4-2018

Evaluation of Social Sustainability Design Aspects in a Recently Developed Student Hostel at UAEU

Fanan Nssaief Jasim Jameel

United Arab Emirates University

College of Engineering

Department of Architectural Engineering

EVALUATION OF SOCIAL SUSTAINABILITY DESIGN ASPECTS IN A RECENTLY DEVELOPED STUDENT HOSTEL AT UAEU

Fanan Nssaief Jasim Jameel

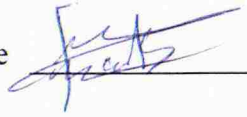
This thesis is submitted in partial fulfilment of the requirements for the degree of Master of Science in Architectural Engineering

Under the Supervision of Dr. Khaled Galal Ahmad

April 2018

Declaration of Original Work

I, Fanan Nssaief Jasim Jameel, the undersigned, a graduate student at the United Arab Emirates University (UAEU), and the author of this thesis entitled "*Evaluation of Social Sustainability Design Aspects in a Recently Developed Student Hostel at UAEU*", hereby, solemnly declare that this thesis is my own original research work that has been done and prepared by me under the supervision of Dr. Khaled Galal Ahmed, in the College of Engineering at UAEU. This work has not previously been presented or published or formed the basis for the award of any academic degree, diploma or a similar title at this or any other university. Any materials borrowed from other sources (whether published or unpublished) and relied upon or included in my thesis have been properly cited and acknowledged in accordance with appropriate academic conventions. I further declare that there is no potential conflict of interest with respect to the research, data collection, authorship, presentation and/or publication of this thesis.

Student's Signature  Date 17th May 2018

Approval of the Master Thesis

This Master Thesis is approved by the following Examining Committee Members:

1) Advisor: Dr. Khaled Galal Ahmed

Title: Associate Professor

Department of Architectural Engineering

College of Engineering

Signature _____ Date 13/5/2018

2) Member: Dr. Ahmed Agiel

Title: Assistant Professor

Department of Architectural Engineering

College of Engineering

Signature _____ Date 13/5/2018

3) Member (External Examiner): Dr. Hasanuddin Bin Lamit

Title: Associate Professor

Department of Landscape Architecture

Institution: Universiti Teknologi Malaysia, Malaysia

Signature _____ Date 13/5/2018

on behalf of Dr Bin Lamit

This Master Thesis is accepted by:

Dean of the College of Engineering: Professor Sabah AlKass

Signature _____ Date 17/5/2018

for Dean of the College of Graduate Studies: Professor Nagi T. Wakim

Signature _____ Date 23/5/2018

Copy 7 of 8

Abstract

In the field of sustainability, the focus is usually on the economic and environmental realms, while the social realm is getting the less attention compared with other realms. This less concern about the social sustainability has been experienced also locally in UAE, where buildings are leaning towards adopting green design approaches but mainly economically and environmentally sustainable. The social variable in student hostels as a type of buildings and micro-communities at the same time is very essential. In UAE, there is a rare focus given to student hostels. This research aims at investigating the social sustainability design aspects in student hostels in UAE to come up with suggested design guidelines for this type of buildings. To achieve this aim, a conceptual framework for a socially sustainable student hostel design is developed to investigate a case study of a recently developed student hostel at UAE University utilizing a mix of qualitative and quantitative tactics. These research investigations let to answer the main research question of to what extent are the recent existing student hostels being designed to be socially sustainable? It is hoped that the findings of this research are going to help renovating the existing hostels to be more socially sustainable and to design new student hostels in a more socially sustainable manner.

Keywords: Social Sustainability, Design aspects, Student hostel.

Title and Abstract (in Arabic)

تقييم عناصر تصميم الإستدامة الإجتماعية في سكن الطلاب المبني مؤخرا في جامعة الإمارات العربية المتحدة

الملخص

في مجال الإستدامة، يكون التركيزعادةً حول الجانب الإقتصادي والجانب البيئي بينما الجانب الإجتماعي يحصل على أقل إنتباه مقارنةً بالجانبين الآخرين. هذا الإهتمام الأقل في الإستدامة الإجتماعية يحصل أيضاً على الصعيد المحلي في دولة الإمارات العربية المتحدة، حيث أن المباني تتوجه نحو تطبيق أساليب تصميم خضراء لكنها بشكل أساسي مستدامة اقتصادياً و بيئياً. العنصر الاجتماعي في السكن الداخلي للطلاب (كنوع من المباني والمجتمعات الصغيرة بنفس الوقت) ضروري جداً. في الإمارات، هناك تركيز نادر على السكن الداخلي للطلاب. هذا البحث يهدف إلى الإستقصاء عن عناصر التصميم المستدام اجتماعياً في السكن الداخلي للطلاب في دولة الإمارات للتوصل إلى إرشادات تصميمية مقترحة لهذا النوع من المباني. لتحقيق هذا الهدف، تم تطويرهيكل نظري لتصميم سكن طلاب داخلي مستدام اجتماعياً من أجل دراسة حالة معينة متمثلة بالسكن الداخلي الجديد لطالبات جامعة الإمارات العربية المتحدة باستخدام مزيج من الوسائل النوعية والكمية. هذه الاستقصاءات أجابت عن سؤال البحث الرئيسي وهو إلى أي درجة تم تصميم مباني سكن الطلاب الداخلي الموجودة حالياً لتكون مستدامة إجتماعياً؟ من المتأمل أن تساعد نتائج هذا البحث في إصلاح مباني السكن الداخلي الموجودة حالياً لتصبح مستدامة اجتماعياً أكثر وتساعد أيضاً في تصميم مباني سكن طلاب داخلية جديدة بحالة استدامة إجتماعية أفضل.

مفاهيم البحث الرئيسية: إستدامة اجتماعية، عناصر تصميم، سكن الطلاب الداخلي.

Acknowledgements

I would like to thank my committee, my supervisor doctor Khaled Galal and examiners, for their guidance in this thesis.

I also would like to thank people who helped me in this thesis. First, thank you to the department of campus development especially Eng. Meera Al Ameri who helped me in getting all the architectural drawings I need for the case study. Second, thank you to the department of residential life especially Mr. Feras Abdulqader who was in charge of providing me with the data I need about the students of the case study. Third, thank you to Eng. Ashraf who helped me technically in installing and updating the software I needed for this thesis. Finally, thank you to the students of the hostel case study who agreed on making the interviews with me and gave me their time.

Special thanks go to my parents, colleagues, and my best friend for their support along the way.

Dedication

To my beloved family and best friend, Omaima

Table of Contents

List of Tables

List of Figures

List of Abbreviations

CLT	Cross-Laminated Timber
FSP	Fire Separation Plans
HIL	Higher Institutions of Learning
KSU	Kansas State University
LAVA	Laboratory for Visionary Architecture
NC Hostel	New Campus Hostel
NUC	National Universities Commission
QAU	Quaid-i-Azam University
SHQ	Student Housing Quality
UAEU	United Arab Emirates University
UPC	Urban Planning Council
UTM	Universiti Teknologi Malaysia
VGA	Visibility Graph Analysis

Chapter 1: Introduction

1.1 Background

The concept of sustainability is the key driver of innovation (Nidumolu, Prahalad, & Rangaswami, 2009) and a priority interest for many organizations (US EPA, 2013). Within the urban field, this concept is oriented globally towards having sustainable cities and communities. For example, this can be seen in the eleventh goal of 2030 agenda of the United Nations for sustainable development ("Cities - United Nations Sustainable Development Action 2015", 2015).

Locally in the United Arab Emirates (UAE), sustainability earns significant attention; this can be seen through multiple developed initiatives towards having sustainable development such as Estidama of Abu Dhabi Urban Planning Council (UPC) and Green Building Regulations of Dubai Municipality. Estidama, which was issued in 2010, has a pearl rating system of four pillars: environment, economy, society, and culture. These pillars are covered through seven different categories of sustainability: integrated development process, natural systems, livable villa/building/community, precious water, resourceful energy, stewarding materials, and innovating practice ("Estidama A to Z", 2010). The Green Building Regulations of Dubai Municipality, which was issued in 2011, was developed to improve the performance of buildings in Dubai by reducing the consumption of energy, water and materials, therefore improving the quality of life ("Green Building in Dubai", 2018).

Although the definitions of sustainability or sustainable development are changing, it is still presented through its three overlapping realms: environment, economy, and society. For that reason, to have a sustainable building, city, or

community, it needs to be environmentally, economically, and socially sustainable. The social realm of sustainability has been the least investigated compared to the other realms because it is difficult to quantify and project future outcomes (Yeung, 2013).

Social sustainability is defined as creating effective places that promote people's well-being through understanding what people need from those places where they live and work. It integrates the design of the physical realm with the design of the social world to support social and cultural life, social amenities, systems for citizen engagement and space for people and places to evolve (Caistor-Arendar, Bacon, Woodcraft, & Hackett, 2011). Social sustainability is the soft infrastructure of a healthy community, as described by Travor Hancock, and has a strong relationship with the physical design of the community (Hancock, n.d.).

The principles of social sustainability differ based on the project type and scale, and they are not easily separated due to their overlapping expected outcomes. In a study investigating the relationship between the urban form and social sustainability, it was proposed that there are two main concepts related to social sustainability: equity of access and sustainability/quality of community (Bramley, Dempsey, Power, & Brown, 2006). Under these two main concepts, the following dimensions of social sustainability were proposed: friendliness and social interaction, pride in /satisfaction with neighbourhood, safety, environment, mobility, collective group activity, and use of local facilities. Later, the concept of social sustainability within the urban context has been explored further, and it was found that the two main dimensions of social sustainability were: social equity which can be measured through accessibility and sustainability of the community itself which can be

measured through social interaction, participation, community stability, pride/sense of place, and safety and security (Dempsey, Bramley, Power, & Brown, 2011).

Locally in UAE, in a study evaluating the social and cultural sustainability in typical public house models in Al Ain city, a set of eight principles with their indicators and variables were developed: responsiveness to social needs, responsiveness to cultural values, quality of life, adaptability, safety, security, participation, and accessibility (Galal Ahmed, 2011).

This research will investigate the social realm of sustainability in student hostels, a type of building and micro community at the same. The social life of student hostels is essential as can be found in a qualitative study investigating the impact of hostel life (Iftikhar & Ajmal, 2015). A student hostel is a basic necessity of any higher educational institution as stated by Kales in his study of the attitude of university girls towards hostel life (Kales, 2014). He also defined a hostel as a place where students stay during their studies and a place of socializing. It is where students share their cultural similarities and dissimilarities and learn many things like social, moral, and spiritual values. "We can say hostel is the home of students" (Kales, 2014, page 265). Moreover, kales described some physical features for a hostel building. For example, it is preferable to be located within the premises of its institute to ease the students' access to the educational facilities and save their time, and to have better supervision of a hostel and its students. A good hostel building should be quite airy, has a sufficiency of greenery around, and has all the facilities, such as a study room, clinic, kitchen, and dining hall.

The previous studies related to student hostels were generally focusing on the concept of quality of life in the hostel from two viewpoints. The first one is the environmental and energy savings viewpoint, which resembles the economic and

environmental realms of sustainability. The second and most common viewpoint is the students' satisfaction, which is related to students' feelings and perceptions towards their hostels' designs and how they perceive them as socially desirable. In Federal University of Technology, Akure, Nigeria, the satisfaction of 322 students with each of the identified facilities of their hostels was measured using Relative Satisfaction Index (Ajayi, Nwosu, & Ajani, 2015). This measurement found that the key factors in the determination of students' satisfaction are: availability, adequacy, and functionality of hostel facilities. For example, the students were dissatisfied with laundry, bathroom and toilet facilities due to the distance from rooms and the level of cleanliness. Another study of residential satisfaction in students housing in Nigeria showed that more than half of the respondents were dissatisfied with their residences (Amole, 2009). The variables which explained the dissatisfaction were the social qualities of the residences, especially the social densities, of the kitchenette, bathroom and storage facilities and some demographic characteristics of the students. The morphological configuration of the halls of residence was also found to be a predictor of satisfaction and the characteristics which appeared most significant were the planform and the length of the corridor. In a case study of hostels of University Sains Malaysia, it was found that the factors that can predict students' satisfaction with their hostels are: distance from university facilities, room safety, room size, hostel security, and hostel facilities (Khozaei, Ayub, Hassan, & Khozaei, 2010). In a study of students' perceptions of room size and crowding in relation to floor height in a dormitory at Bilkent University, Ankara, Turkey, it was found that students' satisfaction with their living condition is affected with their perception of their room sizes and crowding. The students who were living on the highest floor perceived

their rooms larger and less crowded than those living on the lowest floor (Kaya & Erkip, 2001).

Locally in UAE, the demand for student hostels has been grown; by 2020, student numbers in schools and universities is projected to grow by 4.1% annually. It is also expected that the tertiary education will be one of the fastest growing areas due to UAE government's focus on higher education. As a result, the need for student hostels will grow with the inflow of international students (Clarke, 2016). Beside the international students, which represent usually the less percentage of total university students, it is very well known that a considerable number of local students, living in UAE, reside in universities student hostels due to the availability of those desired universities in emirates different from the students' home emirates. For example, in the United Arab Emirates University in Al Ain city (ranked the first in UAE, the sixth in the Arab World, and number 390 Worldwide) more than 90% of the 5536, total female hostel students, are local coming from other emirates of UAE (Abdulqader, 2017). Despite this mentioned importance of student hostels in UAE, a low number of studies tackled them, especially in their designs, and they were mostly focusing on the psychological viewpoint and students' health.

1.2 Research Problem, Objectives, & Limitations

To add more to the realm of social sustainability and to the field of student hostels design, this research tackles the problem of having socially sustainable student hostel design. There are three main objectives for this research. The first one is establishing a conceptual framework for socially sustainable student hostel design to be used globally. The second objective is showing the actual applicability of this conceptual framework within a case study of student hostel of a certain local context. The third and last objective is suggesting design guidelines for student hostels within

the similar context to help renovate the existing hostels to be more socially sustainable and to build new hostels in a more socially sustainable manner. To address the research problem in relation to the mentioned objectives, a main research question followed by a subset of questions are proposed as follows:

- Main research question: To what extent have the existing student hostels been designed to be socially sustainable?
- Sub research questions:
  1. What are the principles of a socially sustainable student hostel design?
  2. What indicates the achievement of each principle?
  3. What design variables can be used to achieve each indicator?
  4. What are the tools that can be used to investigate the achievement of the design variables in a case study of an existing student hostel?
  5. How can the design of an existing student hostel be evaluated using the conceptual framework including its principles, indicators, variables, and tools?

There are some limitations that should be considered after answering the questions and dealing with the findings of the research. First, the conceptual framework for a socially sustainable student hostel design including its principles, indicators, and variables, will be limited with the scope of the reviewed literature. For that reason, there might be other elements that can expand this conceptual framework and contribute more in designing socially sustainable student hostels. Second, due to the longitudinal approach of this research in which the whole found principles of the conceptual framework will be investigated within each selected case study, one local case study will be selected in this research for the evaluation in response to the limited time and access to the case study data. If two or more case

studies are investigated and compared to each other, this could strengthen the applicability of the conceptual framework and add more validity to the suggested design guidelines.

1.3 Research Methodology

This research will follow the case study method in answering its main question utilizing a mix of qualitative and quantitative tactics. The methodology compromises of two main stages. In the first stage, a conceptual framework for a socially sustainable student hostel design will be established from the literature review. This conceptual framework will include the principles, indicators, and variables of a socially sustainable student hostel design. In the second stage, the established conceptual framework will be used to investigate a selected case study of a student hostel and evaluate its design extent of being socially sustainable. The investigation will depend on four main tools: design analysis, observations, space syntax, and structured interviews. Each design variable will be investigated using more than one of the four mentioned tools to assess its degree of achievement in a qualitative scale of five measures: not achieved, poorly achieved, partially achieved, largely achieved, or completely achieved. The degrees of achievement for the variables will reflect the degrees of achievement for their relevant indicators and sequentially their relevant principles.

1.4 Research Structure

This research consists of seven chapters:

- Chapter One - Introduction: introduces the thesis through background about the sustainability in general, social sustainability in particular, and student hostels. Then, it highlights the research problem, objectives, and limitations.

Finally, it gives a brief idea about the research methodology that will address the problem and answer the research main and sup questions.

- Chapter Two - Research Method & Tools: illustrates the methodology in detail through explaining the reasons behind using the case study method and the selected tools.
- Chapter Three - Establishing a Conceptual Framework for a Socially Sustainable Student Hostel Design: describes the first stage of the methodology which is the conceptual framework for a socially sustainable student hostel design, its principles, indicators, and variables.
- Chapter Four - Selected Case Study of UAE University Female Student hostel: explains the rationale for selecting the case study to be one of UAEU female student hostels. Then, the chapter gives an overview about UAEU female hostels in general and introduces the selected case study of New Campus hostel (NC) in specific.
- Chapter Five - Evaluating the Social Sustainability Design Aspects of a Student Hostel in the Selected Case Study: details the second stage of the methodology which is the evaluation of a socially sustainable student hostel design in NC hostel.
- Chapter Six - Discussion: discusses the findings in relation to the research main and sub-questions and links the outcome of the investigated case study to the global theory.
- Chapter Seven - Conclusion and Recommendations: summarizes the whole research, recommends design guidelines for socially sustainable student hostels, and suggests possible future research.

Chapter 2: Research Method & Tools

This chapter explains the research method, case study method, and the mix of qualitative and quantitative used tools. It explains also the two stages of the methodology that is used to answer the research questions: establishing a conceptual framework of a socially sustainable student hostel design and evaluating the conceptual framework on a selected case study of a student hostel (Fig. 1).

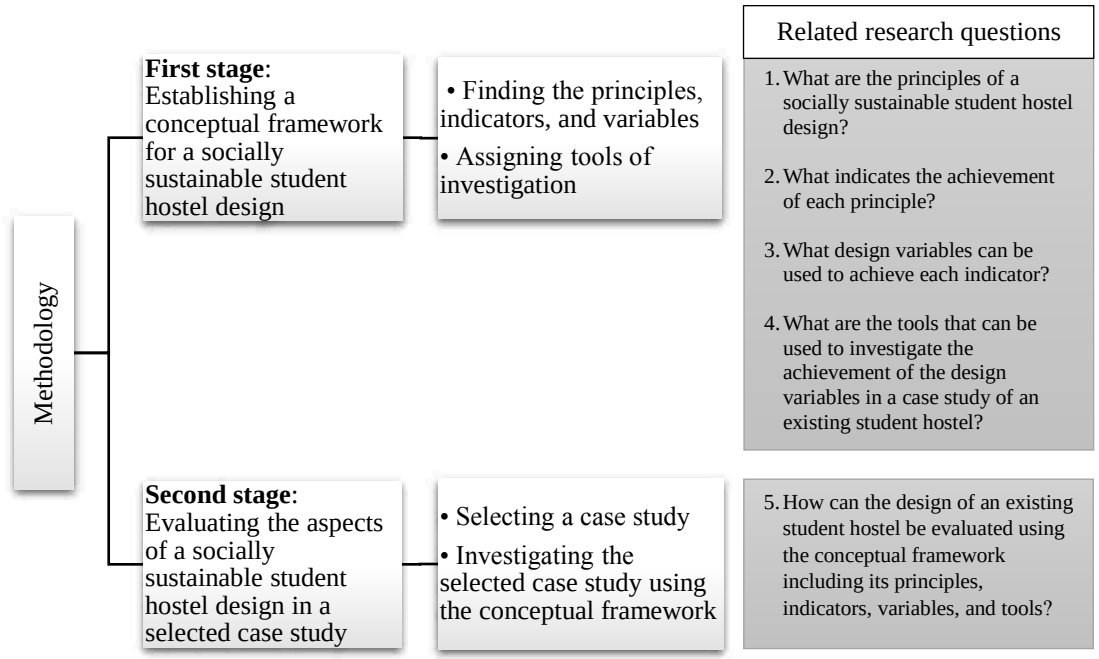


Figure 1: Research methodology

2.1 Case Study Method

According to Yin in his book *Case Study Research*, there are three reasons that make the case study method preferred in research: the first reason is when questions of 'how' or 'why' are posed, the second reason is when events are not controlled by investigator, and third reason is when a present social phenomenon is the focus of the research (Yin, 2009). These three reasons are found in this research. First, the main research question requires an in-depth explanation to evaluate the socially

sustainable design aspects of a student hostel in an existing case study. Second, the evaluation of those aspects does not require the investigator's control over the behavioural events; what needs to be evaluated is free from manipulation. Third and last, the focus of this research is on a contemporary issue within a real-life context, socially sustainable student hostel design. For the aforementioned reasons, the case study method was chosen for this research.

Besides the three reasons for using the case study method, Yin added, the case study method is used when the research has an empirical topic to investigate in which a set of prespecified procedures are followed. This idea is consistent with the methodology of this research through its two stages. In the first stage of the methodology, a conceptual framework of a socially sustainable student hostel design was established; this conceptual framework works as the prespecified producers to be followed in the next stage. Through literature review, the conceptual framework was established out of the principles, indicators, and variables of a socially sustainable student hostel design. Then, multiple tools were assigned to each variable for their evaluation. This established conceptual framework by its principles, indicators, variables, and tools represented the answers to the first four sub-questions.

In the next stage of the methodology, a single case study of a student hostel was selected to evaluate its design extent of being socially sustainable. According to Yin, there are five possible rationales for selecting a single case study instead of multiple ones. One of these rationales is when the case study is a longitudinal case in which two or more different points are studied in the same case at the same time (Yin, 2009). This research complies with this rationale to select a single case study. All the principles of a socially sustainable student hostel design should be evaluated in the

same case study at the same time, and by conducting this evolution the fifth sub-question was answered.

All in all, using the case study method helped achieving the goal of this research since the established conceptual framework is expanded in an analytic generalization rather than statistical generalization.

