ABDULLA HAMDAN

SUSTAINABLE URBAN DEVELOPMENT KYRENIA, NORTH CYPRUS

NEU 2020

SUSTAINABLE URBAN DEVELOPMENT KYRENIA, NORTH CYPRUS

A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF APPLIED SCIENCES OF NEAR EAST UNIVERSITY

By
ABDULLA HAMDAN

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Architecture

NICOSIA, 2020

SUSTAINABLE URBAN DEVELOPMENT KYRENIA, NORTH CYPRUS

A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF APPLIED SCIENCES OF NEAR EAST UNIVERSITY

By
ABDULLA HAMDAN

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Architecture

NICOSIA, 2020

ABDULLA HAMDAN: SUSTAINABLE URBAN DEVELOPMENT KYRENIA, NORTH CYPRUS

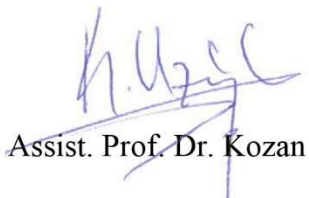
Approval of Director of Graduate School of Applied Sciences

Prof. Dr. Nadire ÇAVUŞ

We certify this thesis is satisfactory for the award of the degree of Masters of Science in Architecture

Examining Committee in Charge:

Prof. Dr. Ozge Ozden Fuller — Committee Chairman, Department of Landscape Architecture, NEU



Assist. Prof. Dr. Kozan Uzunoglu — Committee Member, Department of Architecture, BAU

Dr. Can Kara — Supervisor, Department of Architecture, NEU

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that I have fully cited and referenced all materials and results that are not original to this work, as required by these rules and conduct.

Name, Last name: Abdulla Hamdan

Signature: 

Date: 25/05/2020

To my parents…

ACKNOWLEDGEMENTS

Completion of a Master's degree involves contributions from individuals who deserve recognition. A special word of thanks is due to Dr. Can Kara, for guiding me in this undertaking. As well as his willingness to work long hours toward the completion of my degree.

I would like to thank my family for their support through the duration of my study. Also, I would like to express my deepest thanks to my parent for their understanding, endless patience, support and care.

Eventually, there is a long list of friends that I would like to thank. I can’t mention them all but I would like to thank them from all of my heart for their valuable help and support since I was in my early study until now.

ABSTRACT

This thesis is aimed at investigating the sustainability of urban development in Kyrenia city, so as to examine the impediment that could impede the achievement of urban sustainability in Kyrenia city. In doing these, both primary and secondary data were sourced and utilized for this study. Primary data was sourced through (i) observation of the Leadership in Energy and Environmental Design for Neighbourhood Design indicators and then rate it accordingly; (ii) structured questionnaire which was distributed to the residents to seek their perception on the relationship between the three main categories of the Leadership in Energy and Environmental Design for Neighbourhood Design; (iii) experts interview to seek their opinion on the achievement of urban development sustainability in Kyrenia city. As for the secondary data, various published and unpublished materials were consulted and reviewed. In addition, descriptive and inferential statistical analytical techniques such as percentage and regression analysis were employed for the analysis.

It was established in the thesis that in terms of rating standards, Zone A and Zone B was found to be "Gold", Zone C and D were found to be rated below the minimum standard, while Zone E was found to be "Gold". In all, the average rating of the Kyrenia city was found to be "Certified". Moreover, the joint impact of the three indicators on the neighbourhood quality satisfaction revealed that they all have significant impact on it, and provides about 38.7% explanation variations in what determines neighbourhood quality satisfaction.

In addition, the thesis presented the opinion of the experts on the achievement of urban development sustainability in Kyrenia city and in conclusion, put forward some policy implications that will serve as a guide for the policy makers in North Cyprus on how best to achieve urban development sustainability in Kyrenia city.

Keywords*: Urban development; sustainable development; sustainable urban development; LEED-ND; Kyrenia city.*

ÖZET

Bu tez, Girne şehrinde kentsel sürdürülebilirliğin sağlanmasını engelleyebilecek engelleri incelemek amacıyla Girne şehrinde kentsel gelişimin sürdürülebilirliğini araştırmayı amaçlamaktadır. Bunları yaparken hem birincil hem de ikincil veriler kaynaklanmış ve bu çalışma için kullanılmıştır. Birincil veriler (i) Enerji ve Çevre Tasarımında Liderlik Mahalle Tasarımı için göstergelerinin gözlemlenmesi yoluyla elde edilmiş ve daha sonra buna göre derecelendirilmiştir; (ii) nufüslere, Enerji ve Çevre Tasarımında Liderlik Mahalle Tasarımı için üç ana kategorisi arasındaki ilişki konusundaki algılarını araştırmak üzere dağıtılmış yapılandırılmış anket; (iii) Girne kentinde kentsel kalkınma sürdürülebilirliğinin sağlanması hakkında görüş almak amacıyla bazı uzmanlarla görüşmeler yapılmıştır. İkincil verilere gelince, yayınlanmış ve yayınlanmamış materyallere danışılmış ve gözden geçirilmiştir. Ayrıca analiz için yüzde ve regresyon analizi gibi tanımlayıcı ve çıkarımsal istatistiksel analitik teknikler kullanılmıştır.

Tezde LEED-ND standardına göre derecelendirme açısından kurulmuş, Bölge A ve Bölge B'nin “Altın” olarak, Bölge C ve D'nin minimum standardın altında, ve Bölge E'nin "Altın" olarak bulunduğunu tespit edilmiştir. Toplam olarak, Girne şehrinin ortalama derecesi “Tasdikli” bulunmuştur. Üstelik, üç göstergenin mahalle kalite memnuniyeti üzerindeki ortak etkisi, hepsinin çevre üzerinde anlamlı bir etkiye sahip olduğunu ortaya koymuş ve mahalle kalite memnuniyetini belirleyen unsurlarda yaklaşık 38.7% açıklama varyasyonu sağlamaktadır.

Ek olarak, tez, Girne kentinde kentsel kalkınma sürdürülebilirliğinin sağlanması konusunda uzmanların görüşünü sunmuş ve sonuç olarak, Girne kentinde kentsel kalkınma sürdürülebilirliğinin en iyi şekilde nasıl sağlanacağı konusunda Kuzey Kıbrıs'taki politika yapıcılar için rehberlik edecek bazı politika sonuçları ortaya koymuştur.

Anahtar Kelimeler: *Kentsel gelişim; sürdürülebilir kalkınma; sürdürülebilir kentsel gelişim; LEED-ND; Girne.*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ANOVA:	Analysis of Variance
BREEAM:	Building Research Establishment Environmental Assessment Method
CASBEE:	Comprehensive Assessment System for Building Environmental Efficiency
DCLG:	Department of Communities and Local Governments
EU:	European Union
GDP:	Gross Domestic Product
GIB:	Green Infrastructures and Buildings
GRI:	Global Reporting Initiative
ICLEI:	International Council for Local Environmental Initiatives
LEED-ND:	Leadership in Energy and Environmental Design for Neighbourhood Design
NPD:	Neighbourhood Pattern and Design
OECD:	Organization for Economic Co-operation and Development
OIC:	Organization of Islamic Countries
POA:	Post-Occupancy Assessment
POI:	Post-Occupancy Inspection
SDG:	Sustainable Development Goals
SLL:	Smart Location and Linkage
SPSS:	Statistical package for social sciences
SUD:	Sustainable urban development
SWOT:	Strength Weakness Threat and Opportunity
UCLG:	United Cities and Local Governments
USGBC:	United State Green Building Council
UN:	United Nations
UNCED:	United Nations Conference on Environment and Development
WBCSD:	World Business Council for Sustainable Development
WCED:	World Commission on Environment and Development
WSSD:	World Summit on Sustainable Development

CHAPTER 1
INTRODUCTION

1.1 Background of the Thesis

The increase in the world population moving to the cities is becoming worrisome, most especially in the developing countries where the people prefer to live in cities. This increase is projected to continue because cities acts like magnets that has lots of pull-factors that draws the people, investment and tourism (Chan et al., 2016). Cities are known to be attractive because of numerous attractions (good transportation, healthcare facilities, educational opportunities, entertainment, market etc.). Meanwhile, all these attractions are not without the fair share of the attendant problem which are in form of environmental pollution, inadequate management of solid waste, traffic congestion, high cost of living, unemployment, water shortages, lack of skilled labour, shortage of health care facilities and so on. Furthermore, as urbanization keeps pushing more people into the cities, so also the intensification of the challenges. Looking at the environmental externalities generated from these challenges, it is not a gainsaying that a serious concern has been placed on the future wellbeing of the people and the existence at the long-run (Yigitcanlar and Kamruzzman, 2015, Chikaraishi et al., 2015).

From the foregoing, and the fact that the expansion of the cities is still on increase, it is imperative that the management of cities become efficient and effective. It is in view of this that the search for how the cities will become sustainable or sustainably managed becomes a focal point. The apparent facts that certain steps need to be taken in tackling the environmental challenges, in an effective and efficient manner has led the researchers and other stakeholder in the discovery of an approach that is more eco-friendly (Cecere et al., 2014, Kamruzzaman and Yigitcanlar, 2014)

Sustainability was described by Berkes et al. (1998) as a determinant process in the environment, social and economic dimensions relationship. Moreover, Pollalis et al. (2012) opined that the ability to meet the present generation need, while improving the lives and the environment for future generation has been extensively discussed in previous studies, which Hult (2015) observed that the deeper knowledge on these is fundamental to

sustainability. Because not all practices are “sustainable or unsustainable” (Hult, 2015), the major area of study for researcher has been on the “sustainability assessment” (Singh et al., 2012, Gil and Duarte, 2013). Ghellere, Devitofrancesco and Meroni (2017) observed that as a result of challenges facing the urban development, the urban designers, policy makers and other stakeholder are compelled to ensure the modification of the urban territories so as to preserve some salient feature of the territories to meet the need of the present and the generations to come. According to Gil and Duarte (2013), the overwhelming attention given to the development sustainability is as a result of the continuous population and economic growth of most developing countries, in which North Cyprus is not an exemption. This change has made people living in cities to be in the increase and the attendant effects are on the social, economic and environmental development of such city. Ali (2012) observed that the issue of social, economic and environmental challenges is more pronounced in the urban centers, because the negative and positive influence of development are mostly visible in the cities, and as such it becomes imperative to have a deeper understanding on how the development in these cities could be sustainable. Meanwhile, despite the availability of law and guidelines in some cities, the urban development continues unabated and the attendant effect is on the progressive loss of the sustainability of such area. Ghellere, Devitofrancesco and Meroni (2017) noted that urban sustainability can only be possible when there is a homogenous development in a city in terms of its environmental, social and economic issue; these would enable the city to “recover from significant multi-hazards threats with minimal damages to the public safety and health, economy and security” (Mörtberg et al., 2013).

Meanwhile, literature reveals that there is absence of harmony in the operational contents of “sustainable development” (Bithas and Christofakis, 2006), because of its dynamic coverage of ecology, economic and social dimensions at different “spatio-temporal scale”, and this has led to non-consensus among the scholars and practitioners on “what is to be developed”, understand the relationship between environment and development, and “for what extent of time” (Parris and Kates, 2003). In view of these, many frameworks and guidelines have been developed that incorporates sustainability in development processes (EU, 2007). Aside the national and international frameworks for assessing sustainability,

academia and industry has also contributes to the methods and tools which has helped in no small measure to the process of sustainable development (Dizdaroglu, Yigitcanlar and Dawes, 2012). However, it was observed from the literature that most of the previous studies focused more on the planning and sustainable cities aspects, to the neglect of governance issues (Zhu and Simarmata, 2015), whereas, the cities management is also significant, as the planning and development of sustainable cities. Thus, the need to explore the governance as part of the dimension, so as to achieve integrated sustainable outcomes (Yigitcanlar and Teriman, 2015).

1.2 Thesis Problem

Most cities that in the urbanization process are going through some technological, economic, social and cultural changes, which are in no doubt has some consequences on the inhabitants and the environment as a whole. The situation in Kyrenia city in North Cyprus in terms of rapid urbanization with the concomitant effects is a reflection of what is happening in terms of urbanization around the globe. It is no doubt that the rapid population growth in which this city is experiencing is reflecting in the social, economic, cultural and environmental changes of the city. This change is apparent in the increasing numbers of new and larger housing apartments, water issues, environmental degradation, transportation challenges and the loss of green areas and so on. Aside the increase in the observed population of the city, the approval of building multi-storey building is contributing to the unplanned urbanization of the city. The attendant influence of this scenario can be observed on the environmental, economic and social condition, couple with the traffic that is on the increase.

Meanwhile, all around the globe, the most prominent challenge confronting most cities and urban administrators' and policy makers is the sustainability of the urban development, most especially in the area of sustainability assessment. This challenge is how the current development could be maintained for a long-term in such a way that the inhabitant at the present moment will have an effective social, economic and healthy living environment without jeopardizing the same opportunity for the generations to come. However, the approach of maintaining this development spontaneously for a long-term as being the bane

of the issue, and thus necessitates an effective sustainable urban policy that will be deployed to ensure the achievement of the sustainability of the urban development.

1.3 The Importance of the Thesis

All around the globe today, over half of the world's populations are urban dwellers, Mclaren and Agyeman (2015) opined that the humanity future is absolutely urban. McCormick and Kiss (2015) observed that sustainability is a serious concern in an urban area because it's the center for economic development. Meanwhile, Saveriades (2000) observed that the concern for urban centers is not only because of the human and financial capital, but also as a result of the geometrical development of urban centers and the share of urban pollution that is on the increase all around the globe, in which Kyrenia in North Cyprus is not an exemption. The degradation of natural environment and depletion of natural resources are the main challenges to the enhanced quality of life that disorganized urban ecosystems are visible in these cities. In these circumstances, as suggested by UN-Habitat (2013) that no available option in the achievement of prosperity in the urban development, other than considering "sustainable urban development" (SUD). The main goal of SUD is to enable cities achieve healthy ecosystem and be sustainable in the long-term in terms of the three dimensions (social, economic and environment). The perspective on SUD led to the development of "sustainable cities" as a concept.

However, argument of Bohringer and Jochen (2007) presented a convincing perspective on the sustainable city development, that it is an issue that the measurement is ambiguous, and the improvement seems to be difficult. Bell and Morse (2008) on their own indicates that there are limitations in the quantification, which makes it impossible to quantify all of the human experience, and also that there is apparent trade-off between meaningful sustainable indicators and necessary simplifications. Presently, lots of cities are given priority to their urban sustainability assessment; also, some local administrators have been making efforts in doing similar thing. But the current research and practice expose that the process of assessing sustainability itself throw-up some weakness and threats, that requires improvement, most especially comparative analysis (Dur and Yigitcanlar, 2015, Sharifi and Murayama, 2015).

In view of the above, this thesis will focus on the Kyrenia Central Zone that are in the process of development with possible economic, ecological, environmental challenges most especially the green field areas that being destroyed day by day will be analyzed to determine the sustainability of the city. While evaluating this analysis, the current situation of the city will be evaluated in accordance with the urban development sustainability framework. Meanwhile, a standard sustainable development prescription for all cities does not exist as they have different development levels and socio-cultural characteristics, thus, different frameworks will be evaluated to determine the appropriate and suitable framework that will be employed to evaluate the city.

1.4 The Aim and Objectives of the Thesis

The main aim of this thesis will be to examine the sustainable urban development processes in Kyrenia City, North Cyprus, and how the development can be sustainable. The following objectives will be pursued to achieve the aim:

- To examine the current sustainable development processes in Kyrenia city.
- Evaluate the urban development in Kyrenia in line with urban sustainability framework
- Evaluate the strength, weakness, opportunities and threat of the city
- Based on i-iii, provide policy recommendation(s) that will assist the policy makers in charge of the city to achieve urban development sustainability in the city.

1.5 Thesis Questions

- What is the trend of urban development in Kyrenia city, North Cyprus?
- Does the urban development in Kyrenia sustainable?
- What is the strength, weakness, opportunity and challenges of the city in achieving sustainable urban development?

1.6 Methodology

According to Ivankova et al. (2007), research design was described as the “procedure for collecting, analyzing, interpreting and reporting data in research studies”. This implies that, it involves the general framework that connects the research problem with the way it’s

going to be achieved. In the word of Gray (2013), research design specifies the procedure on the types of data required for the research, the techniques to be employed in collection and analysis of the data, and how the research questions will be answered. Meanwhile, Ivankova et al. (2007) highlighted exploratory, descriptive and explanatory as possible forms of research design. The study stressed further that the classification was based on the purpose of the study area. For example, descriptive study has a purpose of providing how the phenomenon under study relates to each other in its natural sense (Blumberg, Cooper and Schindler, 2005). But Bacon-Shone (2013) observed that descriptive studies are more suitable for a relatively unexplored research area, as it cannot provide explanation on why certain event happened. Thus, in a circumstance where descriptive information is abundant, either explanatory is recommended.

As for exploratory research, Bacon-Shone (2013) posited that it should be conducted when much is not known about a phenomenon, and also where the issue under discussion has not been clearly defined. Saunders et al. stressed further that, the outcome from this kind of research is not the final to research questions, but simply explores the research topic with some different degree of depth. In essence, it is to undertake a new problem on the areas that have not been much deals with in the previous research (Gray, 2013). The third forms of research design which is the explanatory study, seeks to provide explanation and give account for descriptive information. In other words, Gray (2013) observed that while "what kinds of questions" is known for descriptive studies, "why and how questions" are for explanatory studies. Explanatory develops on exploratory and descriptive studies, and subsequently identify the main reasons why certain phenomenon happens.

In accordance with the stated aim of this study, which is to examine and compare the sustainable urban development practices in Kyrenia with an indication that much research has not been carried out on the sustainability of this city in relative to their development, mixed approach that will combine quantitative, exploratory and descriptive research approach will be employed for this study. This will provide an opportunity to have field interaction with the inhabitant of this city and collect first-hand information to complement

the literature, and as well evaluate the present SUD practices in line with the established sustainable urban development framework and describe the result.

1.6.1 Data types and sources

In this study, both primary and secondary data will be used. The primary data will be sourced using observation and structured question as the instrument for data collection. Observation method will be used to observe the current practice of the urban development in the city and do the rating in accordance with the "Leadership in Energy and Environmental Design for Neighbourhood Design" (LEED-ND) which was an established framework developed for such evaluation, and was adjudged to be the most commonly and applied framework for evaluating urban sustainability in the world (Atakara and Akyay, 2017). The structured questionnaire will be developed to elicit information from the inhabitant to have their demographic characteristics and perspective on the challenges confronting the city as a result of the urban development which pose a threat to the sustainable urban development. The use of structured questionnaire is in line with Mohajan (2018) who opined that a questionnaire has fewer discrepancies, less rigorous in distribution, response consistency, and easy data management. The questionnaire will cover basically the perspective of the residents on sustainability, and the three indicators as suggested in the LEED which are: smart location and linkage, neighbourhood pattern and design, and green infrastructure and buildings.

As for the secondary data, various verified published articles on the subject matter will be sourced from the journal database. Conducting literature review is very essential which will enable the researcher to identify what has been done, how it was done and what is left to be done. In relevance to this study, it will afford this researcher to have a deeper understanding on the sustainable urban development practices around the globe and possible identified challenges to its achievement. In addition to the published articles, various maps of the study area will be required to know the extent of the area to be covered in this study (Bacon-Shone, 2013).

1.6.2 Research population, Sample size and sampling procedure

According to Polit and Beck (2004), research target population is defined as the totality of the elements that conform to a set of specifications. In that case, the residents of Kyrenia are the target population for this study, because they are the inhabitant which will understand better the challenges of the urban development as they are experiencing it. It will therefore to be able to easily reflect on their experience either positive or negative in response to our prepared questionnaire. The sample size will be decided putting into consideration the level of precision, desired confidence level and degree of variability. In addition, in the absence of verified record of the total population under study, Cochrans (1977) formula for choosing sample size will be employed, which is stated as follows:

$n_o = Z^2pq/e^2$, where n_o = sample size, Z = confidence level desired, p = population variability, $q = 1-p$, and e = level of precision (Bartlett, Kotrlik and Higgins, 2001). More details about the corresponding tables are given in Appendix 1.

Thus, maximum variability (50%), 95% confidence level with ±5% precision level was adopted, hence:

Sample size = $(1.96)^2 (0.5) (0.5) / (0.05)^2 = 384.16$

1.6.3 Data analysis and Presentation

The analysis of the data collected through questionnaire will be descriptive, using frequencies, percentages and statistical techniques, and will be processed with Statistical package for social sciences (SPSS). The evaluation of the sustainable urban development practices with the LEED-ND will be rated using frequencies and comparison of different zones in line with the recommendation of the framework. Moreover, residence evaluation, to examine the mixed-uses of the buildings will be analyzed using percentages. Similarly, the land use analysis, green area evaluation will also be analyzed using percentages. The multiple regression techniques will be employed to determine the relationship between each of the indicator with sustainability. Lastly, the presentation of the findings will be in form of pictures, maps, figures and tables.

CHAPTER 2
THEORETICAL CONCEPT AND LITERATURE REVIEW

The “sustainable development” as a concept has been regarded as one of the holistic concepts that have come to stay in addressing some challenges that are relating to social, economic and environment. The main idea behind the “sustainability” in a general term is described as a concept that shows the manner at which people should behave towards the environment, their responsibility to each other and the coming generations (Baumgärtner and Quaas, 2010). The overview on the historical background of the “sustainability” or sustainable development” as a concept which will be using interchangeably in this thesis will be presented in this chapter.

2.1 Concept of sustainability and its brief historical background

2.1.1 Brief Historical background

For some decades now, there have been an extreme global change which is still continues unabated, and has contributed significantly to the rural-urban migration, as well as international migration as a consequent of the fast-economic growth that is linked with the industrialization that is taken place around the globe. This rapid economic growth and several forms of migration are in addition to the inadequate housing conditions, excessive materials and energy resources consumption, the social and cultural values instability and disorganization of social structure on global scale. In consequent, these aforementioned development processes have a direct influence on the quality of environment, social values and the equality of economic power, as well as portend a significant danger to the environmental and human health condition around the world (Weiland, 2006). Thus, in about three decades ago, the term “sustainable development” was developed to tackle the challenges related to the protection of the environment against development. According to WCED (1987), it was referred to as the “development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs”. In order to internationalize it, several international meetings followed, for instance

"Earth Summit 1992". It was at this meeting that five major agreements were reached (Xleveland and Kubiszewski, 2007), which are:

- "The Framework convention on climate change"
- "The convention on Biological Diversity"
- "The Rio Declaration"
- "Agenda 21"
- "Statement on Forest Principles"

In 2002, the reaffirmation of the commitment to how the development could be sustainable took place at the world summit 2002 (WSSD, 2002), and the global summit of 2005 highlights the interdependence of "pillars of sustainable development" as social and economic development, as well as environmental protection (UN, 2005). Meanwhile, UCLG (2011) observed that the fourth pillar (culture) was added to address the human-environment vitality, the diversity, well-being, in addition with creativity and innovation. Afterwards, "sustainable development" as a goal, concept and movement diffused rapidly around the world and has been deployed by several national and internationals institutions, corporate enterprises, and sustainable cities, and has also been studied differently, for instance, in terms of domain (economic, social and environment); resources and productive assets (manufactured, natural, human and social capital); wellbeing (quality of life, needs and capabilities); and, norms (efficiency, fairness, prudence, etc.) (Robert et al., 2005)

2.1.2 Concept of Sustainability/Sustainable Development

Drawing from the antecedent of the concept of sustainability as briefly discussed in previous section, the concept received a great attention from all stakeholders across the globe as a tool for making appropriate future for human (Dehghanmongabadi, Hoşkara, and Shirkhanloo, 2014), it was then used in the World conference on environment and development that was held in Rio de Janeiro (Drexhage and Murphy, 2010). It was at the conference that sustainable development was defined as a kind of development that put into consideration the supply of today's need without jeopardizing the ability of the future generations to meet up with their requirements. Harris (2003) observed that the concept as

it was presented in the Brundtland report was to tackle the challenges between developmental processes and environment. The Brundtland report presented a universal definition that forms the basis for all definitions developed on the sustainable development around the world. The definition according to the report stated that "the development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). There are three ideas presented in the definition, these are development, requirements and generations to come. In addition, some elements of sustainability were set out at the UNCED in Rio de Janeiro, and the definition of sustainable development was modified as "a process of improving the quality of human life while living within the carrying capacity of supporting eco system" (Zuhairuse et al., 2009). While, in 2005 summit, the interdependent of the three dimensions of sustainability was identified (Drexhange and Murphy, 2010). In a nutshell, Alshuwaikhat and Abubakar (2008) posited that the concept of sustainable development is characterized by economic development that is anchored on social justice and effective management in the utilization of natural resources. In reference to the definition of sustainable development, moral responsibility of using the natural environment in such a way that it would be useful for the coming generations was placed on the people. According to Dehghanmongabadi, Hoşkara, and Shirkhanloo (2014), sustainability concept seems to be a simple and dynamic process that seeks to increase the use of planning process, but observed that even though the concept is adjudge to be good globally and acceptable, the method of translating it into practice is still a moot topic. But in a general term, it is such a development process that place emphasis on the generating, conservation and improves the quality of human life in all ramifications (Laghai et al., 2013, Mobaraki et al., 2012). Some studies observed that at the initial stage, the focus of sustainability was on the degradation of environment, thus environmental concern was the foundation for sustainability. However, as time progresses, the concept of sustainability continues to evolves and increase its interconnection with other two dimensions (social and economic). Therefore, sustainable development is an interface between environment, economic and social pillars of sustainable development (Dehghanmongabadi, Hoşkara, and Shirkhanloo 2014, Mobaraki, Mohammadi, and Zarabi, 2012). Generally, sustainable development is

the ability of maintaining the balance of a certain process in any system. In this context, it connotes the ability of the environment to meet the basic requirements that will ensure the components sustenance of the three basic dimension (social, environment and economic) within the system in such a way that it won't place a restriction on the ability of the coming generations to meet their need of the various components (Darmola and Ibem, 2010)

However, some studies posited that the future of sustainable development can only be guaranteed if the concept attracts people and make an appearance in their emotions and behaviors, as well as accommodating their values (Nurse, 2006). From the foregoing, it is obvious that sustainable development is not an end result, but a process, which is aimed at ensuring equitable society that, will be developing without exceeding the capacity of earth in supporting the human and non-human life. Meanwhile, the achievement of sustainable development should involve all stakeholders that consist of actors at different levels of government and across disciplines. Lastly, involvement of the people in the process has a potential of achieving sustainable development in communities.

2.1.3 Main elements of sustainable development

It is essential to describe some core elements that are germane to the concept of sustainable development, which according to Menzel (2001) are: "intergenerational fairness" (provision of foundation for the future generation for fulfilling their own development options); globality (sustainable development goes beyond the boundaries); participation (it involves collaboration between state/community and society at large); and, holistic (sustainable development requires equality in the balance between economic stability, environmental sustainability and social sustainability). Moreover, the brief description of the main elements of sustainable development by Menzel (2001) implies that the elements are essential to the discussion of sustainable development as it has been revealed in the antecedents of sustainability and in the genesis of the discourse on it. The sustainable development is achievable when there is equality among the three dimensions. The economic development should not be at the expense of environment and social, while at the other hands, tackling the challenges of environmental issues should not be at the

detriment of economic and social. This constitutes the holistic nature of the concept and reason for having in the literature today different models of sustainability.

2.1.4 Pillars of Sustainable Development

The main three most universal recognized pillars of sustainable development are economic, environmental and social sustainability. While economic sustainability involves sectorial to cross sectorial business, social sustainability equates, diverse, connect the democratic communities and environmental sustainability balances the human resources consumption and natural replenishment. At the initial stage, each of these dimensions is recognized as an individual entity without linking them to each other. Whereas, economic development is aimed at job creations, social needs see to the health care services and the peoples' wellbeing, while environmental agencies tried to guide against and make corrections where necessary on any contamination problems without any recourse to other dimensions.

From the perspective of sustainability, environmental sustainability is referring to as the means of conserving the natural environment, rather than pure conservation and it involve using the system for human existence. The role of the livelihood is being played by the ecological system, and the behavior can only be ecologically sustainable if, at the same time, the preservation of the natural environment proceeds in a manner that the important traits are conserved and the continuous existence of the natural habitat are guaranteed (Van Dieren, 1995).

Social sustainability means preserving the system in a way that ensures the essential characteristics of all individuals and their personal and social survival. In other words, social sustainability should benefit the preservation of social capital. On the one hand, social sustainability aims at social cohesion in organizations, as well as social cohesion. It receives social resources such as tolerance, solidarity, integration or, more generally, humanity, freedom and justice in temporal and spatial dimensions (Colantonio and Dixon, 2011).

Maximizing economic gains has often been a priority for companies and other actors in the past, with the recognition of scarcity of resources and environmental protection, the focus was on ecological issues. Against the background that environmentally damaging activities

influences not only those directly affected (employees, the environment, and countries), the social components of sustainability have also come to the fore.

Meanwhile, some authors argued on the dimensions of sustainability as depicted in Figure 2.1, which led to the development of the intersection of the three pillars as presented in Figure 2.2. The intersection model consists of three elements which are ecology, social and economy as each own quantity. In the given case of overlapping volumes, the overlapping section can be regarded as the successful sustainability. It can be deduced that this is an integrative and interrelated context – economic, environment and social issues cannot be considered as a single set, because there are many overlaps between the topic (Brebbia and Beriatos, 2011).

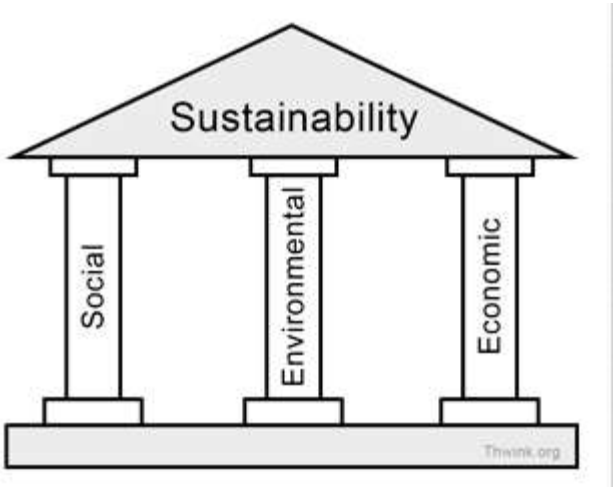


Figure 2.1: The Three Pillars of Sustainability (Purvis et al., 2019)

In most of business and economic literature, sustainable triangle has been receiving much attention. As can be seen in Figure 2.3, an equilateral triangle is used, at the corners of which the respective dimensions are arranged. The term pillars in relation to the columns has the advantage that dimensions allow fewer associations of s side-by-side as is the case with columns and clarify the interaction and interlocking of various elements. The boundaries between the dimensions in the sustainability triangle are blurred; an assignment to one or more dimension is not necessarily possible or even necessary. The geometry of the triangle emphasis the equal right of the respective dimensions, while the representation

varies in details, the triangle can be composed of the triangle of several triangles, considering the integrated character of sustainable development. Thus, Brebbia and Beriatos (2011) posited that a development should be termed as sustainable if the punctual assignment in the model lies between the respective dimensions.

