and environmental science, vol 397, p 012008
Niemann H, Maschke C (2004) WHO LARES final report Noise effects and morbidity. Berlin Center of Public Health Berlin
Nooh AA (2016) Sick building syndrome
Oakerson R, Clifton J (2017) The Neighborhood as commons: reframing neighborhood decline. Fordham Urban Law J XLIV:411
Pineo H et al (2018) Promoting a healthy cities agenda through indicators: development of a global urban environment and health index. Cities Health 2(1):27–45
Pineo H et al (2018c) Urban health indicator tools of the physical environment: a systematic review. J Urban Health 95(5):613–646
Pineo H, Rydin Y (2018) Cities, health, and-well-being. Royal Institution of Chartered Surveyors London
Robinette JW, Charles ST, Gruenewald TL (2016) Vigilance at home: longitudinal analyses of neighborhood safety perceptions and health. SSM Population Health 2:525–530
Ross C, Mirowsky J (1999) Disorder and decay: the concept and measurement of perceived neighborhood disorder. Urban Aff Rev 34:412–432
Ross C, Mirowsky J (2001) Neighborhood disadvantage, disorder, and health. J Health Soc Behav 42:258–276
Ross CE, Mirowsky J (2009) Neighborhood disorder, subjective alienation, and distress. J Health Soc Behav 50(1):49–64
Ross CE, Mirowsky J (2016) Disorder and decay. Urban Aff Rev 34(3):412–432
Rudolph K et al (2013) Neighborhood disadvantage in context: the influence of urbanicity on the association between neighborhood disadvantage and adolescent emotional disorders. Soc Psychiatry Psychiatr Epidemiol 49
Sanusi R et al (2017) Microclimate benefits that different street tree species provide to sidewalk pedestrians relate to differences in Plant Area Index. Landsc Urban Plan 157:502–511
Shawesh R (2019) Evaluating outdoor thermal comfort in hot and humid climate: case of Effat university campus in Jeddah, KSA. In: 2019 Effat university Jeddah , Saudi Arabia
Siti Halipah I et al (2018) The impact of road pavement on Urban Heat Island (UHI) Phenomenon. Int J Technol 9:1597
Talen E, Koschinsky J (2013) The walkable neighborhood: a literature review. Int J Sustain Land Urban Planning 1(1)
Thompson CW, Oliveira ESD (2016) Urban green spaces and health. WHO Regional Office for Europe, Copenhagen
van Esch MME, Looman RHJ, de Bruin-Hordijk GJ (2012) The effects of urban and building design parameters on solar access to the urban canyon and the potential for direct passive solar heating strategies. Energy Build 47:189–200
Wang Y et al (2014) Effect of ecosystem services provided by urban green infrastructure on indoor environment: a literature review. Build Environ 77:88–100
WHO (2019) Information and public health advice: heat and health. In: Health CCAH (ed) World Health Organization

Wonorahardjo S et al. (2019) Characterising thermal behaviour of buildings and its effect on urban heat island in tropical areas. Int J Energy Environ Eng 2019

Xiao R, Wang G, Wang M (2018) Transportation disadvantage and neighborhood sociodemographics: a composite indicator approach to examining social inequalities. Soc Indic Res 137(1):29–43

Xu M (2017) Impacts of building geometries and radiation properties on urban thermal environment. Procedia Comput Sci 108:2517–2521

Yilmaz H (2008) Determination of temperature differences between asphalt concrete, soil and grass surfaces of the City of Erzurum, Turkey. 21(2):135–146

Zwiers M et al (2016) The global financial crisis and neighborhood decline. Urban Geogr 37(5):664–684