2.2 Research Tools

To construct validity in a research using the case study method, multiple sources of evidence should be used to collect and triangulate data. Among these sources, two are distinctively used in a case study research method: direct observations of the studied events and interviews with people who are involved in the events (Yin, 2009). For that reason, this research depended on four tools to collect the required data about the selected case study design; two are qualitative: observations and design analysis, and two are quantitative: interviews and space syntax.

2.2.1 Observations

Observation is one of the main tactics for data collection in a qualitative research, and it has two types: interactive, participant observation, and non-interactive, nonparticipant observations and field notes (Groat, 2002). The utilized observations in the research can be classified into two types: field observations and participant observations. The field observations were used to investigate multiple variables related to the physical design feature of the selected case study. Those observations took place throughout two semesters: spring 2017 and fall 2017.

The second type of the observations, participant observations, was focusing on participant activities. These observations were structured within certain areas, dates, and time slots, and they were focusing on evaluating one specific variable related to

the common outdoor gathering places of students as discussed in chapter five, section 5.3 Social interaction. Furthermore, there are some participant observations that were not structured and occurred while conducting the field observations. Those unstructured participant observations contributed in enriching the evaluation of some variables.

2.2.2 Design Analysis

This tool was an important tool to investigate the design of the NC hostel. The architectural drawings of the hostel were obtained from the Department of Campus Development of UAE University and analysed to investigate most of the design variables.

2.2.3 Interviews

According to Gilbert in his book *Researching Social Life*, an interview survey has greater response rate than the self-completion questionnaire surveys (Gilbert, 1993). Because of that, face-to- interviews were conducted in this research to obtain a highly accurate response rate. Furthermore, Gilbert mentioned two conditions that make the structured type of the interviews, standardized interviews, suitable for research. The first condition is when the researcher has an idea about what is happening with the sample in relation to the research topic, and the second is when imposing a standard way of asking does not risk the loss of meaning.

These two conditions are present in this research, and because of this, the conducted interviews were structured in that the wording of the questions and their order of being asked were the same for all the interviewees. The first condition can be seen through researcher's strong familiarity about the student hostels as there is a personal experience of living in hostels for around 7 years in two different

universities in UAE. Additionally, the researcher is residing currently in one of UAE university's female student hostels, the university of the selected case study. The second condition can be seen through utilizing two initial steps before designing the final interview questions to not risk the loss of meaning. The first step was conducting single tape-recorded semi-structured interviews with four students from four different female hostels of UAE University. These interviews, shown in Appendix 1.1, were focusing on how students make sense of their hostels' environments to understand the social sustainability aspects from the contextual perspective of the case studies. In addition, these interviews helped in framing detailed questions for the final structured interviews coping with the contextual language of the selected case study. The second step was conducting pilot interviews, after preparing the first version of the questions that is shown in Appendix 1.2, with three students to measure the validity and reliability of the questions. After these two steps, the final version of the questions, shown in Appendix 1.3, was prepared after modifying question-wording, adding questions, omitting questions, and altering questions order.

At the time of conducting the interviews, fall semester 2017, the total students residing in New Campus hostel, the selected case study, was 2319 (population size). The population of this hostel are all female students, and the majority are Emirati who earned 30 credit hours or above, which means they are mostly from a second academic year and above. Based on these shared characteristics of the population and the nature of the study focus which is the design of the hostel, it was not necessary to depend on specific criteria related to the demographic information of the population while choosing the sample. Despite, it was necessary to choose a sample representative of the whole hostel. The NC hostel consists of ten typical residential

buildings, named from A1 to A10. Each of these buildings has six floors; therefore, it was decided to have an interviewee from each floor of each building (Table 1).

Table 1: Systematic quantity of the chosen bedrooms for the interviews

Typical floor	Chosen bedroom from floor capacity	Chosen bedrooms from each building capacity	Chosen bedrooms form hostel capacity
G.F.	1 out of 22	6 out of 247	60 out of 2470
1st F.	1 out of 52		
2nd F.	1 out of 51		
3rd F.	1 out of 43		
4th F.	1 out of 43		
5th F.	1 out of 36		

As a result, the sample size was 60 interviewees which represent around 2.5% of the total population. This percentage compiles with the qualitative type of the interviews with its mix of closed and opened end questions. The six interviewees of each building were selected based on their bedroom locations, so all the sides of each building were covered. As shown in Fig. 2, each building has eight sides, four indoor sides towards a similar view and four outdoor sides towards different views. The sampling within each building depended on choosing four bedrooms from the four outdoor sides and two bedrooms from two indoor sides. It was important to keep sufficient distances among the chosen bedrooms from the different floors to cover different positions within the floor layout (Fig. 2). Besides this systematic way of choosing the interviewee based on her bedroom location, the exactly selected bedrooms that are shown in Fig. 2 from each specified side of each building were depending on the availability of the students inside their bedrooms during the interviews times.

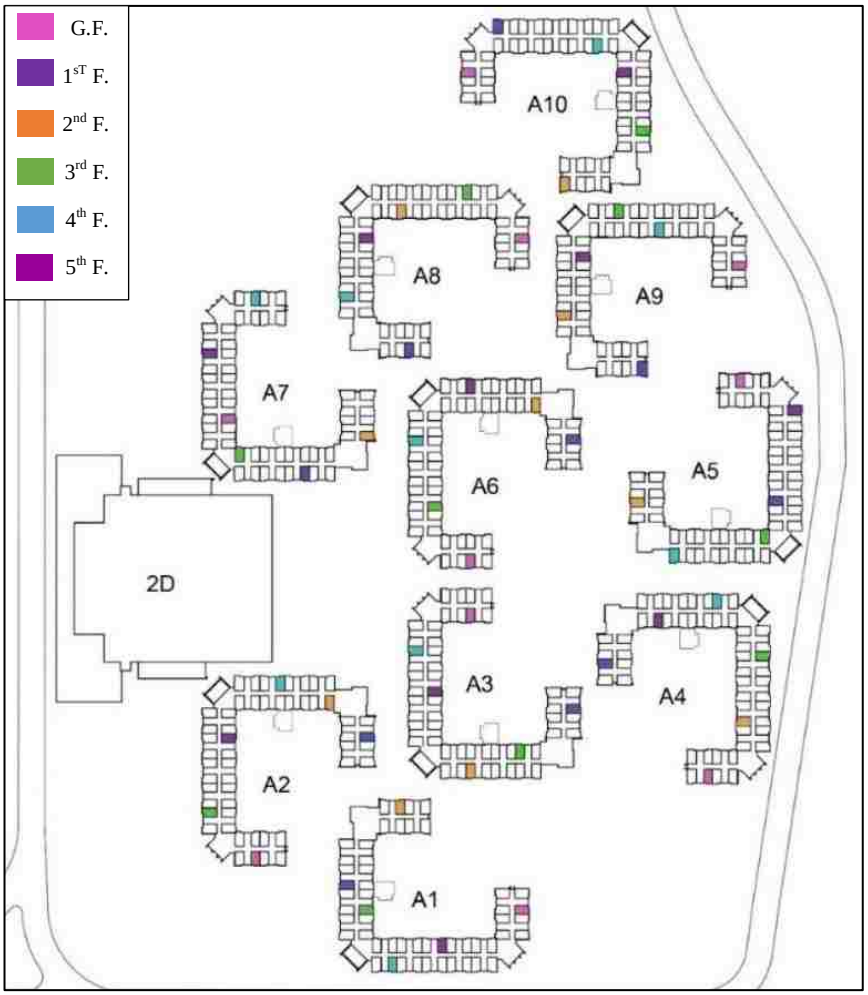


Figure 2: Location of interviewees' bedrooms in NC hostel

During October 2017, the interviews were conducted individually; each interview took around 35 minutes. After finishing the sixty interviews, the answers were coded up and transformed into variables in Statistical Package for the Social Sciences (SPSS) software to use them in finding the quantitative results; the descriptive statistics of SPSS was mainly used to find the frequencies of the answers.

2.2.4 Space Syntax

"Space syntax is a science-based, human-focused approach that investigates relationships between spatial layout and a range of social, economic and environmental phenomena" ("Space Syntax Network", 2018). Space syntax has a

beneficial impact on studying the design of buildings and urban places, and this can be seen in a study exploring how the contribution of space syntax in the design can benefit architects in three design case studies (Dursun, 2007). The first case study was a design practice in an urban context, Trafalgar Square, using axial analysis and movement traces. The second case was a design practice in a building context, Tate Britain, using movement traces and visibility graph analysis (VGA). The third case was a design practice in an educational course, British Museum, using also movement traces and visibility graph analysis (VGA). Through these three case studies, the role of space syntax in the architectural design was found helpful, and it was focusing on the organization of spaces, movement patterns and their social meanings.

Within this research, space syntax was used to understand the configurational properties of the hostel design and to contribute in interpreting multiple social phenomena using DepthmapX software.

To conclude, the aforementioned four tools were used to measure the degrees of achievement of the variables that were found in the established conceptual framework on a qualitative scale of five measures: not achieved, poorly achieved, partially achieved, largely achieved, and completely achieved. The degrees of achievement of those variables reflected the degrees of achievement of their indicators, and sequentially their main principles. By finding to what extent the selected case study has been designed to be socially sustainable, the main research question was answered.

Chapter 3: Establishing a Conceptual Framework for a Socially Sustainable Student Hostel Design

The main source of deriving the principles of social sustainability in the student hostel design was a review of literature for multiple definitions of social sustainability at different scales of residential buildings and communities, in addition to the literature of student hostel satisfaction. The principles found were filtered to twelve ones concentrating on the design of the student hostels as buildings and micro-communities as there are other principles, with their indicators and design variables, that can contribute in creating socially sustainable student hostels from not design perspective for example psychological perspective. The twelve principles are: 'Responsiveness to Social Needs', 'Flexibility', 'Social Interaction', 'Social Integration', 'Accessibility', 'Mobility', 'Privacy', 'Safety', 'Security', 'Local Environmental Quality', 'Participation', and 'Pride/Sense of Place'. Each of these principles is explained in depth in the following subsections to show the possible indicators and design variables of achieving the principle. Additionally, multiple international examples of student hostels are provided to show the various applicable approaches of achieving each principle.

3.1 Responsiveness to Social Needs

How a student hostel is designed to respond to the students' social needs is a topic that has been addressed through the literature of students' satisfaction with their hostels. In a study investigating the relationship between location, facilities, and quality of an on-campus hostel with students' attitudes and satisfaction in the Federal Territory of Labuan, Malaysia, it was found that the type and size of hostel services and facilities are indicators for hostel responsiveness which influence students' attitudes (Suki & Chowdhury, 2015).

Regarding the type of the needed facilities and because the student hostel is a micro-local community, it should have the daily facilities of a community. A community should have the aspect of everyday life such as supermarket, bank, café, public open space, library, and recreation facility (Dempsey, Bramley, Power, & Brown, 2011). On the other hand, on a scale of a residential building, a study evaluating the social and cultural sustainability in typical public house models in Al Ain, UAE, indicated responsiveness to social needs, which was the first principle of the evaluation, by the availability and the quality of needed functional spaces. Multiple variables were mentioned to achieve this indicator, such as suitable service facilities (toilets, stores, parking, etc), suitable areas for the functional spaces, suitable functional spatial organization (zoning), need for a balcony or terrace, and need for a garden (Galal Ahmed, 2011). Furthermore, according to Kales (2014), a good hostel is illustrated to have all the facilities such as kitchen, dining hall, store room, servants' room, common room, reading room, guest room (Kales, 2014). From reviewing multiple student hostel projects globally and locally, the most common basic needed functional spaces in a student hostel were bedrooms, bathrooms, kitchen, laundry, living room, store, study area, computer lab, and car parking. Table 2 shows the availability of these facilities in three examples of student hostels.

Table 2: Examples of provided facilities in projects of student hostels

Polytechnic Ibadan, Ibadan, Nigeria Source: (Akinpelu, 2015)	**Urbanest student accommodation (Tower bridge) in London, UK** Source: ("Tower Bridge Student Accommodation In the Heart of London", n.d.)	**Students' hostel of Sathyabama University in India** Source: ("Sathyabama", 2018)
- Bed rooms - Bathrooms - Reading Chair & Table - Shelf - Toilets	- Residence units: standard studio apartments, large studio apartment, cluster flats for 2,5,6, or 9 people with kitchen, living area,	- Spacious rooms with attached bath - study room - Banking Facility with ATM counter

Table 2: Examples of provided facilities in projects of student hostels (Continued)

Polytechnic Ibadan, Ibadan, Nigeria	Urbanest student accommodation (Tower bridge) in London, UK	Students' hostel of Sathyabama University in India
- Wardrobe - Kitchenettes - Cafeteria - Common/TV Room - Cyber Café - Reading Room - Recreation Facilities - Waste Disposal Facilities	- study desk, bathroom, and cupboard - Group and private study areas - Social spaces - Laundry rooms - Bike storage facility - Living wall	- Medical facility - Medical Lab - Open Air Theater - Gym - Sweets and Juice center - Indoor and Outdoor Games - Laundry and Ironing - Hair Cutting facility - Free Computer Lab - Students Train Reservation center

The previously mentioned facilities and services within a hostel as a building and a micro-community can increase or vary in response to other needs, students' cultural preferences. Examples of such specific facilities which can be found in different hostels around the world can be prayer rooms, pubs, or certain types of recreation facilities, such as music rooms and cinemas.

Within the context of providing the needed facilities and services, disabled students should have their suitable facilities in the hostel. In the city of Pune, India, a hostel has been opened for disabled students who wish to pursue higher studies; the hostel has facilities, such as recreation centre, computer training centre, and digital library with audio-books (for the visually impaired) (Kolhatkar, 2014).

Further, the quality of provided facilities and services is an essential indicator for the responsiveness to social needs. In addition to the size and the spatial organization that were indicated in the aforementioned studies, availability of modern amenities is another quality measure. "Today's students also have high expectations for up-to-date service delivery and facilities that provide value" (Department of Higher Education & Training, Republic of South Africa, 2011). In a

study developing a scale for Student Housing Quality (SHQ) in Higher Institutions of Learning (HIL) in Ghana, it was found that ensuring core facility quality to be up to the required industry standards is the most basic housing quality factor that is perceived as relevant and important to students in HIL (Bondinuba, Nimako, & Karley, 2013).

Through review outlined, it was found that the principle of 'Responsiveness to Social Needs' can be indicated through two main factors: '*Availability of needed facilities and services*' and *'Quality of provided facilities and services*'. Each of these two indicators can be achieved through multiple design variables (Table 3).

Table 3: Summery of 'Responsiveness to Social Needs'

Principle	Indicators	Variables
3.1 Responsiveness to Social Needs	3.1.1 Availability of needed facilities and services	A. Availability of basic functional spaces: bed rooms, bathrooms, kitchen, living rooms, laundry, store, study area, computer lab and parking.
		B. Availability of aspects of everyday life of hostel community: Clinic, post office, chemist, supermarket, bank, corner shop, restaurant/café/takeaway, library, sports/recreation facility, hostel community centre/ multi-purpose hall, and public open/green space.
		C. Availability of specific facilities in respond to students' cultural preferences
		D. Availability of suitable facilities for students with disabilities
		E. Need for a balcony
	3.1.2 Quality of provided facilities and services	A. Suitability of areas
		B. Suitability of spatial organization (zoning)
		C. Availability of modern amenities

3.2 Flexibility

The adaptation of a community over the time to the new needs and possibilities is one measure of its sustainability (Caistor-Arendar et al., 2011). Flexibility is an important principle not only within a community scale but also within a building

scale. It is important to be considered for achieving socially viable housing design (Schneider & Till, 2005). In Nkrumah Postgraduate Hostel at University of Nigeria Enugu Campus, the hostel was incapable to accommodate more residents due to the inflexibility of building spaces. The sanitary facility was overused which is not compliant with the standards of the National Universities Commission (NUC) that specify a maximum of one toilet for six students (Nwadiogwa, 2011).

Flexibility can be measured through the opportunity for adaptability, defined as capable of different social uses, and the opportunity for flexibility, defined as capable of different physical arrangements (Schneider & Till, 2005). Nwadiogwa (2011) proposed a spatially flexible design of female postgraduate student hostel in Nigeria. In this proposal, multiple strategies were suggested to achieve a functional, purposeful hostel accommodation that can adapt to the changing needs of users. These strategies include: designing areas to serve more than one function, furnishing to separate different functional spaces, providing varieties of unit types and the spatial organization of these types, using folding furniture to allow different configurations for day and night, placing the building on its site to leave room for an addition, and giving the building a shape that's easily extended.

A hostel design for Bavarian Youth Hostel Association in Bayreuth, Germany, by Berlin-based Laboratory for Visionary Architecture (LAVA), features a significant flexibility approach through flexible room walls with contemporary modular 'built-in furniture' elements that accommodate two, four, and six people (Fig. 3 & 4) ("Bayreuth Youth Hostel", 2015).

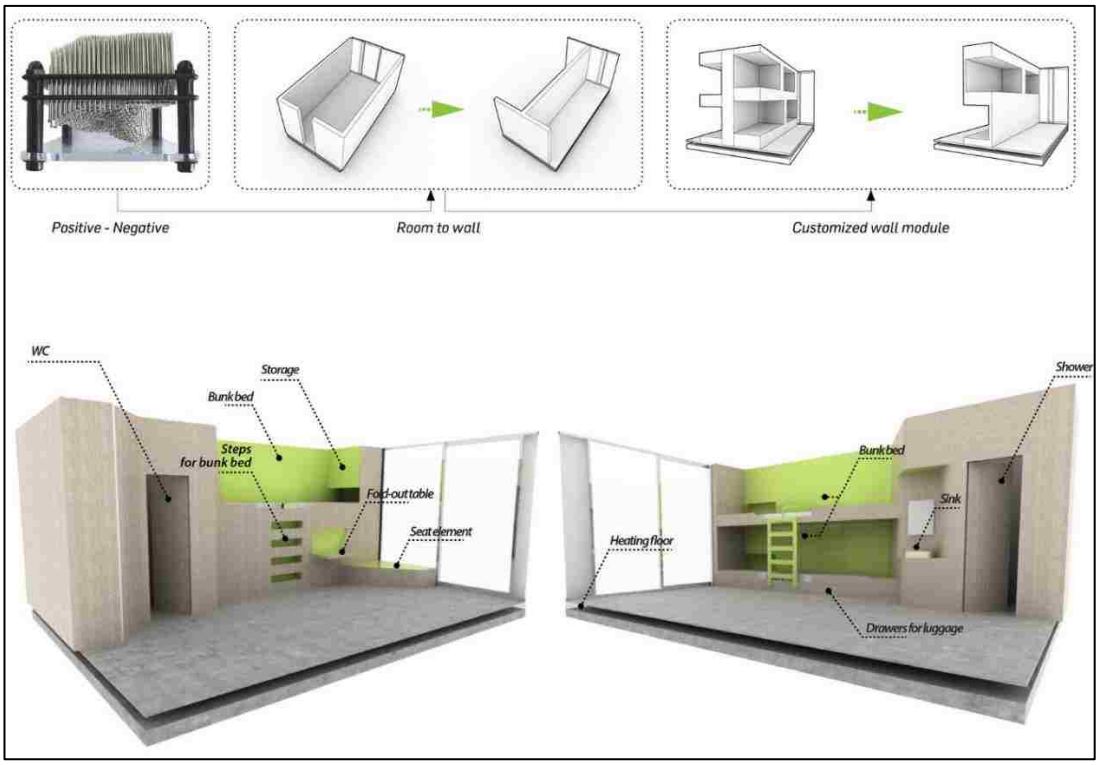


Figure 3: Customized wall module of Bayreuth Youth Hostel in Germany – Source: ("Bayreuth Youth Hostel", 2015)

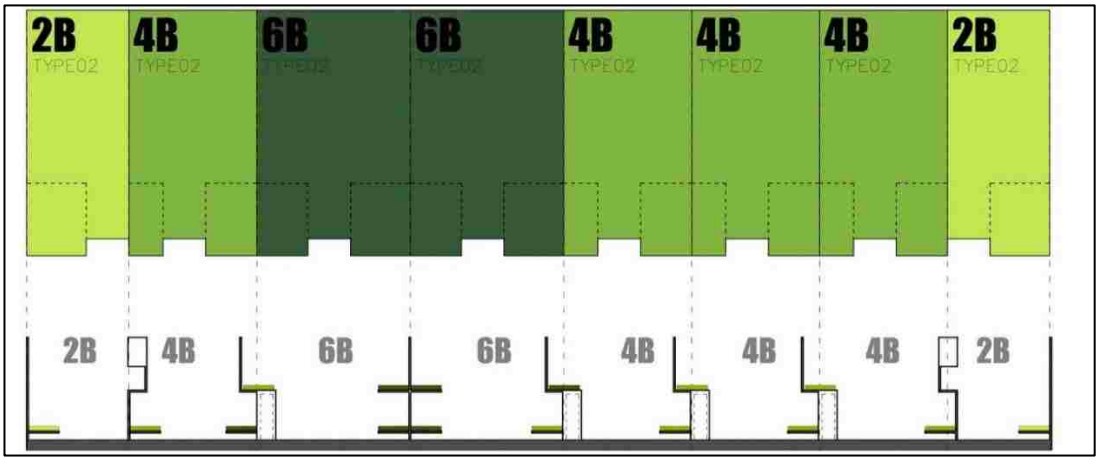


Figure 4: Plan and section of modular room units of Bayreuth Youth Hostel in Germany – Source: ("Bayreuth Youth Hostel", 2015)

Another design case study of achieving flexibility is youth hostel room called Youth Lab for a future hostel that can accommodate two to six guests and to be suitable for group activities and offer private areas at the same time. The Youth Lab is developed by a joint venture of the Bavarian Association of German Youth Hostels

and students of the University for Applied Science in Munich, led by Prof Ruth Berktold ("Intelligent Room Solutions for Travellers", 2013). They end up with various furniture pieces that allow the room to be sectioned into numerous functional areas. For example, the bathroom door can swing inside by 90 degrees separating the shower and sink areas like a mobile wall, so the bathroom can be used by two people, even strangers, at the same time. Furthermore, the room has a double bed and table that fold up against the wall to save space (Fig. 5).