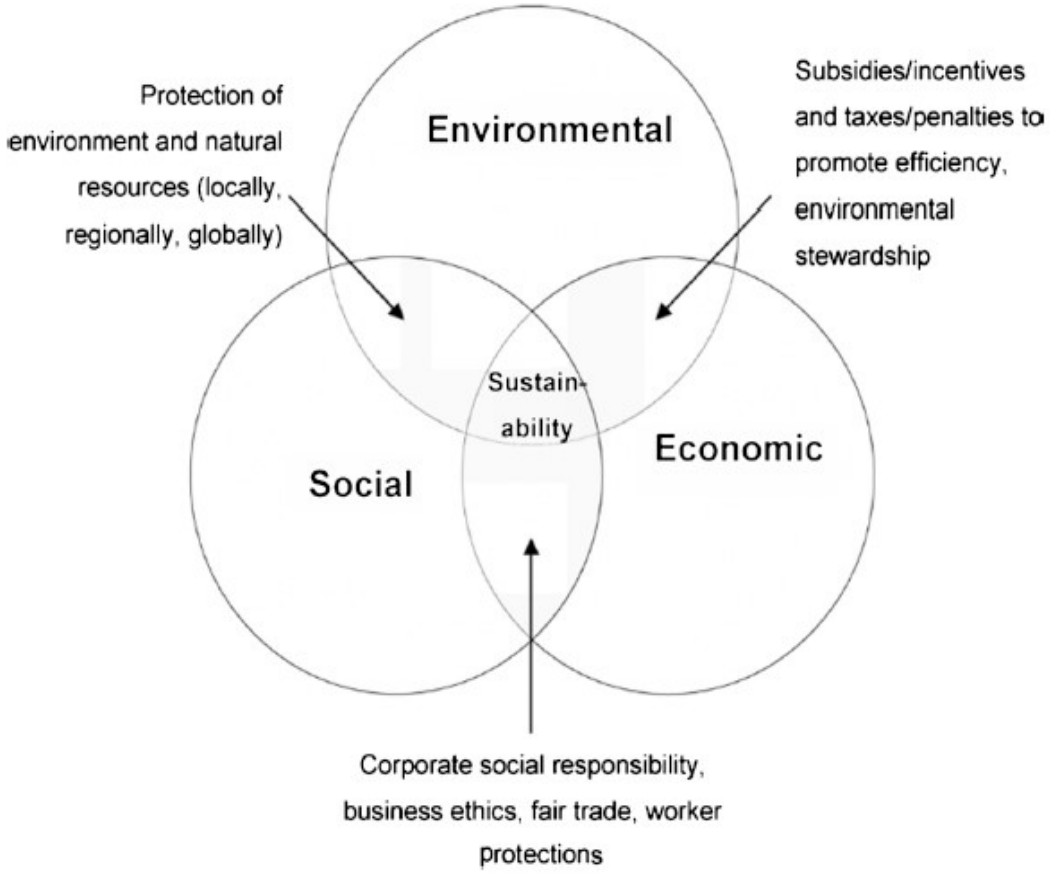


Figure 2.2: The intersection model of sustainability
(Laureti, Rogges and Costantiello, 2018)

In reference to the parts, the three dimensions are supplemented by further pillars, most especially when considering sustainability as a guiding principle in regional planning; it becomes obvious that this is a thoroughly successful extension of the model. The aim of expanding the model is as a result of the significance of the social anchoring of sustainable thinking and sustainable practices for the successful implementation of sustainability

strategies. Thus, the addition of an institutional-political dimension is suggested, which is refers to the development of new control mechanisms and a change of social institutions.

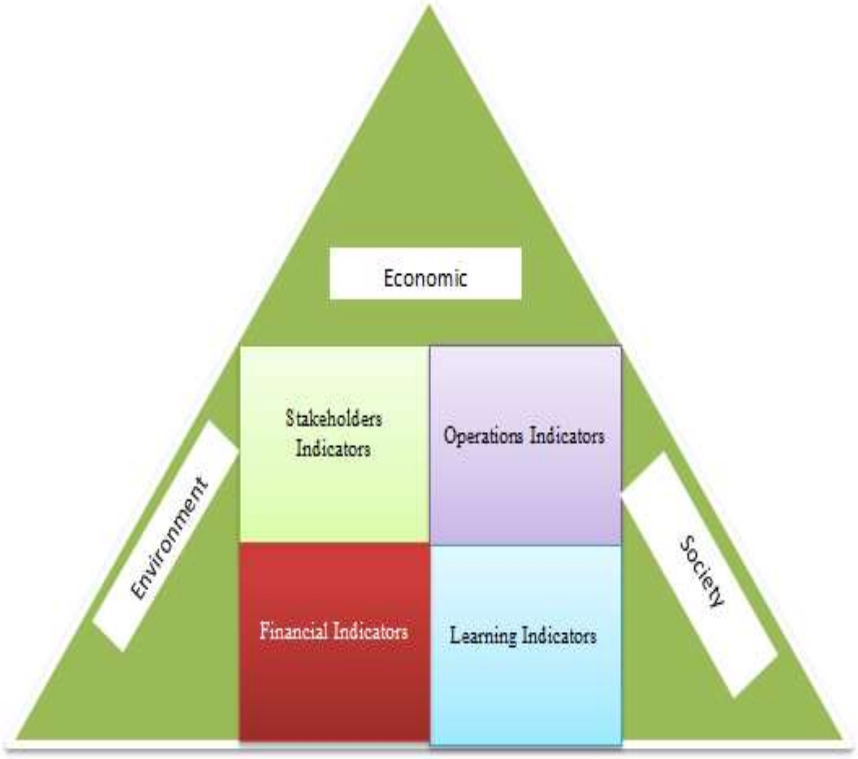


Figure 2.3: The Sustainability Development Pyramid (Beţianu and Briciu, 2011).

2.1.5 Forms of Sustainability:

In the literature, two forms of sustainability which are weak and strong sustainability were highlighted. In principle, the optimal case is to bring the three dimensions into balance. In each decision therefore, economic, environmental and social factors are included equally. In practice however, such a balance can only be achieved to a limited extent. Conflicting goals between two or all three dimensions complicate this project. Aside that, there are also fundamentally different approaches and opinions as to whether all areas should be treated equally, or the environmental dimension should be given absolute priority. Political and scientific practice refers to different positions of sustainability or strong and weak

sustainability. The different positions have an impact on the weighting of the goals and acceptance of the sustainability models (Colantonio and Dixon, 2011).

Strong sustainability is the position that is widely advocated by environmentalist and activists, giving ecology top priority. This position is often associated with the ecological economy. The pursuit of profit and utility maximization as well as the fixation on the individuals are called into question and replaced by an eco-centric position. The need to protect, conserve the ecological systems are unacceptable and must be guaranteed under all circumstances. Therefore, representative of strong sustainability prefers the one-pillar model or pyramid model as depicted in Figure 2.3. The figure illustrates the priority of ecology and natural resources at the foot of the pyramid as a basis for the development of the remaining dimensions (Colantonio and Dixon, 2011).

Weak sustainability on the other hands is based on the assumptions of the neo-classical economy. The general goal is the constant growth through economic activities. This anthropocentric perspective is based on a simple cost-benefit analysis and it is characterized by the idea of the substitutability of ecological capital types. Sustainability is thus given if the sum of the individual capital types grows or at least stagnates. Analogous to the economic-theoretical origin of this position one sees a solution of the intensive use of natural resources in the technical progress and innovations. This view is most likely to be related to the three dimensions model (Colantonio and Dixon, 2011).

2.1.6 Goals and Strategies for Sustainable Development

Sustainability is a cross-cutting issue in the most diverse scientific disciplines which has become a major topic in every discipline. An example of a successful information platform for advancing the idea of sustainable development was launched by the European Union. Since the launch of the platform, the EU has had the sustainability strategy which deals with sustainability takes on different levels and formulates goals, measures and strategies, promoting sustainable development. Also, the Brundtland report of 1987 and Agenda 21 are among these strategies. Local Agenda 21 according to Institution of Civil Engineers Staff (2000) is a regional and local implementation of the Agenda 21 Action program. Content of this program are concrete action orders for the participating states. The core of

Local Agenda 21 is the emphasis on responsibility and influence of local authorities. For this reason, municipalities are invited to develop a local Agenda 21, Chapter 28 of Agenda 21 emphasizes the participation of municipalities as many of the issues objectives and solutions listed in Agenda 21 are local and must be implemented there. In addition, municipalities as a policy and administrative level, plays an important role in informing and mobilizing the public and thus raising their awareness of sustainable, environmentally sound development. Municipalities are therefore called upon to review the development of their local practice and the actual situation for sustainability and to evaluate it based on indicators.

2.1.7 Directional goals and their consequences for the practice of sustainability

Sustainability as a case of mission statement is understood as a positive, aspired state. So, it's not so much a concrete goal that needs to be achieved, but rather a paradigm a direction that should be taken. As a directional goal, no clear definition of the goal can be derived from sustainability and sustainable development. The reason for this is the fact that directional goals describe objectives that point only in a certain direction and are usually to be achieved as completely as possible during a certain period. This aspired state the directional goal can be assumed to be merely a metaphor or rhetorical shell of an idea. This criticism is often found in the discussion about sustainability as an empty shell or illusion, which is why directional goals and thus sustainability of this criticism does not do justice. The fact that should be illustrated by an example from the spatial planning, in doing that the study of Blackburn (2012) used graphic that can be classified thematically in the field of sustainable urban development. The graphic shows a selection of the list of action areas and topics of sustainable urban development of the Academy of Spatial Research and Planning, Germany. The action fields are then broken down into individual action goals or principles and operationalized in a further step in concrete implementation proposals.

2.2 Urban development and Sustainable Development

Developing countries are characterized with the attraction of foreign investment most especially those investment that has to do with urban development. Consequently, the

cities and urban areas are rapidly growing, both in terms of geography and population. In addition, most of these developing countries are majorly the raw materials and cheap cost of production provider for the world economy and most of the developed economies. These has led to some developed countries outsourced their production facilities. The consequent effect of the outsourcing of the production facilities to the developing countries puts pressure on the host countries to accommodate the increase economic demands from the developed countries. In other words, most of the developing countries are "investment friendly" because of the availability of land, capital and more importantly, low and productive labor force. As a result of this development, the non-urban residents migrate to the cities for the new economic opportunities and as such, the urban population density becomes increasing (Kiamba, 2012).

It is evident from the scenario presented above that even developed countries shares similar conditions with developing countries in terms of development challenges at the early stage. It has been argued in the literature that most times, people engage in economic development both at local, regional or global level are ignorant to the concept of sustainability (Clark, 1995). This does not imply that developing countries should pay lip-service to sustainability in their urbanization policies but it's important that that they seek for sustainability as they are growing. The prerequisites for sustainable for sustainable development were identified by Kiamba (2012) as long-term capital, a consistent industrial force, urbanization, capacity for technology, innovation, production on large scale units, and agriculture commercialization. If going by these standards, some necessary features are likely to be found wanting in the developing countries implying an impossibility of achieving sustainable development in those countries.

Irrespective of the sustainability situation at the moment in respective of the program, there has been continuous economic development and urbanization in some developing countries. The better thing about the developing countries is that as more of them experiencing development, most of them are looking for technological solution to their problem. The results of their pursuit have resulted in some innovations which have contributed immensely to the reduction of strains on energy and environmental resources. Though, Kiamba (2012) observed that among the characteristic of sustainable development

is the large-scale production unit, meanwhile, the feasibility of short-term capital and the non-stability of work-force in the developing countries has prompted many of them to rather than emphasizing on the small and medium-scale units of production. Some author noted that the issue of environmental degradation has been bedeviling the developing countries, and also the challenges of infrastructure deficiency, absence of basic social amenities, all of which are germane to the achievement of sustainable development (Clark, 1995). Though the study of Clark (1995) failed to address how the urban developing in developing countries keeps increasing in spite of measures that is put in place by some of these countries to pipe down on the development with the aim to ensure that long-term environmental sustainability. In other words, urban development is feasible across developing countries, but there is rare identification of successful sustainable development.

Moreover, to the challenges of achieving sustainability in developing countries, most of them face with some peculiar challenges which are the ability to measure the developmental progress in their economic system where a large percentage of their transaction cannot be officially accounted for as a result of corruption. In such a situation, it could be a bit difficult for government to harness the tax revenue which could be channeled to the funding of their developmental programs. Therefore, the national and local government institutions most times lack the required resources that will enable them to effectively manage their urban development and implement related policies.

According to Clark (1995), in countries where these scenarios persist, it is usually the result of continuous urban development and lack of planning, and sometimes serves as a market for unauthorized housing, which takes care of the low wagers that lacks purchasing power. Meanwhile, this informal sector though illegal has continued to be a problem for the achievement of sustainability because the government programs are most times failed to factor them into their resources usage.

In the words of Piña and Martínez (2016), growth, development, innovation and poverty reduction are being generated in the cities as a result of the presence of national economic activities, infrastructures availability, and transportation and so on. Meanwhile UN-Habitat (2007); UN (2014); Piña and Martínez (2014) observed that the main links urban areas and rural do improve the country's infrastructure. In addition, most of cities are known for

higher levels of education, adequate health facilities, and easy access to social services in order to enhance the opportunities for cultural and political involvement of all stakeholders. But, it seems the negative aspect most time overwhelmed the positive, among the challenges identified by some authors are vehicular congestion, high presence of pollution, and also when the demand for resources is high which do drive the unsustainable production by firms and consumption patterns (Brezies and Krugman, 1997; Saxenian, 1994). In this kind of situation, the pattern suggest those cities could be unsustainable, which is an indication that there is need for rethink on the manners at which the urban planning and growth will be improved to enhance the overall performance and making the urban to be efficiency so as to produce a competitive, equitable and urban areas that will be sustainable as depicted in Figure 2.4, which shows the cycle urbanization and its influence on environment (Piña and Martínez, 2016)

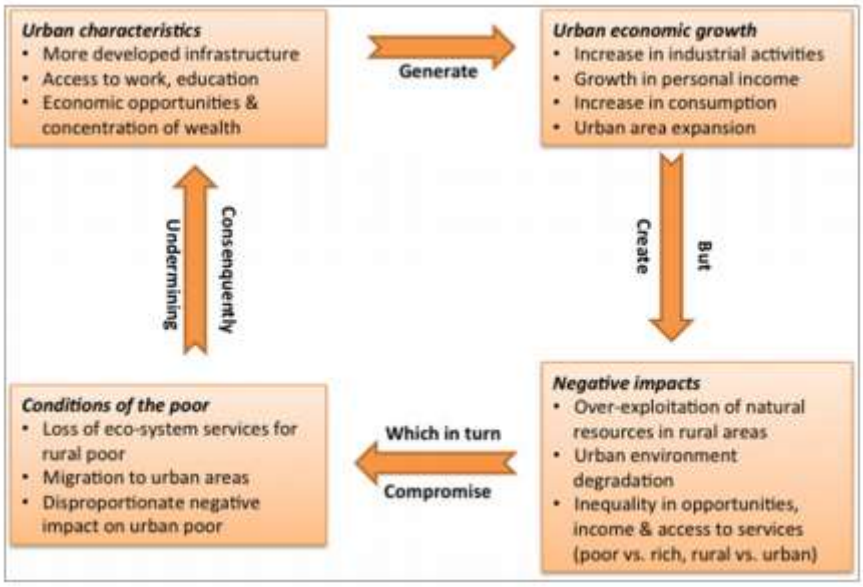


Figure 2.4: The urbanization cycle and the influence on environment (Piña and Martínez, 2016)

It is obvious that urban development in a significant determinant of environmental degradation in developing countries. As a result of the increase of industrialization and the efforts to improve their foreign earnings and being attracted to investors, the aggressive extraction of resources and production of dangerous products and by-products has been on

increase in the developing countries, whereas, the government is still far from meeting the basic needs of the populace.

In reference to Williams and Millington (2004), even where sustainability is achieved, it could either be weak or strong, and observed that most of developing countries are practicing weak sustainability because they are mostly human-centered and places much emphasis on economic growth, and as such the developing countries are missing the path to sustainable development. Though, Corvalán, Kjellstrom and Smith (1999) opined that weak sustainability could be advantageous in meeting short-term basic needs but not significant. Instead, the administrator should be the basic service providers and aim for the quality of life improvement of its people without being detrimental to the environment.

2.3 Urban Development, Sustainable Development and Sustainable Urban Development

The genesis of the sustainable urbanization could be traced to the sustainable development which became popular from the Brundtland Report. Though, most of authors agreed that the concept is noble and important, but it signaled the endless discourse on the world's economic and environment sustainability. Mitlin and Satterthwaite (1996) observed that the hindrance and misunderstanding becomes glaring at the point of moving from theory to practice. Among the issue that have been causing this scenario are: the continuous dominance of economic growth over social and environment (Giddings, 2002), the influence of individual consumption and behavior pattern (Spaargaren and Van Vliet, 2000), and putting of development and economic growth on the same level (Purvis and Grainger, 2013). Among the content of the section that is specifically for urban challenge in the policy direction, it was observed that government was advised to develop settlement strategies that will be explicit in guiding the process of urbanization so that the pressures on the larger cities and smaller towns and cities that building up will be integrate with their rural hinterlands (Brundtland Report, 1987). Olofsson and Sandow (2003) observed that the decentralization and debate on governance started with the Brundtland Report, and after that both at the national and international level, the importance of sustainable development keeps increasing.

Most of international acts that was developed after the report emphasized the "sustainability-urban development relationship". Among these acts is "Sustainable Cities Program" that was established in 1991 (Olofsson and Sandow, 2003), the program plays a major role in the deployment of Agenda 21, which was one of the significant outputs of the Rio summit in 1992. There is a significance primary mechanism in the Local Agenda 21 that could be accepted for the deployment of sustainable development at the local level. The implication of these is that the sustainable development policies became focused on cities from the 1990s. UN (2001) posited that Habitat II is also a significant because it includes among its commitment the "sustainable human settlements". At global level, the focus of Habitat II is on several areas among which are: sustainable land use, population and sustainability of "human settlement development", sustainability of environment, and, achievement of "healthy and livable human settlements" (UN, 2001).

Subsequent to the global attention that is been given to the sustainable development as a result of the global efforts, the attention of the academics is on the best way to define the concept and its tenets. In the first place, the urban aspect of the main sustainability target was divided into three dimensions (social, economic and environment). Secondly, the concept of SUD develops along with sustainability and it took a shape which is a reflection of "principles, policies and actions on space". Since the publication of the publication of Brundtland Report, the SUD has become an essential field of policy all around the world that is aimed at integration the three main pillars of sustainability at the urban level in creating future for the cities. In reference to the study of Van Geenhuisan and Nijkamp (1994), a new potential to attain the socio-economic, demographic and technological development levels was identified with the support of environmental conditions. It is apparent that poverty increase in the cities could make concept of sustainable development to be urban sustainability oriented.

Meanwhile, in the word of Kotharkar and Bahadure (2010), SUD is an attempt aimed at developing urban areas in order to enhance the economic opportunities and ensure the wellbeing of the residents, without neglecting the protection of the natural environment, which serve as the basis for the people and society survival. UNCED (1992) observed that ten out of the twenty-seven principles contained in the Agenda 21 has close relationship

with urban issues. SUD in the context of human settlements was defined according to Yanarella and Levine (1992) as the "continuing maintenance, adaptation, renewal, and development of city's physical structure and systems and its economic base in such a way as to enable it to provide a satisfactory human environment with minimal demands on resources and minimal adverse effect on the natural environment". In view of this definition, most of the planning agencies and their policies have been trying to integrate this concept and tailored it to suit their vision.

Similar to El Sakka and St Tagamoa (2015) who defined the sustainability of urban areas as the development and redevelopment or urban areas in a manner that it will contribute to the improvement of the urban environment, their economy and promotion of equity and social justice among the residents. The study opined that the future goals of the sustainability of cities is urban sustainability, and as such there is need to be conscious of not only the manner at which the three dimensions of sustainability can contribute to the achievement of economic development which will in turn contribute to the effective management of the environment. The goals of sustainability can be attained by the governmental and economic reform, with the development of new policy like smart development and boundaries for urban growth. Literature shows that some sustainability advocates based their assumptions on the today's resources will be the same tomorrow and the people has the potential of a new discovery (El Sakka and St Tagamoa, 2015).

2.3.1 Sustainable Urban Development as a Concept

It is a known fact that the issue of sustainable development has become a global issue, which is aimed at the manner at which the natural and human systems survival could be achieved in distant future (Bahreini and Maknoon 2001). However, SUD according to Hall (1993) was defined as the manner at which today's trend of development will ensure the continuous development of the urban areas and communities in the future. Theoretically, SUD was as a result of the debates on the environment which was done in respect of the environment, most especially the urban environment that was presented towards the "sustainable development theory" which is aimed at given support to the environmental resources. SUD is needed to point out the limitation of environment so as to match the

human activities that are related to urban areas with design techniques within these limitations. Blower (1994) observed that the resources for present and coming generation maintenance issue are in this theory raised through the maximum utilization of land and make a conversion of waste to renewable sources. It is in the theory of SUD that the following topics were highlighted; prevention of urban and regional areas from pollution, reduction in the productive capacity of the environmental levels (local, regional and national), advocating for recycling, absence of support for the development of dangerous and removing the dichotomy between poor and rich. Moreover, SUD is interested in caring about the manner at which the goals of planning could be achieved, with the believe that authority should have total support from the urban environment. The sustainability of the city shape is part of what the theory studies, sustainability of the settlement pattern, ensuring the efficient transportation patter in consumption of fuel, and arranges urban centers in hierarchy because the urban development was accepted for the fun of urbanites (Larijani, 2016).

In the aspect of development studies, SUD is very broad and as such it seems difficult in providing a clear definition, however, there was an effort made in trying to extract the meaning from the functional studies of concepts, rationale and historical background. The main thought on SUD is not only considered in association with background story on development, but also in regards to development principle of various sciences, with the consideration of social knowledge. Moreover, given more attention to the development gives room for the increase in the quality and volume of the knowledge about urban environment that are in existence; includes the identification and air pollution removal, greenhouse gases, and the world climate change. The advancement is made in the social science field with the assistance of different research agenda on the sustainability. This is an indication that the discourse on the urban development has been under the impact of concepts and different issues, which contradict the science like economic policy and experimental knowledge theoretically, which most time shaped by the historical development (Larijani, 2016).

As a result of the realization of the significance of cities and the large populations, infrastructure and properties that are within the urban areas, special attention has been accorded the cities by the United Nations (Chan et al. 2016). This special recognition was evident in the summit of the Heads of State and Government representatives at the United Nation Headquarters in 2015 where it 17 new SDGs was developed (Chan et al. 2016). Out of the 17 SDGs, SDGs 11 was primarily targeted at sustainability of cities and the inhabitants. The goals are to ensure that by 2030, all the cities inhabitants should have access to adequate, safe and housing that is affordable, with the basic services, and the slums upgrading. In addition, the goal 11 meant to ensure provision of accessible safe, affordable, sustainable transport systems for all by 2030, and the improvement in the inclusive and urbanization sustainability, and capacity for participation, integration of human settlement sustainability planning and management around the world; to fortify the efforts in protecting and guide the cultural and heritage of cities, disaster management and reduction in the loss of life and other losses which focus on the protection of the poor people and the vulnerable in the societies. In addition, the goal aim at reducing the consequential influence of environment on the cities in relation to the bad air quality and wastes, provision of general access to safe, inclusive and accessible, green and public spaces, to support positive economic, social and environmental development planning, mitigating the climate change through the efficiency adoption, mitigation and adaptation strategies and gives support to cities in developing countries through technical and financial assistance (Chan et al. 2016). Moreover, SDGs 11 demands that by 2030, there is need for cities to reduce significantly the number of deaths and the number of people that are affected by one disaster or the other which could have direct losses on the economy in relation to the gross domestic product, which includes water-related disaster, with the view of provide a shield for the vulnerable.

Based on the aforementioned, several authors have revealed that there is linkage between the prosperity and sustainability of cities which implies that cities can only maintain the prosperity if the social and environmental objectives are wholly integrated with economic goals (Yigitcanlar et al. 2015). In reference to these, for some years now, new framework and guidelines have been developed by lots of cities in the developed world to incorporate

sustainable development in the urban planning and process of development (Yigitcanlar and Kamruzzaman, 2015). For example in Europe, the document "Sustainable Urban Development in the European Union: A Framework for Action" (EU, 1998), and the "Leipzig Charter" (EU, 2007) are the main policy documents that were utilized in setting up the strategies for sustainable urban development to be implemented across all levels. In addition, most of the national scale reports have given due recognition to the SUD as the main objective of planning and development, for instance, The "Fifth National Policy Document on Spatial Planning in the Netherlands" (VROM, 2001), and "Planning Policy Statement 1 in the United Kingdom" (DCLG, 2005). Several local efforts abound that are targeted at promoting the sustainable city formation through the advantage of urban planning and design. Study of Berke and Conroy (2000) indicates that there is no significance difference in the way support were given to the sustainability principles between those plan that aimed at integrating SUD and those that do not (Yigitcanlar and Kamruzzaman, 2015). But recently, many local councils in Europe, North America and Australia in their planning efforts have find out the new and innovative method of integrating sustainability rationale, technologies and framework in their planning schemes (Bulkeley, 2006; Nijkamp and Perrels, 2014; Pearson, Newton and Roberts, 2014; Raco, 2015). Moreover, some efforts have been put in place though with little success in some developing countries like China, Korea, Malaysia, Turkey and Vietnam (Djoundourian, 2012; Pugh, 2013; Yigitcanlar, Kamruzzaman and Teriman, 2015; Yigitcanlar and Bulu, 2015). But much is still left to be done in improving the situation most especially those emerging economies countries in the developing world (Jones, Tefe and Appiah-Opoku, 2015; Musakwa and Van Niekerk, 2015).

Differently from the national and international guidelines and framework for the assessment of sustainability, Dizdaroglu, Yigitcanlar and Dawes (2012) observed that lots of contribution have been made by both academia and industry. The efficient decision making in respect of the sustainable development process have not been made possible without the support of these tools and methods (Schmidheiny, Chase and de Simone, 1997; Bentivegna et al. 2002; Brandon and Lombardi, 2010; Dur and Yigitcanlar, 2015). In addition, the growing awareness on the sustainability also plays an important influence on

some of the industry activities today; as it is evident in the appearance of new sustainable businesses and eco-friendly technology firms (Alvarez et al. 2015; Gibbs and Neill, 2015). On this note, Utting (2000) highlights the functions and responsibilities of corporate businesses for adopting policies and practices that will give support and promote "Sustainable Urban Development". It observed that "World Business Council for Sustainable Development" (WBCSD, 1997), "Global Reporting Initiative" (GRI, 2002), "Organization for Economic Co-operation and Development's Sustainable Development Standards" (OECD, 2002), and, "United Nation's Transforming Our World: the 2030 Agenda for Sustainable Development" (UN, 2015), has been at the fore front of promoting the implementation of sustainability management in companies. In the declaration of the United Nation's Agenda 2030, it was stated that the global challenges such as extreme poverty, environmental degradation, and climate change can only be ameliorated or eliminated if all stakeholders make a contribution to the implementation of the "Sustainable Development Goals" (Sachs, 2012; Griggs et al. 2013). Meanwhile, Rauscher and Momtaz (2015) opined that this view is highly critical because the realization of cities sustainability cannot be realized without all businesses and government being eco-friendly with the communities in general across countries. In addition, the advancement in the urban technologies has also been identified as a contributor to the efforts that are targeting at dealing with the unsustainability output being produced from the urban areas (Marsal-Llacuna et al. 2015).

CHAPTER 3
SUSTAINABLE URBAN DEVELOPMENT FRAMEWORK

3.1 Introduction

All around the world, since the issue of sustainable has been receiving a global attention; several countries have initiated measuring tools for various types of development. For instance, "Comprehensive Assessment System for Building Environmental Efficiency" (CASBEE) was developed by Japan as a standard and guidelines for building and urbanization sustainability. Similar rating system was developed in the United State which is "Leadership in Energy and Environmental Design for Neighbourhood Design" (LEED-ND). This tool is being used to assess the urban development sustainability with the integration of LEED which is for the scale evaluation of building for its sustainability. Meanwhile, various other tools have been developed for assessing the environmental performance of urban development which is presently and effectively in use all around the world (Bakar and Chen, 2013). The development of different tools was as a result of challenges facing the definition, exploration and implementation of SUD (Smith and Bereitschaft, 2016). This was evident in the earlier study of Godschalk (2004) who observed that development of standards and principles that will yield sustainable development has been a significant challenge facing the professionals in the urban development. The improvement in the deployment of environmental performance evaluation tools for new construction has contributed immensely to the sustainability practices at different levels of building performance. Some of these tools as presented in Table 3.1 have been developed with different evaluation criteria based on the peculiarities that will be in tandem with the traits of the countries for which the tools were developed. The tools as presented in Table 3.1 together with the countries for which it was developed has in them some common criteria that is applicable to some of them that are widely used. Among the common criteria: energy, indoor environment, site, water and materials resources. Also included is the assessment of economic and social through development of some designated sections in line with the local peculiarities of the country. In a nutshell, it observed that urban development sustainability is assessed in relative to the developed

areas in line with the sustainability indices, which includes economics, social, land uses, transportation, communication and the evaluation of building forms to ensure housing performance (Bakar and Chen, 2013).