Figure 5: Folded furniture in Youth Lab, youth hostel room– Source: ("Intelligent Room Solutions for Travellers", 2013)

To conclude, the principle of flexibility can be indicated through three main factors: 'Capability of different social uses', 'Capability of different physical arrangement', and 'Capability of future expansion'. Each of these three indicators can be achieved through multiple design variables (Table 4).

Table 4: Summery of 'Flexibility'

Principle	Indicators	Variables
3.2 Flexibility	3.2.1 Capability of different social uses	A. Design allowance for changing space areas
		B. Design allowance for changing space functions such as: • Designing areas to serve more than one function • Furnishing to separate different functional spaces

Table 4: Summery of 'Flexibility' (Continued)

Principle	Indicators	Variables
	3.2.2 Capability of different physical arrangement	A. Providing unit modules for flexible spatial organization
		B. Use of folding furniture for flexible configurations
		C. Use of movable furniture
	3.2.3 Capability of future expansion	A. Placing the building on its site to leave room for an addition
		B. Giving the building a shape that is easily extended

3.3 Social Interaction

Social interaction can be measured by seeing friends and relatives in the neighbourhood frequently, seeing/chatting with/borrowing from/knowing by name 'some/most/all' of the neighbours, and/or agreeing that this is a place where neighbours look out for each other or are friendly (Bramley et al., 2006).

The social interaction in student hostels can be achieved through multiple design strategies. In a study identifying the factors that influence social interaction in student residence halls in the United States, it was found that there are two categories of factors affecting the ability of spaces to promote social interaction: the configuration of spaces and the quality of individual spaces (Rahimi, 2015). The configuration of spaces include: distribution of common and individual spaces, which can increase the possibility of unintentional encounters among students, hierarchy and spatial depth, which have to do with the number of spatial steps that are required to move from one space to another because the deeper a space is, the less accessible it is, geometry of spaces, which affects the visibility of the spaces and consequently the likelihood of unintentional encounters, and finally spaces with minimal fragmentation, which enable students to see one another and feel their

fellow residents' presence. The quality of individual spaces includes well-chosen design for the common spaces, which involves selected colours, finishing materials, appropriate lighting that encourage students to use these spaces more frequently, and translucent walls that enable students to see one another easily.

In Basket Apartments, student hostel in Paris designed by the firm of OFIS Architects, the entrances of all apartments are aligned on the same line of an open corridor overlooking a football field and a view to the city and Eiffel tower due to the longitudinal site area (11m width X 200 m length) ("OFIS_Paris Student Apartments", n.d.). This corridor of entrances acts as a functional common space where students see each other, interact, and share talks and views (Fig. 6).

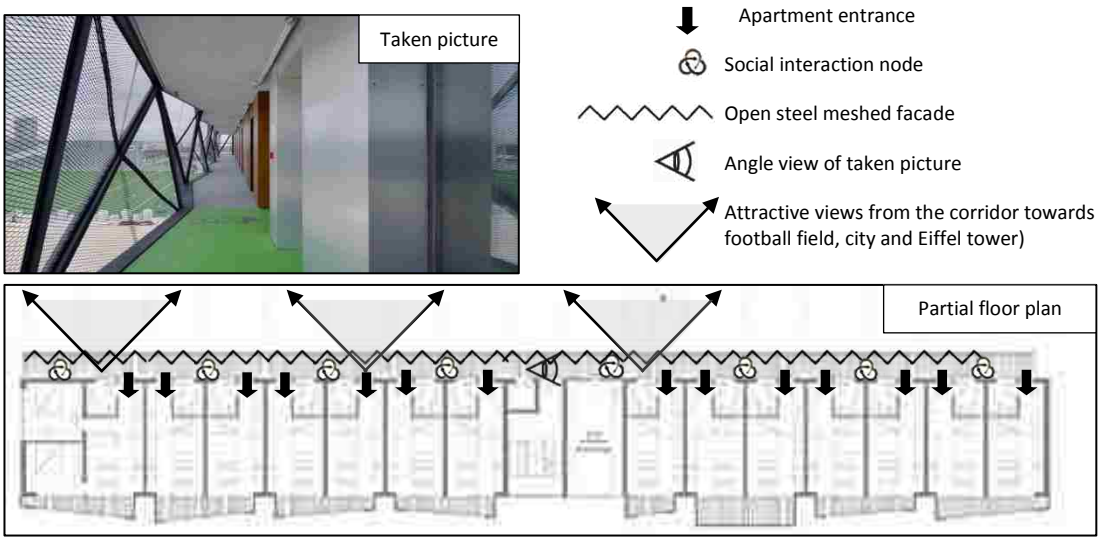


Figure 6: Students' interaction through functional corridor in Basket Apartments in Paris– Source: ("Basket Apartments", 2017)

In another hostel design in Japan called I House, dormitory and international centre for approximately 140 international students designed by Studio SUMO, the same idea of a common corridor facing a view of rice fields and serving the dormitory rooms is applied ("I House Dormitory / Studio SUMO", 2016). However, this time the corridor has projecting balconies working as gathering points (Fig. 7).

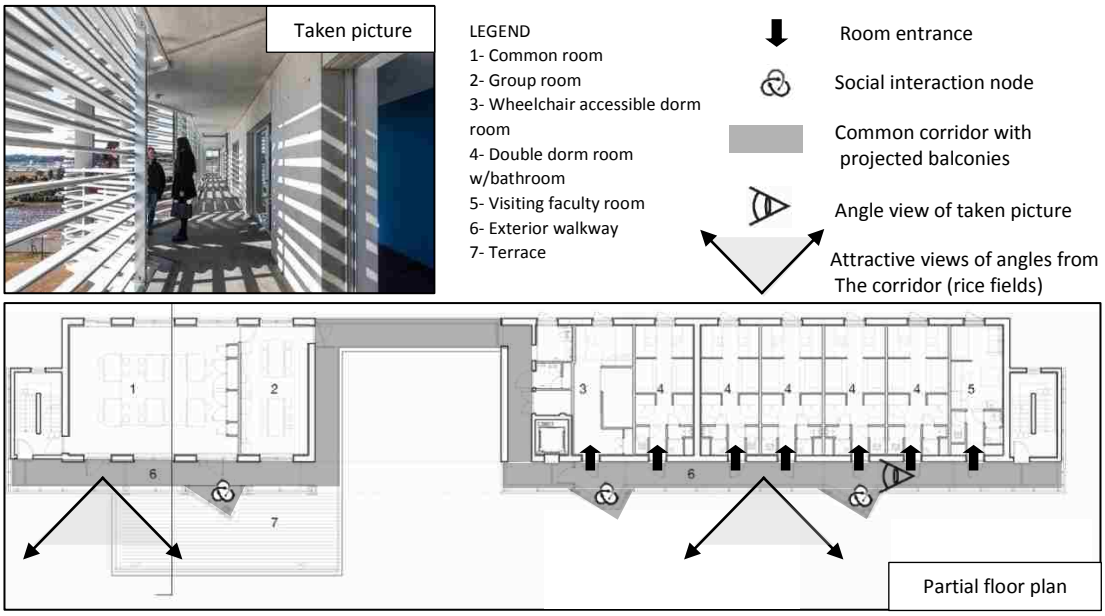


Figure 7: Students' interaction through functional corridor with balconies in I House dormitory in Japan – Source: ("I House Dormitory / Studio SUMO", 2016)

Moreover, some designs of hostel projects create the social interaction through having communal services instead of isolated ones, for example, kitchen in each room or housing unit of a hostel. This approach can be seen in Monash Student Housing in Melbourne, Australia where every 30 students are served by a common room with kitchen facility. This communal service room supports the students' interaction and counteracts any feelings of isolation experienced by students living away from their homes ("Monash Student Housing by BVN | Architecture & Design", 2012). Furthermore, the one communal kitchen in the ground floor of Trondheim Student Housing by MEK Architects in Norway is described as space where common life is negotiated (Fig. 8) ("Trondheim Student Housing / MEK Architects", 2012).

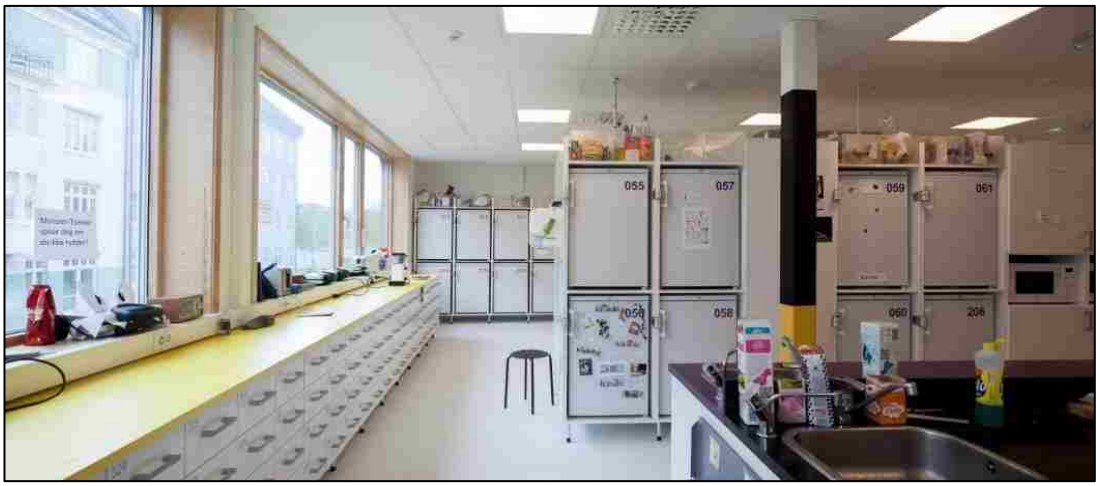


Figure 8: Ground floor communal kitchen in Trondheim Student Housing – Source: ("Trondheim Student Housing / MEK Architects", 2012)

While the communal services increase the social interaction, the zoning incorporates in making these spaces more successful in supporting the interaction. In the design of Carlaw Park Student Accommodation in New Zealand by Warren and Mahoney, the communal spaces, such as lounge, study, laundry and games facilities are located in one building, with car parking at basement level, in the centre of the hostel community surrounded by the residential buildings of hostel departments (Fig. 9 & 10) ("Carlaw Park Student Accommodation / Warren and Mahoney", 2014).

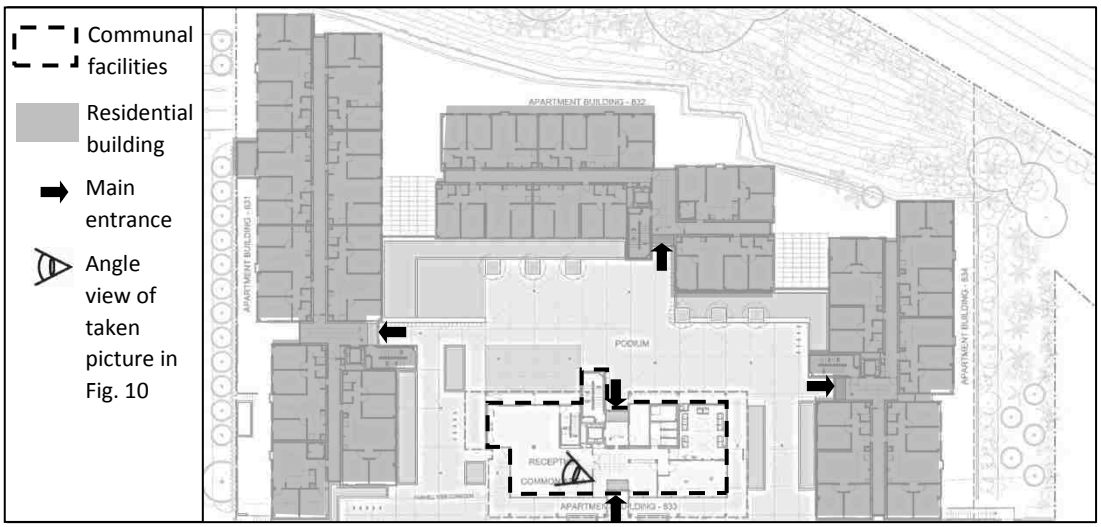


Figure 9: Floor plan of Carlaw Park Student Accommodation in New Zealand – Source: ("Carlaw Park Student Accommodation / Warren and Mahoney", 2014)

Figure 10: Communal lounge area in Carlaw Park Student Accommodation in New Zealand – Source: ("Carlaw Park Student Accommodation / Warren and Mahoney", 2014)

To conclude, the social interaction can be indicated in the design of a student hostel through the 'Interaction' that can be achieved through multiple design variables (Table 5).

Table 5: Summery of 'Social Interaction'

Principle	Indicators	Variables
3.3 Social Interaction	3.3.1 Students' intentional and unintentional interaction	A. Configuration of spaces: • Distribution of common and individual spaces • Hierarchy and spatial depth • Geometry of spaces • Spaces with minimal fragmentation
		B. Quality of individual common spaces: • Well-chosen design through aptly selected colours, finishing materials, appropriate lighting, and translucent walls
		C. Use of communal services such as kitchen to serve groups of students

3.4 Social Integration

It means the involvement in social activities. It is measured by participating at least once a month in each of six activities within the neighbourhood or the city, including sport, adult education, community/residents' groups, support groups, religious or other groups (Bramley et al., 2006). The social integration claimed to be

associated with mixing land uses and increasing density, so that residents will have greater variety of activities to be involved in (Dempsey et al., 2011). In a student housing for the University of Southern Denmark in Odense, designed by C. F. Moller in 2015, the hostel, by its design of three interconnected 15-storey buildings, has a shared common space in the interconnection area in each floor ("Student Housing / C.F. Møller", 2016). This area has mixed uses of living room and kitchen for the three clusters, each has seven bedrooms, encouraging the social integration. It has also glazed facades that ensure light and views in three directions (Fig. 11).

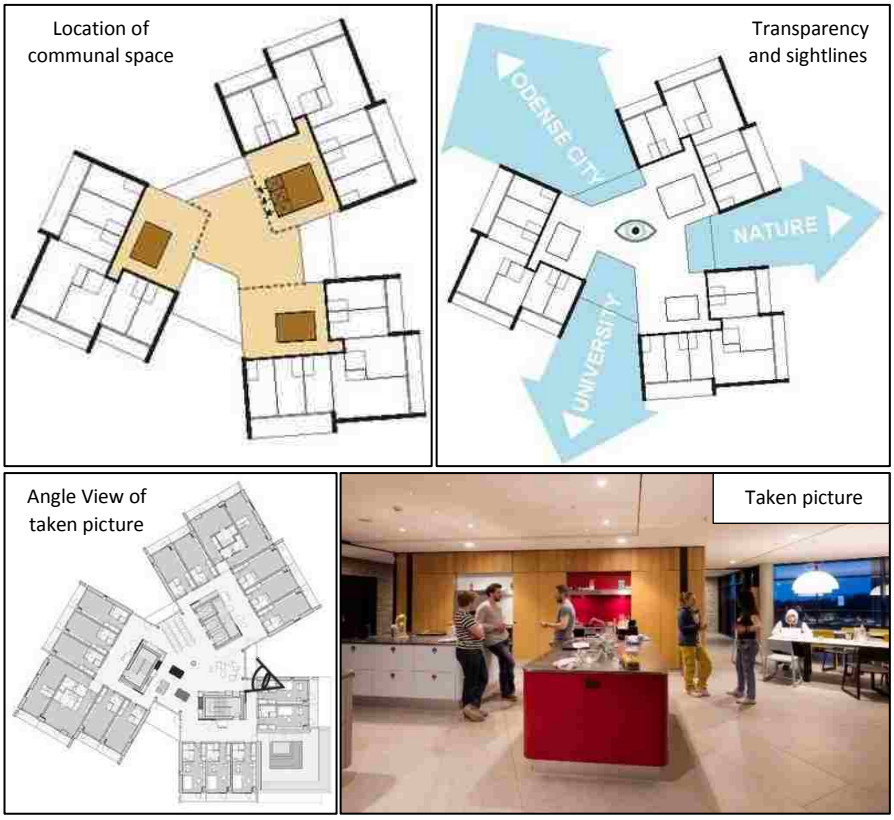


Figure 11: Centred communal area in a student housing for the University of Southern Denmark – Source: ("Student Housing / C.F. Møller", 2016)

In a study of identifying main factors affecting student inclusion with the campus environment in Malaysia, it was found that the most important primary indicator of social inclusion is legibility (Sedaghatnia, Lamit, Abdullah, &

Ghahramanpouri, 2015). The legibility is resembled by how the environment can be functioned and whether people can understand the environment immediately and explore it without getting lost. Wayfinding, sufficient landmarks, easily recognizable buildings and welcoming outdoor spaces are perceived to be the most significant variables influencing student inclusion. In addition to the aforementioned features, there is positive strong relationship between student inclusion and physical facilities with their qualities. Moreover, the identity of a space is also a significant indicator for the social inclusion because the absence of landmarks disorients the user and gives no identity to the space, making it more difficult to remember and to reuse it.

In the design of Carlaw Park Student Accommodation in New Zealand that had been mentioned before in social interaction, social integration had been achieved by integrating the interior spaces of common facilities with the surrounded exterior spaces in the ground floor by glass walls. Additionally, continuous pedestrian walkways towards private open spaces had been designed between the campus buildings to strengthen the community/student realm for residents (Fig. 12) ("Carlaw Park Student Accommodation / Warren and Mahoney", 2014).

Figure 12: Connected indoor and outdoor spaces in Carlaw Park Student Hostel in New Zealand – Source: ("Carlaw Park Student Accommodation / Warren and Mahoney", 2014)

In Tietgen Dormitory project in Denmark which is designed by Lundgaard & Tranberg Architects, a circular form representing the equality and the communal symbol is chosen to locate the buildings in a circular theme with common facilities in the ground floor and balconies of residents' rooms overlooking a central courtyard (Fig. 13) ("Tietgen Dormitory / Lundgaard & Tranberg Architects", 2014).

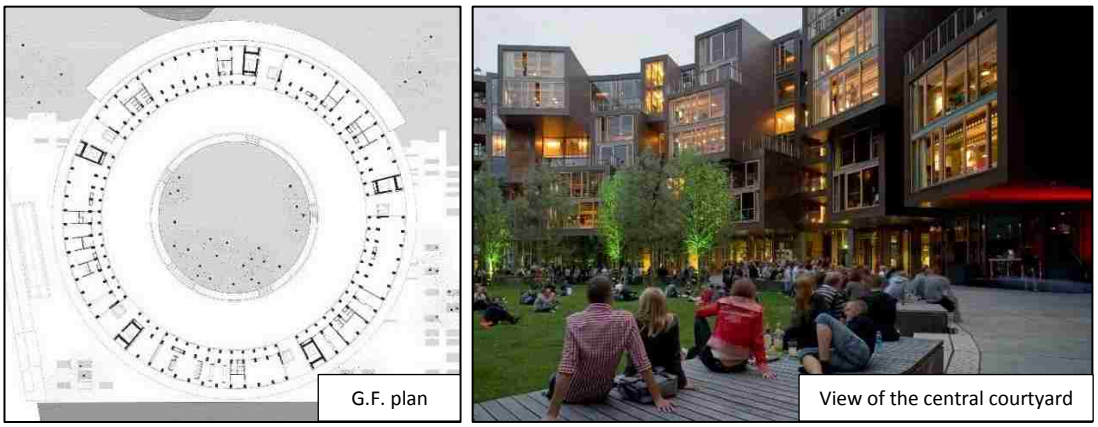


Figure 13: Central courtyard within the circular form of Tietgen Dormitory in Denmark – Source: ("Tietgen Dormitory / Lundgaard & Tranberg Architects", 2014)

Social integration can be studied also through another concept of active living which resembled by a way of living of which physical activities are worthier and connect to daily life while focus on the issue that how created environment such as, locals, transportation, buildings, parks and outdoors may provide more active life (Hossini, Azemati, Elyasi, & Mozaffar, 2015). Active living can be achieved through the following principles: furniture and benches to study outside, roofed and guarded places for ordinary meetings, suitable and calm meeting spaces, eliminating nonemergency preventives, providing treed pathway between pedestrian and its edge, particularly margin streets of hostel community (Hossini et al., 2015).

To conclude, the social integration can be indicated in the design of a student hostel through two factors: 'Participating in activities within hostel community' and

'Active living'. Each of these indicators can be achieved through multiple design variables (Table 6).

Table 6: Summery of 'Social Integration'

Principle	Indicators	Variables
3.4 Social Integration	3.4.1 Participating in activities within hostel community	A. Mixing land uses and increasing density
		B. Legibility: • Wayfinding • Identity of space through sufficient landmarks • Easily recognizable buildings • Welcoming outdoor
		C. Quality of activity places: • Quality and sufficiency of available facilities
	3.4.2 Active living	A. Landscape features: • Comfortable furniture and benches to study outside, • Roofed and guarded places for ordinary meetings, • Suitable and calm meeting spaces, • Eliminating nonemergency preventives, • Providing treed pathway between pedestrian and its edge, particularly margin streets

3.5 Accessibility

Residents need equitable access to the everyday services and facilities such as public open/green space, sports/recreation facility, library, restaurant/café, supermarket, clinic, and public transport (Dempsey et al., 2011). In M6B1 student housing in Paris, the circulation within the building is organized as a spiral movement in which the communal spaces are aligned along the path linking the ground floor to the roof terrace (Fig. 14) ("M6B1 Student Housing", n.d.). This distribution of social spaces along the spiral path provides kind of equitable access where residents of different floors have the same variety of distances to those social spaces.

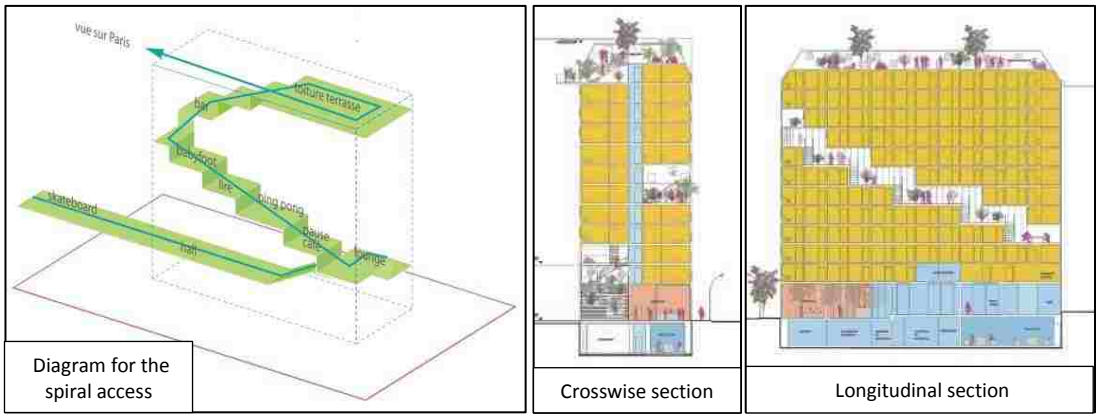


Figure 14: Accessibility pattern in M6B1 student housing in Paris – Source: ("M6B1 Student Housing", n.d.)

Another approach for equitable access is clustering method such as the one in student housing for the University of Southern Denmark that had been mentioned earlier in social integration. The rooms are distributed radially around the communal centre that has the core of vertical circulation which provides equitable access to all the rooms of each floor (Fig. 15) ("Student Housing / C.F. Møller", 2016).

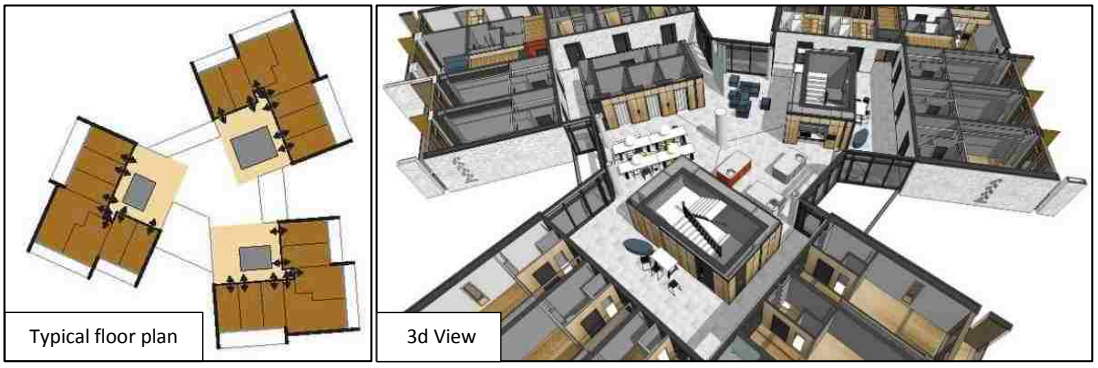


Figure 15: Accessibility pattern in the student housing of the University of Southern Denmark in Odense – Source: ("Student Housing / C.F. Møller", 2016)

While equitable access to services and facilities takes one important side, equitable accessibility between disabled and normal people takes another important side. In the study evaluating the social sustainability in house models in Al Ain, UAE, accessibility is indicated by providing appropriate measures for handicapped.

For that reason, main doors and facilities such as kitchen and bathroom should be designed to be usable by persons in wheelchairs (Galal Ahmed, 2011). In Warwick Accommodation in the United Kingdom, students with disabilities had in-purpose built rooms to ease their accessibility. For example, there are rooms suitable for wheelchair users with level access bathrooms, and several halls have push entry systems to increase ease of access ("Warwick Accommodation", 2018). In the study proposing spatially flexible student hostel design in Nigeria, placing the critical spaces on the lowest floor is one of the mentioned strategies to ease the access of people of different degrees of mobility and age (Nwadiogwa, 2011).

In the conclusion of this principle, the principle of accessibility can be evaluated in the design of a student hostel through two main indicators: 'Equitable access for everyday services and facilities' and 'Appropriate measures for handicapped'. Multiple design variables can contribute in achieving these two indicators (Table 7).

Table 7: Summery of 'Accessibility'

Principle	Indicators	Variables
3.5 Accessibility	3.5.1 Equitable access for everyday services and facilities	A. Distribution of facilities
		B. Floor layout
		C. Mode of access: horizontal/vertical, direct/indirect
	3.5.2 Appropriate measures for handicapped	A. The doors of main entrance and common use area are accessible by students in wheelchair
		B. Kitchens and bathrooms are designed to be useable by students in wheelchairs
		C. Suitable width and access for car parking space
		D. Placing critical spaces on the lowest floor

3.6 Mobility

It is defined by the potential for movement; in other words, how to reach a destination. It is a focus on the means of movement rather than the ends (Handy,

2002). In a study assessing the individual mobility patterns in a neighbourhood, daily mobility is defined as individual's everyday movement over space between activity locations (Chaix et al., 2012).

Mobility is represented by walkable and cycling neighbourhood through friendly pedestrian walk and bicycles ways (Dempsey et al., 2011). Choosing a non-motorized mode (walking or cycling) to reach the destinations depends on the distance between the destinations as proven in the study of University Student Travel Behaviour in the Greater Phoenix region of Arizona, USA (Volosin, 2014). In another study testing the association between the built environment and walking behaviour at a university campus in Hong Kong, China, it had been found that walking can be promoted by increased pedestrian connectivity, exposure to life area buildings (recreational buildings), and population density (Sun, Oreskovic, & Lin, 2014).

A student hostel can be vertical community where mobility happens vertically within the same building, and in this case the system of movement will be stair cases and elevators. On the other hand, it can be horizontal community where mobility happens horizontally among multiple buildings through walking and cycling. In a linked hybrid project, a high rise residential development designed by Steven Holl Architects in China, a new approach of accessibility is introduced where the residential towers are linked together by bridges in the sky containing public facilities (Fig. 16) ("Linked Hybrid / Steven Holl Architects", 2009).

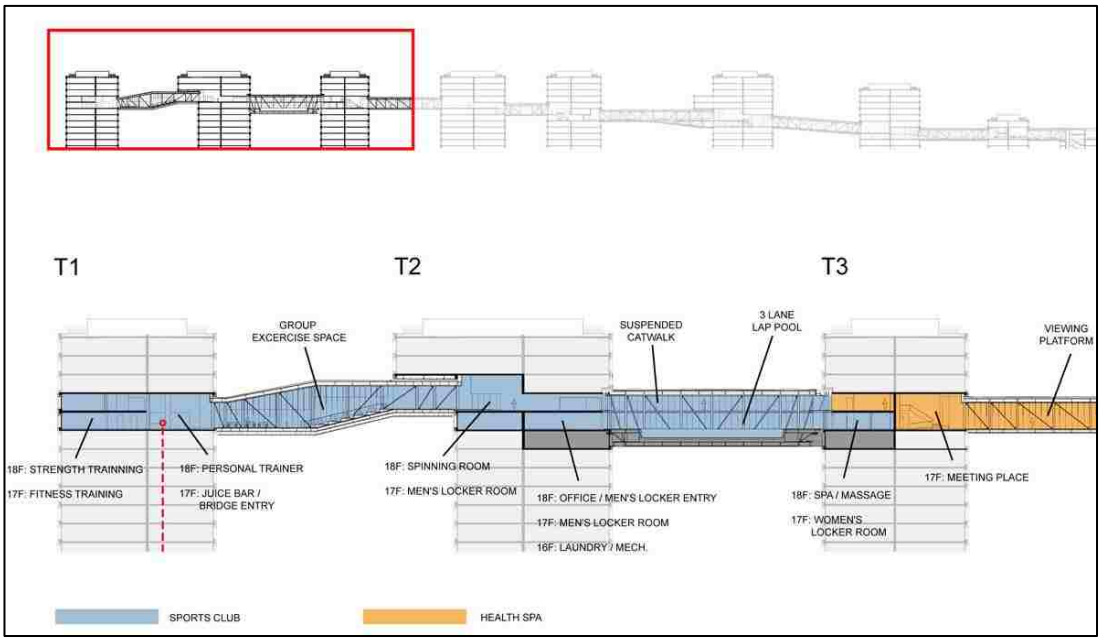


Figure 16: Accessibility pattern in Linked Hybrid development through sky bridges – Source: ("Linked Hybrid / Steven Holl Architects", 2009)

Bike storage and bike rental service are found in many student hostels around the world and their availability representing the first step towards capability of cycling. In Conii student hostel in Quarteira, Portugal by architect Estudio ODS, cycling is required due to the absence of everyday life facilities within the hostel community ("Hostel CONII / Estudio ODS", 2016). For the response to the need of cycling, a bike storage is provided in the ground floor (Fig. 17).

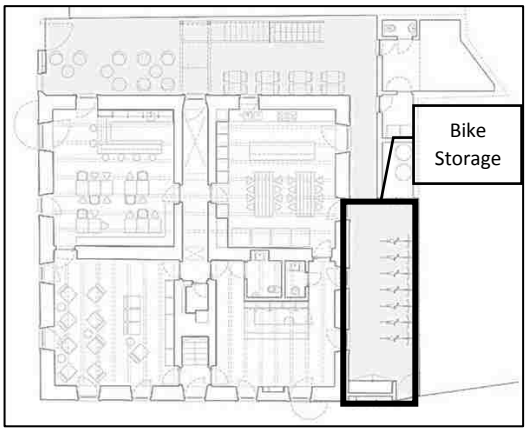


Figure 17: Bike storage in the ground floor plan of Conii StudentHostel in Portugal – Source: ("Hostel CONII / Estudio ODS", 2016)

In the project of Bastyr University Student Village in Washington, USA, 11 living units instead of a traditional dorm are allocated and connected through cycling and walking ways (Fig. 18) ("Bastyr University Student Village / CollinsWoerman", 2010). Each of the 11 living units has its own bike storage (Fig. 19).

Figure 18: Cycling and walking ways of Bastyr University Student Village in Washington – Source: ("Bastyr University Student Village / CollinsWoerman", 2010)

Figure 19: Bicycle storage in one of the 11 living units of Bastyr University Student Village in Washington – Source: ("Bastyr University Student Village / CollinsWoerman", 2010)

In the student housing for the University of Southern Denmark in Odense, the mobility within the context of the site and the available means of transport had been studied and designed carefully (Fig. 20) ("Student Housing / C.F. Møller", 2016).

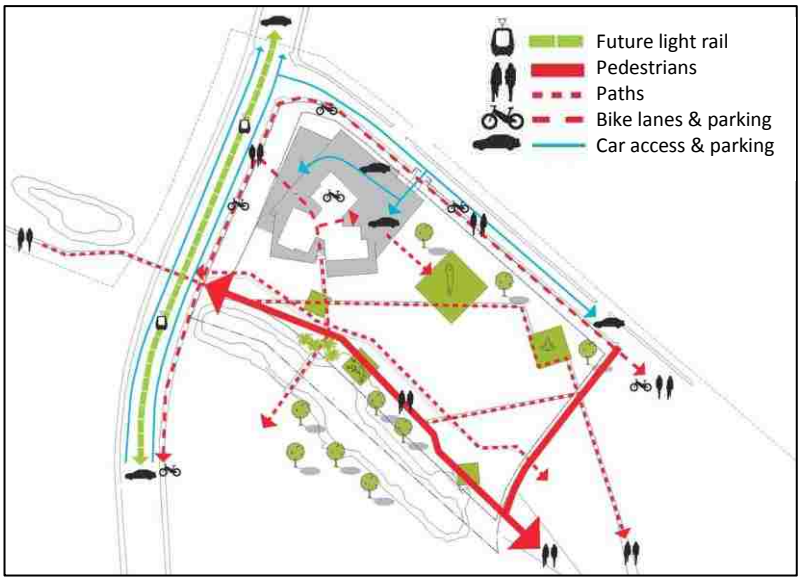


Figure 20: Mobility diagram of student housing of the University of Southern Denmark in Odense – Source: ("Student Housing / C.F. Møller", 2016)

Going out of the scale of the student hostel community, mobility to nearby adjacent buildings and downtown of the city is also important to consider. In West Campus Housing of University of Washington in USA, designed by Mahlum, a site analysis, shown in Fig. 21, is made to study the bicycles flow, walking distance, and public transportation ("West Campus Housing Phase I - Mahlum - 2013 AIA/WA Civic Design Awards", n.d.). Through this analysis, the designed campus ensured five-minute walk to the centre of the University of Washington campus and to the neighbouring business district. In addition, 44 bus routes pass nearby the site, connect the project to downtown Seattle and neighbourhoods throughout the city; the planned University District light rail station is 3 ½ blocks from the site also.

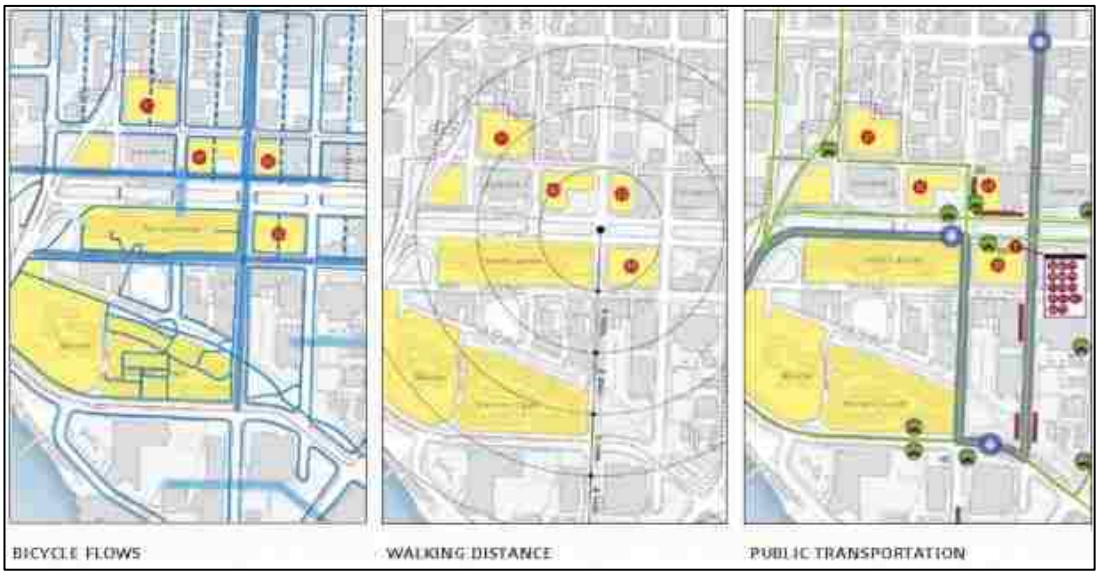


Figure 21: Site analysis for the mobility of West Campus Housing of University of Washington in USA – Source: ("West Campus Housing Phase I - Mahlum - 2013 AIA/WA Civic Design Awards", n.d.)

To conclude, this principle can be assessed through two main indicators: 'Walkable and cycling hostel community' and 'Public transportation to outside hostel community'. Multiple variables contribute in achieving each of these two indicators (Table 8).

Table 8: Summery of 'Mobility'

Principle	Indicators	Variables
3.6 Mobility	3.6.1 Walkable and cycling hostel community	A. Availability of friendly pedestrian walk and bicycles ways
		B. Availability of bike storage and bike rental service
		C. Promoting walkability: • Increased pedestrian connectivity, • Exposure to life area buildings (recreational buildings) • Population density
	3.6.2 Public transportation to outside hostel community	A. Availability of efficient public transportation system

3.7 Privacy

On the level of buildings, a study of the performance of residential buildings constructed between 2003 and 2009 in public housing estates in urban areas of Ogun State Southwest Nigeria, found that the principle of privacy is higher than others in determining residents' satisfaction (Ibem, Opoko, Adeboye, & Amole, 2013).

The concept of privacy can be considered in the hostel design in multiple forms. The hierarchy of distribution of spaces within the building of the hostel is an element of privacy. In West Campus Housing of the University of Washington in USA that had been mentioned in the previous section of mobility, the spaces were distributed vertically from top to below from private to public (Fig. 22) ("West Campus Student Housing / Mahlum", 2013). The top private spaces include residential rooms and studio apartments, the middle semi-private/semi-public spaces include residential commons areas, car parking and bike parking, services, academic resource centre, and health and wellness centre, and the below public spaces, which are accessible by public people from adjacent buildings not only residents of the hostel, include restaurant, grocery store, café, conference centre, and retail.

Figure 22: Hierarchical distribution of spaces in West Campus Housing of University of Washington in USA – Source: ("West Campus Housing - Phase I | Mahlum", 2017)

In a study evaluating the standard of comfort indices and living expectation in student hostel at Universiti Teknologi Malaysia (UTM), it had been found that while the doors of the bedrooms can be kept opened to create effective cross ventilation, clustering kind of room planning is suggested to avoid the direct visual contact from the opposite room (Ismail, Abdullah, & Siang, n.d.). Furthermore, it was suggested that in private rooms there should be an area for common space acting as an intermediate space that separates guests who visit the room and the room owner personal space.

Another element of privacy involves having a bathroom attached within the room unit rather than communal shared bathroom as can be found in Hektor design hostel in Estonia ("Hostel Tartu I Hektor Design Hostel I Estonia", n.d.). In Nkrumah Postgraduate Hostel University of Nigeria Enugu Campus, designing the hostel with single rooms is considered as an indicator for affording the privacy that the users need (Nwadiogwa, 2011). Even within the shared bedroom, privacy can still be enhanced. In Conii student hostel, mentioned before in mobility section, each bed in the shared bedrooms has its own curtain for achieving the individual privacy within the shared room (Fig. 23) ("Hostel CONII / Estudio ODS", 2016).

Figure 23: Bed curtains in the shared bedrooms of Conii student hostel in Portugal – Source: ("Hostel CONII / Estudio ODS", 2016)

Going out from the enclosed space, the privacy can also be maintained in the outdoor communal space of the hostel from the adjacent surroundings. In the project of Campus North Residential Commons of University of Chicago, USA, the form of the building surrounds the external courtyard in a sense of giving it privacy and make it semi-public for the students of the hostel rather than keeping the outdoor emerging with the public Hyde Park (Fig. 24 & 25) ("University of Chicago Campus North Residential Commons / Studio Gang", 2016).

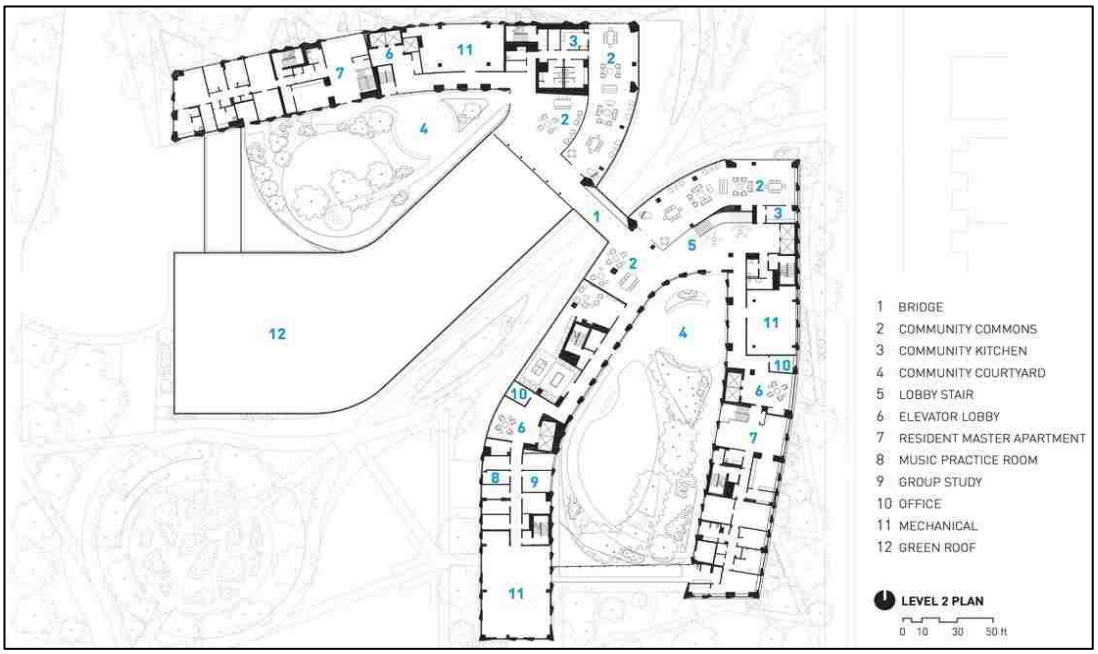


Figure 24: Surrounded community courtyards by building form in Campus North Residential Commons of University of Chicago, USA – Source: ("University of Chicago Campus North Residential Commons / Studio Gang", 2016)

Figure 25: Views of surrounded courtyards in Campus North Residential Commons of University of Chicago, USA – Source: ("University of Chicago Campus North Residential Commons / Studio Gang", 2016)

To conclude, the privacy can be assessed in the design of a student hostel through two main indicators: 'Perception of privacy within hostel community' and 'Perception of privacy from nearby adjunct hostel surroundings'. Each of these indicators can be achieved through multiple design variables (Table 9).

Table 9: Summery of 'Privacy'

Principle	Indicators	Variables
3.7 Privacy	3.7.1 Perception of privacy within hostel community	A. Hierarchy of distribution of spaces from public to semi-public/semi-private to private
		B. Clustering kind of room planning which avoid direct visual contact from the opposite room
		C. Area for common space in private room acting as an intermediate space between guests and owner personal space
		D. Attachment of bathroom within the room unit rather than communal shared bathroom
		E. Single type of bedroom rather than shared
		F. Use of bed curtains in shared bedroom
	3.7.2 Perception of privacy from nearby adjacent hostel surroundings	A. Form of hostel building/s
		B. Orientation of the hostel building/s
		C. Locations of fenestrations in relation to surroundings

3.8 Safety

Safety can be indicated by people' sense of safety which is established based on their interaction with their environment. People's sense of safety is affected by the condition and maintenance of the built environment (Dempsey et al., 2011).