3.2 Evaluation of Sustainability in Urban area

Achieving sustainability of urban areas has become a critical goal of the achievement of sustainable development in the recent years all around the world. Though, several works have been done to ensure the sustainability of human settlement and the strategy to be adopted in getting it done (Al Qahtany, Rezgui and Li, 2013; Choguill, 2008; Smith and Bereitschaft, 2016). The study of Paralkar et al. (2017) noted that evaluation of happiness of the inhabitants and its sustainability at the neighbourhood level has tendency of pulling together a great potential and knowledge that will be required in the promotion of sustainable urban development (SUD). Some studies observed that lots implementations have been carried out at the local level (Szibbo, 2016), but the significance of urban sustainability is more understood when such implementations become more spread. Paralkar et al. (2017) observed further that inclusion of policies and incentives so as to effectively integrate the three dimensions of sustainable development with urban plans has been receiving more attentions.

The approaches to urban planning sustainability and design have been appearing mainly in contrast to urban sprawl, the rapid increase of the periphery and dependence of vehicle and the weakening of individual's relationship with environment and society. The important rationale such green spaces conservation, creation of active settlements and increase in the participation and supporting local traits are included in the approaches. But, the knowledge on the fact that these practices have shift from the general objectives in the implementation have been increasing the merit of managing the process. Thus, Yildiz et al. (2016) and Özdal (2015) opined that the establishment of appropriate assessment program to monitor the implementation of those policies and provide the feedbacks in order to achieve the desired level of SUD is required.

According to Smith and Bereitschaft (2016), different evaluation tools have been developed in various countries to address whether urban area could be sustainable or not.

Also, to give a direction on how it could be achieved in a situation where the assessment shows unsustainability. The status of the settlements is evaluated with these tools in the manner of sustainability and its success in achieving stated objectives within the context of a set of rationale and criteria. The effective conceptualization and definition of the manner at which the people can contribute to the sustainable development of the urban areas through planning and design can be achieved through the use of the assessment tools.

In response to the drastic global changes in all dimensions (economic, social and environment), the use of sustainable urbanism as a strategy, as well as the development of an effective mechanism for the evaluation of sustainability and enhance the strategy at the main issues at all levels (Hamedani and Huber, 2012). The need for monitoring and evaluation of the implementation has increased with increasing attention to sustainability policies and initiatives. The first objective of sustainability evaluation initiatives was to find out whether people or organizations are making progress in the area of sustainability (Özdal, 2015). In doing so, selecting the appropriate tools and giving effective feedback has become increasingly important. Sustainability evaluation methods applied in different contexts and at different scales in different parts of the world makes provision for the global, contextual, pluralistic and progressive framework (Gil and Duarte, 2013).

Urban sustainability assessment methods are based on three-dimensional development assessment; building level, neighbourhood level and city level. Initially, these assessment methods were introduced to measure and certify the sustainability performance of green buildings, also called green buildings, based on measurement results.

The BREEAM (Environmental Assessment of Building Research Establishments) system was first developed in 1990 to assess environmental problems with buildings. The number of building evaluation systems has since increased. These systems evaluate the performance of the building based on different criteria such as CO2 emissions, indoor air quality, accessibility and energy efficiency, as well as visual, auditory and thermal comfort. Taking into account rapidly developing urban environments around the world, it is inevitable that new institutions are built in accordance with the principles and criteria of sustainability. The instruments for sustainable development on a building scale, however,

were insufficient to create sustainable settlements. As a result of these, new programs have developed for checking the neighbourhood sustainability.

The buildings performance sustainability does not necessarily mean the sustainability of the entire urban area. For Instance, even if the whole neighbourhood comprises of high-quality buildings in terms of sustainability, it would not be good to mention the sustainability of the neighbourhood if it is surrounded by heavily paved parking garages (Farr, 2008). For an appropriate sustainable urbanization policy, it was intended that an evaluation program should cover the urban area. The shortcomings of the sustainability test at the building level have led to evaluation programs being developed in a more all-encompassing way. As opined by Choguill (2008), while sustainable urban settlements are followed by sustainable housing and new contributions, most sustainability ideas are formulated at neighbourhood level. Based on this insight, sustainability programs are being developed at neighbourhood level in the current century. According to Farr (2008), movements such as smart cities and new urban planning, which play a crucial role within the implementation of the concept of sustainable development in urban areas, form the basis of assessment tools.

As said by Choguill (2008), the sustainability of a city will remain limited as long as the elements that make it up do not exist. Sustainability assessment at neighbourhood level is an effective way to perform a comprehensive assessment that takes into account the synergies between the various components of the urban system and the dimensions of sustainability (Sharifi and Murayama, 2014). The evaluation of the neighbourhood is not only buildings, it also an evaluation of the synergies and activities between these buildings, the services provided the residents, the other living things and all elements of this wide range (Cole, 2010). With all these characteristics, the assessment of neighbourhood sustainability is directly related to urban planning and design.

First, the settlement evaluation began with CASBEE urban development, developed by CASBEE. This was followed by the tools developed by LEED and BREEAM. These instruments use for assessing sustainability in the neighbourhood contributes to a greater awareness of sustainable urban development and urban growth, from the absolute production of buildings and spaces to the environment.

Though, these assessment tools are used in buildings and neighbourhoods, the assessment tools for urban sustainability are still evolving. Implementations often give direction to development plans, but they are not yet widely used. Sharifi (2013) explains this situation through multi-step planning processes at different urban scales, with long-term evaluation and a small number of applications.

Table 3.1: Assessment tools for Sustainable Urban Development, Adopted from Abu Bakar and Soo Cheen, (2013)

No	System Name	Country	Year
1	CASBEE for Urban Development	Japan	2007
2	LEED for neighborhood Development	US	2008
3	RHSI (Rural Housing Sustainability Index)	Ireland	2004
4	FGBC-Green Development	Florida, US	2009
5	DDC-Sustainable Urban Site Design	New York, US	2008
6	ACI - Adriatic Common Indicators	Greece, Italy, Slovenia	2004
7	ACTEUR - Analyze Concerté des Transformations et des Equilibres URbains	France	2004
8	Baden-Württemberg-Indicators in the framework of the Local Agenda 21	Germany	2004
9	Catania - State of the Environment Report	Italy	2004
10	CI - Cercle Indicateurs	Swiss	2004
11	CEROI - Cities Environmental Reporting on the Internet Indicator Database	Czech Republic, Finland, Others	2004
12	Cities21® Assessing Mutual Progress Toward Sustainable Development	Czech Republic, Finland, Latvia, Poland, Others14	2004
13	Core Indicator System of the cities Basel and Zürich	Basle, Zurich	2004
14	Czech Republic - Environmental indicator	Czech Republic	2004
15	Czech Republic - Transport Yearbook 2002	Czech Republic	2004
16	Denmark National Strategy for Sustainable Development	Denmark	2004
17	Nature Balance	The Netherlands	2004
18	EcoBUDGET	Germany, Greece, Italy, Sweden, United Kingdom	2004
19	Ecosistema Urbano	Italy	2004
20	EEA - Core set of environmental indicators	Europe	2004
21	EEA - Environmental Indicators	Europe	2004
22	The Integrated Regional Framework for the North East	England	2004
23	Environment Explorer Amsterdam	The Netherlands	2004

24	TISSUE - Trends and Indicators for Monitoring the EU Thematic Strategy on Sustainable	Finland, the Netherlands, UK, France, Italy, Switzerland, Czech Republic	2004
25	SUDEN - Sustainable Urban Development European Network	France, Italy, Denmark, Romania, Belgium, Poland	2004
26	Indicators for Sustainable Development in Scotland	Scotland	2004
27	ISD - Indicators For The Sustainable Development In The Mediterranean Region	Mediterranean area	2004
28	Quality of Life indicators	United Kingdom	2004
29	SURPAM - Sustainable Urban Renewal Project Assessment Model	Hong Kong	2008
30	GBI - Green Building Index for New Residential Development and Township	Malaysia	2011

3.2.1 LEED-ND for Neighbourhood Development

The rating framework of LEED-ND is one among the foremost current urban planning instruments for analyzing and encourage mixed-use and high-density development.

LEED-ND is an assessment system generated by the US Green Building Council (USGBC) in 2007, as a team with the New Urbanism and the Natural Resources Defense Council Congress. In spite of fact that the LEED rating framework for new construction is commonly known, rating framework of the LEED-ND is simply starting to be perceived at neighbourhood level (see Table 3.2). It is an assessment method that incorporates the principles of smart growth, green building and new urban design into an extensive framework for neighbourhood design assessment. Using design principles is the point to encourage sustainable urban design. Presently, LEED-ND is considered a "gold standard" in North America for sustainable development of neighbourhood and has become hugely popular with planning experts, sustainability consultants and developers. The acceptance of this system has led to the neighbourhood sustainable design implementation across the world (Sharifi and Murayama 2015).

The official LEED-ND standard was published in 2009 as part of test evaluation system. The projects that is aiming for LEED-ND certification have to be assessed through recognized LEED-ND expert which assesses three main development categories: Green Infrastructure and Buildings (GIB), Smart Location and Linkage (SLL) and Neighbourhood Pattern and Design (NPD). There are two optional categories for regional priority credits and innovation credits. There is a different requirement for each main category, plus a list with potential credits. The certification limit based on the total number

of earned points: (40-49) certified, (50-59) silver, (60-79) gold and (80+) platinum (USGBC, 2014). Other assessment systems developed around the world to evaluate sustainable communities, but in North America LEED-ND is the foremost well-known evaluation system (Sharifi and Murayama 2013a).

3.2.2 Smart Location and Linkage (SLL)

SLL concentrates on selecting sites that decrease the negative impact of the new environment avoiding contributes to urban expansion and its consequences (USGBC, 2014). Representative development of propagation: commercial use in individual dwellings, low density and vehicle-bound environmental areas can damage natural resources environment: It may deplete forest lands, destroy wildlife areas and destroy water quality, also the increased rainwater drainage and wetlands pollute the air and greenhouse gases emission. Agriculture is often moved and moved from arable land to areas requires more energy and chemical inputs for food production (Atakara and Akyay, 2017). Skip this development (a model for land use, as well as these direct environmental impacts that new developments are often incompatible with existing ones, often lost, undeveloped soils) may also indirectly affect the environment through further development in an undeveloped area. One of the most damaging consequences of urban expansion is the increase in the number of travels. People working and living surroundings tend to travel longer distances, own more cars, drive more cars and increase traffic risk walk less and kill. The emissions of vehicles take part in climate change, particle pollution and smoke it is harmful to natural ecosystems and human health (Loures, Santos and Thomas, 2007). In addition, parking space and ground surface are necessary for this in supporting vehicle journeys which consumes land and non-renewable resources, disrupts and increases the natural flow of rainwater urban heat islands (USGBC, 2014).

In order to ameliorate the impact of urban expansion and create more livable communities, sites near to existing cities and city centers, good access sites to public transport, filling sites and sites should be preferred and places already developed and adjacent to existing development projects. The selection of these sites prevents the development of surrounding sites. Additionally, these locations infrastructure, roads and other infrastructures that

minimize the expansion of impermeable surfaces that reduce the need for new infrastructure and increase drainage of rainwater. In these places that are respectful to the environment, the benefits can often be more than one and strengthen: proper transport, such as cars, buses, minibus, heavy trains, light rail, bike paths and sidewalks are more accessible to neighbourhood centers and city centers, which are often linked with shorter journeys. Research has revealed that living in a multifunctional environment near businesses and services promotes walking and cycling, improves respiratory and cardiovascular health, and reduces the risk of obesity and hypertension (USGBC, 2014).

3.2.3 Neighbourhood Pattern and Design (NPD)

NDP focuses on creating compact, pedestrian areas and multi-use neighbourhoods connections with neighboring communities. These lively neighbourhoods offer many advantages to the environment, residents, employees and visitors. The compact neighbourhoods that is using land and infrastructure effectively prevent fragmentation natural areas loss and agricultural land loss, slowing the spread of economic resources and low-intensity development of landscape of a region. Residents access easily to services, public areas and shops within walking distance, saves money and time by cycling and making shorter car trips when people choose to ride to avoid emissions. Compact development facilitates access to public transport as public transport progresses it is more economical when supported by high population concentrations. Moreover, compact neighbourhoods with small blocks connected encourage walking and cycling, increased connectivity, shorter travel distances, more welcoming pedestrian environment and slower traffic. Lower traffic speeds, which are often seen in intensive developments, can also reduce the rate of injury.

There are some urban elements such as footpaths and sidewalks, attractive building facades, street trees, minimum parking, minor disruptions and the measures of slowing down automobiles that increase the activity of pedestrian (USGBC, 2014). Public spaces such as squares, playgrounds and parks can promote active recreation and social interaction and can also help control rainwater drainage reduce the effects of urban heat islands. Shared gardens also promote physical activities and social interaction improve

access to fresh and local products (Cahantimur, 2007; Ewing and Cervero, 2010). Communities offering different types of housing adapted to a range of income, age and physical facilities to help the residents live near to their workplaces, also to heal the community to save its inhabitants and to give chance for families to stay if their neighbourhood changes over time.

3.2.4 Green Infrastructure and Buildings (GIB)

The GIB concerns is on the measures that can leads to reduction in the implication of operation and construction of buildings and neighbourhood infrastructure on the environment. The high proportion of energy and water consumption is being accounted for by building in the United States. In general, the building consumes a large portion of new wood, gravel sand, and stone used around the globe. The technologies sustainable building reduces use energy and waste, water and water materials more efficient than traditional building applications. The inclusion of attested green buildings is a way to decrease the bad impact on the environment. These buildings perform significantly better in environmental measures field, and the cost of per square meter is comparable to the cost of traditional buildings. The energy efficiency is an important strategy to reduce greenhouse gas emissions and pollution, which is probably the case. The environmental most negative impact of infrastructure and building operations is the electricity production from the use of fossil fuels that is liable for water pollution, air pollution and more than one third of US greenhouse gas emissions; river habitats may be affected by hydroelectric power plants and offers nuclear waste processing and security issues. Building systems: electricity, heating, lighting, air conditioning, ventilation and others can be designed to reduce energy consumption compared to traditional design techniques. The same advantages with neighbourhood infrastructure components such as water, wastewater pumps, street lighting and traffic signals.

By reusing existing buildings, the environmental impact of construction can be limited. Reuse prevents the environmental impact of raw material extraction, production and transport, and decreasing volume of the demolition and construction wastes, disposal costs extends the service life of construction sites. Reusing of exists infrastructure components

and systems can also decrease construction costs. Also, another result of standard development programs and practices is urban heat islands. Uses of non-reflective dark materials for roofs, walkways, parks and other surfaces increases the surrounding temperature as the solar radiation is absorbed and transmitted to the surrounding areas.

Water savings can also be reduced with designs and technologies developed to reduce water saving limitations and to save water. Drinking water consumption can be reduced indoors with the help of low-flow sanitary fittings and waterless urinals. The use of outdoor water primarily for landscape maintenance is an important part of US consumption of water and can be decreased by selection a careful plant and design view.

The building construction process itself is generally harmful to ground ecology, animal populations and natural plants. This problem can be decreased by limiting construction process to specific parts and limiting the development footprint. Protecting sensitive areas and open spaces by using strict boundaries it reduces the damage to the ecology of the site and protects natural vegetation, natural habitats and trees. Construction can also cause baring due to water, wind and soil and water pollution from the site can cause pollution and loss of arable land. Increase rainwater drainage, contaminate nearby water bodies, and possibly require more pesticides, irrigation and fertilizer. These problems can be avoided by preparing a plan to control erosion and sedimentation (USGBC, 2014).

3.2.5 Innovation and Design Process (IDP) and Regional Priority (RP)

The strategy for Sustainable design has been constantly developing. The aim of this LEED category to recognizes projects due to innovative planning methods and sustainable building functions. Sometimes a strategy leads to the performance of a project much higher than necessary in an existing environment LEED Loan. Other strategies cannot be dealt with under the LEED credit or condition, but deserve respect for sustainability benefits (USGBC, 2014). Moreover, LEED is implemented ultimate efficiently as part of a compliant team and this category relates to the role of a LEED Accredited Expert in supporting this process.

As for the priority of region, as a result of some environmental concerns which are peculiar to a particular area, USGBC volunteers and the "LEED International Roundtable" highlighted some special environmental priorities which are peculiar to their area and the credits that address those issues. The project teams were encouraged by these regional priorities so as to focus on their immediate environmental priorities. The USGBC has six RP credits for each site and rating system within the department or country borders. The participants were asked to define which environmental problems were most important in their countries or regions. The problems can be natural (e.g. water scarcity) or artificial (e.g. contaminated water) or environmental problems (e.g. water inadequacy) or environmental assets (e.g. plenty of sunlight). Fields are identified by a combination of priority issues, for example, an affected river basin is compared to an urban area with pristine river basin. Participants gave priority to appropriations to overcome the major problems of certain places. The main goal of RP credits is to improve LEED project team's ability to classify critical environmental issues throughout the country and around the world.

Table 3.2: The LEED-ND Rating System showing the credit allocating to individual indicators, Adopted from USGBC (2014).

Prerequisite/ Credit	**Credit name**	**Points**	**Prerequisite/ Credit**	**Credit name**	**Points**
	Smart Location and Linkage (SLL)			**Green Infrastructure and Buildings (GIB)**	
P	Smart Location	Required	P	Certified Green Building	Required
P	Imperiled Species and Ecological Communities Conservation	Required	P	Minimum Building Energy Performance	Required
P	Wetland and Water Body Conservation	Required	P	Indoor Water Use Reduction	Required
P	Agricultural Land Conservation	Required	P	Construction Activity Pollution Prevention	Required
P	Floodplain Avoidance	Required		Certified Green Building	5
C	Preferred Locations	10		Optimize Building Energy Performance	2
C	Brownfield Remediation	2		Indoor Water Use Reduction	1

C	Access to Quality Transit	7		Outdoor Water Use Reduction	2
C	Bicycle Facilities	2		Building Reuse	1
C	Housing and Job Proximity	3		Historic Resource Preservation and Adaptive Reuse	2
C	Steep Slope Protection	1		Minimized Site Disturbance	1
C	Site Design for Habitat or Wetland and Water Body Conservation	1		Rainwater Management	4
C	Restoration of Habitat or Wetlands and Water Bodies	1		Heat Island Reduction	1
C	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1		Solar Orientation	1
				Renewable Energy Production	3
	Neighbourhood Pattern and Design (NPD)			District Heating and Cooling	2
P	Walkable Streets	Required		Infrastructure Energy Efficiency	1
P	Compact Development	Required		Wastewater Management	2
P	Connected and Open Community	Required		Recycled and Reused Infrastructure	1
C	Walkable Streets	9		Solid Waste Management	1
C	Compact Development	6		Light Pollution Reduction	1
C	Mixed-Use Neighbourhoods	4			
C	Housing Types and Affordability	7		**Innovation and Design Process (IDP)**	
C	Reduced Parking Footprint	1	C	Innovation and Exemplary Performance	5
C	Connected and Open Community	2	C	LEED Accredited Professionals	1
C	Transit Facilities	1			
C	Transportation Demand Management	2		**Regional Priority (RP)**	
	Access to Civic and Public Space	1	C	Regional Priority	4
C	Access to Recreation Facilities	1			
C	Visit ability and Universal Design	1			

C	Community Outreach and Involvement	2
C	Local Food Production	1
C	Tree-Lined and Shaded Streetscapes	2
C	Neighbourhood Schools	1

3.2.6 Present concerns with LEED-ND

While some studies have been conducted on the criticism of the LEED-ND Newsham et al. (2009) and Retzlaff (2008), some evaluation studies Dermisi (2009) have proceed on LEED-NC, a scoring tool intended for singular buildings get by a presage to LEED-ND. Also, Studies have been conducted to evaluate houses by LEED Reposa (2009) and existing buildings (Hodapp, 2012). How can the LEED-ND rating system possibly be used for analyzing the adequacy within municipal governments to steer development was investigated by (Talen et al., 2013). Other study such as Smith (2015), analyzed the LEED-ND projects geography in the United States and found a bi-coastal configuration existed through recording sites. Wangel et al. (2016) de-constructed the rating framework and tested it to be sure it actually assessed what should examined through sustainability categories, and tested its inner validity as a performance-based scoring instrument. However, these studies don't examine residents or finished assessments after the occupation of LEED-ND neighbourhoods, instead, they compared and analyzed the data from the secondary LEED-ND score card.

Similar to other Smart Growth, "New Urbanism" and "Traditional Neighbourhood Design" (TND) frameworks, LEED-ND includes both green building standards and concerns about sustainability planning. Evaluating method seeks to classify change in climate at the level of neighbourhood, by enhancing energy decrease strategies, recompense renewable energy supply and promoting solutions at the level of building, thanks to green infrastructure under the influence of "urban heat island" (UHI). It was noted in the study of Freilich et al. (2010) that LEED-ND responds to concerns that the new urban design principles are independent of growth and sustainability management issues, as the rating system has incorporated new city planner and smart growth principles into techniques. Though there has been little research on socio-cultural and socio-economic diversity in LEED-ND neighbourhoods, there has been much research on the lack of diversity of the predominant

new urban design. New city planners and smart growth have ignored diversity, affordability and social equality and LEED-ND neighbourhoods are likely to do the same (Talen, 2010; Talen, 2012; Talen and Koschinsky, 2011). A few in-depth surveys of new city planners have presumed that only a small percentage of their homes are suitable for house owners that earn the "area median income" (AMI) of the region in the surrounding area of region, and developers demand homes premium (Talen, 2010; Tu and Eppli, 2001). Moreover, in new sustainable neighbourhoods, research is necessary for demographic structure and distribution of income.

The study of Fraker (2013) investigated the criteria of the LEED-ND rating system by using the four regions data performance, in Sweden B001 in Stockholm and Germany (Vauban in Freiburg and Kronsberg). Fraker discovered that the most of the rating system points are given to elements that not significantly decrease CO2 emissions, for example by allowing the neighbourhood to evaluate through a recognized LEED-ND expert. Buildings examined in four European different neighbourhoods outperformed LEED-certified North America green buildings. However, they lost a few points because the official LEED certification process didn't finish. Also, he found that a low percentage of ratings given to major categories such as renewable energy sources and energy efficiency. Fraker concluded that the goal of becoming a trademark owner with the LEED certificate was ultimately important, and first, to some extent, it could be said that a "market-based rating system" has become a "self-fulfilling prophecy", because the brand is the continuation of the brand and marking a list instead of creating high-quality neighbourhoods that are constantly re-evaluated by performance statistics.

A number of recent LEED-ND studies have explored the possible effect on mode and vehicle mileage ratio (VMT). Ewing et al. (2013) think that the number of VMTs for each person participating in LEED-ND developments would decrease by 24-60% compared to the regional averages. However, this is a prediction study using comparison data from the LEED-ND project data and the scorecard from the "National Household Travel Survey (NDHP) 2009. Further statistical analysis and research are required to confirm these estimates.

Referring to the Garde (2009) study, which critically assessed the scoring system at an early stage; he found that involvement in the LEED-ND scoring system did not ensure neighborhoods sustainability. Although LEED-ND has been reviewed since its beginning in 2007, it never included the Post-Occupancy Assessment (POE) in its standards. Although Mapes and Wolch (2011) claim that LEED-ND is a deductive method, they encourage developers not to limit themselves to "green washing" to include functions that include a greater effect on sustainability for long-term especially due to post-occupation assessment and assessment of built-in residents' perceptions and absence of attention to affordable housing. An updated version of LEED-ND (LEED-ND v.4) was published in 2013 (USGBC 2014), which meets industry standards and current criteria for LEED assessment systems (LEED BD & C) for design and building construction. In order to better result its intention in LEED-BD and LEED-C rating systems, various credits have been renamed. Moreover, some loans reflect the underlying LEED requirements and standards for rating systems more accurately in NC and other BD & C assessment systems.

3.3 Post-Occupancy Assessment for LEED-ND

Among the disadvantages of LEED-ND rating system, the scarcity of performance-based long-term indicators, which are constantly being assessed as to which sustainability claims to be achieved in the area of sustainability, particularly in the area of social sustainability. Although other USGBC LEED programs are evaluated after occupation, this criterion has never been specifically integrated into LEEDND. Wangel et al. (2016) emphasize that in their research, that the scoring system are not well included the performance criteria. Unfortunately, the present evaluation system focused on existing of certain features of established way and the containment of processes does not classify how these functions or processes work effectively. Sharifi (2016) acknowledges that LEED-ND needs a better assessment strategy to document the achievement of the original development objectives.

In the architecture field, "post-occupancy assessments" (POEs) or "post-occupancy analyzes" (POAs) are a useful tool for assessing the performance of buildings (USGBC 2014). POEs include a building performance survey and / or a satisfaction of residents after settling in a settlement. POEs try to determine if the building meets the intended

environmental objectives (indoor air quality, materials, energy, water, etc.). Private consultations or university institutes often complete access points because they want to measure the performance of buildings for marketing or educational purposes (Szibbo, 2016). More recently, POIs have received great interest as a popular green building assessment tool because a research dataset can confirm achieving sustainability goals. Recent examples of regional experience include the Mustel Group (2010) at SFU University in Lancaster POE (2008) at Burnaby, Metro Vancouver and False Creek North. Vancouver, British Columbia. Post-occupancy assessments are recommended after 3 to 6 months (immediate operational evaluation) and more than 9 to 18 months after people are mindful of project.

The previous literature shows a lot of research has been conducted on the rating system of LEED-ND. However, to date, the main objective is: 1) to assess the validity and calibration of the internal assessment system, 2) to compare the structure with other sustainable neighbourhood assessment systems and 3) to improve performance to compare with others certified or non-certified neighbourhoods LEED-ND. Not all of these approaches examine the quality and sustainability of the neighbourhood for its residents. This thesis tries to overcome these shortcomings by interviewing the residents of these neighbourhoods.

3.4 North Cyprus and Kyrenia City in Brief

The name “Kyrenia” was derived from the general name for all the regions in North Cyprus that includes various different scaled settlement areas that falls on the north coast of the country. The areas are known for having an accelerated development as a result of its natural structure, topographic features, as well as the genuine settlements samples. Cyprus generally has some features that are peculiar to Mediterranean, as it was found to lies at the eastern part of Mediterranean and sandwiched between Asia, Europe, Asia and Africa. It is located west of Syria and south of Turkey, and considered it is the third largest island in the Mediterranean Sea as Sardinia and Sicily are the first two. North Cyprus is about 64.37 km from the south of Turkey, 96.56 km from the west of Syria and about 386.24 km from the north of Egypt. It has an area of about 9251.48 km2, out of which about 1735 km2 are forest lands. There are two distinctive mountain ranges that have

important features on the country. The mountains extend from East to West and are divided by a wide and fertile plain of “Mesaoria”. While the Northern range which is the narrow belt along the entire stretch of the northern coast is called “Kyrenia Range”, the southern range is known as “Troodos Mountain” and it much bigger in area and higher than Kyrenia range. The country as depicted in Figure 3.1 shows that the Island has five distinct districts (Famagusta, Kyrenia, Gulzeyurt, Iskele and Nicosia) which are being administered by “Turkish Republic of Northern Cyprus (TRNC)”. The capital of the Island is located in Nicosia, which happens to be the largest city among the five districts.

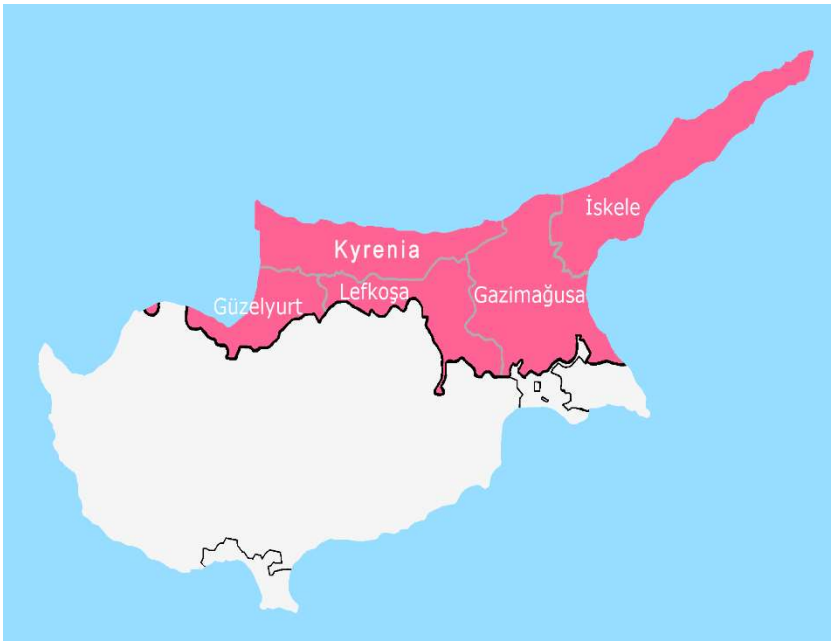


Figure 3.1: District Map of North Cyprus (Wikipedia contributors, 2020)

Moreover, the diversity in the Island population was said to be as a result of the five major ethnic that are cohabiting on the island. These groups are: Greek Cypriot, Turkish Cypriot, Maronites, Armenians and Latins. Meanwhile, out of the five ethnic groups, only two dominates the communities with Greek Cypriots has about 77% and Turkish Cypriots are 18% of the population respectively, while the other three ethnic groups shared the remaining 5%.

In reference to the socio-economic properties of the country, semi-presidential system of government is what is in operation in the country which is said to be rich in cultural

heritage but gets lots of interference from both within and external forces. It is a country that is import-oriented in nature, as a result of its over-dominance of service sector. There was a boom in the country economic growth around 2010s when the GDP increased astronomically. But the growth was short-lived due to the embargo that has been on the country and the port closure. The country population is largely dominated by Muslims. Notwithstanding, the secular nature is still being maintained. In spite of the embargo and non-recognition by the United Nations, the country is an observer country in the "Organization of Islamic Countries (OIC)".

It is on record that about 69% of the GDP is accounted for by the service sector. This sector consists of trade, tourism, general public sector and education. Worthy to note that education for some time now has been among the main GDP contributor, with the records that shows it contributes about 22%, while agriculture contributes a meager 9%. This improvement in the economic growth continues till 2014 when the Island was rated as the highest country in Europe with entrepreneurial skill in 2014 (Wikipedia contributors, 2020). As the country is experience growth, the physical facilities and infrastructure keep expanding with the attendant consequences on the environment.