Further, safety can be indicated through protection from hazards where means of fire resistance in the design such as smoke detectors and alarms, anti-slippery floorings, and means of escape in case of emergency are different design variables of protecting from hazards (Galal Ahmed, 2011).

Additionally, there are other non-common means of protection from hazards can be found in some designs. For example, in student hostel of University of Science and Technology of Hong Kong where safety is considered as a first priority, AUGREEN Block Wall System has been used for partitioning bedrooms/bathrooms and pipes ducts. The two sizes of the used AUGREEN Block Wall System, 80mm and 100mm, have passed the 2 hours and 4 hours Fire Resistant Poly (FRP) test respectively ("CaSO Environmental Group Limited | CaSO (HK) Engineering Co., Ltd", n.d.).

The hazards differ contextually and therefore protecting students form them differ accordingly. For example, an innovative structural Cross-Laminated solid Timber boards (CLT) system is suggested in building student houses in Serbia due to its high characteristics such as a good behaviour in case of earthquake or fire (Cvetković, Stojić, Krasić, & Marković, 2015). The CLT is domestic timber species assembled in layers and glued together crosswise to form massive timber wall and floor panels characterized by significant mechanical properties.

All in all, the principle of safety can be indicated in the design of a student hostel by two main factors: 'Students' sense of safety' and 'Protection from Hazards'. These two indicators can be achieved through multiple design variables (Table 10).

Table 10: Summery of 'Safety'

Principle	Indicators	Variables
3.8 Safety	3.8.1 Students' sense of safety	A. Condition and maintenance of the built environment
	3.8.2 Protection from Hazards	A. Means of fire resistance in the design such as smoke detector and alarms and fire resistance materials
		B. Anti-slippery floorings
		C. Means of escape in case of emergency

3.9 Security

The importance of security principle in designing student hostels can be seen in multiple studies. In a study investigating the impact of hostel life, one of the given suggestions from the students to improve hostel life was increasing the level of hostel security (Iftikhar & Ajmal, 2015). In another study investigating the perceptions of Kansas State University (KSU) students in USA about hostels and their intent to use hostels, it was found that hostel security (locks on doors, etc.), location of hostel in a safe part of town, room security (lockers, safes, etc.) and amenities are the highest factors in determining the residency in a hostel, and they were higher in females' perceptions than males' (Edwards, 2012).

Like safety, security is indicated by people's sense of being secured and protection from crimes. It had been found that security is measured through violation of laws through a number of crimes and of violations of environmental regulations and through people's feeling of security (Anna, Zoltán, Miklós, & György, 2008). One of the design approaches of enhancing the sense of security is the natural surveillance through active frontage such as having windows directly overlooking streets (Bramley et al., 2006). On another study, security is indicated by protection from crimes where means of security in design details such as fences, suitable building materials, lockers, alarms, and lighting sensors, relative position (control) for each room in the plan, and degree of visibility among internal/external spaces are representing multiple design variables of protecting from crimes (Galal Ahmed, 2011). In a study of students' accommodation and security implications in some selected hostels of the Kwame Nkrumah University of Science and Technology in Ghana, it had been found that three out of the four hostels had perimeter protection

measures of security such as fences and exterior walls (Anokye & Mohammed, 2016).

In hostels of the Quaid-i-Azam University (QAU) in Islamabad, Pakistan, a comprehensive security plan is made to filter out outsiders, weapons, and other unwanted elements after crimes of killing three students, including a girl, on the campus in two different incidents ("New security plan for QAU hostels", 2003). One of the approaches in this security plan is building a new main gate to control who comes in and out. In addition, the university is also considering installing metal detectors to check weapons. Having one main entry for the hostel can be seen also in a student hostel in Paris that had been mentioned before in social interaction; one main entrance entry is designed to secure the two blocks of the hostel within its tight site limits (Fig. 26) ("OFIS_Paris Student Apartments", n.d.).

Figure 26: One main entry for the two blocks of a student housing in Paris- Source: ("OFIS_Paris Student Apartments", n.d.)

In conclusion, the principle of security can be indicated by two factors: 'Students' sense of security' and 'Protection from crimes'. These two indicators can be achieved through multiple design variables (Table 11).

Table 11: Summery of 'Security'

Principle	Indicators	Variables
3.9 Security	3.9.1 Students' sense of security	A. Location of hostel in a safe part of town
		B. Natural surveillance through active frontage such as having windows directly overlooking streets
	3.9.2 Protection from crimes	A. Means of security in design details such as fences, suitable building materials, lockers, alarms, and lighting sensors
		B. Relative position (control) for each space in the plan.
		C. Degree of visibility among internal/external spaces
		D. One main entrance entry

3.10 Local Environmental Quality

In a study of developing green building rating system for residential units in Jordan, assessment indicators for the indoor environment were: visual quality, acoustic and noise control, daylight, thermal comfort (Ali & Al Nsairat, 2009). The satisfaction of the students with the visual quality of their hostel varies in its level from the environment of their own rooms to the environment of the overall hostel. In a study of students' colour perception and preference for hostel room as a learning environment amongst undergraduate students at Universiti Teknologi MARA and Universiti Putra Malaysia, it had been found that there is a significant relationship between genders in colour selection of colour recommendation for a hostel room (Jalil, Yunus, & Said, 2013). On the other hand, the visual quality of the outdoor space of the hostel can be related to the landscape features such as availability of street lighting and parks/open spaces (Bramley et al., 2006).

Regarding the acoustic and noise control, in a project of turning an office building to student hostel in Amsterdam, Netherlands, a double skin is developed at the west façade to achieve better acoustic insulation from the adjacent highway, while in the east façade facing quiet neighbourhood, no second skin was necessary ("Student Housing in Elsevier Office Building / Knevel Architecten", 2015). Prevention of overcrowding is found also as an important approach towards acoustic and noise control. In a study of the effects of student housing condition on students' health in Kaduna State College of Education in Nigeria, it had been found overcrowding is associated with sleep disturbance, interruption of speech and social interaction, and disturbance of concentration (Nos, 2013).

Regarding the thermal comfort, in the study of living spaces in UTM hostels in Malaysia that had been mentioned before in privacy and safety sections, one of the suggested design guidelines to achieve ideal and comfortable living in hostels is that the room should have ample ventilation and natural lighting (Ismail et al., n.d.). In Youth Olympic Games Student Housing in Norway, shown in Fig. 27, Kebony's sustainable, durable wood is used to resist the chilly, windswept climate of the mountainous, lakeside Gudbrandsdal region (Kebony, 2015).

Figure 27: Durable wood resisting the chilly climate in Youth Olympic Games Student Housing in Norway – Source: (Kebony, 2015)

Moreover, providing a healthy indoor quality is another indicator of the good achievement of local environmental quality. In the local study of the housing design in Al Ain city, UAE, that is mentioned before, healthy indoor quality was one of the principles for creating socially sustainable housing and what contributes to achieving it is the availability of fittings resisting insects such as windows and doors screens (Galal Ahmed, 2011). Furthermore, in the previous mentioned study of the effects of student housing condition on students' health in Kaduna State College of Education in Nigeria, it was found that the poor state and condition of available student housing facilities and the inadequacy of the existing facilities which has created high occupancy ratio caused diseases amongst students residing in the hostels (Nos, 2013).

In conclusion, the local environmental quality in the design of a student hostel can be indicated through five main factors: 'Visual quality', 'Acoustic and noise control', 'Daylight', 'Thermal comfort', and 'Healthy indoor quality'. Each of these indicators has its own design variables (Table 12).

Table 12: Summery of 'Local Environmental Quality'

Principle	Indicators	Variables
3.10 Local Environmental Quality	3.10.1 Visual quality	A. Students' colour perception and preference for hostel room
		B. Availability of street lighting
		C. Provision of good views to green areas
	3.10.2 Acoustic and noise control	A. Use of acoustic insulation design features
		B. Prevention of overcrowding
	3.10.3 Daylight	A. Availability of natural lighting
	3.10.4 Thermal comfort	A. Availability of ample ventilation
		B. Use of proper material in respond to hostel climate location
	3.10.5 Healthy indoor quality	A. Fittings resisting insects such as (windows and doors screens)
		B. Adequacy of available facilities to avoid high occupancy ratio

3.11 Participation

The participation involves the voice of residents in shaping their surroundings (Caistor-Arendar et al., 2011). In a study of assessing facilities management service in postgraduate hostel in Henry Carr postgraduate hall of University of Lagos, it was found that there is a huge gap between the student's service expectations and perceived facilities management service offered in the hall with highest expectations being on the assurance dimension (Mohammad, Gambo, & Omirin, 2012).

In the design of Fordham University Residence Halls in Bronx, New York City, USA, by architects Sasaki Associates, Inc, e single rooms not located within apartments were provided on the Rose Hill campus in respond to students' most common request of having apartments with single bedrooms to have their own spaces (Nwadiogwa, 2011). Further, in Bastyr University Student Village that had been mentioned before in mobility section, the architect,

CollinsWoerman, let both students and faculty to be involved in a highly interactive and collaborative design process to create a design specially tailored for the older, independent students that attend the school ("Bastyr University Student Village / CollinsWoerman", 2010). In another project of student hostel, Massachusetts College of Art and Design's Student Residence Hall, in Boston, USA, the involvement of students' voice in the design of their hostel increased to reach making full-scale mock-up units for students to explore and critique. The final design of the building, shown in Fig. 28, is responding to students' ideas of having their hostel look like a painting and that to be colourful and vibrant as they are ("Massachusetts College of Art and Design's Student Residence Hall / ADD Inc.", 2014).

Figure 28: Designed lounges according to students' preferences in Massachusetts College of Art and Design's Student Residence Hall in Boston, USA – Source: ("Massachusetts College of Art and Design's Student Residence Hall / ADD Inc.", 2014)

All in all, the participation can be indicated through 'Involvement of students in shaping their surroundings', and this indicator can be achieved through two variables (Table 13).

Table 13: Summery of 'Participation'

Principle	Indicators	Variables
3.11 Participation	3.11.1 Involvement of students in design	A. Involving students within hostel design process
		B. Involving students with hostel design-oriented decision making

3.12 Pride/Sense of Place

The sense of place is measured by feelings of pride, identification and belonging (Bramley et al., 2006). Among the three essential factors identified by Michael Young on a study of New Earswick, a new community developed in 1904 by Joseph Rowntree, for measuring sense of place, one of them was a design factor which is a place with a character of its own that distinguishes it from its surroundings (Caistor-Arendar et al., 2011). In the design of students' housing in Paris by Hamonic+Masson & Associés, the building which is called golden student housing had been designed with golden painted surfaces in order to give it a distinct identity (Fig. 29) (Gibson, 2016).

Figure 29: Distinct identity through golden painted exterior surfaces in a student housing in Paris – Source: (Gibson, 2016)

In addition to the golden painted surfaces, the concept of the design which is said by Hamonic and Masson "Like birds, students come and go, and need their nest" added another feature of identity through designing wooden bird boxes that slot in between the concrete structure and the golden cladding (Fig. 30 & 31).

The occupants cannot interfere with them, and they require no maintenance and can be opened to be cleaned (Gibson, 2016).

Figure 30: View of the birdhouses from the exterior façade of golden student housing in Paris – Source: (Gibson, 2016)

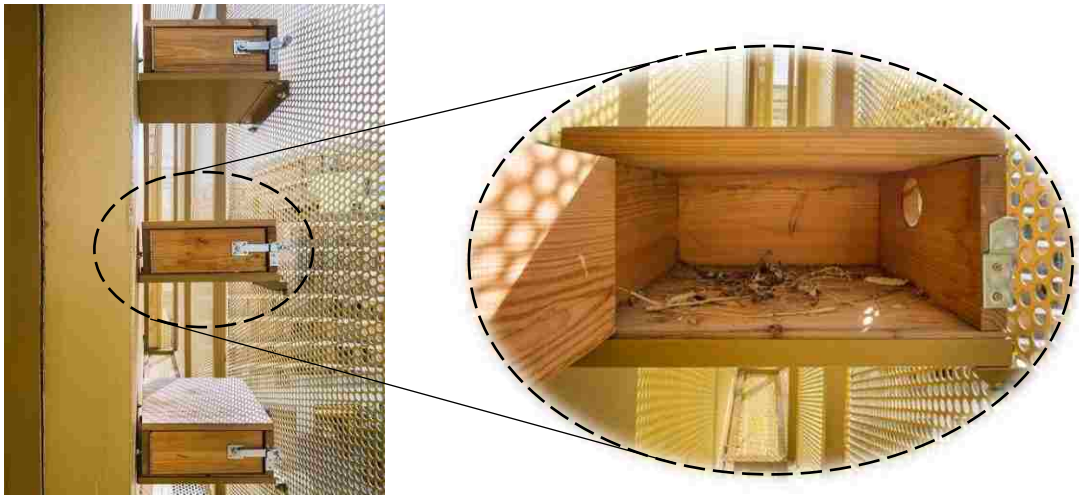


Figure 31: Section for the wooden birdhouses of golden student housing in Paris – Source: (Gibson, 2016)

Moreover, it is proved that the sense of place has a relationship with the built environment; it can be felt through the perceived quality of space (Dempsey et al., 2011). Another study showed that sense of students' attachment to their hostel is positively correlated with their level of satisfaction with the services and facilities of the hostel, such as sharing the room, hostel design and layout, hostel population,

hostel safety and security, and so forth (Khozaei, Hassan, & Khozaei, 2010). Additionally, it was found that this positive correlation between satisfaction and attachment to hostel is not affected by the student's ethnicity.

Further, the sense of attachment can be felt through the involvement of students in designing their hostels. In the project of Massachusetts College of Art and Design's Student Residence Hall in Boston, USA that had been mentioned before in participation section, after involving students in the design phase and create their hostel according to their ideas, the students voted to nickname their building, "The Tree House" ("Massachusetts College of Art and Design's Student Residence Hall / ADD Inc.", 2014).

To conclude, the sense of place can be indicated in the design of a student hostel by 'Feelings of pride, identification, and belonging' which can be achieved through multiple design variables (Table 14).

Table 14: Summery of 'Pride/Sense of Place'

Principle	Indicators	Variables
3.12 Pride/Sense of Place	3.12.1 Feelings of pride, identification, and belonging	A. Hostel with character of its own
		B. Hostel design promoting shared common characteristics of its students
		C. Students' satisfaction with perceived design quality of the hostel
		D. Involvement of students in designing their hostel

To conclude this chapter, all the found principles, indicators, and variables of a socially sustainable student hostel design are gathered in Table 15 to be used in the next stage of evaluating the design of an existing student hostel. For the purpose of the evaluation, multiple tools are assigned to each variable, as shown in Table 15, to investigate its degree of achievement.

Table 15: Principles, indicators, and variables of a socially sustainable student hostel design

Principles	Indicators	Variables	Tools
3.1 Responsiveness to Social Needs	3.1.1 Availability of needed facilities and services	A. Availability of basic functional spaces: bed rooms, bathrooms, kitchen, living rooms, laundry, store, study area, computer lab and parking.	Design analysis Observations Interviews
		B. Availability of aspects of everyday life of hostel community, such as: clinic, post office, chemist, supermarket, bank, corner shop, restaurant/café/takeaway, library, sports/recreation facility, hostel community centre/ multi-purpose hall, and public open/green space.	Design analysis Observations Interviews
		C. Availability of specific facilities in respond to students' cultural preferences	Design analysis Observations Interviews
		D. Availability of suitable facilities for students with disabilities	Design analysis Observations Interviews
		E. Need for a balcony	Design analysis Interviews
	3.1.2 Quality of provided facilities and services	A. Suitability of areas	Design analysis Observations Interviews
		B. Suitability of spatial organization (zoning)	Design analysis Interviews
		C. Availability of modern amenities	Interviews
3.2 Flexibility	3.2.1 Capability of different social uses	A. Design allowance for changing space areas	Design analysis Interviews
		B. Design allowance for changing space functions such as: • Designing areas to serve more than one function • Furnishing to separate different functional spaces	Design analysis Observations Interviews
	3.2.2 Capability of different physical arrangement	A. Providing unit modules for flexible spatial organization	Design analysis
		B. Use of folding furniture for flexible configurations	Design analysis
		C. Use of movable furniture	Design analysis Observations Interviews

Table 15: Principles, indicators, and variables of a socially sustainable student hostel design (Continued)

Principles	Indicators	Variables	Tools
	3.2.3 Capability of future expansion	A. Placing the building on its site to leave room for an addition	Design analysis
		B. Giving the building a shape that is easily extended	Design analysis
3.3 Social Interaction	3.3.1 Students' intentional and unintentional Interaction	A. Configuration of spaces: • Distribution of common and individual spaces • Hierarchy and spatial depth • Geometry of spaces • Spaces with minimal fragmentation	Space syntax Design analysis Observations Interviews
		B. Quality of individual common spaces: • Well-chosen design through aptly selected colours, finishing materials, appropriate lighting, and translucent walls	Observations Interviews
		C. Use of communal services such as kitchen to serve groups of students	Design analysis Interviews
3.4 Social Integration	3.4.1 Participating in activities within hostel community	A. Mixing land uses and increasing density	Space syntax Design analysis Interviews
		B. Legibility: • Wayfinding • Identity of space through sufficient landmarks • Easily recognizable buildings • Welcoming outdoor	Observations Interviews
		C. Quality of activity places: • Quality and sufficiency of available facilities	Observations Interviews
	3.4.2 Active living	A. Landscape features: • Comfortable furniture and benches to study outside, • Roofed and guarded places for ordinary meetings, • Suitable and calm meeting spaces, • Eliminating nonemergency preventives, • Providing treed pathway between pedestrian and its edge	Observations Interviews

Table 15: Principles, indicators, and variables of a socially sustainable student hostel design (Continued)

Principles	Indicators	Variables	Tools
3.5 Accessibility	3.5.1 Equitable access for everyday services and facilities	A. Distribution of facilities	Space Syntax Design analysis Interviews
		B. Floor layout	Space Syntax Design analysis Interviews
		C. Mode of access: horizontal/vertical, direct/indirect	Design analysis
	3.5.2 Appropriate measures for handicapped	A. The doors of main entrance and common use area are accessible by students in wheelchair	Design analysis Interviews
		B. Kitchens and bathrooms are designed to be useable by students in wheelchairs	Design analysis Interviews
		C. Suitable width and access for car parking space	Design analysis
		D. Placing critical spaces on the lowest floor for ease of access	Design analysis
3.6 Mobility	3.6.1 Walkable and cycling community	A. Availability of friendly pedestrian walk and bicycles ways	Observations Interviews
		B. Availability of bike storage and bike rental service	Design analysis
		C. Promoting walkability: • Increased pedestrian connectivity, • Exposure to life area buildings (recreational buildings) • Population density	Space syntax Design analysis Interviews
	3.6.2 Public transportation to outside hostel community	A. Availability of efficient public transportation system	Design analysis Interviews
3.7 Privacy	3.7.1 Perception of privacy within hostel community	A. Hierarchy of distribution of spaces from public to semi-public/semi-private to private	Space syntax Design analysis Interviews
		B. Clustering kind of room planning which avoid direct visual contact from the opposite room	Design analysis Interviews
		C. Area for common space in private room acting as an intermediate space between guests and owner personal space	Design analysis Interviews

Table 15: Principles, indicators, and variables of a socially sustainable student hostel design (Continued)

Principles	Indicators	Variables	Tools
		D. Attachment of bathroom within the room unit rather than communal shared bathroom	Design analysis Interviews
		E. Single type of bedroom rather than shared	Design analysis Interviews
		F. Use of bed curtains in shared bedroom	Design analysis Interviews
	3.7.2 Perception of privacy from nearby adjacent hostel surroundings	A. Form of hostel building/s	Design analysis
		B. Orientation of the hostel building/s	Design analysis
		C. Locations of fenestrations in relation to surroundings	Design analysis Interviews
3.8 Safety	3.8.1 Students' sense of safety	A. Condition and maintenance of the built environment	Observations Interviews
	3.8.2 Protection from Hazards	A. Means of fire resistance in the design such as smoke detector and alarms and fire resistance materials	Design analysis Observations
		B. Anti-slippery floorings	Interviews
		C. Means of escape in case of emergency	Design analysis
3.9 Security	3.9.1 Students' sense of security	A. Location of hostel in a safe part of town	Interviews
		B. Natural surveillance through active frontage such as having windows directly overlooking streets	Design analysis Observations Interviews
	3.9.2 Protection from crimes	A. Means of security in design details such as fences, suitable building materials, lockers, alarms, and lighting sensors	Observations Interviews
		B. Relative position (control) for each space in the plan	Design analysis
		C. Degree of visibility among internal/external spaces	Space syntax Observations
		D. One main entrance entry	Design analysis
3.10 Local Environmental Quality	3.10.1 Visual quality	A. Students' colour perception and preference for hostel room	Observations Interviews
		B. Availability of street lighting	Observations Interviews
		C. Provision of good views to green areas	Observations Interviews
	3.10.2 Acoustic and noise control	A. Use of acoustic insulation design features	Interviews
		B. Prevention of overcrowding	Interviews

Table 15: Principles, indicators, and variables of a socially sustainable student hostel design (Continued)

Principles	Indicators	Variables	Tools
	3.10.3 Daylight	A. Availability of natural lighting	Design analysis Observations Interviews
	3.10.4 Thermal comfort	A. Availability of ample ventilation	Interviews
		B. Use of proper material in respond to hostel climate location	Design analysis
	3.10.5 Healthy indoor quality	A. Fittings resisting insects such as (windows and doors screens)	Observations Interviews
		B. Adequacy of available facilities to avoid high occupancy ratio	Design analysis Interviews
3.11 Participation	3.11.1 Involvement of students in design	A. Involving students within hostel design process	Interviews
		B. Involving students with hostel design-oriented decision making	Interviews
3.12 Pride/Sense of Place	3.12.1 Feelings of pride, identification, and belonging	A. Hostel with character of its own	Interviews
		B. Hostel design promoting shared common characteristics of its students	Interviews
		C. Students' satisfaction with perceived design quality of the hostel	Interviews
		D. Involvement of students in designing their hostel	Interviews

Chapter 4: Selected Case Study of UAE University Female Student Hostel

There are two main criteria for selecting the case in a case study research. The first one is selecting cases with the needed sufficient access to the potential data including interview people, review documents, or make observations in the field. The second criterion is choosing the case study, among the selected ones with sufficient access, that will most lighten the main research question (Yin, 2009). Based on these two criteria, the female student hostels of UAE university were selected initially according to researcher's potentiality of access to collect the required data from any of them. Then, one of these hostels, New Campus hostel (NC), was chosen to be the case study for the research. In addition to the fact that his new hostel is more easily accessible than the other new hostel, Maqam 4, it is the biggest, in terms of its capacity, among the all other old and new female hostels of the university and has the most facilities. This chapter gives an overview of the selected UAEU female student hostels and then introduces the chosen student hostel, NC hostel.