Meanwhile, the development could not be consistent as a result of the embargo on the country which was the penalty for breaking away from the south. This made all the ports in the country to be closed for any international businesses. Meanwhile, in the face of the sanctions, Turkey is the only country that remains deviant and refused to obey the sanction of the International organization. Thus, all the international transactions are being channeled through Turkey and placed a great burden on the price of products and services in North Cyprus due to multiple taxes. (Wikipedia contributors, 2020).

Aside the education, tourism sector of North Cyprus is showing some potential on being a contributor to economic growth of the island. It is on record that since 2012, the revenue generated from tourists has been on increase (Wikipedia contributors, 2020). In this development, property business is not left out, as it is found to have created more than 10,000 jobs, most especially in Kyrenia which is the closest to the sea among the major five districts. The boom in the investment in properties is in response to surge in the population of tourists which requires accommodation during their stays in the Island.

In the area of transportation and communication sector, the contribution of this sector has not been consistent like every other sector. While the contribution of this sector was found to nosedive between 2008 and 2011, some improvement was recorded from 2013 (Wikipedia contributors, 2020). Even though only Ercan International Airport is the one functioning at present, the passenger traffic increase after the renovation carried out in 2010. But due to the embargo, its only flight from Turkey has the permission to fly directly to the airport. All international flight must first go through Turkey.

Lastly, it is on record that the Island population is on increase. This was revealed in that last census that was conducted in 2011 under the supervision of UN. The figure shows that the population has increased from 200,587 in 1996, to 265,100 in 2006, and to 294,906 which was the figure from last census of 2011.

3.4.1 Information about study area (Kyrenia)

The City of Kyrenia is regarded as the most affected settlement by the ongoing development in the Island as a result of its location along the north coastal line of Cyprus, which is one of the notable reasons of choosing the city for our study. Moreover, some unplanned urbanization along the coastline of the Northern Cyprus in contravention of the ordinance was observed. Meanwhile, the city of Kyrenia is regarded as the most beautiful city and popular resort in the Island. This city is attached to a significant medieval castle which was built around a miniature harbor on the north coast of the island and surrounded with beautiful scenery down to the base of the northern range of mountains, which steeply slope towards the sea. Since the establishment of the city in 10^{th} century BC by an Achaean settler (Marshall and Caliskan, 2011). The city has undergone series of civilization through "Mycenaeans, Achaeans, Egyptians, Polemics, Helens and Roman, all in the Pre-historic times". The civilization during the medieval age was through "Byzantines, Lusignians and Venetians". Subsequently, the city was ruled by Ottomans in 1861, rented to Britain in 1878, then Cyprus Republic in 1969 which was governed by Greeks and Turks till 1974 when the Island was divided into North and South.

The Kyrenia district has some municipal divisions that serve as the local administrative units. The city and its environs are under the administration of Kyrenia municipalities. Other communities that are neighbors are Alsancak, Lapta, all on west side, with Catalkoy and Esentepe on the east side.

As for the ecological nature of the city, it is dominated by the Mediterranean climate like every other city in North Cyprus. The city experience long and dry summer, with the short and rainy winter. The city is rich in winter rain; also, sun is being recorded for about 300 days per year. During the winter, the city does records about 9^0C in temperature in January, while about 40^0C temperature could be recorded in July during summer (Wikipedia contributors, 2020).

The meteorological record shows that average rainfall in Kyrenia district between the periods of 2013 – 2017 was about 471.3 mm^2. The maximum rainfall is usually recorded around January, while the least was observed in August (Meteoroloji dairesi, 2018). Similary, average temperature in the city was found to be about 21^0C. The highest month average of temperature is usually recorded between July and August with about 33^0C, and the lowest of about 9^0C around January and February (Meteoroloji dairesi, 2018).
According to Meteoroloji dairesi (2018), the relative humidity values of Kyrenia city ranges between the annual average of 61.94%, with lowest value of 66.2% around July.
Above all, the abundance of natural features and human interefence has brought about some development to the city, most especially since 2008, with the attendant impact on the haparzard development that is springing up all around the city, lack of infrastructure to cope with the population increase, conversion of the green lands to other uses, inbalance and distruption of the ecosystem, and the pollution. All these are consequence of urban development which pose a threat to sustainable development if not addressed.

CHAPTER 4
ANALYZING THE URBAN DEVELOPMENT SUSTAINABILITY IN KYRENIA CITY

In this section, the evaluations of the strength, weakness, opportunity and Threats (SWOT) was done for the city and the land use evaluation for the five (5) zones were provided. This is with the view of providing a detailed study on each of the zone, in accordance with the LEED-ND guidelines which stipulates that a city of large areas should be sub-divided into neighbourhoods for easy evaluation. The Kyrenia city as depicted in Figure 4.1 was subdivided into five (5) zones. The sub-division follows the reconnaissance survey carried out by the researcher to ascertain how best to divide the city into neighbourhoods. In the course reconnaissance survey, some secondary roads were considered appropriate to use in demarcating the city into zones (see Figure 4.1). The secondary roads were found to distinctively divide the city into different neighbourhoods which was considered appropriate as a zone in this study, while the arterial roads provide door-to-door accessibility to the buildings, blocks, infrastructure and services that are available within the zones. In addition, it was observed that the zones are not evenly developed, which indicate a slight difference in their urban development, which makes green spaces to be more available in some zones than others. The details of each zone are discussed in the subsequent section.

Moreover, differently from the land use evaluation of the zones, the SWOT analysis of the city was presented in the succeeding section, while the analysis of the LEED-ND indication of each zone was presented in the followings section. Furthermore, the analysis of the resident's and expert perception on the urban development sustainability were presented in the succeeding section, while discussing of findings and conclusion rounded up this chapter.

Figure 4.1: Map of Kyrenia city showing the five zones

4.1 Strength, Weakness, Opportunities and Threats (SWOT) Analysis of Kyrenia City

In order to investigate the current situation of Kyrenia city and its sustainability, which the author observed is continuously and rapidly developing and thus requires analysis in line with the zoning law (see Table 4.1) and the sustainability indicator standard of LEED-ND, an analysis was carried out. The analysis was aimed at evaluating the sustainability of the city, so that the present residents will achieve their good living without compromising the ability of the future generations in achieving the same. The evaluation was done in terms of land area allocated to different land uses that is available, most especially the available lands area for green areas and the building density, which is one of the indices for mixed-used, and indicator for sustainability.

Table 4.1: Kyrenia SWOT Analysis (Atakara and Akyay, 2017, Author)

	Strength	Weakness	Opportunities	Threats
Socio-Economic	• Potential tourist attraction is high. • The sunny climate of the city is attractive to the tourists. • It's a safe city and the people are friendly. • Cheap cost of living in comparison to other European countries. • Abundant tourist activities.	• Paucity of cultural and arts activities. • The streets are narrow and has shops lining in the old quarters. • Absence of resources.	• Opportunities of developing the coastline for more tourism activities. • Influx of workers from Turkey and other neighboring countries. • Presence of three universities. • Developing to a cosmopolitan city that accommodates different cultures. • Cohabiting of different cultures.	• Absence of industrial activities. • Absence of alternative electricity generation besides water. • Heavily dependent on imported products. • Lack of employment. • Looming danger of unemployment increase in the nearest future.
Built	• Availability of significant national heritage which a potential benefit of being a tourist activity that could foster sustainable development for the city. • Antique harbor and the Venetian Castle. • Traditional urban pattern/places/buildings.	• Ineffective urban management. • Absence of public spaces. • Inadequate attention from the municipality to the beaches. • Lack of effective coordinated transport system. • Excess presence of military zones within the city. • Winding streets with surprising vistas. • Housing development on the mountains. • Fast and dense construction. • Developmental pressure. • Sea pollution.	• Development and implementation of some actions that will brings investment to the city and subsequently aid further the development of the city. • Need for the improvement of Kyrenia landscape. • Old courtyard houses creating a continuous wall. • Availability of holiday villages, hotels, residential complexes and so on. • Abundant spaces for future development. • Has the potential of the available universities' expansion and development of new ones, and other investment. • Establishment of new sewage lines.	• Prioritizing construction over conservation. • Ineffective management and regulation enforcement for protecting green regions. • Absence of master plan to guide the future development of the city. • Potential destruction of historical-cultural heritage by the pressure of developmental pressure.
Natural Environment	• The city is strategically located for investment and other economic activities. • Availability of seaport. • Located along the coast and on the mountains. • Temperate Mediterranean climate. • Panoramic view of the city from mountains. • Availability of beaches in and around the city.	• Excessive temperature and humidity, most especially during summer. • Absence of natural resources. • Farming activities is non-existing.	• Availability of Olive trees, begonvilles, carob trees, and so on. • Fresh mountain air as a result of the city location. • Available spaces for agricultural practices. • Opportunity of harnessing the sun energy and rain water as a resource for water and electricity generation.	• Possibility of neglecting agricultural practices in the nearest future. • Absence of safe drinking water. • Huge cost incurred for water and electricity importation. • Inadequate attention for the archaeological sites.

4.1.1 Land use evaluation of Zones

The detailed description of the land zones as it was highlighted in the preceding section were described and evaluated in reference to the natural and man-made features that are available in each of the zone. The various land uses and the mixed use of the building discussed in this section was to better the understanding of each zone in relation to acceptable land use standard.

Table 4.2: Land uses within the Zones.

Land use	**ZONE A (M^2)**	**ZONE B (M^2)**	**ZONE C (M^2)**	**ZONE D (M^2)**	**ZONE E (M^2)**
Circulation	142784.26 (8.1%)	360336.24 (17.4%)	115461.84 (3.5%)	93869.02 (7.1%)	151971.23 (9.3%)
Green area	647073.16 (36.6%)	379686.27 (18.4%)	2936987.24 (90.1%)	958022.65 (72.1%)	380216.28 (23.3%)
Recreation	53004.03 (3%)	65308.16 (3.2%)	0	5705.68 (0.4%)	14845.26 (0.9%)
Open space	530066.15 (30%)	786056.55 (38.2%)	160421.74 (5%)	178795.97 (13.5%)	781713.74 (47.8%)
Residential	241157.48 (13.7%)	348727.59 (17%)	36063.39 (1.1%)	63420.9 (4.8%)	247814.82 (15.2%)
Commercial	97164.29 (5.5%)	61926.35 (3%)	8797.25 (0.3%)	12554.69 (0.9%)	34549.06 (2.15%)
Education	0	16599.7 (0.8%)	0	2319.88 (0.15%)	0
Industrial	0	3374.87 (0.15%)	0	13059.39 (1%)	0
public	52604.84 (3.1%)	38136.88 (1.85%)	0	864.93 (0.05%)	21962.54 (1.35%)
Grand Total	**1763854.21 (M^2)**	**2060152.61 (M^2)**	**3257731.46 (M^2)**	**1328613.11 (M^2)**	**1633072.93 (M^2)**

Land use evaluation of Zone A

The zone A as depicted in Figure 4.1 occupies about 1763854.21 m^2 which is about 17.56% of the total area. In respect of the different land uses as presented in Table 4.2 and Figure 4.2, it shows that in Zone A, the larger chunk of the land area was apportioned to green area (36.6%), followed by the open space (30%), while residential, circulation, commercial, public and recreational uses are 13.7%, 8.1%, 5.5%, 3.1% and 3% respectively. The implication of these findings is that the zone has room for expansion which is as a result of the large percentage of the land area that still belongs to green area.

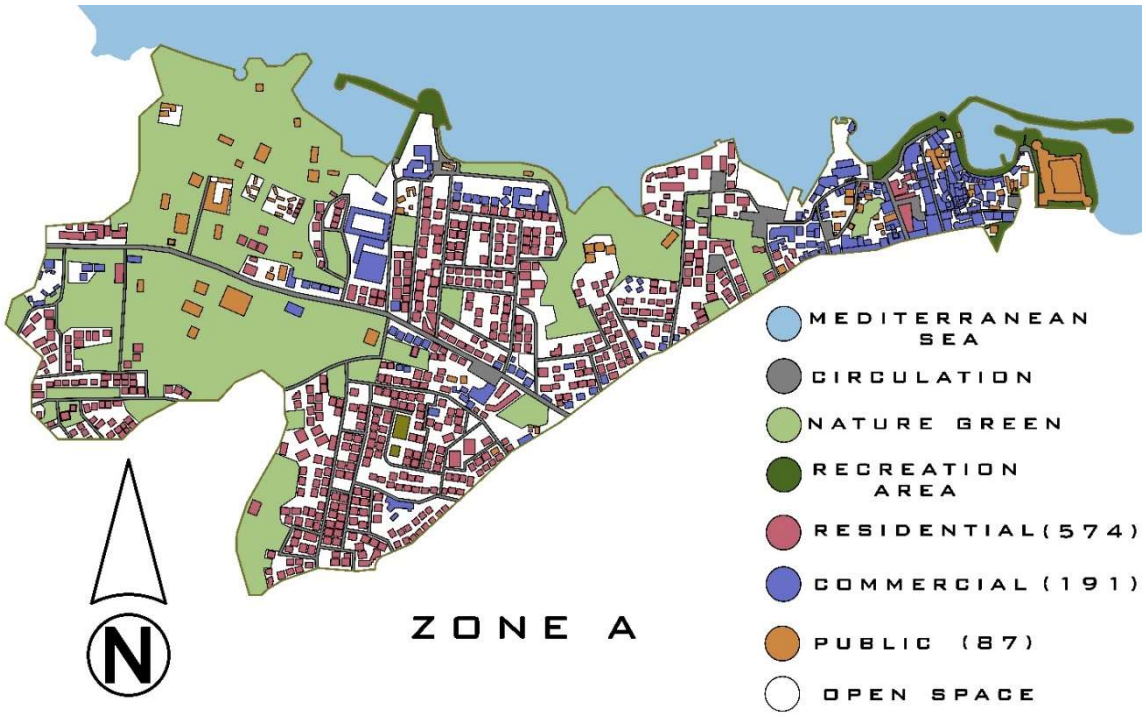


Figure 4.2: Map of Zone A land uses

In addition, from the types of building heights that are available in Zone A, Figure 4.3 shows that about 3,334 buildings were enumerated by the researcher in the entire city, out of which 852 buildings are in Zone A. From these 852 buildings, 61 are ground floor houses, 211 are one-storey building, while 537 are 2-5 storey building and 43 are above 5 storey building respectively. The availability of the mixed use of the houses within the zone is an indication that different caliber of people is living within the neighbourhood, which some extent encourages social cohesion and develop unity among the resident, and to some extent facilitate the social sustainability.

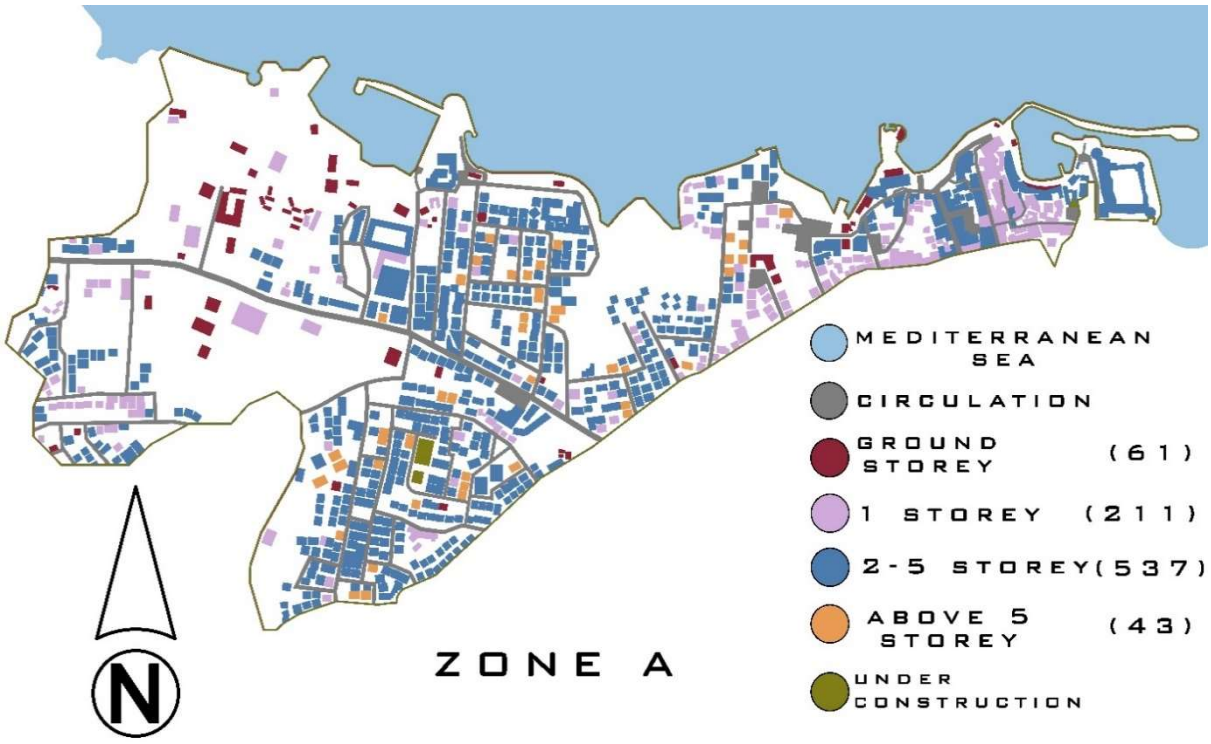


Figure 4.3: Zone A Buildings height

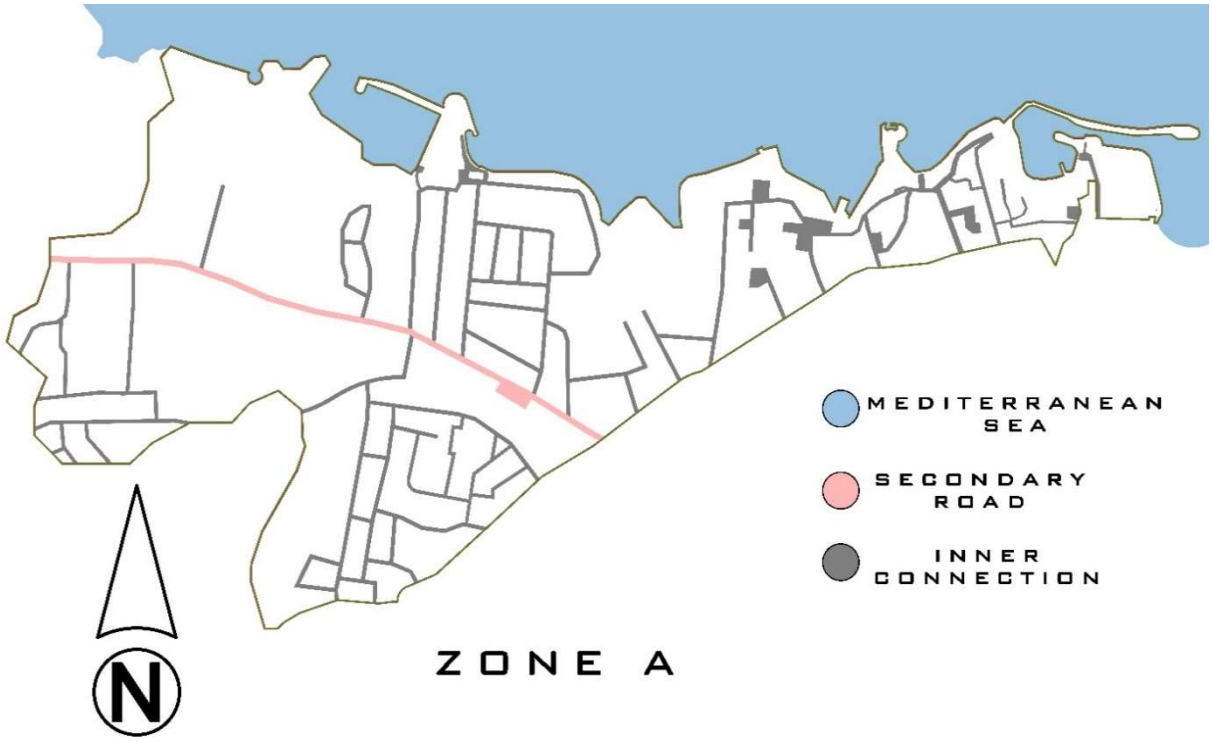


Figure 4.4: Map of Zone A circulation

Land use evaluation of Zone B

In Zone B, nine (9) different land uses were identified, and all the land uses constitutes about 2060152.61 m^2 which is about 20.51% of the total area in the Kyrenia city (Figure 4.1). Among the different land uses as depicted in Figure 4.5 and Table 4.2, open space constitutes the largest percentage of the area with about 786056.55 m^2 which is about 38.2% of the total area covered by Zone B. The green area covered about 379686.27 m^2 (18.4%), the other land use within the zone is circulation (17.4%), the residential constitutes about 17% (348727.59 m^2), the recreational use that comprises of children playing ground, available parks and other spaces earmarked for recreational activities constitutes about 65308.16 m2 (3.2%), also the spaces where some commercial activities like shopping mall, hotels and other commercial activities takes place constitutes about 61926.35 (3%), while educational, industrial and public use covers about 0.8%, 0.15% and 1.75% of the total area covered by Zone B respectively (see Figure 4.5)

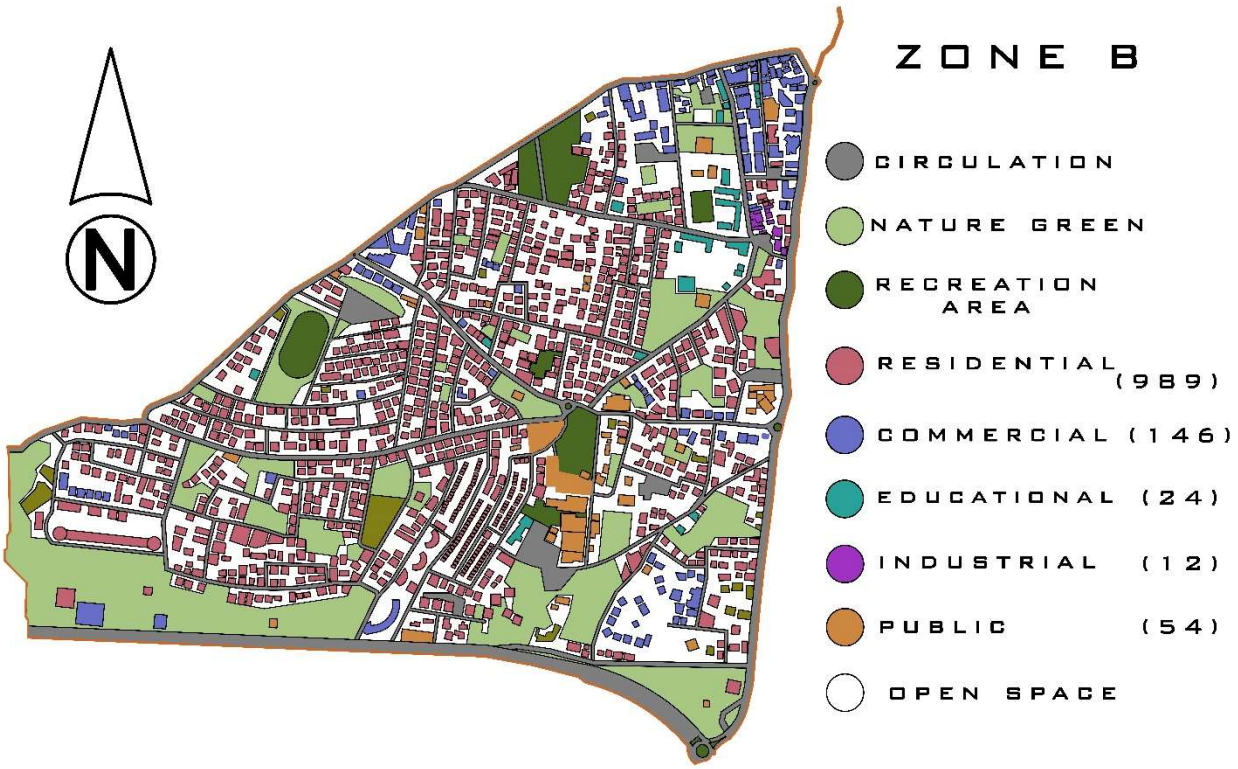


Figure 4.5: Map of Zone B land uses

Moreover, the building height within Zone B was evaluated to ascertain the mixed-used of the buildings. The type of building heights that is available in Zone was depicted in Figure 4.6. As shown in Figure 4.6, out of the 3334 available building that were enumerated to be available within Kyrenia city, Zone B has the largest number of buildings among the five (5) zones. Out of the 1225 building that was enumerated in Zone B, 60 are ground floor houses, 272 are 1 storey building, while 841 are 2-5 storey and 52 are above 5 storey buildings respectively. The mixed-use of the building is an indication that the zone has some features of a sustainable urban city, where different categories of people within the society will have the opportunity of co-habiting and thus foster a social cohesion within the society.

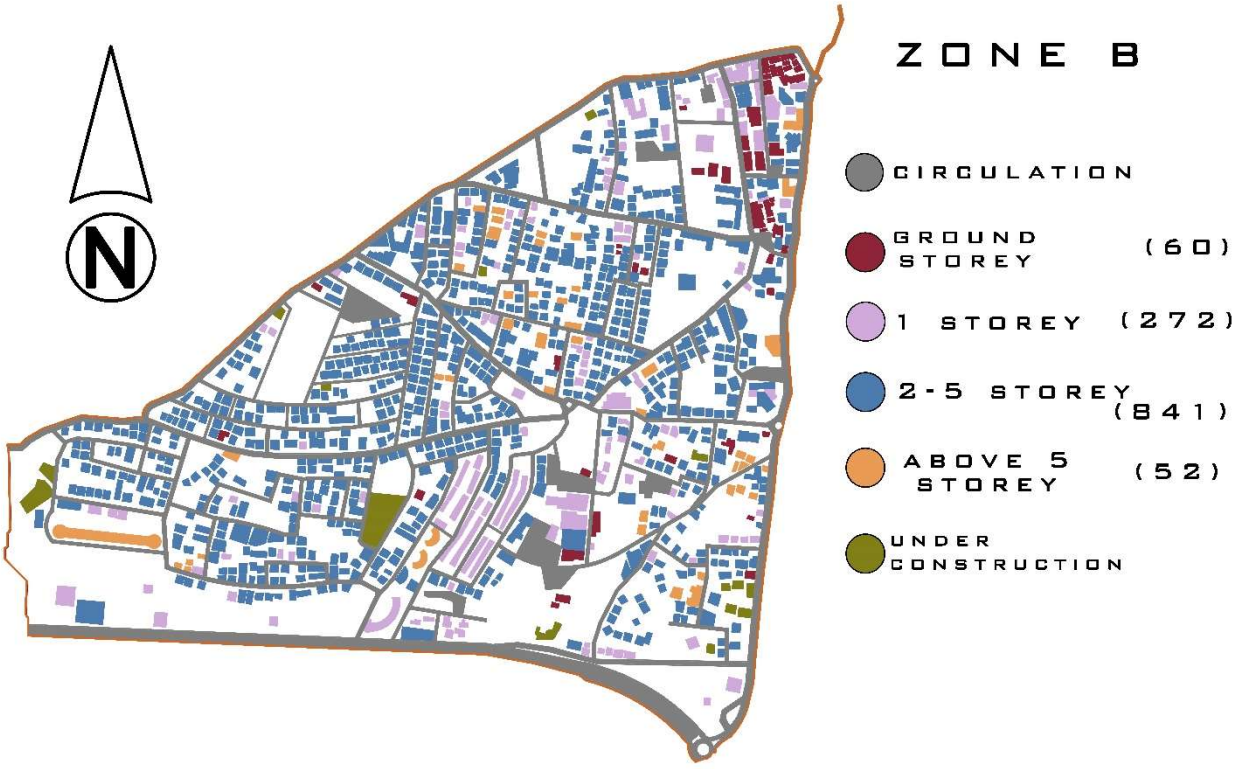


Figure 4.6: Zone B Building heights

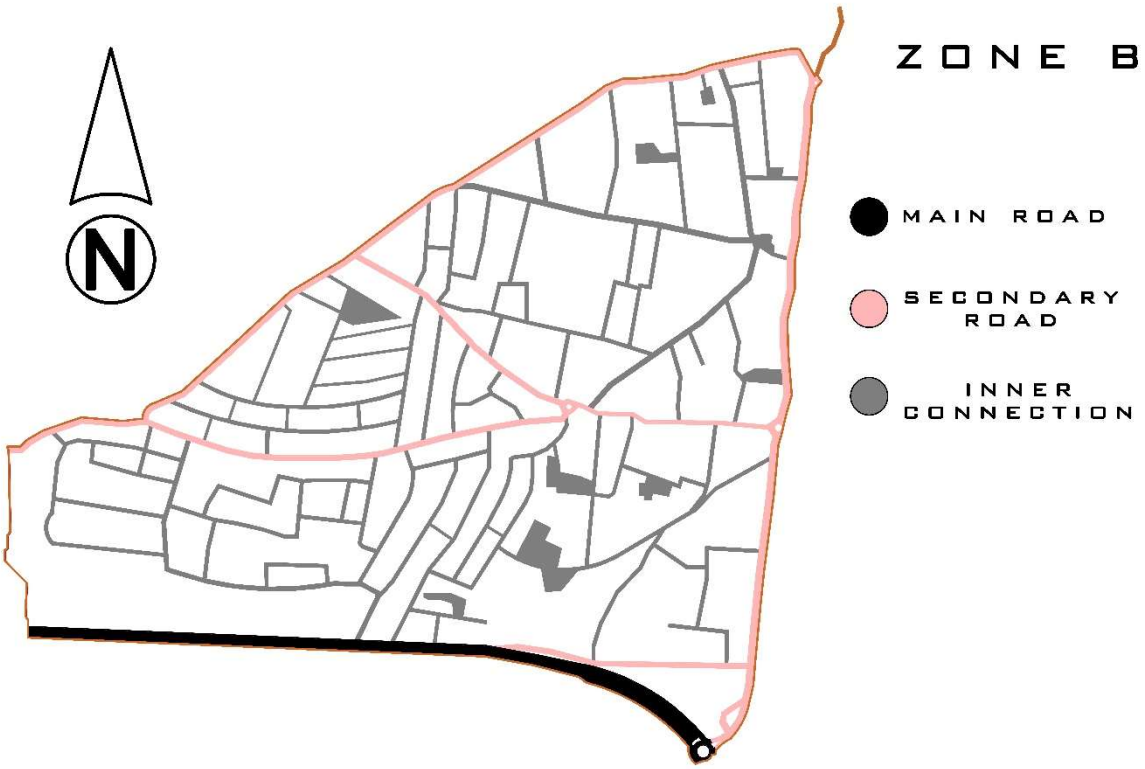


Figure 4.7: Map of Zone B circulation

Land use evaluation of Zone C

In Table 4.2 where the summary of different land uses for Zone C is presented, it was revealed that Zone C occupies about 32577731.46 m^2 (32.44%) which is the largest area among the five zones (see Figure 4.1). As presented in Table 4.2 and depicted in Figure 4.8, the accessibility routes available within the zone covers about 360336.24 m^2 (17.4%) of the total area covered by Zone C. Interestingly, even this zone is the largest among the zones, it has less development compares to other zones. This is evident in the available area for green areas which is about 2636987.24 m^2 (90.1%). This is an indication that, the zone has potential for future development in terms of the available lands for such development. Meanwhile, recreational, educational, industrial and public uses were not found to be available within this zone, but the open space, residential and commercial uses occupies about 160421.74 m^2 (5%), 36063.39 m^2 (1.1%) and 8797.25 m^2 (0.3%) respectively.

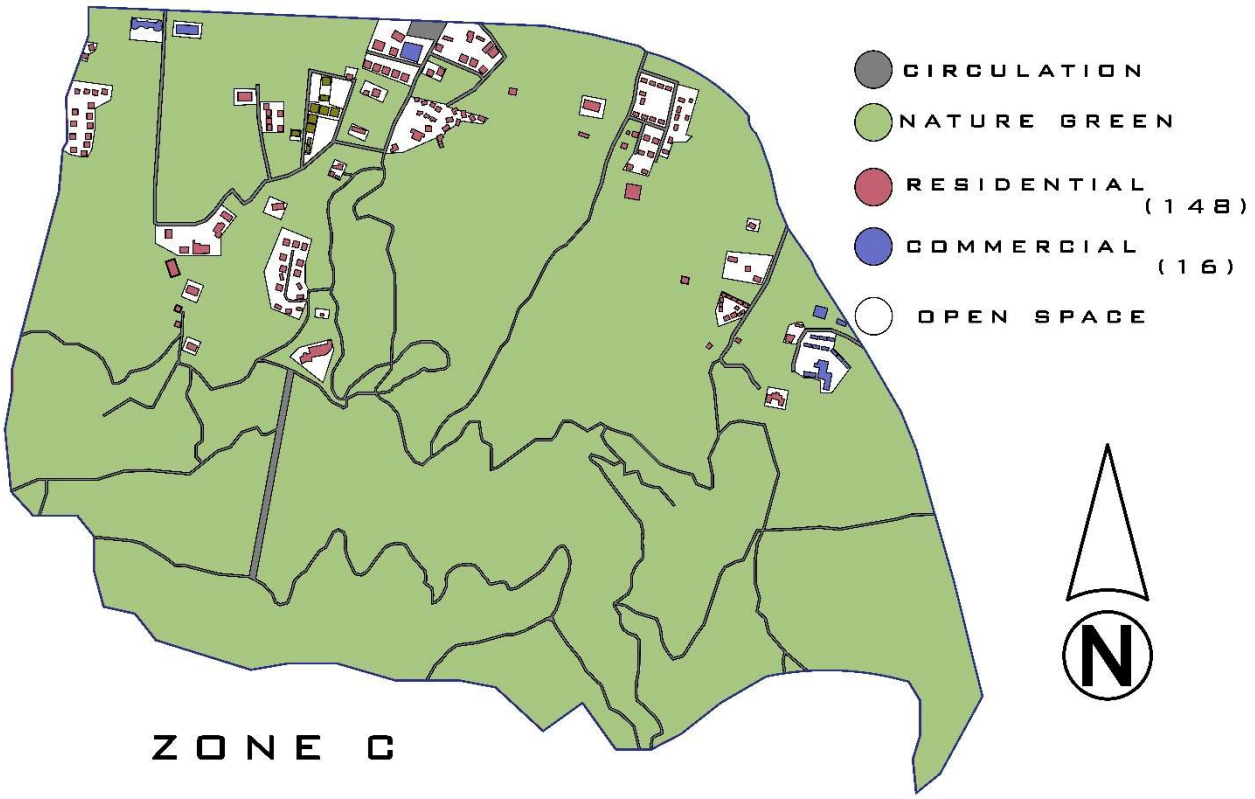


Figure 4.8: Map of Zone C land uses

As for the evaluation of the different building heights that is available within the zone, Figure 4.9 shows different building heights available among the few available buildings. Out of the 3,334 buildings that are available within Kyrenia city as enumerated by the author, and as a result of the less development in comparison to other zones, zone C has about one hundred and sixty-four (164) buildings. Out of this one hundred and sixty-four (164) buildings, two (2) houses are ground floor, one hundred and twenty-eight (128) are one-storey buildings, while thirty-four (34) buildings are 2.5 storey buildings. Similar to other zones, Zone C displayed a mixed used of buildings, which shows that the zone is not solely occupied by certain caliber of people but mixed set of people that belong to different level of income in the society. This kind of arrangement as suggested in the literature, brings social cohesion that facilitates social development which in turn contributes to sustainability.

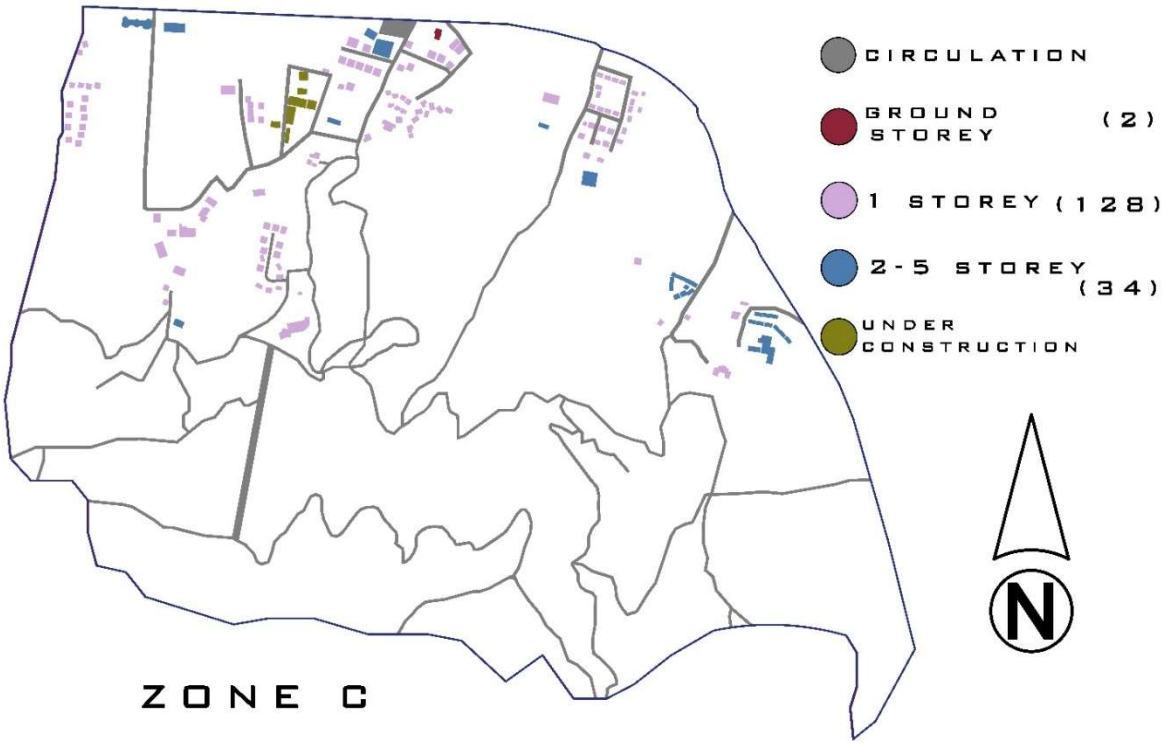


Figure 4.9: Zone C Building heights

Figure 4.10: Zone C circulation

Land use evaluation of Zone D

The area occupied by zone D as depicted in Figure 4.1 shows that the area occupied the least area among the zones, but second to zone C in terms less development. As summarized and presented in Table 4.2, it shows that different land uses are available within the zone. The larger portion of the area is occupied by green area which is about 958022.65 m^2 (72.1%). The main and access roads within the zone occupies about 93869.02 m^2 (7.1%) of the total land area available within the zone. Similarly, the available area for recreational activities like sporting, parks, children playground and so on, occupies about 5705.68 m^2 (0.4%). In addition, about 13.5% (178795.97 m^2) and 4.8% (63420.9 m^2) are available for open spaces and residential uses, while about 0.9% (12554.69 m^2), 0.15% (2319.88 m^2), 1% (13059.39 m^2) and 0.05% (864.93 m^2) are occupies by commercial, education, industrial and public uses respectively.

As for the building heights analysis, out of the 3,34 buildings that are available for all the zones, Figure 4.12 shows that only about two hundred and ninety (290) houses are available within zone C. However, out of these two hundred and ninety (290) houses, different buildings heights were found to be available. As it is depicted in Figure 4.12, twenty (26) houses are ground floor, two hundred and fourteen (214) of the houses are one storey buildings, while forty-eight (48) of the houses are 2-5 storey and two (2) are above 5 storey buildings respectively.

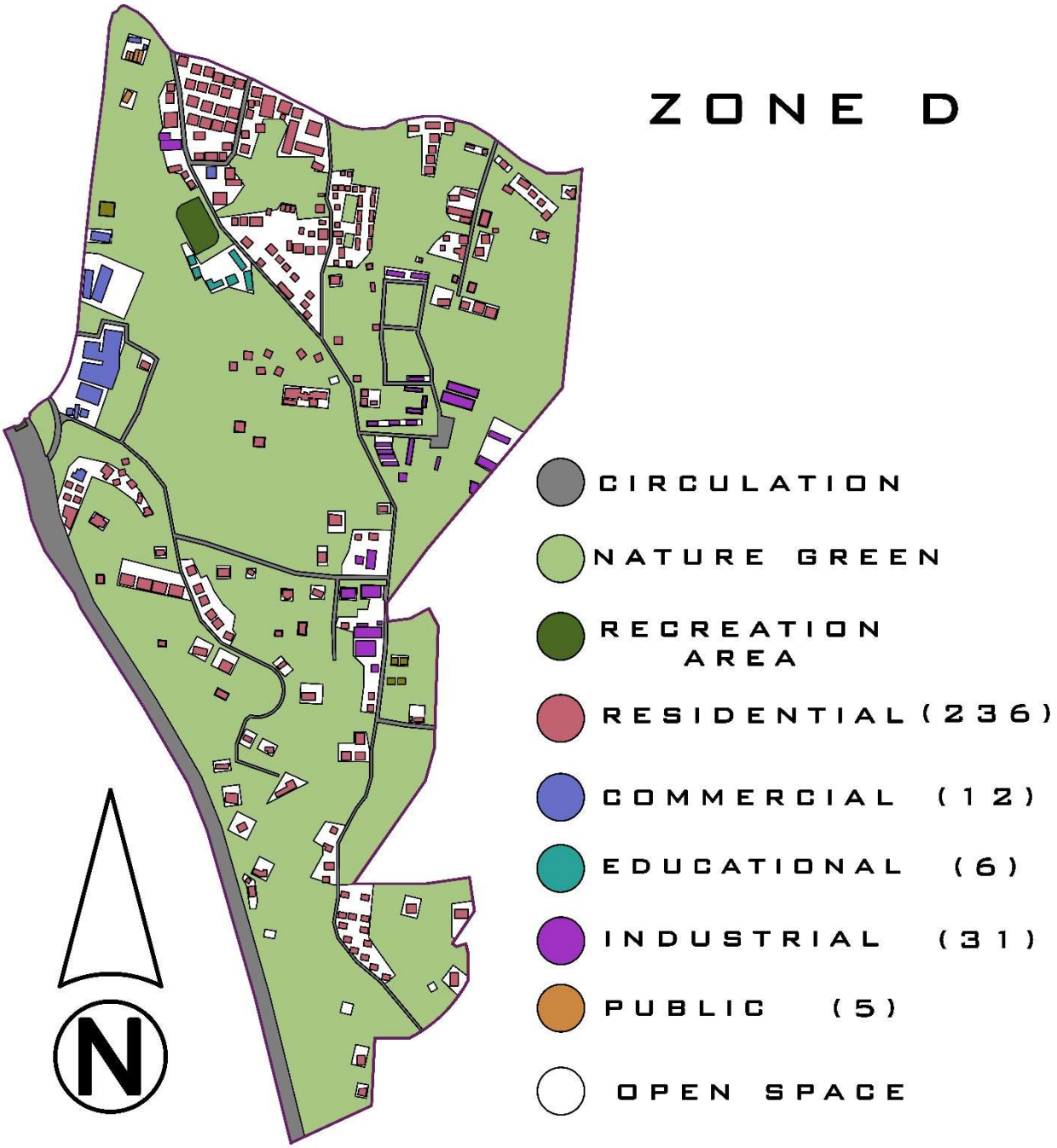


Figure 4.11: Map of Zone D land uses

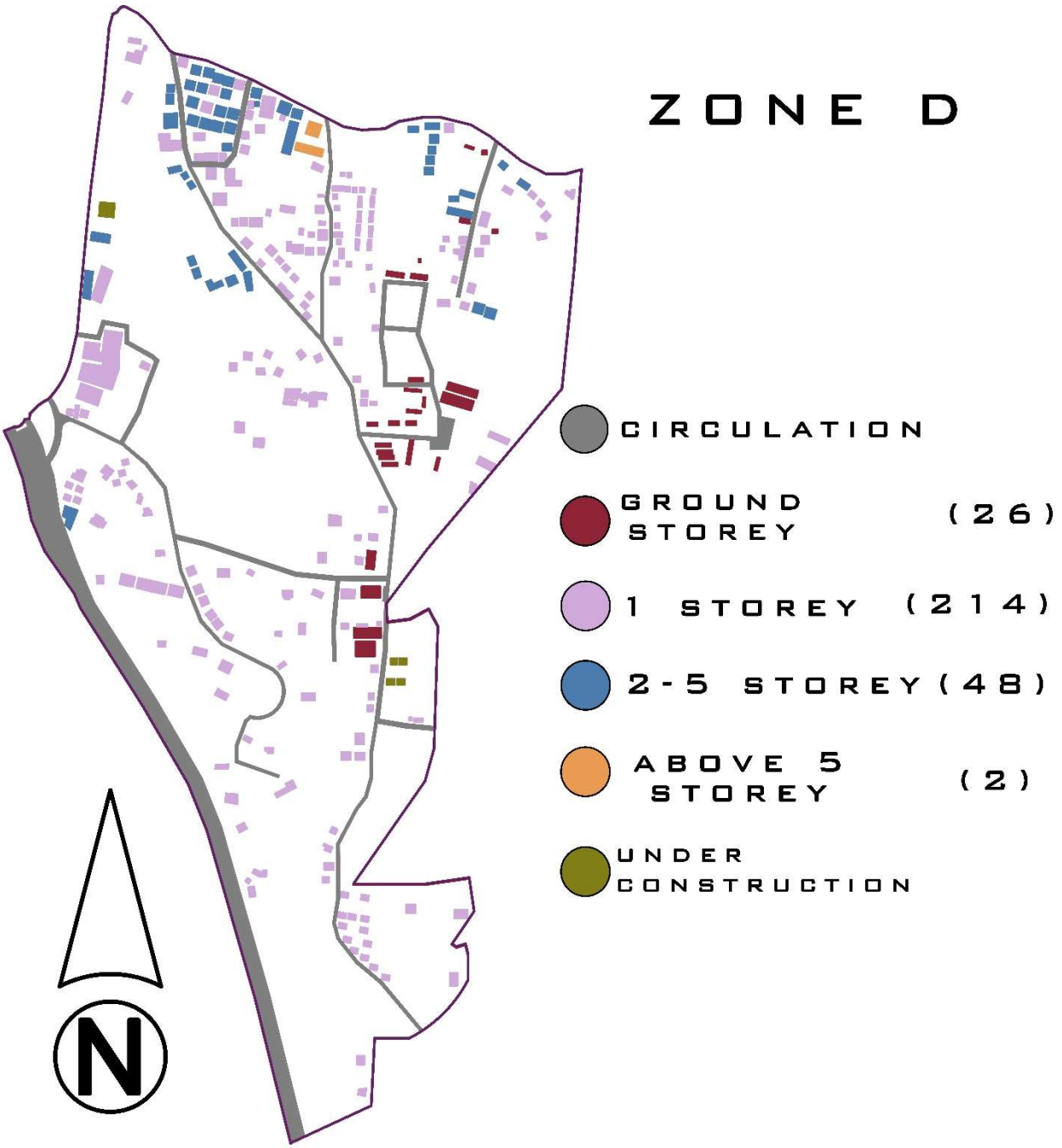


Figure 4.12: Zone D Building heights

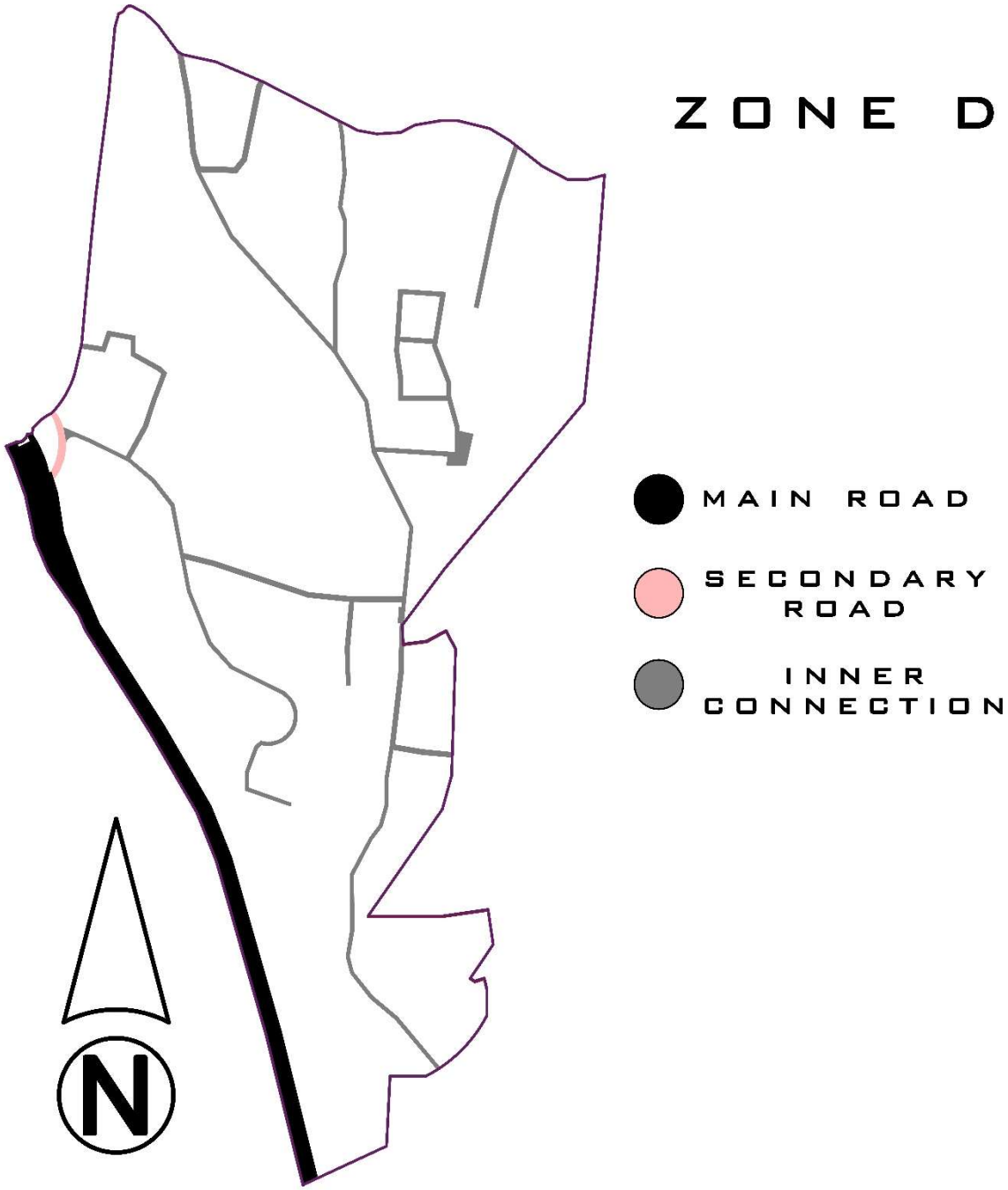


Figure 4.13: Zone D circulation

Land use evaluation of Zone E

The last zone which is demarcated as Zone E occupies about 16.26% (1633072.93 m^2) of the entire land in the study area (See Figure 4.1). Different land uses were found to be available (see Table 4.2). As summarized and presented in Table 4.2, the accessibility route with the zone occupies about 9.3% (151971.23 m^2) of the land available for Zone E. The zone has vast area for both green area and open space which are 23.3% (380216.28 m^2) and 47.8% (781713.74 m^2) respectively. Other use such as recreational uses is also available which occupies about 0.9% (14845.26 m^2), residential 15.2% (247814.82 m^2) and commercial 2.15% (34549.06 m^2) respectively, while about 1.35% (21962.54 m^2) was earmarked for public use. The availability of larger area for open space and green area is an indication that the zone has potential for future development which the author view that if the standard procedure and regulations are followed in terms of future development, there is potential for sustainable development.

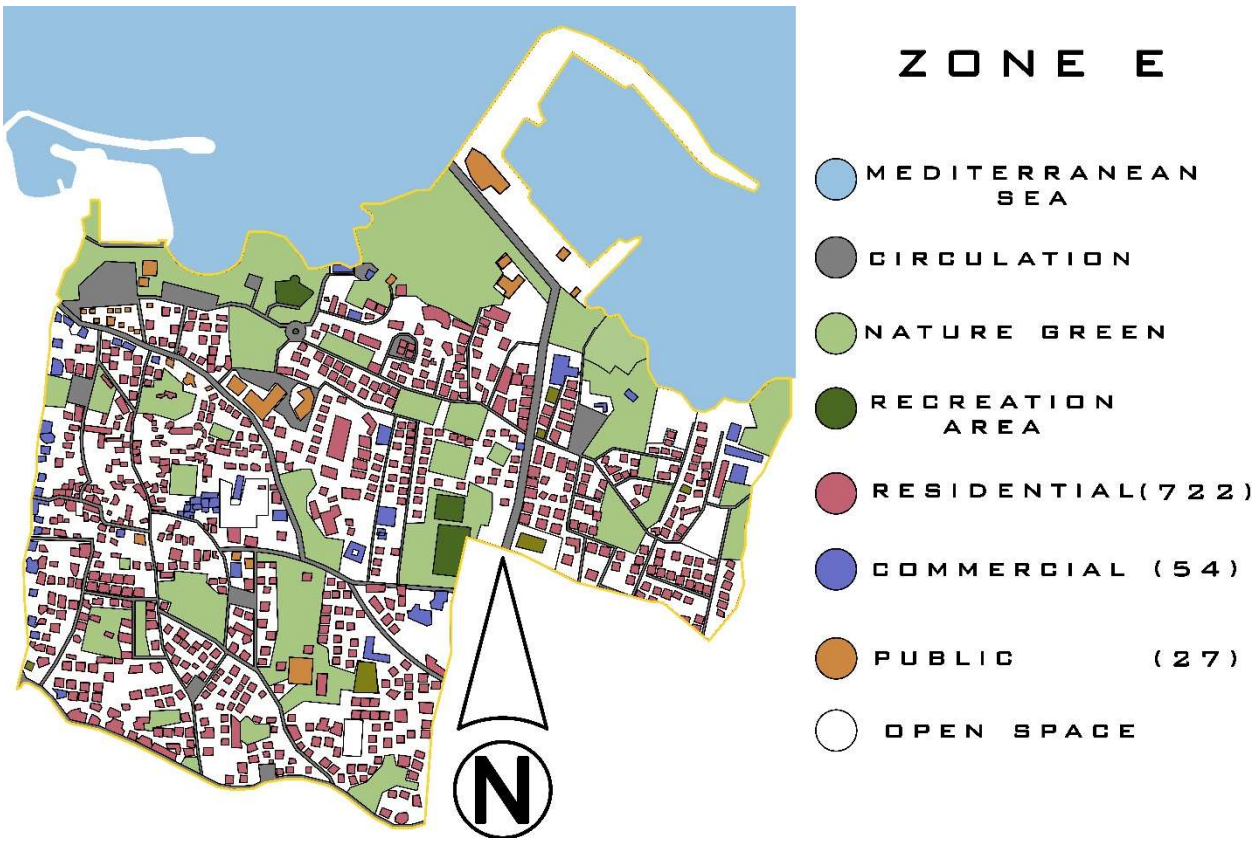


Figure 4.14: Map of Zone E land uses

The building density for Zone E was also analyzed and depicted in Figure 4.15. As it is shown in Figure 4.15, eight hundred and three (803) buildings were available within zone E. Out of these eight hundred and three (803) buildings, different heights are available. It was found that seventeen (17) buildings out of the eight hundred and three (803) buildings are ground floor, two hundred and forty-two (242) buildings are 1 storey buildings, while four hundred and ninety-seven (497) are 2-5 storey and forty-seven (47) buildings are above 5 storey buildings respectively. The mixed of density within this zone shows that in all the zones, the residential density consist of low, medium and high density, which is good as an indicator for urban sustainability.

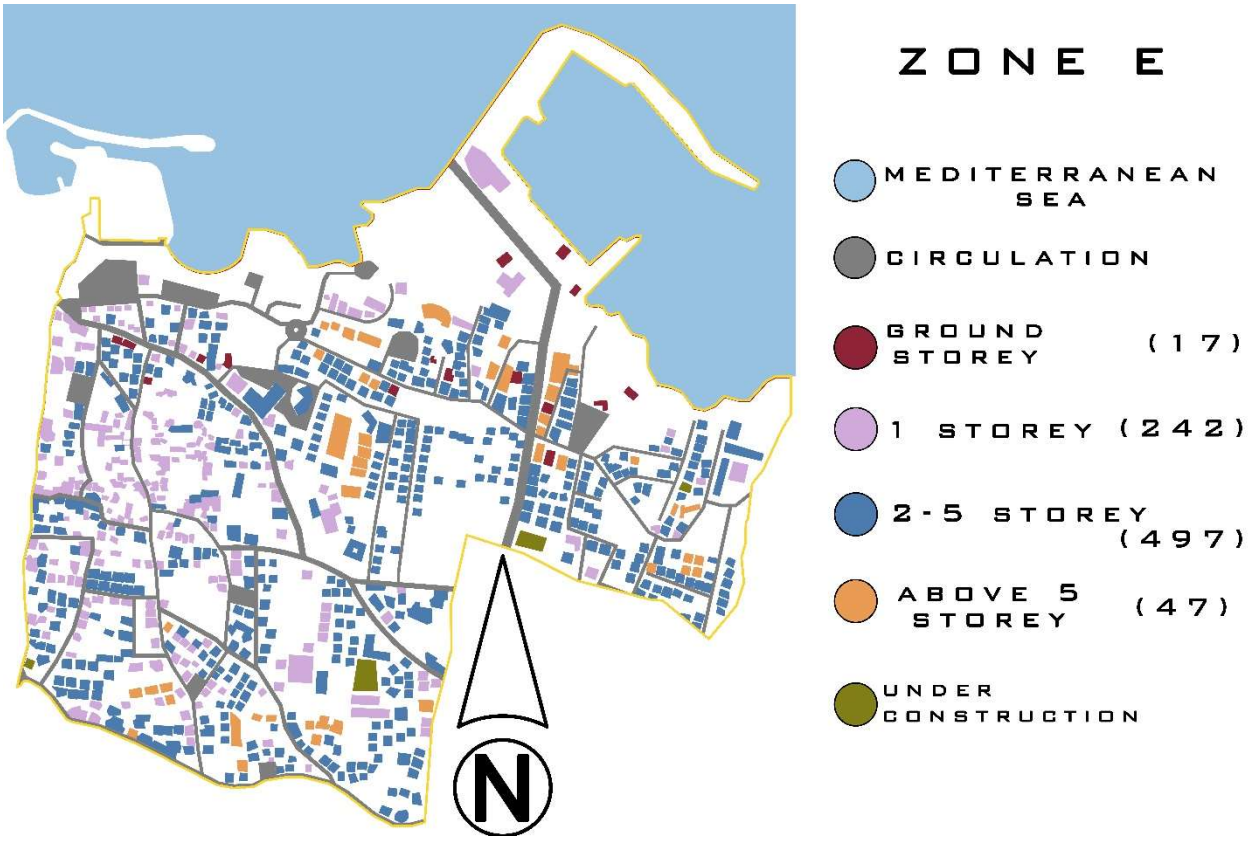


Figure 4.15: Zone E Building heights

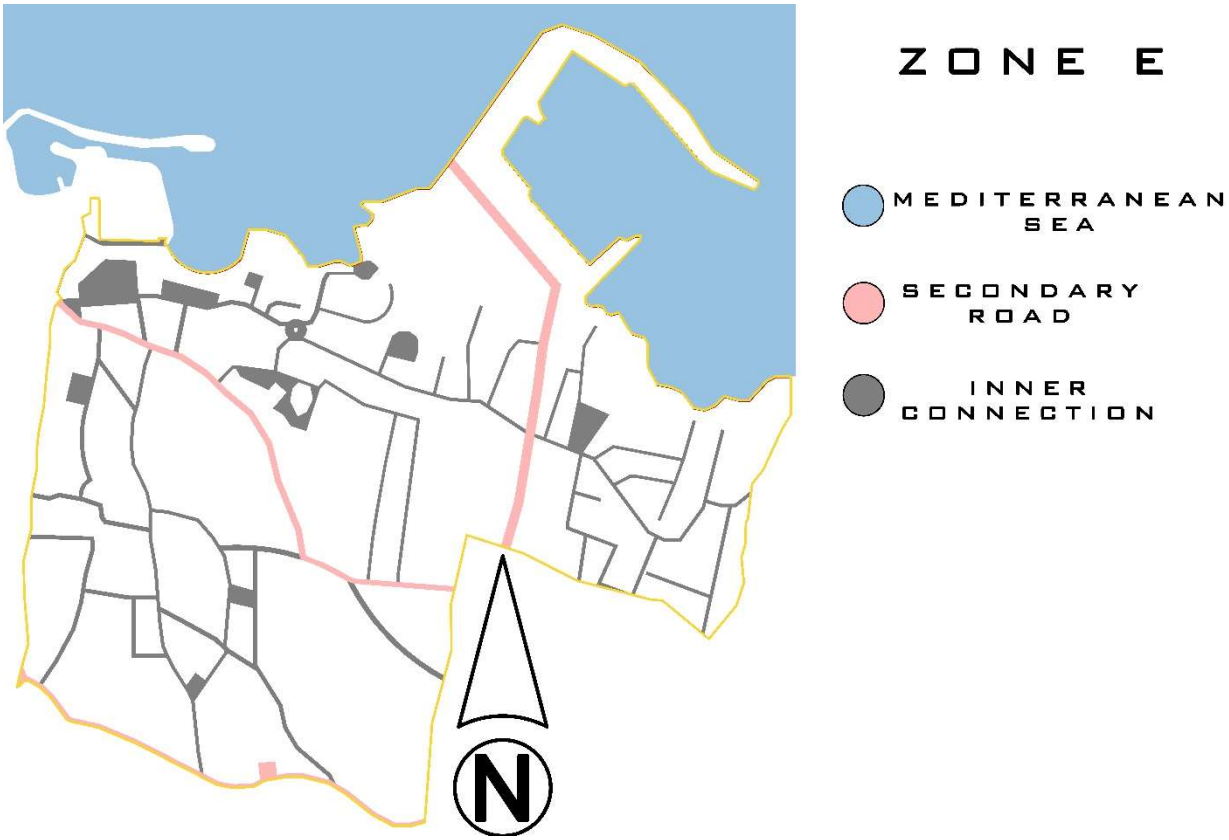


Figure 4.16: Zone E circulation

In summary, the land uses and building density evaluation was discussed in this section for all the zones. The city was divided using the main road, for easy evaluation and most especially in line with the recommendation of LEED-ND indicator that city should be subdivided into neighbourhood for easy evaluation. The land uses analysis revealed that different land uses are available within each of the zone which will complement each other in providing an aesthetical pleasing physical environment for the resident so as to achieve their safety, health and well-being. Moreover, the residential density evaluation shows that the zones comprises of low, medium and high density which is good and suitable for the promotion of sustainable development. Meanwhile, it should be noted that in all the evaluations, the military base within the city was not included due to the accessibility restriction to this area.