4.1 Overview of UAEU Female Student Hostels

UAE University has five female student hostels located in different locations and at different proximities from the university (Fig. 32).

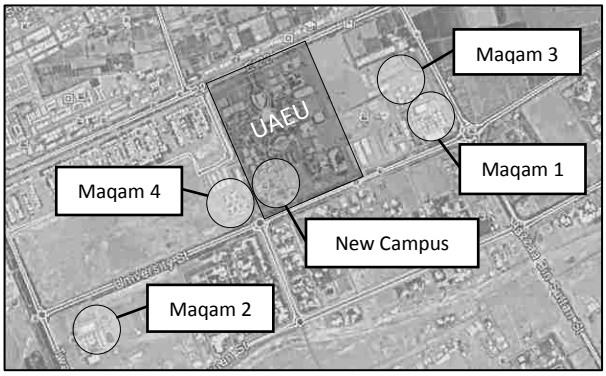


Figure 32: Locations of UAE University female student hostels – Source: (Google Earth Pro)

These hostels can be divided into two main groups based on the lifetime of the hostel. The first group, old hostels, includes Maqam 1, 2, and 3 hostels which had been utilized for more than twenty years ago. The second group, new hostels, includes NC hostel that was first utilized in 2012 and Maqam 4 hostel that was first utilized in 2016. All the hostels in the two groups are communities consisting of multiple residential buildings with shared facilities and outdoor space. The main differences among these hostels can be seen in Tables 16 and 17.

Table 16: UAE University female student hostels - Source of images: ("Overview", 2018)

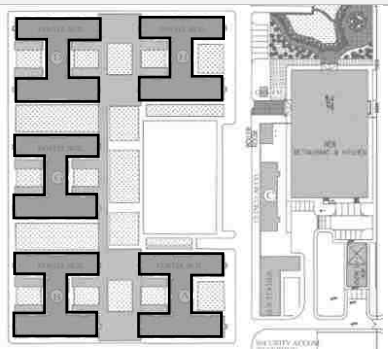
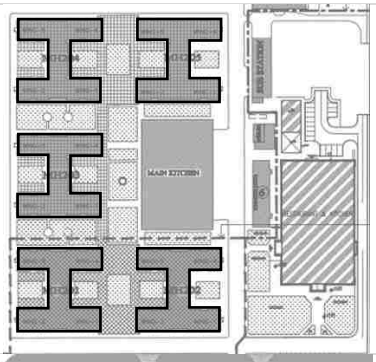
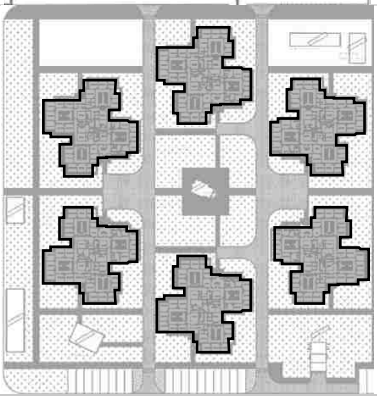
Type	Hostel	Layout	Exterior view
Group 1: Old hostels	Maqam 1		
	Maqam 2		
	Maqam 3		

Table 16: UAE University female student hostels - Source of images: ("Overview", 2018) (Continued)

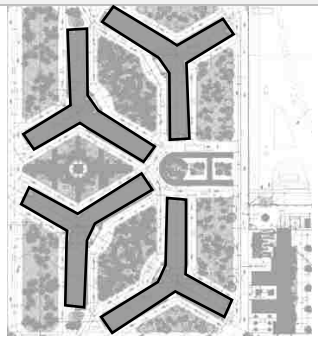
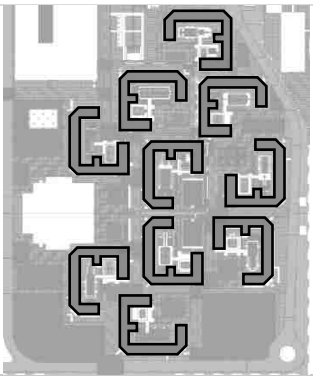
Type	Hostel	Layout	Exterior view
Group 2: New hostels	Maqam 4		
	NC		

Table 17: Comparison among UAE University female student hostels

Criterion	**Group 1: Old hostels**			**Group 2: New hostels**	
Hostel	Maqam 1	Maqam 2	Maqam 3	Maqam 4	New Campus
No. of residential buildings	5	5	6	4	10
Capacity	1310	949	804	1006	2470
Criteria of Students distribution	New undergraduates	International + Medical + Master & PHD+ Visitor + Exchange + Fast Track Students	Undergraduates who earned from 0 to 15 credit hours	Undergraduates who earned 16 credit hours and above	Undergraduates who earned 30 credit hours and above + Approved medical reports
Availability of students with special needs	No	Yes	No	No	Yes
Timing of openness	Weekdays only	All the week days and ends	Weekdays only	Weekdays only	Weekdays only
Room type	Double, & triple	Single, double, & triple	Double, & triple	Single	Single
Transportation between hostel and university	Needed	Needed	Needed	Not needed	Not needed

4.2 New Campus, NC Hostel

The new campus hostel, that is located within the university campus, consists of ten typical residential buildings named with A letter starting from A1 to A10 in addition to a canteen building named as A11 or 2D (Fig. 33).

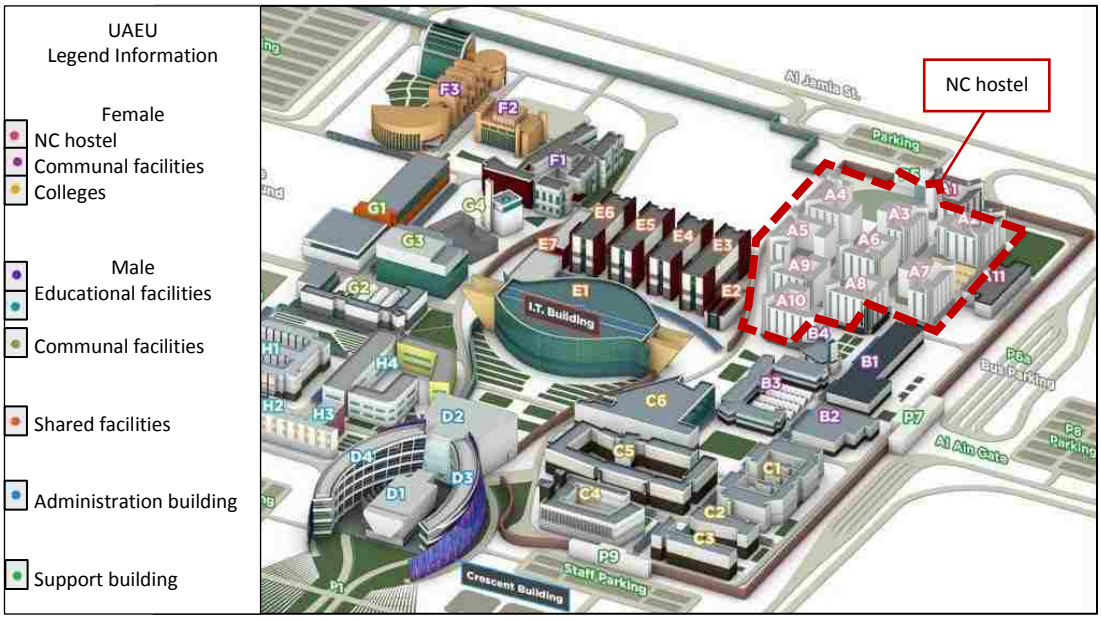


Figure 33: Location of NC hostel within the university campus 3D view – Source: ("UAEU Legend Information", 2018)

This hostel had been built in 2006 by the Ministry of Public Works of UAE that depended on COX group for the design consultations. The hostel was utilized for the first time in 2012, and now it hosts more than 2000 students.

Figure 34: View of NC hostel – Source: ("Overview", 2018)

Chapter 5: Evaluating the Social Sustainability Design Aspects of a Student Hostel in the Selected Case Study

In this chapter, each principle of the socially sustainable student hostel design was investigated in the selected case study of NC hostel to see to what extent each of these principles had been achieved. The principles were investigated through their relevant indicators, and the indicators were investigated through their relevant variables. Each variable was investigated using its assigned tools. The degree of achievement of each variable, and accordingly its indicator, and then its principle is expressed within a qualitative scale of five measures (Fig. 35). It is important to mention that all the variables were considered having equal weights while assessing their indicators, and the indicators were considered having equal weights while assessing their principles.

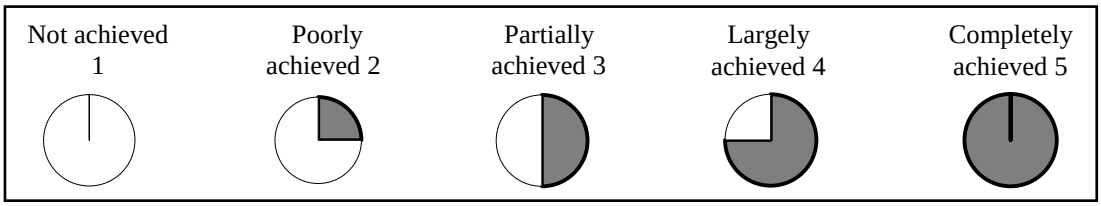


Figure 35: The qualitative scale of measuring the variables, indicators, and principles

5.1 Responsiveness to Social Needs

There are two main indicators for this principle to investigate: 'Availability of needed facilities and services' and 'Quality of provided facilities and services'. To have a look at the available facilities in the hostel, a list of all their types with their quantities, locations, and areas are available in Appendix 2.

5.1.1 Availability of needed facilities and services

This indicator was assessed through five variables: '*Availability of basic functional spaces*', '*Availability of aspects of everyday life of hostel community*',

'*Availability of specific facilitates in respond to students' cultural preferences*', '*Availability of suitable facilities for students with disabilities*', and '*Need for a balcony*'.

A. <u>Availability of basic functional spaces</u>

The design achieved partial availability for this type of facilities. Through the design analysis, the available basic functional spaces in the hostel were identified as shown in below layout and in one of the typical residential buildings (Fig. 36 & 37).

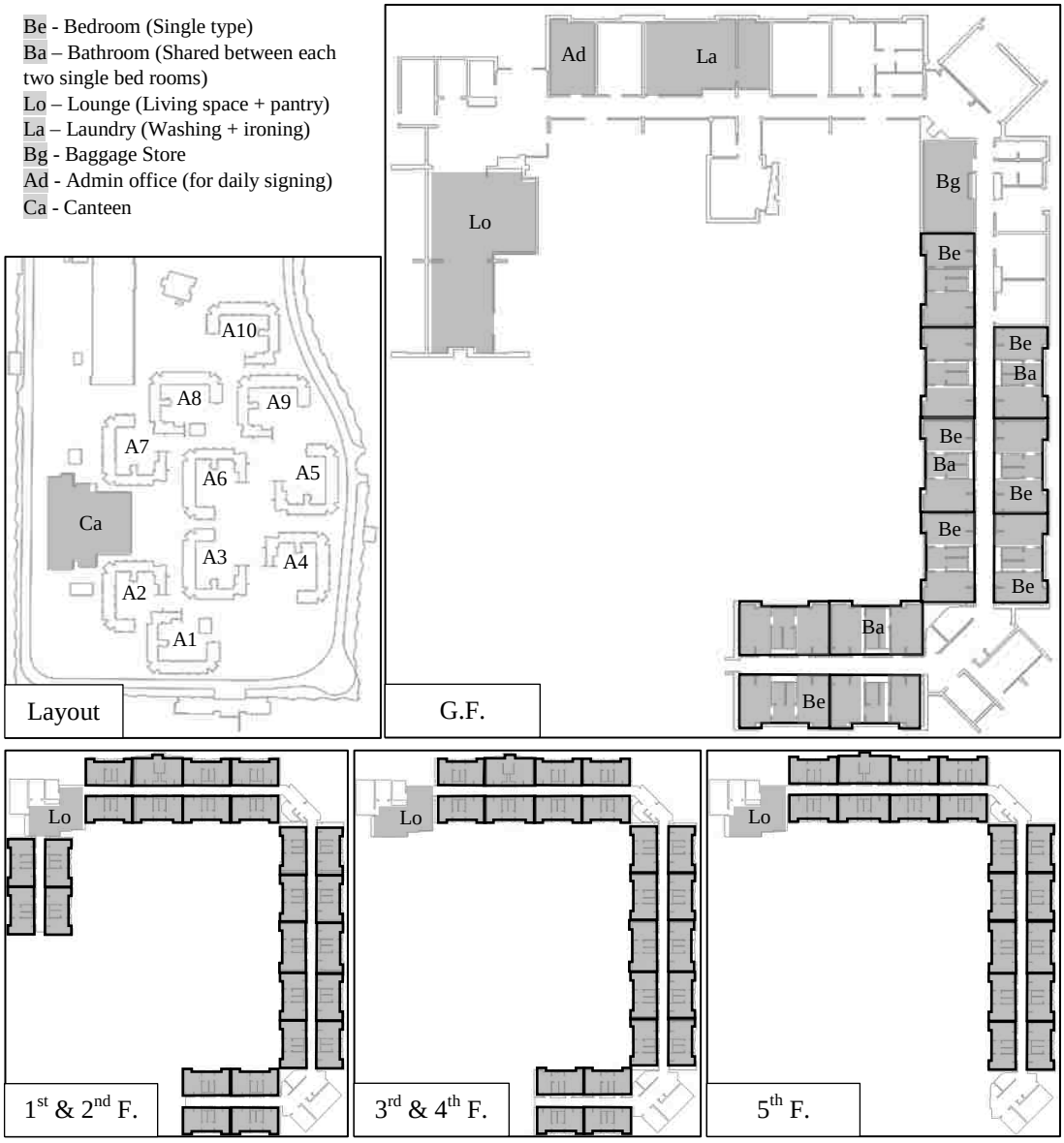


Figure 36: Available basic functional spaces in NC hostel

Figure 37: Views of multiple typical basic functional spaces in NC hostel

Comparing those available basic functional spaces in NC hostel with the most common ones that are available in most hostels as discussed in the conceptual framework in Chapter Three showed that there are some of this type of facilities that are not considered in the design of NC hostel. Those missing facilities are: kitchen, study hall, computer lab, and parking. The kitchen is not available as a facility; instead, there is a canteen facility serving the students with three meals per day in addition to a small pantry in each lounge space. Besides, no study hall and computer lab are available within the hostel; they are available in other places within the university campus such as colleges and library. In addition, car parking is not considered as basic facility for hostel's students. There is only car parking beside the reception for the staff and family members when they pick on and off their daughters. The students of the hostel are not allowed to bring their own cars and go outside the campus alone.

Through observations, because of the absence of the kitchen, multiple cooking operations were observed within the pantry and some in bedrooms where basically it is not allowed to cook. Moreover, due to the absence of the study halls, the students were observed studying in the prayer rooms of multiple buildings, and in whole buildings, there are tables and chairs brought from the lounge space and put in the prayer room for studying as shown in following sample of three prayer rooms in three different buildings (Fig. 38).

Figure 38: Studying in prayer rooms of multiple buildings of NC hostel

Through interviews, when the students were asked about what kind of facilities they are missing in their hostel, 53% of the total responses were facilities related to the basic functional spaces. Further, the common mentioned missing basic functional spaces supported the kitchen and the study hall as recognized missing facilities through the design analysis and observations. Moreover, although there is a lounge space (combining a living space and a pantry) in each floor, the students mentioned a separated living space as one of the common missing facilities (Fig. 39).

Figure 39: Results of interviewees' responses to missing basic functional spaces

B. *Availability of aspects of everyday life of hostel community*

The design achieved large availability of aspects of everyday life of hostel community. Through design analysis, it had been found that there are variety of aspects of everyday life of hostel community; however, limited of them are available within NC hostel (Fig. 40).

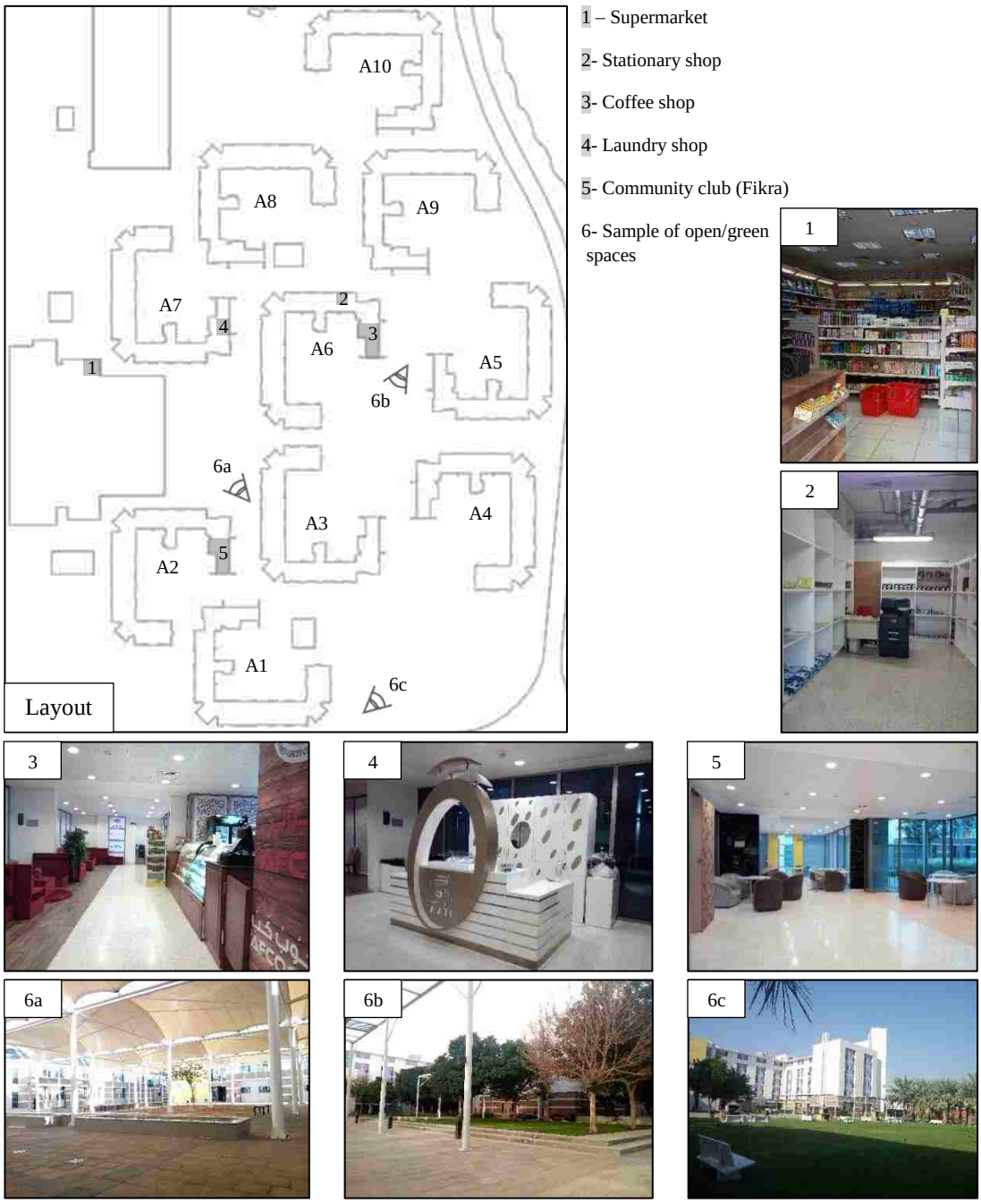


Figure 40: Available aspects of everyday life of hostel community within NC hostel

On the other hand, there are much more various facilities that are located nearby the hostel within the campus to be used by both female hostel students and all other university female students and staff (Fig. 41).