4.2 Analyzing the LEED-ND indicators within the Zones

The sets of sustainable urban development that was highlighted in the previous section which was in line with the LEED-ND standard will be evaluated in this section in the five zones. In the evaluation, descriptive analysis was employed by assigning the value specified for each of the indices as prescribed in the framework (USGBC, 2014), and add it up for each of the zone and then determine the status of the development in line with the standard set in USGBC (2014).

4.2.1 LEED-ND Assessment of Zone A

Smart location and linkage (SLL)

From the previous land use evaluation of Zone A, it was found that different land uses are available and effectively utilized. Though, the zone is not the most developed among the zones, but second to Zone B. In evaluation of the zone in line with the sustainable development indicator, it was observed that zone A has an advantage location (see Table 4.3) and the ecological and green area is sufficient with about 36.6% of the entire land area for the zone (see Table 4.2). In addition, transit and accessible location was observed, as well as the houses have less proximity to the residence places of work. Out of the indices that made up of smart location and linkage which is one of the main indicators of the sustainable development according to USGBC (2014), three indices were observed to be available while site for treating waste and cycling facilities were not found within the zone.

Neighbourhood pattern and design (NPD)

As for the NPD, fifteen (15) indices were employed for measuring NPD as an indicator for sustainable development (see Table 4.3). The evaluation as summarized and presented in Table 4.3 shows that walkable streets was observed in this zone (see Figure 4.17), also landscape designing was observed, as well as the compact development that is apparent within the zone. As for the mixed-use neighbourhood, it was observed that some residential building has office and other commercial activities located within the building. Especially in terms of the housing types and affordability, the types of housing density as depicted in Figure 4.2 shows that various land use density are available within the zone.

The parking and transport demand are not left out, even though it is not a well-structured transport system, the availability still caters for the people's need. Moreover, the parks and recreational activities which sustainable development standard recognized as one of the indices for neighbourhood pattern and design was found to be available within the zone (see Figure 4.17). Meanwhile, the zone was found to lack universal design which is one of the main indices.

Figure 4.17: A Walking path and Recreational place in Zone A

Green infrastructure and buildings (GIB)

In terms of green infrastructure and building indicator, the zone lacks virtually most of the indices (see Table 4.3), aside few indices like rain water management, wastewater management, district heating and cooling and historical and existing building reuse which were observed. In zone A, certified green building could not be sighted, similarly the irrigation techniques put in place. There is absence of energy efficiency and conservation and neighbourhood-wide energy efficiency, as well as the green building process and heat island reduction could not be located within the zone.

In summary, the evaluation of Zone A in line with the sustainability indicator and rated in line with the standard (see Table 3.2) reveals that the zone has a total point of 69. In accordance with the guideline of rating as set by USGBC (2014) which specified the

rating score and category as follows: 40 – 49 points (certified), 50 – 59 points (Silver), 60 – 79 points (Gold), and above 80 points (Platinum). According to this categorization, Zone A falls into gold category, which is an indication that the zone has potential to achieve sustainable urban development in as much the present efforts that is geared towards the urban development is improved and sustained.

4.2.2 LEED-ND Assessment of Zone B

Smart location and linkage (SLL)

The evaluation of zone B in line with the sustainable indicator as presented in Table 4.3 shows that under the SLL indicator, Zone B has advantage of location as it was observed that the zone is accessible. Moreover, the evaluation of the land uses as summarized and presented in Table 4.2 shows that the green and open spaces available in the zone covers about 56.6% of the entire land in zone B. The open land availability is an indication of the fact that the zone has a potential for future expansion, and if properly managed, it would foster sustainable development. In addition, the circulation and transit system for the resident commuting to and from their place of work is observed, and the proximity of their workplace to houses is minimal. However, site for treating contaminated waste and cycling facilities were found missing in this zone.

Neighbourhood pattern and design (NPD)

Similar to zone A in respect of having most of the indices for neighbourhood pattern and design, zone B shows improvement on the availability of indices for neighbourhood pattern and design indicator except the universal design which was found missing in the zone (see Table 4.3). In Zone B, walkable street was observed, the street is dotted with landscape designs, the development is compact to some extent, there is mixed-use of the building, different housing density are available and affordable, and lastly the available of parking space, and parks and recreation were observed (see Figure 4.18).

Figure 4.18: Pictorial view of some area in Zone B

Green infrastructure and buildings (GIB)

The green infrastructure and building indicator which is the third indicator specified in the sustainable development evaluation framework was assessed in zone B and the result is presented in Table 4.3. The evaluation as presented in Table 4.3 shows that the situation in this zone in respect of GIB indicator is similar to zone A as most of the indices were not found in the zone. Meanwhile, few green buildings were observed in this zone unlike zone A, while rain water management, solar orientation, district heating and cooling and wastewater management was put in place in this zone.

In summary, the rating of zone B according to the rating scale indicate that in all the zone has 73 point which is similar to zone A which has 69 points. The rating point of 70 according to the rating standard falls in gold category (60-79). According to USGBC (2014), a neighbourhood with gold rating is an indication that some efforts have been putting in place which are geared towards the sustainability of the urban development going in that neighbourhood. Therefore, zone B has the potential of achieving sustainable urban development without compromising the future.

4.2.3 LEED-ND Assessment of Zone C

Smart location and linkage (SLL)

It was observed in zone C that different land uses are efficiently utilized (see Table 4.2). Meanwhile, measuring against the urban sustainable development indicator, the zone consists of different housing density ranges from ground floor to above 5-storey buildings (see Figure 4.9). Moreover, the green area available for future expansion and development as presented in Table 4.2 covers about 90.1% of the total area within the zone. The neighbourhoods are not bad connected to each other, and the presence of some commercial activities mixed with residential buildings was observed in the zone, but need to be improved to bring a close proximity of the residents to their place of work. However, absence of cycling facilities was observed, whereas, this feature is considered to be an important index in measuring smart location and linkage indicator for urban sustainable development measurement. Also, of significance that is missing is the site for treating contaminates waste, which it is believe to be essential for the community to treat their waste in accordance with the established standard so as to maintain a safe environment.

Neighbourhood pattern and design (NPD)

In terms of neighbourhood pattern and design, the only strength is in the walkable streets and the few developments that are observed in the zone. The zone is the least developed zone among the five zones. Only few houses are available, even the few houses available, the presence of different housing density were observed which a good indicator for compact development. Meanwhile, the street elements such as wooded and shaded sidewalks that could enhance the comfortability of the pedestrian is lacking within the zone.

Green infrastructure and buildings (GIB)

In zone C, the presence of solar orientation, district heating and cooling and wastewater management, while light pollution reduction strategy by preferring low density lights, and heat island reduction to keep things cool were found missing and evaluated against the urban sustainable development indicator.

In addition, the neighbourhood-wide energy efficiency, the use of solar energy on design and using it at the neighbourhood level were all examined. The evaluation shows that some streets in zone C are adorned with landscape design for the street beautification (see Figure 4.19). There was absence of irrigation techniques within the zone, but the residents of the zone are conscious of the light pollution and embrace the use of low-density lights so as to reduce the light pollution, and dark colored roofs was also observed on virtually all the buildings. In addition, in reference to standard of infrastructure, several building within the zone employed the use of solar energy of their building (see Figure 4.19), but could not be observed on a neighbourhood-wide scale, and also heat island reduction to keep things cool could not be sighted.

In summary, it is established that the abundant availability of green area in this zone placed the zone is an advantage position for future expansion and development. But the transport system remains a challenge to this zone which is similar to other zones, and also the absence of sewage treatment plant which is very essential for the healthiness of the environment. Generally, the zone performs poorly in terms of rating as more or less a few points was scored according to standard of urban sustainability framework. Therefore, the total point scored by zone C is 21 which are far below the minimum point (40-49) that was specified by LEED-ND as a neighbourhood with a potential for urban development sustainability. It is then become imperative for the urban development stakeholders to ensure that the zone is given adequate attention and more attention should be paid to the essential indices that will foster the urban development sustainability of the zone.

Figure 4.19: Pictorial view of Zone C

4.2.4 LEED-ND Assessment of Zone D

Smart location and linkage (SLL)

Even though the evaluation of land use in zone D shows that the proportion of land currently being put into different use seems to be in order (see Table 4.2), but in line with the urban development sustainability indicator, zone D is rated poorly (see Table 4.3). The available open space and green area observed in this zone are considered to be good for environment sustainability. Also, the commercial activities and the playground that was observed to be available in this is believed that it will aid the residents' livability and socialization (see Figure 4.20). Meanwhile, the non-availability of efficient public transport system, cycling facilities and site for treating waste are some indices that pose a challenge to the sustainable development of zone D.

Neighbourhood pattern and design (NPD)

The strength of Zone D in reference to the neighbourhood pattern and design is its compact development, while its weakness is in its not having universal design. The street within the zone were adorned with landscape designing, however, the street furniture and cycling facilities that could aid the comfortability of the pedestrian and cyclist are missing within the zone. The playground is sighted within the zone, also the zone is well connected with access routes, and different types of housing density ranges from ground floor to above 5-storey buildings are available.

Meanwhile, the shortcomings were observed in the area of transportation and parking facilities. These are necessary as the population keeps growing and the zone keep developing, because reliance and increase in private vehicle will pose a threat to environment and its sustainability.

Green infrastructure and buildings (GIB)

Though, there are some noticeable efforts observed within zone D in reference to LEED-ND indicator in terms of green infrastructure and buildings. However, there are no irrigation techniques in sight within the zone, also neighbourhood-wide scale energy efficiency and the heat island reduction to keep things cool. Meanwhile, in the area of building construction, even though the green building technologies have not been adopted, some green building techniques has been incorporated into the construction for the achievement of green environment. For instance, landscape design, using of low-density bulb to reduce light pollution, dark colored roof for alluring heat and trees planting which is in the process.

Generally, zone D was rate below the minimum standard of urban sustainability framework, as the rating of the available indices were calculated to be 30. Whereas, the minimum certified category for urban sustainability is 40-49. Therefore, there is need for concerted efforts to ensure that the haphazard development that is ongoing in this zone is regulated and monitored to ensure compliance with standard so as to ensure the sustainability of the zone in the long-run.

Figure 4.20: Playground in Zone D

4.2.5 LEED-ND Assessment of Zone E

Smart location and linkage (SLL)

The observation on zone E in terms of SLL is similar to zone A and B but different from zone C and D. The land use in this zone could be considered to be efficiently allocated to different uses. According to the evaluation presented in Table 4.2, the green space and open spaces covers about 23.3% and 47.8% respectively of the total land area in zone E, and the building use covers about 15.2% which is considerate enough in terms of proportion. In terms of urban sustainability indicator, the zone is well located, has sufficient green area and open space for future expansion and development and also that could encourage environmental and ecological sustainability. There is evidence of commercial and recreational activities that will facilitate socio-economic relationship among the residents, while the parks sighted will enhance the livability and healthy living of the residents.

However, public transportation is observed to be a challenge for the residents of Zone E as most of them rely on private car which could pose a threat to the environmental sustainability of the zone in the nearest future. Also, the cycling facilities which could enable the residents to have an option of commuting with bicycle are absent, which will enhance the healthy living of the people, as well as reducing environmental pollution.

Neighbourhood pattern and design (NPD)

Similar to Zone A and B, Zone E has a good in the indices for NPD indicator. It was observed in Zone E that there are presences of landscape designing, the connection of the neighbourhood with each other is in order, the zone consists of different housing density and also there is availability of playing ground which serves as relaxation and other sporting activities for the resident and thus contributing to their healthy living (see Figure 4.21). However, similar to other zone, there is no facility for cycling and public parking space is missing. All these are essential for achievement of sustainable development, due to the fact that as the population of the zone keeps growing, so also the transport demand and in a situation where there is no available parking, the street will become congested and hinder free flow of vehicle which will eventually results to environmental pollution.

Green infrastructure and buildings (GIB)

The shortcomings observed in other zone in terms of the construction techniques currently deployed is similar to what was observed in Zone E. Virtually all the zones have not come with the terms that there is need to integrate green building technologies into their construction techniques. Though, some indices of urban sustainability indicator were observed. For instance, the observed landscape design, the use of dark-colored roof on the building with the aim of alluring the heat, the tree planting, and the use of light-colored roof with solar panel reflector. But the conformity of the zone to LEED-ND in the area of irrigation techniques, certified green building, energy efficiency and conservation, neighbourhood-wide energy efficiency, green building process, heat island reduction and historic and existing building reuse were all found missing within the zone.

Generally, zone E rating was found to be fair in comparison to zone C and D which were found to be rated below minimum urban sustainability indicator. The total rating points for zone E is found to be 66 which according to (USGBC, 2014) fall into the gold category (60-79). This implies that with the current form of urban development of zone E, it has the potential achieving sustainability in the long-run. But more efforts need to be put in place in the areas where the shortcomings were observed so that the sustainability of the urban development will be efficient.

Figure 4.21: Pictorial view of Zone E

Table 4.3: LEED-ND standard evaluation for Kyrenia City

	Indicator	Credit	ZONE A	ZONE B	ZONE C	ZONE D	ZONE E
1	**Smart location and linkage**						
	Preferred Locations	10	✓	✓	✓	✓	✓
	Brownfield Remediation	2	×	×	×	×	×
	Access to Quality Transit	7	✓	✓	×	×	✓
	Bicycle Facilities	2	×	×	×	×	×
	Housing and Jobs Proximity	3	✓	✓	✓	✓	✓
	Steep Slope Protection	1	×	×	✓	✓	×
	Site Design for Habitat or Wetland and Water Body Conservation	1	×	×	×	×	×
	Restoration of Habitat or Wetlands and Water Bodies	1	×	×	×	×	×
	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1	×	×	×	×	×
2	**Neighbourhood Pattern and Design**						
	Walkable streets	9	✓	✓	×	×	✓
	Compact development	6	✓	✓	×	×	✓
	Mixed-Use Neighbourhoods	4	✓	✓	×	×	✓
	Housing types and affordability	7	✓	✓	×	×	✓
	Reduced Parking Footprint	1	×	×	×	×	×
	Connected and Open Community	2	✓	✓	×	×	✓
	Transit Facilities	1	✓	×	×	×	✓
	Transportation Demand Management	2	✓	×	×	×	✓
	Access to Civic & Public Space	1	✓	✓	×	×	✓
	Access to Recreation Facilities	1	✓	✓	×	✓	✓
	Visitability and Universal Design	1	×	×	×	×	×
	Community Outreach and Involvement	2	✓	✓	×	✓	✓
	Local Food Production	1	✓	✓	×	✓	×
	Tree-Lined and Shaded Streetscapes	2	✓	✓	✓	✓	✓
	Neighborhood Schools	1	×	✓	×	✓	×
3	**Green Infrastructure and Building**						
	Certified green Building	5	×	✓	×	×	×
	Optimize Building Energy Performance	2	×	×	×	×	×
	Indoor Water Use Reduction	1	×	×	×	×	×
	Outdoor Water Use Reduction	2	×	×	×	×	×
	Building Reuse	1	×	×	×	×	×
	Historic Resource Preservation and Reuse	2	✓	×	×	×	×
	Minimized Site Disturbance	1	×	×	×	×	×
	Rainwater Management	4	✓	✓	×	✓	✓
	Heat Island Reduction	1	×	×	×	×	×
	Solar Orientation	1	✓	✓	✓	✓	✓
	Renewable Energy Production	3	×	×	×	×	×
	District Heating and Cooling	2	✓	✓	✓	✓	✓
	Infrastructure Energy Efficiency	1	×	×	×	×	×
	Wastewater Management	2	✓	✓	✓	✓	✓
	Recycled and Reused Infrastructure	1	×	×	×	×	×
	Solid Waste Management	1	×	×	×	×	×
	Light Pollution Reduction	1	×	×	×	×	×
	Grand Total	**100**	**69**	**70**	**21**	**30**	**66**

4.3 Residents perception on Urban Development Sustainability

In this section, the perception of the residents was examined and analyzed using structured questionnaire to elicit information on their socio-demographic characteristics, neighbourhood quality satisfaction, smart location and linkage, neighbourhood pattern and design, and the green infrastructure and building. This is with the aim of complementing the evaluation using the LEED-ND urban development sustainability framework which was presented in the previous section. Firstly, the descriptive statistics is presented, follow by the mean, standard deviation and correlation of the variables employed in the study. Lastly, the reliability of the variables was evaluated through Cronbach's alpha and then the regression analytical techniques was employed to determine the impact of smart location and linkage, neighbourhood pattern and design, and green infrastructure and building on the neighbourhood quality satisfaction.

4.3.1 Socio-economic characteristic of respondents

In order to have a deeper understanding on the urban development sustainability of Kyrenia city, a structured questionnaire was prepared for the residents to collect information from them. As presented in Table 4.4, about two hundred and sixty (260) respondents are male, while one hundred and thirty (130) are female. The proportion is 66.7:33.3 which is considered to be fair enough for our study. In respect of the age of respondents, about 39.4% (154) are below 30 years of age, 24.2% (94) are between 31-40 years, while 18.2% (71) and 18.2% (71) are between ages of 41-50 and above 50 years respectively.

The education level of the respondents was also examined and the result as presented in Table 4.4 shows that the larger portion of the respondent's bachelor degree or more (54.5%), while 27.3% and 18.2% of the respondents has education level between high school and middle school respectively. Moreover, the result on the occupation of the respondents shows that most of the respondents (36.4%) are business owner who work on their own, about 27.3% are students, 15.2% are government workers, while 12.1% and 9.1% are retired and unemployed respectively. As for the family size, 21.2% of the respondents have two family sizes, 15.2% has three family sizes, 27.3% has four family

sizes and 36.4% of them have family size that is above five. Finally, the income level analysis of the respondents reveals that majority of the respondents earn above 4000 TL (48.5%). Also, result shows that 6.1% of the respondents earn between 1000-2000 TL, while 24.2% and 21.2% earns between 2000-3000 TL and 3000-4000 TL respectively.

Table 4.4: Socio-economic characteristics of respondents

Variable		**Frequency**	**Percentage**
Gender	Male	260	66.7
	Female	130	33.3
	Total	**390**	**100**
Age	< 30 years	154	39.4
	31-40 years	94	24.2
	41-50	71	18.2
	> 50 years	71	18.2
	Total	**390**	**100**
Education	Middle school	71	18.2
	High school	106	27.3
	Bachelor	213	54.5
	Total	**390**	**100**
Occupation	Unemployed	36	9.1
	Business	142	36.4
	Govt. worker	59	15.2
	Student	106	27.3
	Retired	47	12.1
	Total	**390**	**100**
Family size	Two	83	21.2
	Three	59	15.2
	Four	106	27.3
	> Five	142	36.4
	Total	**390**	**100**
Income level	1000-2000 TL	24	6.1
	2000-3000 TL	94	24.2
	3000-4000 TL	83	21.2
	> 4000 TL	189	48.5
	Total	**390**	**100**

4.3.2 Statistics of variables

Subsequently, the mean, standard deviation and correlation of the variables were examined and presented in table 4.5. As presented in Table 4.5, the results show that the mean value for respondents on gender was (1.33), age (2.15), education level (3.36), occupational level (2.97), family size (2.79) and income level (3.12). The standard deviation of the statistics reveals that the variable deviation from the mean value is minimal (see Table 4.5). The mean value for NQS which is (3.27) indicate that the respondents are more tilted towards "agreed" in their response because the variable was measured on 5-point Likert scale. As for SLL, the mean value (2.89) reveals that the respondents are more tilted between "Neutral" and "Agreed". Meanwhile, the standard deviation for SLL (.51) shows that the variation among the respondents in their responses is not much from the mean value. Similarly, NPD has a mean value of 2.70 and standard deviation value of .55 which is an indication that the respondent is mostly sandwiched between "neutral" and "agreed", and the standard deviation established the variation among their response from the mean value that it's not much. In addition, GIB has a mean value of 3.39 and standard deviation of .355 which indicate that the respondent's average response is "agreed" and standard deviation value shows that the respondents are so close to the mean value in their responses.

The correlation value among the main variables is presented in Table 4.5. The result shows that there is a positive and weak correlation between SLL and NQS, meanwhile the association is not significant. Moreover, NPD demonstrates to have association with NQS and SLL, but the correlation was found not to be significant. In addition, GIB demonstrates to have a negative but moderate and significance association with NQS, while GIB correlation with SLL and NPD was found to be positive and negative respectively but not statistically significant.

Table 4.5: Mean, Standard Deviation, and Correlation among the variables

	Mean	Std.Dev	NQS	SLL	NPD
Gender	1.33	.479			
Age	2.15	1.15			
Education	3.36	.78			
Occupation	2.97	1.24			
Family size	2.79	1.17			
Income	3.12	.99			
NQS	3.27	1.28			
SLL	2.89	.51	.187		
NPD	2.70	.55	.286	.276	
GIB	3.39	.355	-.506**	.303	-.215

Note: NQS = Neighbourhood Quality Satisfaction, SLL = smart location and linkage, NPD = neighbourhood pattern and design, GIB = green infrastructure and building. ** denotes 1% confidence level.

4.3.3 Results of analysis

Subsequent to the descriptive analysis, in order to ensure that the items in our questionnaire to measure each of the variables are reliable, reliability test was conducted using Cronbach's alpha and the result presented in Table 4.6. The reliability test result as presented in Table 4.6 reveals that all the four variables (NQS, SLL, NPD and GIB) has alpha index that is above the 0.5 threshold. This implies that the variable has internal consistency and reliable for further analysis.

Table 4.6: Reliability test

Variable	Cronbach Alpha
Neighbourhood Quality Satisfaction	.884
Smart location and linkage	.501
Neighbourhood Pattern and Design	.512
Green Infrastructure and Building	.540

Based on the reliability of the variable, simple linear regression was conducted to determine the relationship between the dependent variable (NQS) and independent variables (SLL, NPD and GIB). The regression results as presented in Table 4.7 reveals that smart location and linkage has a positive and significant relationship with neighbourhood quality satisfaction, with the coefficient of .884, t-value = 2.146, with a p-value of .040 which is less than .05. This result implies that an increase in the smart location and linkage of Kyrenia city will influence positively the neighbourhood quality satisfaction for the residents and the city. However, the relationship between neighbourhood pattern and design, and neighbourhood quality satisfaction was found not to be statistically significant as a result of the p-value (.712) that is greater than .05. Therefore, much could not be said because of the non-significance of the coefficient of the relationship. Moreover, green building infrastructure and building relationship with neighbourhood quality satisfaction was examined and the result shows that a negative and significant relationship exists between the two variables (β = -2.166, t-value = -3.719, p-value = .001). This result implies that the perception of the residents on green infrastructure and building is having negative influence on neighbourhood quality satisfaction.

Table 4.7: Regression analysis result

Model	Coefficient	Std. Error	T statistic	P Value
Constant	7.68	2.23	3.45	.002
SLL	.884	.412	2.146	.040
NPD	.139	.374	.372	.712
GIB	-2.166	.582	-3.719	.001
R Square	.387			

a. Dependent variable: NQS
b. Predictor: (Constant), GIB, NPD, SLL

Generally, the three variables have about 38.7% (R Square = .387) explanation variation in the neighbourhood quality satisfaction. This result shows that the three indicator of urban development sustainability has about 38.7% determinant of what constitutes the neighbourhood quality satisfaction. In addition, the analysis of variance (ANOVA) test was conducted to determine if the three indicators (SLL, NPD, and GIB) jointly influence neighbourhood quality satisfaction. The result as presented in Table 4.8 shows that with the ANOVA model has an f-value of 6.094 and p-value of .002, it implies that the three indicators has a joint impact on neighbourhood quality satisfaction and the impact is statistically significance at less than 1% confidence level.

Table 4.8: ANOVA Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.248	3	6.749	6.094	.002
Residual	32.119	389	1.108		
Total	52.367	392			

a. Dependent variable: NQS
b. Predictor: (Constant), GIB, NPD, SLL

4.3.4 Comparison of zones in terms of LEED-ND indicators

In order to provide a clear picture on the three indicators considered in the analysis, survey results are obtained for each zone separately. The average of scores for each of the LEED-ND indicators are represented in Table 4.9. These scores correspond to the level of agreement among the respondents regarding each indicator. It can be seen that for SLL, the scores are at almost the same level of agreement for all zones which is consistent with the detailed LEED-ND evaluation. For the case of NPD, as also revealed by inspections in site, zone C suffers from deficiency as it is the least developed district among all. It is also evident that respondents perceive their zones as green infrastructures and buildings at a significant level. The results of the comparison more or less align with the LEED-ND evaluation results reported in Table 4.3. The case of slight differences between the evaluation results and survey result can be explained as what the respondents perceive is not precisely what an expert does think. Figure 4.22 shows the pie charts comparing the levels of agreement among respondents at each zone.

Table 4.9: Average of indicators for each zone

Indicator	Zone A	Zone B	Zone C	Zone D	Zone E
NQS	3.67	3.71	2.46	3.25	3.29
SLL	2.94	3.05	2.94	2.83	2.65
NPD	3.05	3.09	2.45	2.83	2.92
GIB	3.41	3.54	3.25	3.39	3.33

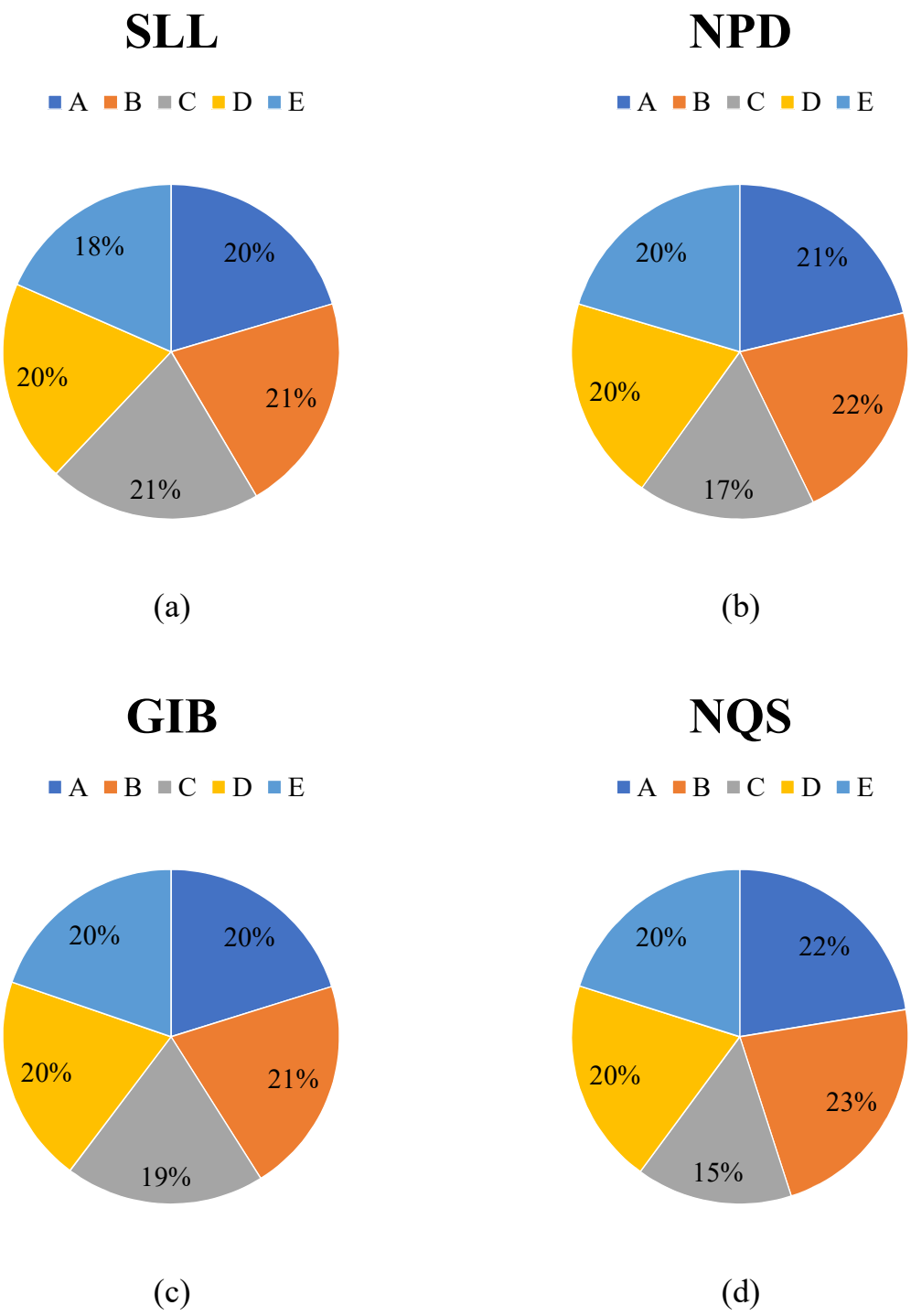


Figure 4.22: Comparison of indicators in different zones

4.4 Expert opinion on the Urban Sustainability in Kyrenia City

In order to gain more understanding on the sustainable urban development in Kyrenia city, the expert opinion was sorted. Several experts were contacted for interview, but only four obliged to grant interview to the author and the results from the experts are presented. Out of the four experts, three (3) of them are Architect by profession, while one (1) is a civil engineer. One of them ages between 25-34 years, one (1) also ages between 35-34 years, while the remaining two ages between 45-54 years and 55-64 years respectively. In addition, the four experts are Assistant Professor who understand better the subject under discussion, and they all have more than ten (10) years working experience.

Opinion on the challenges of sustainable urban development (SUD) implementation:

The experts opined that the challenges impeding the implementation of SUD in respect of Kyrenia city are numerous, but the notable ones are not limited to the followings:

- ✓ Uncontrolled urban development.
- ✓ Unsatisfactory rules and regulation.
- ✓ Politician interference in the environment laws and regulations.
- ✓ Insufficient public acts on conservation.
- ✓ Generally, the entire expert agreed that the government actions on the urban development enforcement is insufficient and posing a threat to the sustainable development of Kyrenia City.

Possible solution to address the challenges:

- ➢ The expert suggested that there should be synergy among the stakeholders to address the challenges.
- ➢ Politician should not be allowed to have total control over the decision-making in environmental design.
- ➢ There is need to ensure that sustainable urban development is done scientifically.
- ➢ Local governances must be alive to their responsibilities.
- ➢ Public enlightment for the community on sustainability.
- ➢ Policies to encourage people on sustainability must be formulated.

Effectiveness of SUD indicator in addressing SUD in Kyrenia city:

In the opinion of the expert, it was believed that the indicator as suggested in the sustainable development indicator, it should be supported with the development of urban planning/master plan. In addition, there should be strict rules and regulations for preventing undesirable development.

Sufficiency of three SUD indicators:

The experts opined that the three indicators as suggested in LEED-ND which are: smart location and linkage, neighbourhood pattern and design, and green infrastructure and building are important, but suggested that it should be supported with laws and regulations. However, one of the experts has a contrary opinion on one of the indicators, which is neighbourhood pattern and design. The expert opinion is in quote "Neighbourhood pattern and design is not that much important". He stressed further that even though it might be relevant, but it's not that significant as a determinant for sustainable urban development.

Suggestions for achievement of SUD in Kyrenia city:

- ✓ Establishment of new planning law
- ✓ Existing laws and regulations must be revised to be in line with sustainable development
- ✓ Public interest should be the priority in the policies targeting towards the urban development sustainability.

4.5 Discussion of findings

In the preceding section, the Kyrenia city was sub-divided into five (5) zones and evaluated in line with LEED-ND indicator to ascertain if the present urban development that is ongoing in the city could be sustainable in the long run. The LEED-ND has three (3) main indicators which are: smart location and linkage, neighbourhood pattern and design and green infrastructure and buildings. Under each of these indicators are indices that are assigned some value for rating (see Table 3.2).

In the evaluation of the first indicator which is smart location and linkage, the result as presented in Table 4.3 shows that in all the zones, the location, and ecological and green area are the most ubiquitous in all the zones. Though, these indices are very essential, most especially for future expansion and development. However, in all the zones, site for treating waste materials, and cycling facilities were found missing. Meanwhile, transit-accessible location was observed in all the zones, except Zone C and D which are less developed among the five (5) zones.

Meanwhile, in achieving sustainable urban development, all the missing indices must be present. Most especially the cycling facilities which is necessary to encourage residents to walk and cycling and discourage them from increasing the car ownership which at the long-run will result to traffic congestion and air pollution from the vehicle emission.

As for the second indicator in the LEED-ND which is the neighbourhood pattern and design, the result as presented in Table 4.3 shows that three of the zones (A, B, and E) demonstrates presence most of the indices that was employed in measuring the indicator. While the remaining two zones (C and D) fell short of standard by showing the presence of few indices. Though, this result is not surprising owing to the fact that the two zones are the least developed among the five zones.

Though, some zones show improvement in the rating under this indicator, but in order to achieve overall urban development sustainability, there is need to ensure that the zones that are lacking in some indices are given adequate attentions. For instance, the parking and transport demand, universal design that are lacking in virtually all the zones are a very important indices that guaranteed a sustainable urban development. Because, as the city continues to experience growth in terms of population, the need for more parking will be increased, thus all the missing indices should be integrated so as to achieve overall sustainable urban development in Kyrenia.

Moreover, the last indicator which is the green infrastructure and building was also evaluated and rated in line with LEED-ND indices. This aspect of the indicator is very essential it reflects on the environmental and ecology aspect of urban development. In all the zones, a certified green building is missing, except in zone B. None of the zones shows the presence of irrigation techniques and energy conservation, and also the neighbourhood-wide-energy efficiency. The reuse of historical and existing building could not be sighted in all the zone except zone A. This indicator is found not to perform fairly in rating in all the zones. This indicates that more efforts are required in this aspect to ensure the sustainable of urban development of Kyrenia city. It is established in the literature that green environment is essential for the achievement of sustainable urban development.

In addition, the rating of the zones according to LEED-ND rating, the result shows that zone A has 69 scores (gold), zone B has 70 (gold), and zone E has 66 (gold), while zone C has 21 and zone D has 30 respectively which falls below the minimum standard for a neighbourhood to be sustainable. Meanwhile, generally, the overall rating of the city was determined by finding the average rating of the five zones. It was found that the city has rating value of 51.2 (certified). This implies that even though the city lacks some indices of sustainable urban development as prescribed in the LEED-ND framework, the city has potential to achieve sustainable urban development in the long-run if all the stakeholders work together for the achievement.

Subsequently, in order to overcome the shortcomings of the LEED-ND rating as emphasized by Sharifi (2016) that there should be post-occupancy assessment to complement the LEED-ND rating, this author developed a questionnaire and administered to the residents. The aim was to examine the significant impact of each of the indicator on the neighbourhood quality satisfaction. The findings from the analysis reveals that only smart location and linkage and the green infrastructure and building that has individual relationship with neighbourhood quality satisfaction. Though, the relationship between green infrastructure and building was negative, but statistically significant. Meanwhile, the analysis result for the joint impact of all the indicators (smart location and linkage,

neighbourhood pattern and design and green infrastructure and building) shows that they all have a joint and significant impact on neighbourhood quality satisfaction. In addition, the R square (.387) indicate that the three indicators have an explanation variation of about 38.7% in neighbourhood quality satisfaction.

4.5.1 Impediment to the achievement of sustainable urban development in Kyrenia city

It was established in the literature that the achievement of sustainable urban development might not become reality due to some challenges. In order to understand these challenges and understand better, expert opinion was sought. An open-ended questionnaire was employed in eliciting information on the perception of the expert on the followings: challenges on the implementation of SUD; suggestion for the solution to the challenges; effectiveness of SUD indicators; suitability of SUD indicators; and suggestion for the effective achievement of SUD in Kyrenia city.

From the expert interview, it was found that uncontrolled urban development, unsatisfactory rules and regulations, politician interference, and lack of government control on environment are the main factors highlighted by the expert as the constraints for the implementation of SUD. In addition, the experts opined that the challenges could be addressed if the politicians are restricted in interfering in the decision-making in environmental design; SUD should be done scientifically, public enlightenment is essential; and policies to encourage public on sustainability must be formulated.

Moreover, the experts opined that the SUD indicators will be effective for the implementation of SUD in Kyrenia city if there is strict rule and regulations for preventing undesirable development, and development of urban planning/master plan. In addition, the entire experts agreed that the three indicators are important, but need to be supported with laws and regulations. Lastly, some suggestions were made on how they think SUD could be achieved in Kyrenia city. Among which are that: there should be establishment of new planning law; existing regulations must be revised to be in line with sustainable development; and, that the public interest should be the priority in the policies targeting towards the urban development sustainability.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The sustainable development is viewed as a holistic approach that was developed to classify some challenges that are relating to social, economic and environment. The attention given to this concept has been receiving great attention from all stakeholders among which are researchers across various discipline that are trying to adjust the concept to classify the issue in different field. The issue of sustainable urban development was in response to the challenges arises as a result of the increasing urbanization that is going on all around the world, most especially developing countries, out of which Kyrenia city in North Cyprus is among. Meanwhile, the rapid urbanization in Kyrenia in North Cyprus has been with the attendant effect such as environmental degradation, the loss of green areas, lack of safe drinking water, transportation challenges and the random urban development.

Though, studies have been conducted on this subject, but the use of sustainable urban development framework has been criticized in the literature that it should be supported with post-occupancy assessment. Therefore, this thesis aimed at examining the sustainable urban development process in Kyrenia City, and how the city development can be sustained. In doing so, the following objectives were stated to be pursued: to evaluate the urban development in Kyrenia in line with urban sustainability; to evaluate the SWOT of the city; and make policy recommendations that will assist the policy makers to achieve sustainable urban development in Kyrenia city.

In addressing the objectives of the study, LEED-ND framework rating scale was employed and to complement the findings from the rating, structured questionnaire was prepared for the residents and an interview guide was prepared for the expert to seek their opinion on the achievement of sustainable urban development in Kyrenia city.

The study findings revealed that Kyrenia city is growing at the moment without a comprehensive master plan which should guide the development, which is resulting in the

random development that is observed in virtually all the zones. In line with sustainability framework, the zones were evaluated and found that while two of the zones performed poorly below the threshold standard. However, average rating for the Kyrenia city revealed that the city rated to be in “certified” category. This is an indication that the city has the opportunity of becoming sustainable at the long-run if the stakeholder established a synergy for the achievement of SUD.

In addition, the findings from the empirical analysis to determine the relationship between the three indicators and neighbourhood quality satisfaction revealed that only the SLL and GIB has a significant relationship with neighbourhood quality satisfaction. Meanwhile, the examination of the joint impact of SLL, NPD and GIB was found to have a significant impact on the neighbourhood quality satisfaction.

Moreover, the expert opinion on the challenge of implementing SUD in Kyrenia city revealed that several issues are impeding the implementation of the SUD among which are politician interference in the decision-making and lack of coordinated efforts on the part of the government in addressing challenges of urban development. The finding from expert opinion revealed further that the three indicators in the SUD framework are essential but should be supported with rules and regulation to be effective.

Moreover, the SWOT analysis of the city revealed that the city strength is more than the weakness, and this study found that opportunities abound for Kyrenia city to become sustainable, but some threats were highlighted which if not checked would impede the achievement of sustainable urban development.

In conclusion, the suggestion that LEED-ND needs a better assessment mechanism to document the achievement of the original development objectives was considered and applied. Presently, smart location and linkage shows a positive relationship with SUD, but green infrastructure and building shows a negative and significant relationship, while neighbourhood pattern and design shows no significant relationship.

5.2 Recommendations

Based on the findings from this thesis, the following recommendations are put forward to address the findings.

- New planning law should be established to guide the urban development in Kyrenia.
- Existing laws and regulations on the urban development and environment should be revised in line with sustainable development.
- Public interest should be the priority of the policy makers in policy making that is targeted towards the urban development sustainability.
- In the case of Kyrenia city, the management should be more effective on the enforcement of regulations for protecting green region and urban development.
- Alternative green energy should be developed so as to contribute to the environmental sustainability.
- Generally, the LEED-ND framework should always be supported with post-occupancy assessment using questionnaire to understand the perception of the residents in respect of the relationship of the urban sustainable development indicators to the achievement of sustainable urban development. This will enable the stakeholders to have a deeper insight into which of the indicators should be prioritized.

REFERENCES

Al Qahtany, A., Rezgui, Y., & Li, H. (2013). A proposed model for sustainable urban planning development for environmentally friendly communities. *Architectural Engineering and Design Management*, *9*(3), 176-194.

Ali, M. (2012). *Sustainability Assessment: Context of Resource and Environmental Policy*. Academic Press. New York, NY, USA.

Alshuwaikhat, H. M., & Abubakar, I. (2008). An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices. *Journal of cleaner production*, *16*(16), 1777-1785.

Alvarez, J.B.; Mackalski, R.; Loeb, A.; Mazzanti, L. (2015). Leading sustainable change: An organizational perspective. *Strategic Management. Journal*, *34*, 1209–1231.

Assembly, U. G. (2005). World summit outcome document. New York: UN.

Atakara, C., & Akyay, G. (2017). SUSTAINABLE URBAN DEVELOPMENT IN THE GREEN CITY: KYRENIA WHITE ZONE. *Open House International*, 42(2).

Bacon-Shone, J. H. (2013). *Introduction to quantitative research methods*. Graduate School. The University of Hong Kong.

Bahreini, S. H., & Maknoon, R. (2001). Sustainable Development: From Ideas to Actions. *Journal of Environmental Studies, 27*, 41-60.

Bakar, A. H. A., & Cheen, K. S. (2013). A framework for assessing the sustainable urban development. *Procedia-Social and Behavioral Sciences*, *85*, 484-492.

Bartlett, J. E.; J. W., Kotrlik; and C. C. Higgins (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research. *Information Technology, Learning, and Performance Journal, 19, 1,* 43-50.

Baumgärtner, S.; Quaas, M.F (2010). What is sustainability economics? *Ecology Economics*, *69*, 445–450.

Bell, S., & Morse, S. (2008). Sustainability Indicators: Measuring the Immeasurable? Earthscan. London. Sterling, VA.

Bentivegna, V., Curwell, S., Deakin, M., Lombardi, P., Mitchell, G., & Nijkamp, P. (2002). A vision and methodology for integrated sustainable urban development: BEQUEST. *Building Research & Information*, *30*(2), 83-94.

Berke, P. R., & Conroy, M. M. (2000). Are we planning for sustainable development? An evaluation of 30 comprehensive plans. *Journal of the American planning association, 66*(1), 21-33.

Berkes, F., Henley, T., Blanford, H. R., Bryant, R. L., Carney, D., & Chambers, R. (1925). 1998 Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience. Cambridge. *Development, 18*(1), 71-82.

Beţianu, L., & Briciu, S. (2011). Balanced Scorecard–Sustainable Development Tool. *Analele Stiintifice ale Universitatii" Alexandru Ioan Cuza" din Iasi- Stiinte Economice*, *2011*, 19-27.

Bithas, K. P., & Christofakis, M. (2006). Environmentally sustainable cities. Critical review and operational conditions. *Sustainable Development*, 14(3), 177-189.

Blowers, A. (1994). Planning for a sustainable environmnet, A report by the Town and Country Planning Association, London. *Town and Country Planning Association.*

Blumberg, B. F., Cooper, D. R., & Schindler, P. S. (2005). Survey research. *Business research methods*, 243-276.

Böhringer, C., & Jochem, P. E. (2007). Measuring the immeasurable—A survey of sustainability indices. *Ecological economics, 63*(1), 1-8.

Brandon, P.S.; Lombardi, P. *Evaluating Sustainable Development in the Built Environment*; John Wiley & Sons: London, UK, 2010.

Brebbia, C. A., & Beriatos, E. (2011). Fifth International Conference on Sustainable Development and Planning, Wessex Institute of Technology, UK, 12-14 July 2011.

Bulkeley, H. (2006). Urban sustainability: Learning from best practice? *Environ. Plan. A*, *38*, 1029–1044.

Cahantimur, A., & YILDIZ, H. T. (2007). A socio-cultural approach for sustainable urban development: a case study for Bursa. *Unpublished Ph. D. Thesis, Istanbul Technical University, Institute of Science and Technology, Department of Architecture, Istanbul.*

Cecere, G.; Corrocher, N.; Gossart, C.; Ozman, M. (2014). Lock-in and path dependence: An evolutionary approach to eco-innovations. *J. Evolut. Econ.*, *24*, 1037–1065.

Chan, N. W., Imura, H., Nakamura, A. K. I. H. I. R. O., & Ao, M. (2016). Sustainable Urban Development Textbook.

Chikaraishi, M., Fujiwara, A., Kaneko, S., Poumanyvong, P., Komatsu, S., & Kalugin, A. (2015). The moderating effects of urbanization on carbon dioxide emissions: A latent class modeling approach. *Technological Forecasting and Social Change, 90*, 302-317.

Choguill, C.L. (2008). Developing Sustainable Neighbourhoods, Habitat International. Elsevier 32(2008), 41-48.

Clark, J. G. (1995). Economic development vs. sustainable societies: Reflections on the players in a crucial contest. *Annual review of ecology and systematics, 26*(1), 225-248.

Colantonio, A., & Dixon, T. (2011). *Urban regeneration and social sustainability: Best practice from European cities*. John Wiley & Sons.

Cole, R. J. (2010). Environmental assessment: shifting scales. In: Ng E, editor. Designing High-Density Cities for Social and Environmental Sustainability, London; Sterling, VA: Earthscan, 273-282.

Corvalán, C. F., Kjellstrom, T., & Smith, K. R. (1999). Health, environment and sustainable development: identifying links and indicators to promote action. *Epidemiology-Baltimore, 10*(5), 656.

Darmola A, IBem EO (2010) *Urban Environmental Problems in Nigeria: implication for Sustainable Development Journal of Sustainable Development in Africa*, 124-145.

Dehghanmongabadi, A., Hoşkara, Ş. Ö., & Shirkhanloo, N. (2014). Introduction to Achieve Sustainable Neighborhoods. *International Journal of Arts and Commerce*, *3*(9), 16-26.

Department for Communities and Local Government (DCLG) (2005). *Planning Policy Statement 1: Delivering Sustainable Development*; DCLG: London, UK.

Dermisi, S. (2009). Effect of LEED ratings and levels on office property assessed and market values. *Journal of Sustainable Real Estate, 1*(1), 23-47.

Dizdaroglu, D.; Yigitcanlar, T.; Dawes, L. (2012). A micro-level indexing model for assessing urban ecosystem sustainability. *Smart Sustain. Built Environ.*, *1*, 291–315.

Djoundourian, S. (2012). Environmental performance of developing countries: A comparative study. *Top. Middle East. Afr. Econ.*, *14*, 265–277.

Drexhage, J., & Murphy, D. (2010). Sustainable development: from Brundtland to Rio 2012. *United Nations Headquarters, New York, 2010*, 9-13.

Dur, F., & Yigitcanlar, T. (2015). Assessing land-use and transport integration via a spatial composite indexing model. *International Journal of Environmental Science and Technology, 12*(3), 803-816.

ELSAKKA, S., & ST TAGAMOA, E. K. (2015). The challenges confront the developing countries in applying sustainable urban development-an application on egypt. *Journal of Advances in Social Science and Humanities, 1*(01).

European Union (EU). (1998). *Sustainable Urban Development in the European Union: A Framework for Action*; European Commission: Brussels, Belgium.

European Union (EU). (2007). *Leipzig Charter*; European Council: Brussels, Belgium.

Ewing, R, Greenwald MJ, Zhang M, Bogaerts M, and Greene W. (2013). Predicting transportation outcomes for LEED projects. *Journal of Planning Education and Research* 33(3), 265-279.

Ewing, R., & Cervero, R. (2010). Travel and the built environment: A meta-analysis. *Journal of the American planning association, 76*(3), 265-294.

Farr, D. (2011). *Sustainable urbanism: Urban design with nature*. John Wiley & Sons.

Fraker, Harrison. (2013). *The Hidden Potential of Sustainable Neighborhoods: Lessons from Low-Carbon Communities*. Washington, D.C.: Island Press.

Freilich RH, Sitkowski RJ, Mennillo SD. (2010). *From Sprawl to Sustainability: Smart Growth, New Urbanism, Green Development, and Renewable Energy*. Chicago, IL: American Bar Association.

Garde A. (2009). Sustainable by design? Insights from U.S. LEED-ND pilot projects. *Journal of the American Planning Association* 75, 424-440.

Ghellere, M., Devitofrancesco, A., & Meroni, I. (2017). Urban sustainability assessment of neighborhoods in Lombardy. *Energy Procedia*, *122*, 44-49.

Gibbs, D.; O'Neill, K. (2015). Building a green economy? Sustainability transitions in the UK building sector. *Geoforum*, *59*, 133–141.

Giddings, B. (2002). Environment, economy and society: fitting them together into sustainable development. *Sustainable development, 10*(4), 187-196.

Gil, J., & Duarte, J. P. (2013). Tools for evaluating the sustainability of urban design: a review. *Proceedings of the Institution of Civil Engineers-Urban Design and Planning, 166*(6), 311-325.

Godschalk, D. R. (2004). Land use planning challenges: Coping with conflicts in visions of sustainable development and livable communities. *Journal of the American Planning Association, 70*(1), 5-13.

Gray, D. E. (2013). Theoretical perspectives and research methodology. *Doing research in the real world. 3rd ed. LA: sage,* 14-38.

Griggs, D.; Stafford-Smith, M.; Gaffney, O.; Rockström, J.; Öhman, M.C.; Shyamsundar, P.; Noble, I. (2013). Policy: Sustainable development goals for people and planet. *Nature*, *495*, 305–307.

Hall, P. (1993). Toward Sustainable*. Livable and Innovative Cities for, 21.*

Hamedani, A. Z., & Huber, F. (2012). A comparative study of DGNB, LEED and BREEAM certificate systems in urban sustainability. *The sustainable city VII: Urban regeneration and sustainability, 1121.*

Harris, J. M. (2003). Sustainability and sustainable development. *International Society for Ecological Economics, 1*(1), *1-12.*

Hodapp RT. (2012). LEED-EB: Leadership in Energy and Environmental Design for Existing Buildings, in Jorgensen SE: *Encyclopedia of Environmental Management*. Boca Raton, FL, CRC Press: 1647-1653.
http://www.un.org/summit2005/documents.html Accessed Nov, 8, 2019
https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf. Accessed on, oct, 26, 2019.

Hult, A. (2015). The circulation of Swedish urban sustainability practices: To China and back. *Environ. Plan. A***,** *47*, 537-553.

Imperatives, S. (1987). Report of the World Commission on Environment and Development: Our common future. *Accessed Oct, 10.*

Institution of Civil Engineers Staff (2000). *Local Agenda 21.* London: Thomas Telford.

Ivankova, N.V., Creswell, J. W., & Plano Clark, V.L. (2007). Foundations and approaches to mixed methods research. *First steps in research. Pretoria: Van Schaik*, 253-282.

Jones, S.; Tefe, M.; Appiah-Opoku, S. (2015). Incorporating stakeholder input into transport project selection: A step towards urban prosperity in developing countries? *Habitat Int.*, *45*, 20–28.

Kamruzzaman, M.; Yigitcanlar, T.; Washington, S.; Currie, G. (2014). Australian baby boomers switched to more environmentally friendly modes of transport during the global financial crisis. *Int. J. Environ. Sci. Technol.*, *11*, 2133–2144.

Khor, S. C. S., & Abu Bakar, A. H. B. (2012). Incorporating sustainable management system into housing development practice in Malaysia. *International journal of sustainable development, 15*(3), 277-291.

Kiamba, A. (2012). The sustainability of urban development in developing economies. *Consilience*, (8), 20-25.

Kotharkar and Bahadure. (2010). Mixed Landuse, An approach to Sustainable Urban Development. International Conference Urbanism and Green Architecture titled Mixed Landuse, *An approach to Sustainable Urban Development*, (pp.149-158). NIT, Hamirpur.

Kotrlik, J. W. K. J. W., & Higgins, C. C. H. C. C. (2001). Organizational research: Determining appropriate sample size in survey research appropriate sample size in survey research. *Information technology, learning, and performance journal, 19*(1), 43.

Laghai, H. A., Loghman, M., & Kolbadi, N. (2013). *Strategy for Sustainable Urban Development Guidelines for Tehran. American Journal of Scientific Research, (89),* 91-96.

Larijani, A. H. (2016). Sustainable Urban Development, concepts, features, and indicators. *International Academic Journal of Science and Engineering, 3*(6), 9-14.

Laureti, L., Rogges, M. G. L., & Costantiello, A. (2018). Evaluation of Economic, Social Effects of Renewable Energy Technologies. *Journal of Environmental Protection*, *9*(11), 1143.

Loures, L., Santos, R., & Panagopoulos, T. (2007). Urban parks and sustainable city planning-The case of Portimão, Portugal. *population, 15*, 23.

Mapes, J., & Wolch, J. (2011). 'Living green': the promise and pitfalls of new sustainable communities. *Journal of Urban Design, 16*(1), 105-126.

Marsal-Llacuna, M.L.; Colomer-Llinàs, J.; Meléndez-Frigola, J. (2015). Lessons in urban monitoring taken from sustainable and livable cities to better address the Smart Cities initiative. *Technol. Forecast. Soc. Chang.*, *90*, 611–622.

Marshall, S., & Çalişkan, O. (2011). A joint framework for urban morphology and design. *Built Environment, 37*(4), 409-426.

McCormick, K., & Kiss, B. (2015). Learning through renovations for urban sustainability: The case of the Malmö Innovation Platform. *Current Opinion in Environmental Sustainability, 16*, 44-50.

McLaren, D., & Agyeman, J. (2015). *Sharing cities: a case for truly smart and sustainable cities.* MIT press.

Menzel, H. J. (2001). Das Konzept der „nachhaltigen Entwicklung "—Herausforderung an Rechtssetzung und Rechtsanwendung. *Zeitschrift für Rechtspolitik*, 221-229.

Meteoroloji Dairesi (2018). Kuzey Kibris Turk Cumhuriyeti Cevre ve Dogal Kaynaklar Bakanligi, Sayi: MTD.0.00.M12-18/087.

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM) (2001). *Making Space, Sharing Space: The Fifth National Policy Document on Spatial Planning 2000/2020*; VROM: The Hague, The Netherlands.

Mitlin, D., & Satterthwaite, D. (1996). Chapter one sustainable development and cities. Sustainability: *The environment and urbanization, 23.*

Mobaraki, O., Mohammadi, J., & Zarabi, A. (2012). Urban Form and Sustainable Development: The Case of Urmia City. *Journal of Geography & Geology*, *4*(2).

Mohajan, H. K. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series, 17*(4), 59-82.

Mörtberg, U.; Haas, J.; Zetterberg, A.; Franklin, J.P.; Jonsson, D.; Deal, B. (2013). Urban ecosystems and sustainable urban development: Analyzing and assessing interacting systems in the Stockholm region. *Urban Ecosystem*, *16*, 763–782.

Musakwa, W., & Van Niekerk, A. (2015). Earth observation for sustainable urban planning in developing countries: *Needs, trends, and future directions. Journal of Planning Literature, 30*(2), 149-160.

Newsham, G. R., Mancini, S., & Birt, B. J. (2009). Do LEED-certified buildings save energy? Yes, but…. *Energy and Buildings, 41*(8), 897-905.

Nijkamp, P.; Perrels, A. (2014). *Sustainable Cities in Europe*; Routledge: New York, NY, USA.

Nurse, K. (2006). Culture as the fourth pillar of sustainable development. *Small states: economic review and basic statistics, 11*, 28-40.

Olofsson, J., Sandow E., (2003). *Towards a More Sustainable City Planning: case Study of Dar es Salaam, Tanzania*, Minor Field Studies Report, Umea University, Department of Social and Economic Geography.

Organisation for Economic Co-operation and Development (OECD). (2002). *An Update of the OECD Composite Leading Indicators*; OECD: Paris, France.

Özdal Oktay, S. (2015). Mahalle Ölçeğinde Sürdürülebilirlik Değerlendirme Araçlarının İrdelenmesi ve Yerele Özgü bir yöntem Önerisi, Doktora Tezi, Mimar Sinan Güzel Sanatlar Üniversitesi Fen Bilimleri Enstitüsü, İstanbul.

Paralkar, S., Cloutier, S., Nautiyal, S. & Mitra, R. (2017). The sustainable neighborhoods for happiness (SNfH) decision tool: Assessing neighborhood level sustainability and happines. Ecological Indicators. 74, 10–18.

Parris, T.M.; Kates, R.W. (2003). Characterizing and measuring sustainable development. *Annu. Rev. Environ. Resources*, *28*, 559–586.

Pearson, L.; Newton, P.; Roberts, P. (Eds.) (2014). *Resilient Sustainable Cities: A Future*; Routledge: New York, NY, USA.

Piña, A., William, H., & Pardo Martínez, C. I. (2016). Development and urban sustainability: An analysis of efficiency using data envelopment analysis. *Sustainability, 8*(2), 148.

Pina, W. A. (2014). The suburbanization process in Bogotá DC and municipalities of the Savanna of Bogotá. 1998-2010. *In Suburbanization Versus Peripheral Sustainability of Rural-Urban Areas Fringes* (pp. 103-123). Nova Science Publishers.

Piña, W. H. A., & Martínez, C. I. P. (2014). Urban material flow analysis: An approach for Bogotá, Colombia. *Ecological indicators*, *42*, 32-42.

Polit, D. F., & Beck, C. T. (2004). *Nursing research: Principles and methods*. Lippincott Williams & Wilkins.

Pollalis, S. N., Georgoulias, A., Ramos, S. J., & Schodek, D. (Eds.). (2013). *Infrastructure sustainability and design.* Routledge.

Pugh, C. (2013). *Sustainable cities in developing countries.* Routledge.

Purvis, M., & Grainger, A. (2013). *Exploring sustainable development: Geographical perspectives.* Routledge.

Purvis, B., Mao, Y. & Robinson, D. Three pillars of sustainability: in search of conceptual *Sustainability Science*, 14, 681–695 (2019). https://doi.org/10.1007/s11625-018-0627-5

Raco, M. (2015). Sustainable city-building and the new politics of the possible: Reflections on the governance of the London Olympics 2012. *Area*, *47*, 124–131.

Rauscher, R.; Momtaz, S. (2015). *Sustainable Neighbourhoods in Australia: City of Sydney Urban Planning*; Springer: New York, NY, USA.