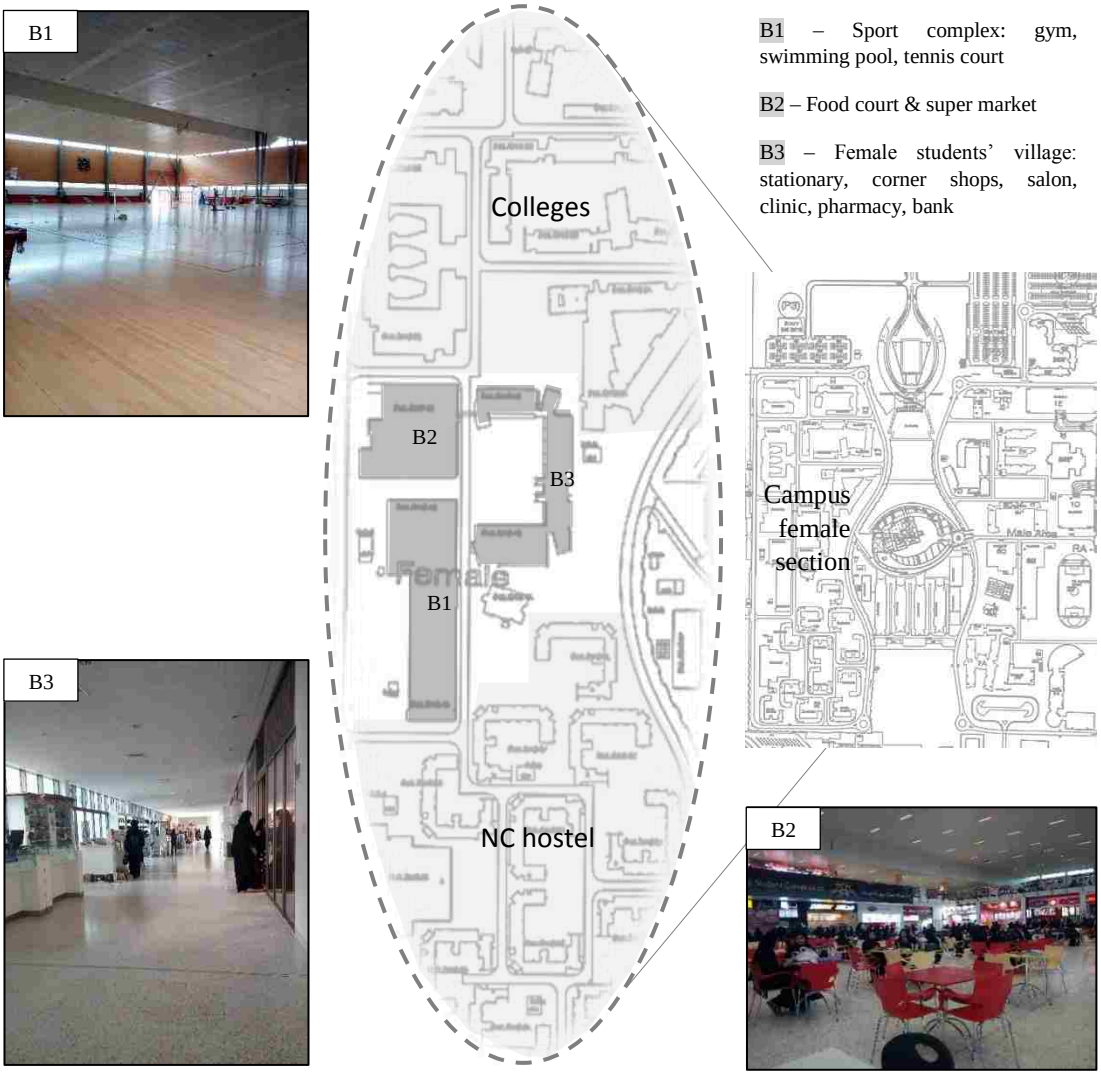


Figure 41: Available aspects of everyday life of hostel community within university campus

The interviews supported the results of the design analysis as hostel students were largely satisfied with the available aspects of everyday life in their campus although they are limited within their hostel. 26% of the total responses on the question of missing facilities were related to facilities of everyday life of hostel community. Although, no obvious emphasis on certain missing facility was found,

there was a preference for having various shops including food, beverages, clothes… etc. to be located within the hostel (Fig 42).

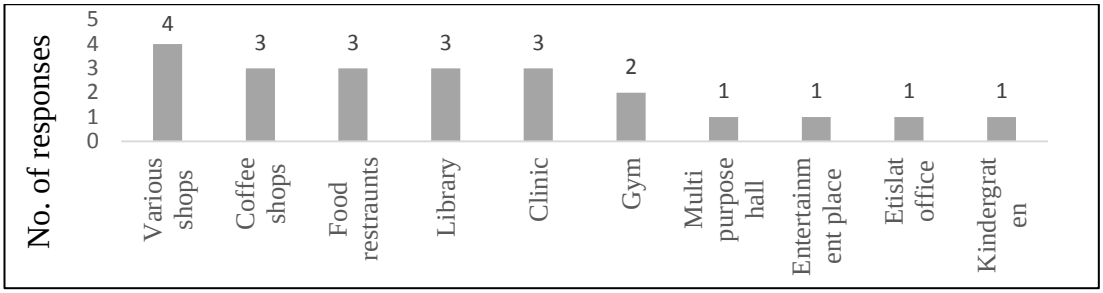


Figure 42: Results of interviewees' responses to missing aspects of everyday life of hostel community

C. Availability of specific facilities in respond to students' cultural preferences

The design achieved complete availability of this type of facilities. Through design analysis, it had been found that the design program took into consideration the students of the hostel as a Muslim community, and therefore an emphasis on praying space is found (Fig 43). In addition to the availability of one big mosque as separate building called 4A (Fig. 44), there is a prayer room in the ground floor of each of the ten residential buildings (Fig. 43 & 45).

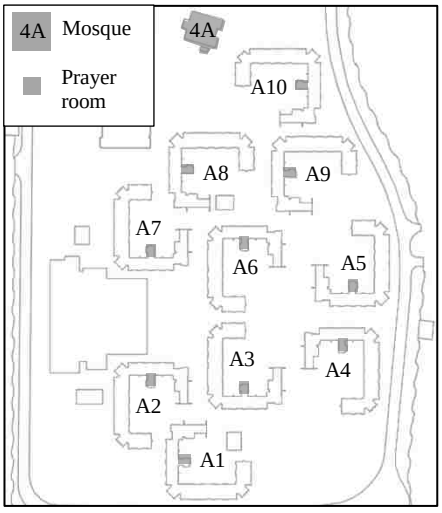


Figure 43: Availability of Praying spaces in NC hostel

Figure 44: Female mosque (building 4A)

Figure 45: Typical prayer space in each of the ten residential buildings of NC hostel

No other widely known facilities related to students' cultural preferences can be considered as missing within the NC hostel. The interviews supported this result due to zero response to missing facilitates related to students' cultural preferences.

D. Availability of suitable facilities for students with disabilities

The design achieved partial availability of suitable facilities and services for disabled students. Through design analysis, no additional specific facilities for students with disabilities had been found in the hostel; however, there are 38 out of the 2470 total bedrooms had been designed little differently to be utilized by students with disabilities. For students with mobile disability and/or require escorts, there are 30-bedroom units distributed in the ten residential buildings; three-bedroom units allocated in the 2nd, 3rd, and 4th floors of each building. Each of these units is supported with handrails and has two bedrooms for the student and her escort and shared bathroom in between. Each of the two bedroom has an area of 12.8 m^2 which is little bigger than the normal bedroom (10.7 m^2) and the bathroom has an area of 4.8 m^2 which is little smaller than the normal bathroom (6.3 m^2) (Fig. 46).

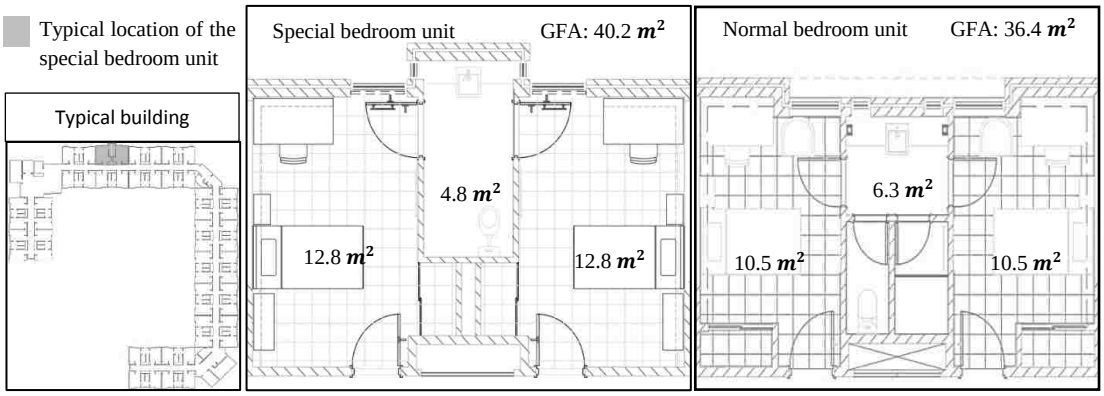


Figure 46: Comparison between typical normal bedroom unit and special one for students with disabilities

The remaining eight bedrooms are for students with visual weakness; these bedrooms are located in the ground floor of building A6, and they are similar to any normal bedroom except a ceiling light is added (Fig. 47 & 48).

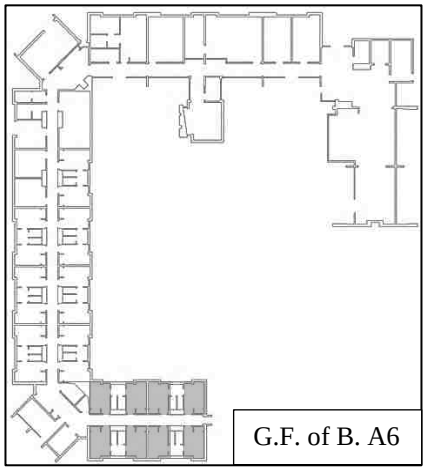


Figure 47: Location of bedrooms with ceiling light

Figure 48: Comparison between typical normal bedroom unit and special one for students with visual weakness

What had been found through the design analysis shows a partial achievement for this variable especially because this hostel is designed to be suggested for the students with disabilities due to its location within the campus. The interviews supported the results of the design analysis as there was dissatisfaction with the specially designed bedroom units in the upper floors and satisfaction with the overall

available facilities in the hostel. Among the eight students of two types of disabilities, six cases of visual disability and two cases of motor disability, one student from each type of disability was interviewed. Both students were not using the specially designed bedroom units, as the motor disabled student was not satisfied with the location of the bedroom in the upper floors, and the visually disabled student did not find the special bedrooms distinguished than any other normal one. On the other hand, both students are seeing the overall available types of facilities in the hostel are partially sufficient for their needs without mentioning any need for extra facility related to their disabilities to be available.

E. *Need for a balcony*

The design poorly satisfied the students with the need for a balcony. While the design analysis showed a complete absence for the balcony in all the spaces of the hostel, the interviews showed a highly need for having balconies. Within the bedroom space, there was high agreement to have a balcony by the most majority of the interviewees; 53.3% of the interviewees completely agreed, and 33.4% were largely and partially agreed evenly. In addition to the bedroom, most of the interviewees preferred having balconies in other places of the hostel with high emphasis on the lounges particularly (Fig 49).

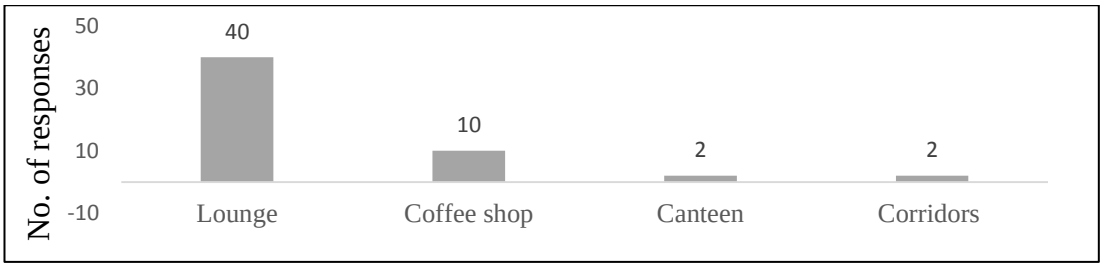


Figure 49: Results of interviewees' responses to other preferred places with balcony

5.1.2 Quality of provided facilities and services

This indicator was investigated through its three main variables: '*Suitability of areas'*, '*Suitability of spatial organization (zoning)*', and '*Level of modernity'*.

A. *Suitability of areas*

This variable is achieved partially. Through observations, some spaces were observed clearly tight. The supermarket, with around 15 m^2, was experienced very narrow. Additionally, the bedroom, with 10.5 m^2, seems small for rearranging furniture, and what emphasized its narrowness is that in multiple buildings the refrigerators of students were observed allocated in the corridors instead of their own bedrooms or within tight space in the bedroom (Fig. 50).

Figure 50: Allocation of Students' refrigerators

These observations were emphasized through interviews' results, when the residents were asked about the suitability of the areas, most of them found the areas somehow suitable. 38.3% of the interviewees said it is partially suitable, and 25% said it is largely suitable. Moreover, the interviewees mentioned the areas of the supermarket and the bedroom as the least suitable followed by the bathroom (Fig. 51).

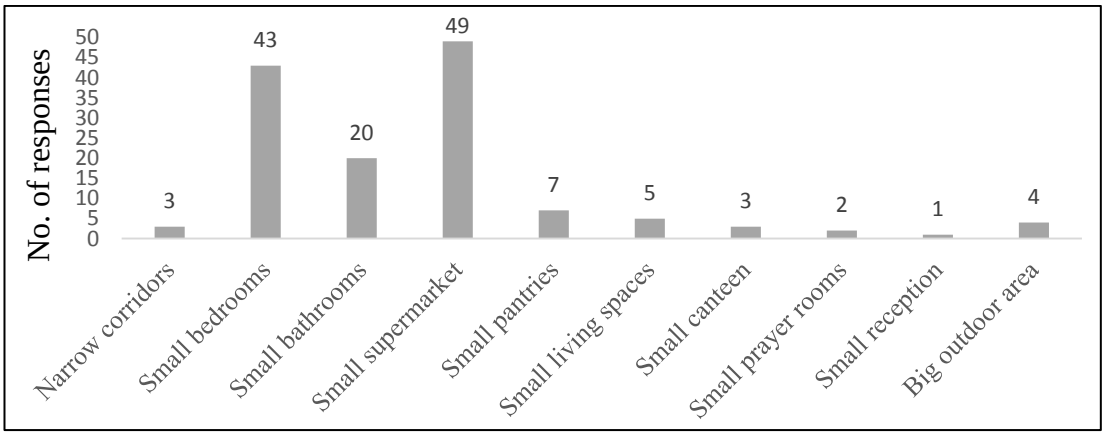


Figure 51: Results of interviewees' responses to spaces with unsuitable areas

B. *Suitability of spatial organization (zoning)*

The suitability of the zoning is achieved largely in the design. Through design analysis, the facilities seem grouped in a rational way as a distribution, shown in Appendix 2. However, this distribution has some issues with the accessibility which will be discussed later in a separate principle.

The interviews supported this result as most of the interviewees showed high satisfaction with the zoning of the facilities. 33.3% of the interviewees found the distribution of the facilities largely suitable, and 31.6% found it partially suitable. Except the issues of accessibility, there were other issues are highlighted by the interviewees regarding the zoning, but they are not emphasized. An example of these issues is having the lounge space as open space not isolated from the bedroom corridors and having the bathroom with direct connection to the bedroom.

C. *Availability of Modern amenities*

The design largely achieved this variable. The interviews showed large satisfaction of the residents with the level of modernity in the hostel. 55% of the interviewees were largely satisfied with the modernity in their hostel, and 30% were completely satisfied.

After concluding the results of all variables in terms of their achievement, the first indicator of 'Availability of needed facilities and services' was found partially achieved, and the second indicator of 'Quality of available facilities and services' was found largely achieved. Sequentially, the main principle was found largely achieved in the design (Fig. 52).

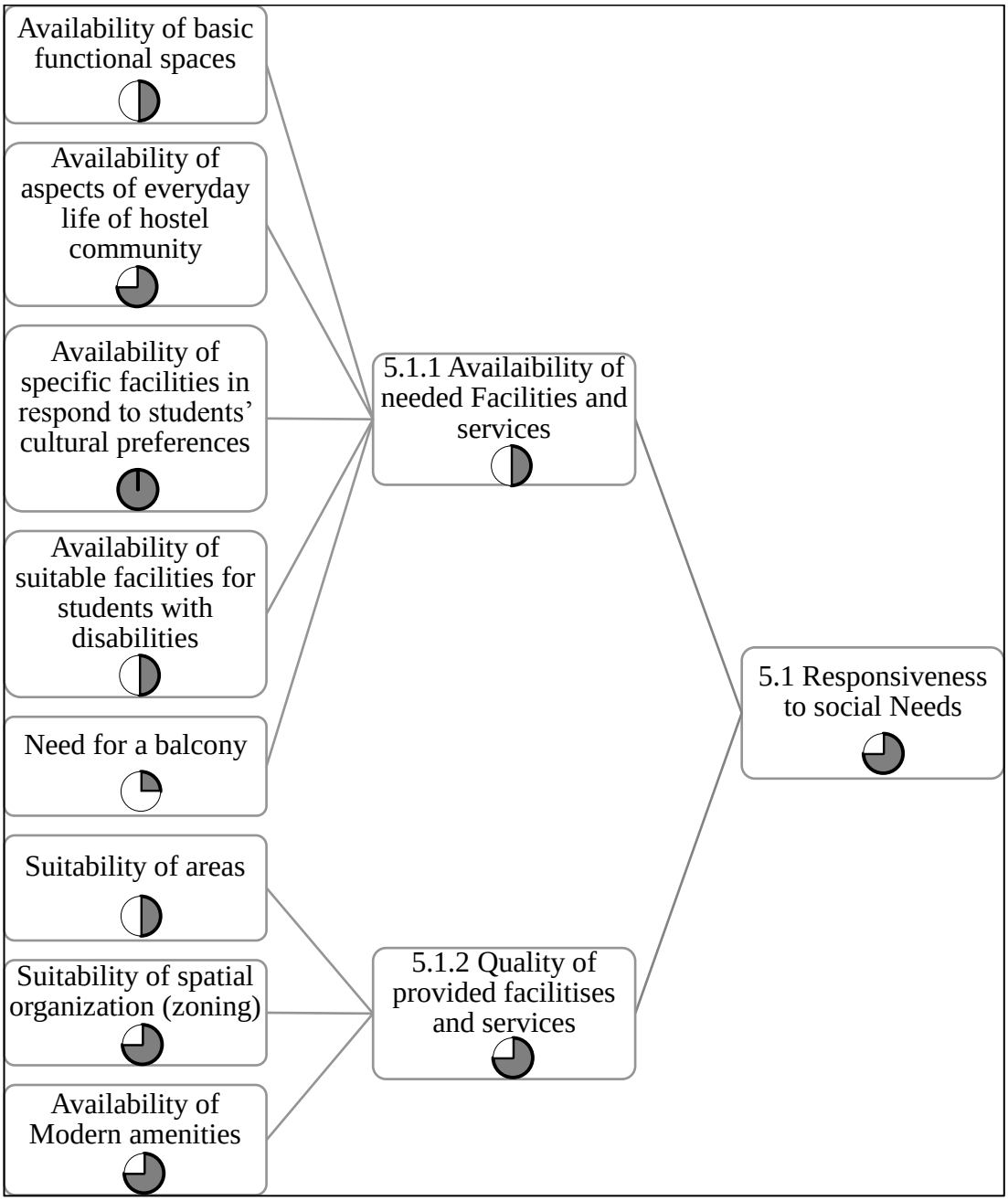


Figure 52: Concluded evaluation of first principle (Responsiveness to social needs)

5.2 Flexibility

There are three indicators for this principle: 'Capability of different social uses', 'Capability of different physical arrangement', and 'Capability of future expansion'.

5.2.1 Capability of different social uses

There are two design variables can achieve this indicator: '*Design allowance for changing space areas* 'and '*Design allowance for changing space functions'*.

A. Design allowance for changing space areas

The design achieved the flexibility in areas poorly. Generally, the areas were designed with no option for changing, making them bigger or smaller. Through observations, the lounge space in the ground floor (Fig. 53 & 54) and in each upper floor (Fig. 55 & 56) found as spaces with capability to be flexible in their areas.

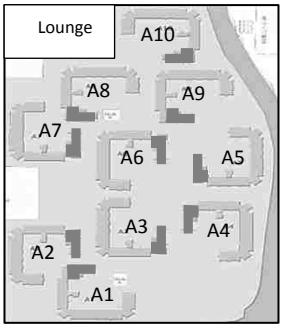


Figure 53: Location of typical G.F. lounge

Figure 54: G.F. lounges of multiple buildings

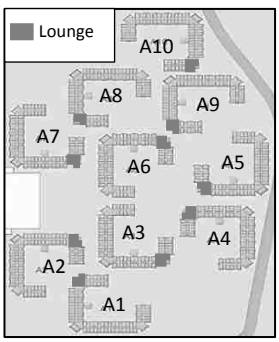


Figure 55: Location of typical upper floor lounge

Figure 56: Upper floor lounges of multiple buildings

The important part that is wanted to be investigated is whether there is an actual need by the students to have a flexible area in a certain place. Through interviews, half of the interviewees did not see a need for having a flexible area for any space; however, there was preference by 21.7% of the interviewees to have the lounge spaces of the upper floors with flexible areas (Fig. 57).

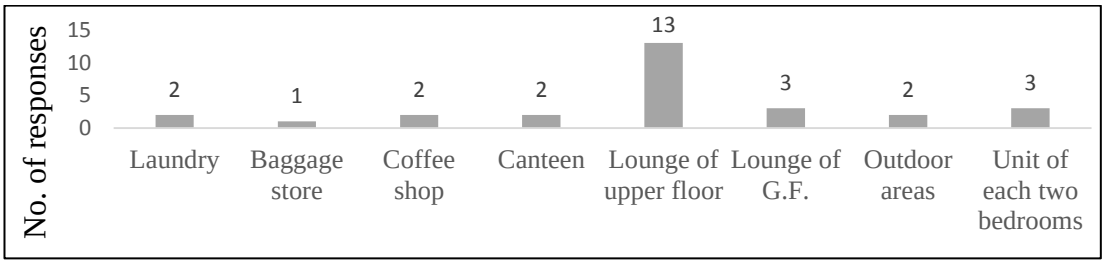


Figure 57: Results of interviewees' responses to preferred spaces with flexible areas

B. <u>Design allowance for changing space functions</u>

The unchangeable areas of spaces were found designed with partial flexibility for their functions. This variable can be seen through designing areas to serve more than one function and furnishing to separate different functional spaces. Through observations, the lounges were observed as flexible spaces in their functions. The flexibility of the ground lounges can be seen through various facilities that were hosted in them (Fig. 58). In building A2, the ground lounge is designed differently to host a club called Fika (Fig. 59), in building A6, it is also designed differently to host a coffee shop (Fig. 60), and in building A7 it hosts a laundry shop (Fig. 61).