Reposa J.H. (2009). Comparison of USGBC LEED for homes and the NAHB National Green Building Program. *International Journal of Construction Education and Research 5*(2), 108-120.

Retzlaff R.C. (2008). Green building assessment systems: A framework and comparison for planners. *Journal of the American Planning Association 74*(4), 505-519.

Robert, K. W., Parris, T. M., & Leiserowitz, A. A. (2005). What is sustainable development? Goals, indicators, values, and practice. *Environment: science and policy for sustainable development, 47*(3), 8-21.

Sachs, J.D. (2012). From millennium development goals to sustainable development goals. *Lancet*, *379*, 2206–2211.

Saveriades, A. (2000). Establishing the social tourism carrying capacity for the tourist resorts of the east coast of the Republic of Cyprus. *Tourism management, 21*(2), 147-156.

Saxenian, A. (1994). Regional Advantage: Culture and Competition in Silicon Valley and Route 128; Harvard University Press: Cambridge, MA, USA.

Schmidheiny, S.; Chase, R.; de Simone, L. (1997). Business progress toward sustainable development. *Yale F&ES Bull*, *101*, 143–156.

Sharifi A, Murayama A. (2013a). A critical review of seven selected neighborhood sustainability assessment tools. *Environmental Impact Assessment Review 38,* 73-87.

Sharifi A, Murayama A. (2015). Viability of using global standards for neighborhood sustainability assessment: Insights from a comparative case study. *Journal of Environmental Planning and Management, 58*(1), 1-23.

Sharifi A. (2016). From garden city to eco-urbanism: the quest for sustainable neighborhood development. *Sustainable Cities and Society 20,* 1-16.

Sharifi, A. & Murayama, A. (2014). Viability of using global standards for neighborhood sustainability assessment: Insights from a comparative case study, *Building and Environment*, *72,* 243-258.

Sharifi, A. (2013). Sustainability at the Neighborhood Level: Assessment Tools and the Pursuit of Sustainability, PhD Thesis, Nagoya University, Department of Environmental Engineering and Architecture. Nagoya, Japan.

Singh, R.K.; Murty, H.R.; Gupta, S.K.; Dikshit, A.K. (2012). An overview of sustainability assessment methodologies. *Ecol. Indic.*, *15*, 281–299.

Smith, R. M. (2015). Planning for urban sustainability: the geography of LEED®–Neighborhood Development™(LEED®–ND™) projects in the United States. *International Journal of Urban Sustainable Development, 7*(1), 15-32.

Smith, R., & Bereitschaft, B. (2016). Sustainable urban development? Exploring the locational attributes of LEED-ND projects in the United States through a GIS analysis of light intensity and land use. *Sustainability*, *8*(6), 547.

Spaargaren, G., & Van Vliet, B. (2000). Lifestyles, consumption and the environment: The ecological modernization of domestic consumption. *Environmental politics, 9*(1), 50-76.

Szibbo, N. A. (2016). Assessing neighborhood livability: evidence from LEED® for Neighborhood Development and New Urbanist Communities. *Articulo-Journal of Urban Research*, (14).

Talen E, Allen E, Bosse A, Ahmann J, Koschinsky J, Wentz, E, Anselin L. (2013). LEED-ND as an urban metric. *Landscape and Urban Planning* 119, 20-34.

Talen E, Koschinsky J. (2011). Is subsidized housing in sustainable neighborhoods? Evidence from Chicago. *Housing Policy Debate* 21(1), 1-28.

Talen E. (2010). Affordability in new urbanist development: Principle, practice, and strategy. *Journal of Urban Affairs* 32(4), 489-510.

Talen E. (2012). Prospects for walkable, mixed-income neighborhoods: Insights from U.S. developers. *Journal of Housing and the Built Environment* 28(1), 79-94.

Tu CC, Eppli M.J. (2001). An empirical examination of traditional neighborhood development. *Real Estate Economics* 29(3), 485-501.

UCLG. (2011). Culture: Fourth Pillar of Sustainable Development, United Cities and local Governments Policy Statement.

UNCED. (1992). UNCED, 1992-*Agenda 21 „Policy plan for environment and sustainable development in the 21st Century*. http://www.un.org/esa/dsd/agenda21 *Accessed oct, 2019*

UN-Habitat. (2013). *State of the World's Cities 2012/2013: Prosperity of Cities*; Routledge: New York, NY, USA.

United Nations (UN). Transforming Our World: The 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org *Accessed oct, 8, 2019*

United Nations Human Settlements Programme. (2006). The State of the World's Cities 2006/2007: The Millennium Development Goals and Urban Sustainability: 30 Years of Shaping the Habitat Agenda (Vol. 3). Routledge.

United Nations, *Sustainable Urban Development: A Regional Perspective on Urban Governance*, Economic and Social Commission for Western Asia, New York, 2001.

USGBC (2014). LEED Reference Guide for Neighborhood Development, LEED v4 Edition. Washington, DC.

Utting, P. (2000). *Business Responsibility for Sustainable Development: Geneva 2000*; United Nations: Geneva, Switzerland.

Van Dieren, W. (1995). *Taking nature into account: a report to the Club of Rome: toward a sustainable national income*. Springer Science & Business Media.

Van Geenhuisan, M., Nijkamp, P., (1994). *Sürdürülebilir Kenti Nasıl Planlamalı?* Toplum ve Bilim Dergisi, translated by Duruöz Nil, No: 64–65, pp. 129–140.

Wangel J, Wallhagen M, Malmqvist T, Finnveden G. (2016). Certification systems for sustainable neighbourhoods: what do they really certify? *Environmental Impact Assessment Review* 56: 200-213.

WCED. (1987) Our Common Future, Chapter 2: Towards Sustainable Development. World Commission on Environment and Development (WCED), United Nation, Geneva.

Weiland, U., Kindler, A., Banzhaf, E., Ebert, A., & Reyes-Paecke, S. (2011). Indicators for sustainable land use management in Santiago de Chile. *Ecological indicators, 11*(5), 1074-1083.

Wikipedia contributors. (2020, March 27). Districts of Northern Cyprus. In Wikipedia, The Free Encyclopedia. Retrieved 03:40, Feb 9, 2020, from https://en.wikipedia.org/w/index.php?title=Districts_of_Northern_Cyprus&oldid=947616651

Williams C., & Millington A. (2004). The diverse and contested meanings of sustainable development The Geographical Journal Vol. 170 No. 2, 99-104. World Business Council for Sustainable Development (WBCSD). *Signals of Change: Business Progress toward Sustainable Development*; WBCSD: Geneva, Switzerland, 1997.

WSSD. (2002). Johannesburg Declaration on Sustainable Development and Plan of Implementation of the World Summit on Sustainable Development: the final text of agreements negotiated by governments at the World Summit on Sustainable Development. Johannesburg, South Africa.

Xleveland C. & I.Kubiszewski. (2007). Rio declaration, United Nations Conference on Environment and Development (UNCED).

Yanarella, E. J., & Levine, R. S. (1992). Does sustainable development lead to sustainability? *Futures, 24*(8), 759-774.

Yigitcanlar, T., Bulu, M. (2015). Dubaization of Istanbul: Insights from the knowledge-based urban development journey of an emerging local economy. *Environ. Plan. A*, *47*, 89–107.

Yigitcanlar, T., Dur, F.; Dizdaroglu, D. (2015). Towards prosperous sustainable cities: A multiscalar urban sustainability assessment approach. *Habitat Int.*, *45*, 36–46.

Yigitcanlar, T., Kamruzzaman, M. (2014). Investigating the interplay between transport, land use and the environment: A review of the literature. *Int. J. Environ. Sci. Technol.*, *11*, 2121–2132.

Yigitcanlar, T., Kamruzzaman, M. (2015). Planning, development and management of sustainable cities: A commentary from the guest editors. *Sustainability*, *7*, 14677-14688.

Yigitcanlar, T., Kamruzzaman, M.; Teriman, S. (2015). Neighborhood sustainability assessment: Evaluating residential development sustainability in a developing country context. *Sustainability*, *7*, 2570–2602.

Yigitcanlar, T., Teriman, S. (2015). Rethinking sustainable urban development: Towards an integrated planning and development process. *Int. J. Environ. Sci. Technol.*, *12*, 341–352.

Yıldız, S., Yılmaz, M., Kıvrak. S. & Gültekin, A.B. (2016). Mahalle Sürdürülebilirlik Değerlendirme Araçları ve Beş Farklı Değerlendirme Aracına İlişkin Karşılaştırmalı Bir Analiz. *Planlama Dergisi, 26*(2), 93-110.

Zuhairuse, M.D., Abdul Khalim, A.R., NorAtikah, H., Zaidi, O., Masran, S., and Noraziah, M. (2009) "Development of Sustainable Campus: Universiti Kebangsaan Malaysia Planning and Strategy", Wseas Transactions on Environment and Development, Vol. 5, No. 3, pp 273-282.

APPENDICES

APPENDIX 1

POPULATION SAMPLE SIZE

Sample Size

Population Size	Continuous data (margin of error = .03)			Categorical data (margin of error = .05)		
	alpha = .10 z = 1.65	alpha = .05 z = 1.96	alpha = .01 z = 2.58	p = .50 z = 1.65	p = .50 z = 1.96	p = .50 z = 2.58
100	46	55	68	74	80	87
200	59	75	102	116	132	154
300	65	85	123	143	169	207
400	69	92	137	162	196	250
500	72	96	147	176	218	286
600	73	100	155	187	235	316
700	75	102	161	196	249	341
800	76	104	166	203	260	363
900	76	105	170	209	270	382
1,000	77	106	173	213	278	399
1,500	79	110	183	230	306	461
2,000	83	112	189	239	323	499
2,500	83	119	198	254	351	570
3,000	83	119	209	259	362	598
3,500	83	119	209	262	367	613
4,000	83	119	209	264	370	623

NOTE: The margins of error used in the table were .03 for continuous data and .05 for categorical data. Researchers may use this table if the margin of error shown is appropriate for their study; however, the appropriate sample size must be calculated if these error rates are not appropriate. Table developed by Bartlett, Kotrlik, and Higgins, (2001).

LEED v4 for Neighborhood Development Plan
Project Checklist

Project Name:
Date:

Yes	?	No				
0	0	0	**Smart Location & Linkage**			28
Y			Prereq	Smart Location	Required
Y			Prereq	Imperiled Species and Ecological Communities	Required
Y			Prereq	Wetland and Water Body Conservation	Required
Y			Prereq	Agricultural Land Conservation	Required
Y			Prereq	Floodplain Avoidance	Required
			Credit	Preferred Locations	10
			Credit	Brownfield Remediation	2
			Credit	Access to Quality Transit	7
			Credit	Bicycle Facilities	2
			Credit	Housing and Jobs Proximity	3
			Credit	Steep Slope Protection	1
			Credit	Site Design for Habitat or Wetland and Water Body Conservation	1
			Credit	Restoration of Habitat or Wetlands and Water Bodies	1
			Credit	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1

Yes	?	No				
0	0	0	**Neighborhood Pattern & Design**			41
Y			Prereq	Walkable Streets	Required
Y			Prereq	Compact Development	Required
Y			Prereq	Connected and Open Community	Required
			Credit	Walkable Streets	9
			Credit	Compact Development	6
			Credit	Mixed-Use Neighborhoods	4
			Credit	Housing Types and Affordability	7
			Credit	Reduced Parking Footprint	1
			Credit	Connected and Open Community	2
			Credit	Transit Facilities	1
			Credit	Transportation Demand Management	2
			Credit	Access to Civic & Public Space	1
			Credit	Access to Recreation Facilities	1
			Credit	Visitability and Universal Design	1
			Credit	Community Outreach and Involvement	2
			Credit	Local Food Production	1
			Credit	Tree-Lined and Shaded Streetscapes	2
			Credit	Neighborhood Schools	1

Yes	?	No				
0	0	0	**Green Infrastructure & Buildings**			31
Y			Prereq	Certified Green Building	Required
Y			Prereq	Minimum Building Energy Performance	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Certified Green Buildings	5
			Credit	Optimize Building Energy Performance	2
			Credit	Indoor Water Use Reduction	1
			Credit	Outdoor Water Use Reduction	2
			Credit	Building Reuse	1
			Credit	Historic Resource Preservation and Adaptive Reuse	2
			Credit	Minimized Site Disturbance	1
			Credit	Rainwater Management	4
			Credit	Heat Island Reduction	1
			Credit	Solar Orientation	1
			Credit	Renewable Energy Production	3
			Credit	District Heating and Cooling	2
			Credit	Infrastructure Energy Efficiency	1
			Credit	Wastewater Management	2
			Credit	Recycled and Reused Infrastructure	1
			Credit	Solid Waste Management	1
			Credit	Light Pollution Reduction	1

0	0	0	**Innovation & Design Process**		6
			Credit	Innovation	5
			Credit	LEED® Accredited Professional	1

0	0	0	**Regional Priority Credits**		4
			Credit	Regional Priority Credit: Region Defined	1
			Credit	Regional Priority Credit: Region Defined	1
			Credit	Regional Priority Credit: Region Defined	1
			Credit	Regional Priority Credit: Region Defined	1

0	0	0	**PROJECT TOTALS (Certification estimates)**	110

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points

APPENDIX 3

ENGLISH QUESTIONNAIRE

The Sustainability of Urban Development in Kyrenia, North Cyprus

Questionnaire

This research is meant for academic purposes. It will try to find out the possibility of urban development sustainability in Kyrenia, North Cyprus. You are requested to kindly provide answers to these questions as honestly and precisely as possible. Responses to these questions will be treated as confidential.

Section I

1. Gender of Respondents: a. Male ( ) b. Female ( )

2. Age of Respondents: a. Less than 30 years ( ) b. 31 – 40 years ( )
   c. 41 – 50 years ( ) d. Above 50 years ( )

3. Education level: a. Primary ( ) b. Middle School ( )
   c. High School ( ) d. University level ( )

4. Occupational Status: a. Unemployed ( ) b. Business Owner ( )
   c. Govt. Official ( ) d. Student ( ) e. Retired ( )

5. Family Size: a. 2 ( ) b. 3 ( )
   c. 4 ( ) d. Above 5 ( )

6. Income level: a.1000-2000TL ( ) b. 2000-3000TL ( )
   c. 3000-4000TL ( ) d. Above 4000TL ( )

Section II

The following questions are aimed to examine your perception on the above subject matter. Please indicate your preference on the 1 to 5 scale provided. SD = strongly disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree. Please tick the appropriate box that corresponds to your opinion.

	Topic	Questions	SD	D	N	A	SA
I	**Neighborhood quality satisfaction** - Social attribute - Urban attribute - Physical attribute	1- I am satisfied with this neighborhood as a place to live					
		2- I am satisfied with the social attributes of this city (safety, social support, friendliness of neighbors, sense of belongings)					
		3- I am satisfied with the urban/environmental attributes (accessibility, attractiveness, public transport and recreational facilities)					
		4- I am satisfied with the physical attributes of this city (traffic density, level of noise, crowding, and street maintenance)					
II	**Smart location and linkage** - Location - Ecological and green area - Transit accessible location - Cycling facilities - Shopping stores	5- The urban development enhances the accessibility of this area					
		6- The internal connectivity within this area is adequate					
		7- The development enables this area to have a location advantage					
		8- The green areas are regularly maintained					
		9- The loss of green area is detrimental to the city					
		10- Accessibility to local services is adequate					
		11- Provision of cycling facilities is adequate					
		12- Accessibility to transport system is adequate					
		13- The shopping centers are adequate to cater for the population					

	Topic	Questions	SD	D	N	A	SA
III	**Neighborhood pattern and design** - Walkable streets - Landscape designing - Compact development - Neighborhood connections - Mix uses - Parking and transport demand - Parks and recreation	14- The street design encourages non-motorized transport					
		15- The distance between my house and public service is a walkable distance					
		16- Adequate landscape design in this city					
		17- The compact development of this city prevents crime					
		18- This neighborhood is well connected to other neighborhoods					
		19- The mixed use of the buildings in this city makes the housing to be affordable					
		20- There is provision for adequate parking facilities					
		21- Adequate provision for recreation facilities and park is made in this city					
IV	**Green infrastructure and building** - Energy efficiency and conservation - Green buildings process - Stormwater and waste water - Light pollution - Historic and existing building reuse	22- There is adequate daylight in my apartment					
		23- Uses of green materials in the construction of buildings in this area					
		24- Appropriate buildings height in this area					
		25- Adequate space was created between the buildings					
		26- Use of energy-saving bulb contribute to energy efficiency					
		27- Inadequate provision of storm water is a challenge in this area					
		28- Inadequate provision of waste water is a challenge in this area					
		29- Reuse of existing building contribute to environmental protection					

APPENDIX 4

TURKISH QUESTIONNAIRE

Kentsel Gelişmenin Sürdürebirliği- Girne,Kuzey Kıbrıs

Anket

Bu araştırma akademik amaçlıdır. Raporda, Girne,Kuzey Kıbrıstaki, kentsel kalkınma sürdürebirliği olasılığını bulmaya çalışacaktır.Bu sorulara mümkün olduğunca dürüst ve tam olarak cevap vermenizi istenir. Bu soruların cevapları gizli olarak değerlendirilecektir.

Bölüm 1

1. Katılımcıların Cinsiyeti: a. Erkek ( ) b. Kadin ( )

2. Katılımcıların Yaşı: a. 30 Yaşından Küçük ( ) b. 31-40 Yaş ( )
c. 41-50 Yaş ( ) d. 50 Yaşından Büyük ( )

3. Eğitim Seviyesi: a. Ilk Okul ( ) b. Orta Okul ( )
c. Lise ( ) d. Üniversite ( )

4. Mesleki durum: a. Işsiz ( ) b. Iş Sahibi ( ) c. Devlet Memuru ( )
d. Öğrenci ( ) e. Emekli ( )

5. Aile Boyu: a. 2 ( ) b. 3 ( )
c. 4 ( ) d. 5 Üstü ( )

6. Gelir Seviyesi: a.1000-2000TL ( ) b. 2000-3000TL ( )
c. 3000-4000TL ( ) d. Ti Üstü 4000TL ( )

Bölüm II

Aşağıdaki sorular, yukarıdaki konu hakkındaki algınızı incelemeyi amaçlamaktadır. Lütfen tercihinizi verilen 1-5 ölçeğinde belirtin. SD = Kesinlikle katılmıyorum, D = Katılmıyorum, N = Tarafsız, A = Katılıyorum, SA = Kesinlikle katılıyorum. Lütfen fikrinize karşılık gelen uygun kutuyu işaretleyin.

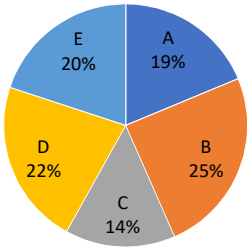
	Konu	Sorular	SD	D	N	A	SA
I	**Mahalle kalite memnuniyeti** - Sosyal özellik - Kentsel özellik - Fiziksel özellik	1- Bu mahallede yaşayacağım bir yer olarak mutluyum					
		2- Bu şehrin sosyal özelliklerinden memnunum (emniyet, sosyal destek, komşuların samimiyeti, aidiyet duygusu)					
		3- Kentsel / çevresel özelliklerden memnunum (erişilebilirlik, cazibe, toplu taşıma ve dinlenme tesisleri)					
		4- Bu şehrin fiziksel özelliklerinden memnunum (trafik yoğunluğu, gürültü seviyesi, kalabalık ve cadde bakımı)					
II	**Akıllı konum ve bağlantı** - Konum - Ekolojik ve yeşil alan - Transit erişilebilir konum - Bisiklet tesisleri - Alışveriş mağazaları	5- Kentsel gelişim bu alanın erişilebilirliğini arttırıyor					
		6- Bu alandaki dâhili bağlantı yeterli					
		7- Geliştirme, bu alanın konum avantajına sahip olmasını sağlar					
		8- Yeşil alanlar düzenli olarak bakılmaktadır					
		9- Yeşil alan kaybı şehre zararlıdır					
		10- Yerel hizmetlere erişilebilirlik yeterli					
		11- Bisiklete binme tesislerinin sağlanması yeterli					
		12- Ulaşım sistemine erişim yeterli					
		13- Alışveriş merkezleri nüfusu karşılamak için yeterli					

	Konu	Sorular	SD	D	N	A	SA
III	**Mahalle düzeni ve tasarım** - Yürünebilir caddeler - Peyzaj tasarımı - Kompakt gelişim - Mahalle bağlantıları - Birden fazla kullanım - Otopark ve ulaşım talebi - Parklar ve rekreasyon	14- Sokak tasarımı motorsuz ulaşımı teşvik eder					
		15- Evimle kamu hizmeti arasındaki mesafe, yürünebilir bir mesafedir.					
		16- Bu şehirde peyzaj tasarımı yeterlidir					
		17- Bu kentin kompakt gelişimi suçu önler					
		18- Bu mahalle diğer mahallelerle iyi bir şekilde bağlantılı					
		19- Bu şehirde binaların karma kullanımı, konutun uygun maliyetli olmasını sağlıyor					
		20- Yeterli otopark imkânı var					
		21- Bu şehirde rekreasyon tesisleri ve parklar için yeterli hüküm hazırlanmıştır					
IV	**Yeşil altyapı ve bina** - Enerji verimliliği ve tasarrufu - Yeşil bina süreci - Yağmursuyu ve atık su - Işık kirliliği - Tarihi ve mevcut binaların yeniden kullanımı	22- Dairemde yeterli gün ışığı var					
		23- Bu alandaki binaların yapımında yeşil malzemelerin kullanımı					
		24- Bu alanda bina yüksekliği uygundur					
		25- Binalar arasında yeterli alan yaratıldı					
		26- Enerji tasarruflu ampul kullanımı, enerji verimliliğine katkıda bulunur					
		27- Yağmur suyunun yetersiz sağlanması bu alanda zorlu bir iştir					
		28- Yetersiz atık su temini bu alanda bir zorluktur					
		29- Mevcut binanın tekrar kullanılması çevre korumasına katkıda bulunur					

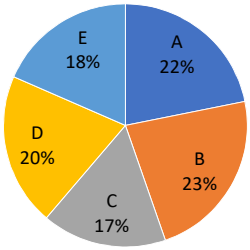
APPENDIX 5

QUESTIONNAIRE RESULTS

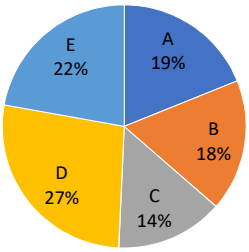
Q1: I am satisfied with this neighborhood as a place to live



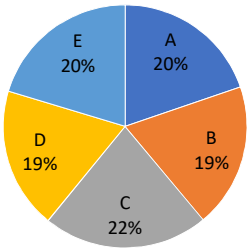
Q2: I am satisfied with the social attributes of this city



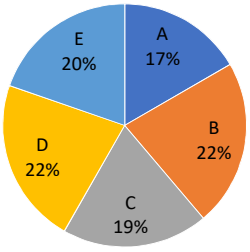
Q3: I am satisfied with the urban/environmental attributes



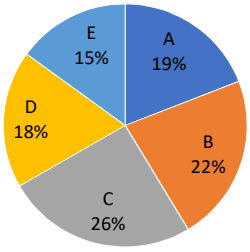
Q4: I am satisfied with the physical attributes of this city



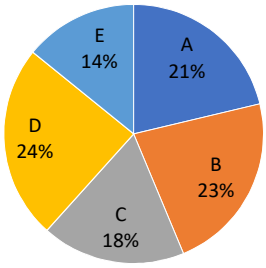
Q5: he urban development enhances the accessibility of this area



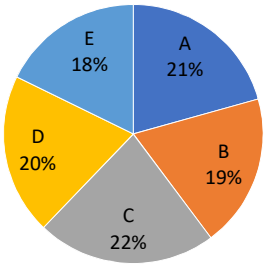
Q6: The internal connectivity within this area is adequate



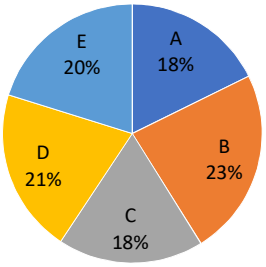
Q7: The development enables this area to have a location advantage



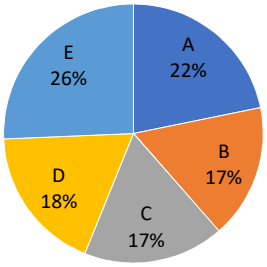
Q8: The green areas are regularly maintained



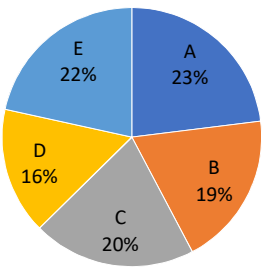
Q9: The loss of green area is detrimental to the city



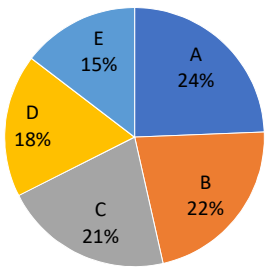
Q10: Accessibility to local services is adequate



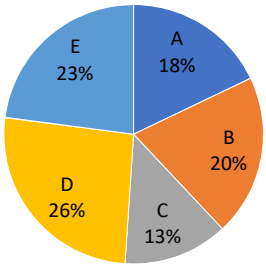
Q11: Provision of cycling facilities is adequate



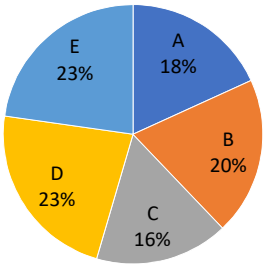
Q12: Accessibility to transport system is adequate



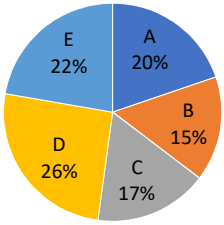
Q13: The shopping centers are adequate to cater for the population



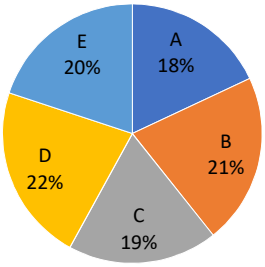
Q14: The street design encourages non-motorized transport



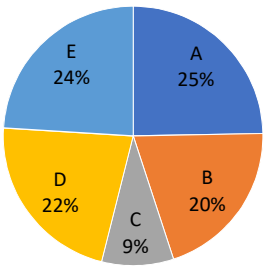
Q15: The distance between my house and public service is a walkable distance



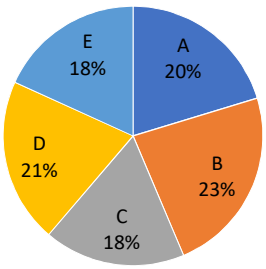
Q16: Adequate landscape design in this city



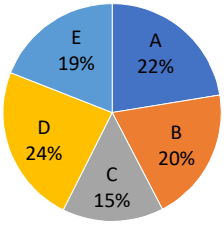
Q17: The compact development of this city prevents crime



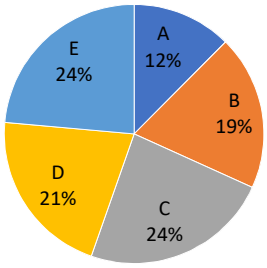
Q18: This neighborhood is well connected to other neighborhoods



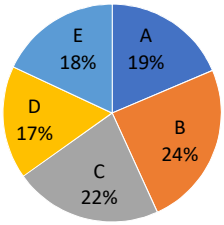
Q19: The mixed use of the buildings in this city makes the housing to be affordable



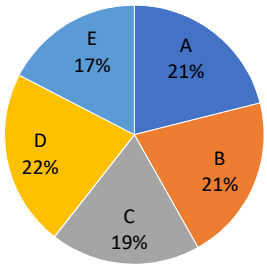
Q20: There is provision for adequate parking facilities



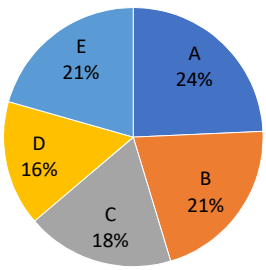
Q21: Adequate provision for recreation facilities and park is made in this city



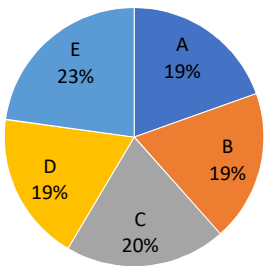
Q22: There is adequate daylight in my apartment



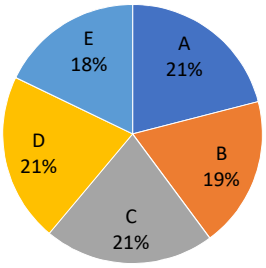
Q23: Uses of green materials in the construction of buildings in this area



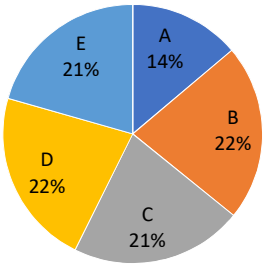
Q24: Appropriate buildings height in this area



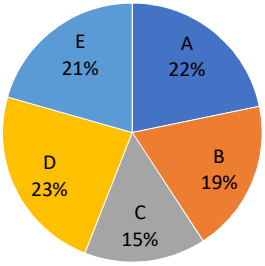
Q25: Adequate space was created between the buildings



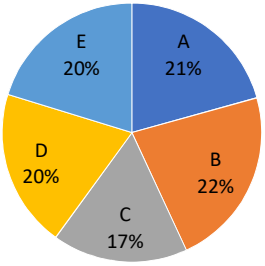
Q26: Use of energy-saving bulb contribute to energy efficiency



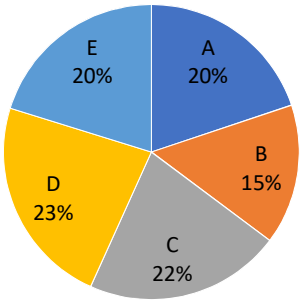
Q27: Inadequate provision of storm water is a challenge in this area



Q28: Inadequate provision of waste water is a challenge in this area



Q29: Reuse of existing building contribute to environmental protection



APPENDIX 6

ETHICAL APPROVAL LETTER

12.12.2019

Dear Abdulla Hamdan

Your application titled **"Sustainable Urban Development Kyrenia, North Cyprus"** with the application number YDÜ/FB/2019/80 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

Direnc Kanol

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

APPENDIX 7

SIMILARITY REPORT