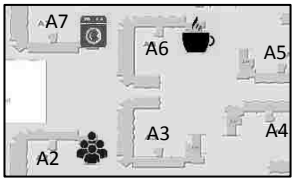


Figure 58: Facilities in ground lounges

Figure 59: Fikra club

Figure 60: Coffee shop

Figure 61: Laundry shop

Also, as mentioned and shown previously in the principle of 'Responsiveness to social needs', the prayer room can be considered as flexible space due to its capability to be study room. Although the space is completely clear from any furniture, the students were observed bringing tables and chairs to use them there. Moreover, the typical lounges of the upper floors were designed as flexible spaces by using the fixed furniture, counter, to separate the pantry from the living space.

The capability of the observed spaces to serve more than one function was supported by the interviews' results. The lounge was the most common space used for multiple functions by the interviewees followed by bedroom, outdoor area, and prayer room consequentially (Fig. 62). However, the degrees of allowance of these common mentioned spaces to serve different functions varied. The lounge and the bedroom were found partially allowing the students to have different functions, while the outdoor and prayer room were largely allowing (Fig. 63).

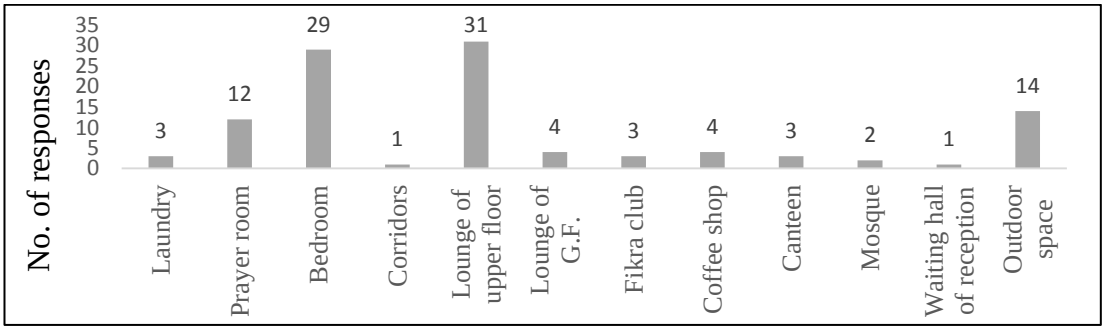


Figure 62: Results of interviewees' responses to used places for multiple functions

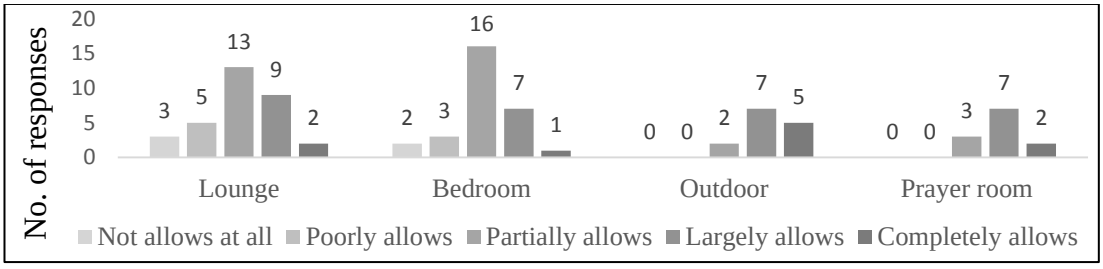


Figure 63: Results of interviewees' responses to spaces' allowance for changing function

5.2.2 Capability of different physical arrangement

This second indicator was investigated through three variables: '*Providing unit modules for flexible spatial organization'*, '*Use of folding furniture for flexible configurations*, and '*Use of movable furniture'*.

A. *Providing unit modules for flexible spatial organization*

The deign did not achieve this variable due to the complete absence of any type of module units that can create flexibility in the spatial organization of any space.

B. *Use of folding furniture for flexible configurations*

The deign did not achieve this variable also because no folding furniture at all had been used in the design to allow for any different types of configurations.

C. *Use of movable furniture*

This variable that is achieved largely in the design, is the only variable that allows for different physical arrangement. Through design analysis, the type of the used furniture was found varied between some fixed and other more movable. The fixed furniture can be seen limitedly in bedroom through fixed cupboard and lighting shelf, lounge space through fixed counter of the pantry, and in ground floor corridor in front of prayer room through fixed wooden benches and shoes shelf (Fig. 64).

Figure 64: Fixed shelf and benches in front of the prayer room

Although, the fixed furniture is limited in their availability, but their existing in the crucial spaces like bedroom make them appear as an obstacle for having different physical arrangement (Fig. 65 & 66).

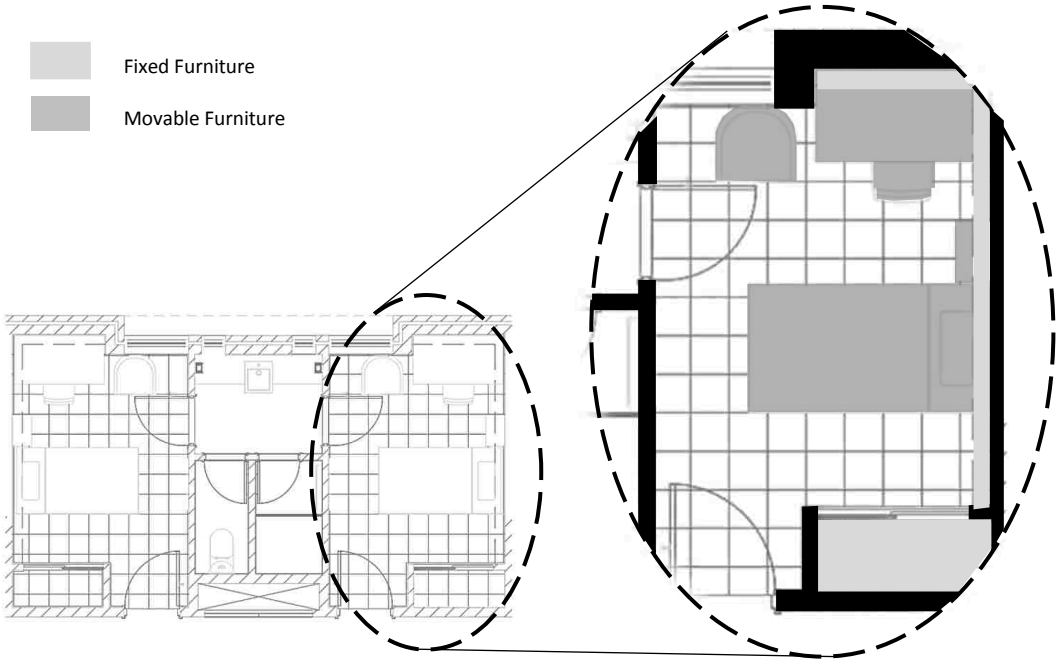


Figure 65: Types of used furniture in bedroom

Figure 66: Common two different types of furniture arrangements in bedrooms

Through interviews, all the interviewees agreed on their need to rearrange the furniture in their bedrooms, and half of them showed this need in the lounge of upper floors (Fig. 67). Moreover, the interviewees were less satisfying with their capability for rearranging the furniture in their bedrooms than the lounges (Fig. 68).

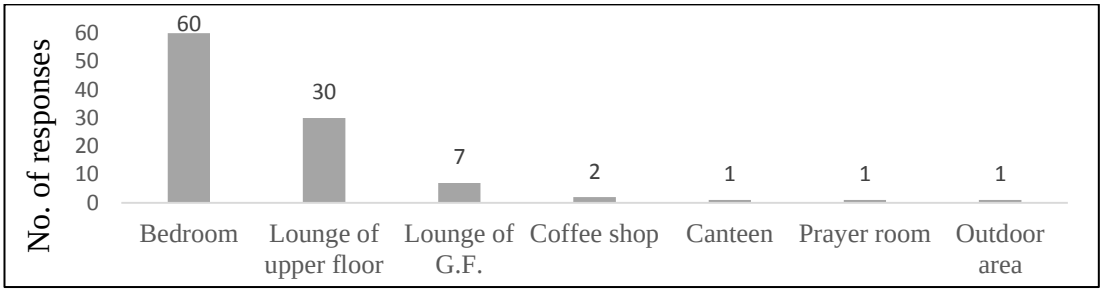


Figure 67: Results of interviewees' responses to places of need to rearrange furniture

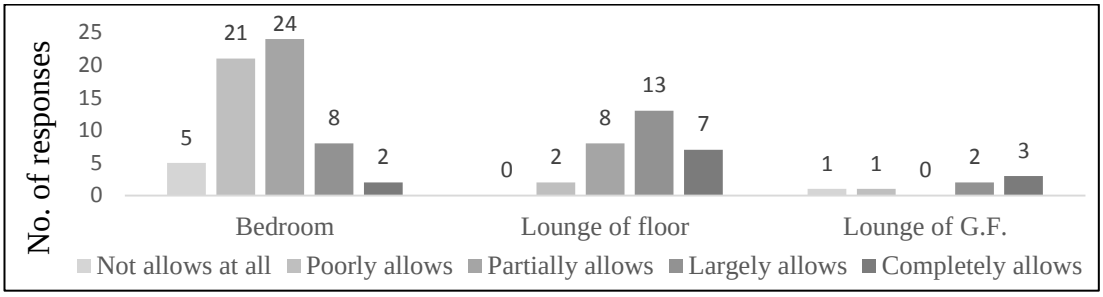


Figure 68: Results of interviewees' responses to space allowance to rearrange furniture

The main reason behind the interviewees' low satisfaction with the degree of allowance of their bedroom to be rearranged differently was the small area (Fig. 69).

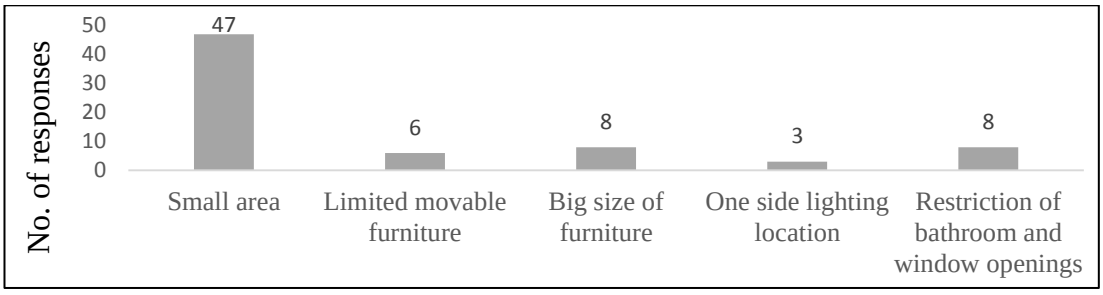


Figure 69: Results of interviewees' responses to reason of their low satisfaction with bedroom allowance for rearranging furniture

5.2.3 Capability of future expansion

This indicator can be achieved through two main variables: '*Placing the building on its site with a room for an addition'* and '*Giving the building a shape that is easily extended'*.

A. Placing the building on its site to leave a room for an addition

The variable is achieved completely in the design. As mentioned before, this hostel is located within the university campus site, and it was found in the master plan of the hostel that there is a room left intentionally for two additional buildings, each with capacity of 247 bedrooms, to be built on the same site of the hostel according to the future needs (Fig. 70).

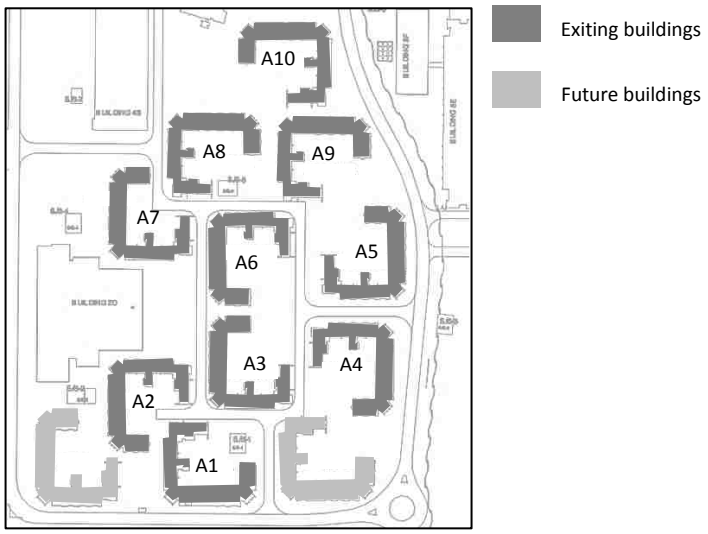


Figure 70: Future buildings in the master plan of NC hostel

B. Giving the building a shape that is easily extended

This variable is achieved in the design largely. Through observations and drawing analysis, it had been found that the form of the residential buildings allows for two capable types of expansion: horizontal and vertical. Horizontally, the buildings have uncompleted rectangle shapes which allow for a horizontal

expansion from one end where there is a room in the site (Fig. 71). Seven buildings are capable for this type of expansion from the bedroom corridor. For example, other four bedrooms can be added in each of the five floors of this part of each of the mentioned buildings to result with additional 20 bedrooms in each building and sequentially additional 140 bedrooms in the hostel.

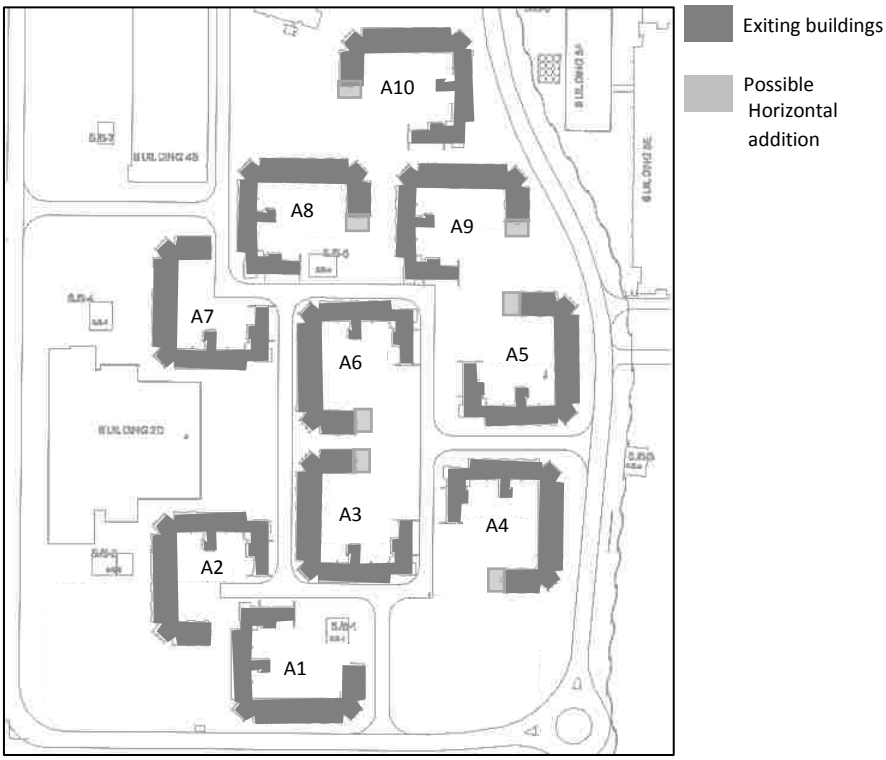


Figure 71: Possible horizontal expansion in master plan of NC hostel

Vertically, the vertical expansion by adding more floors above the six existing floors is expected to be restricted due to Al Ain municipality rules. However, there is a room for additional three partial floors to be added above the second floor in each of the ten buildings which will keep the buildings with their maximum six floors (Fig. 72 & 73).

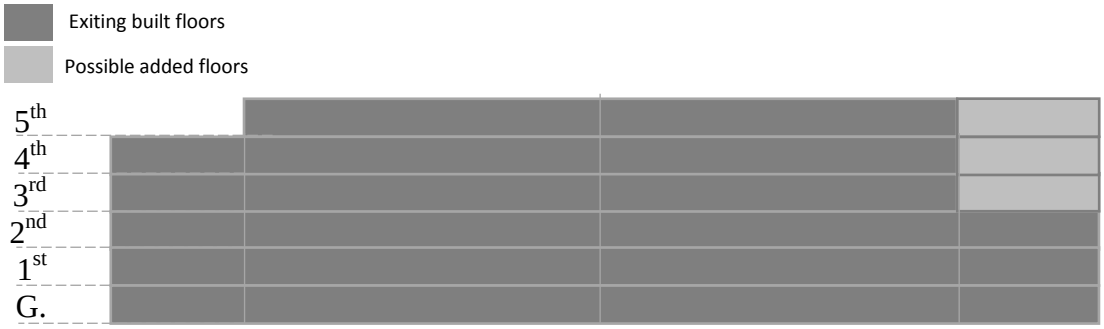


Figure 72: Illustration diagram for the vertical height of typical residential building

Figure 73: Diagram for the location of additional floors in 3D view

This vertical addition can result with more eight bedrooms in each of the third, fourth, and fifth floors of each building which means more 24 bedrooms in each building and sequentially more 240 bedrooms in the entire hostel. However, this expansion not be achieved without restrict condition of having structure can carry the loads of the additional three floors.

After concluding the results of all variables in terms of their achievements, both first indicator of 'Capability of different social uses' and second indicator of 'Capability of different physical arrangements' are found poorly achieved, while the

third indicator of 'Capability of future expansion' is found largely achieved. Sequentially, the principle is partially achieved in the design (Fig. 74).

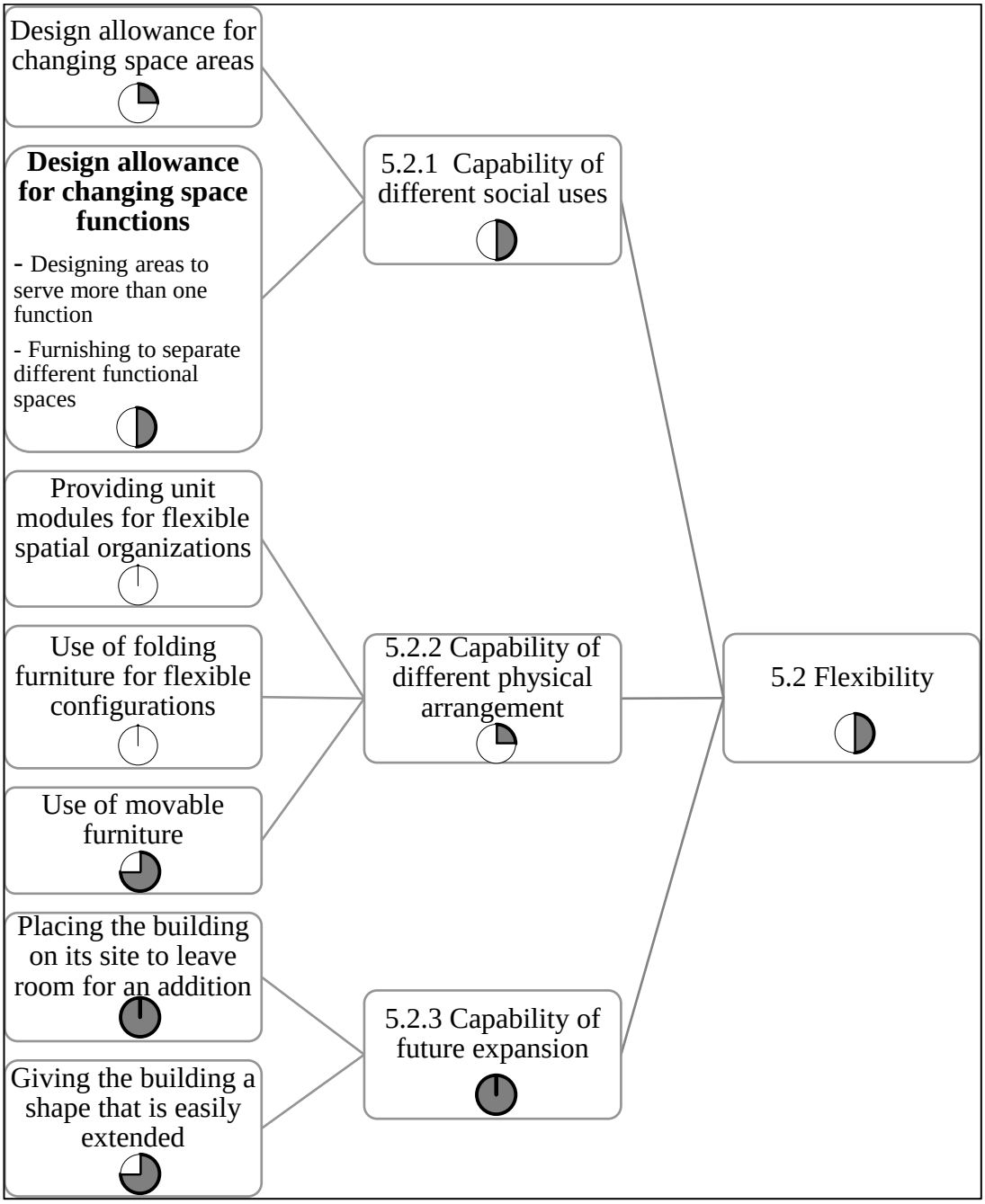


Figure 74: Concluded evaluation of second principle (Flexibility)

5.3 Social Interaction

There is one main indicator for this principle which is the students' intentional and unintentional interaction through seeing friends in the hostel frequently, chatting with/borrowing from/knowing by name 'some/most/all' of the residents, and/or agreeing that this is a place where residents look out for each other or are friendly.

5.3.1 Students' intentional and unintentional interaction

There are three found design variables can contribute in designing student hostel encouraging the interaction among its students: '*Configuration of spaces'*, '*Quality of individual common spaces'*, and '*Use of communal services'*.

A. *Configuration of spaces*

This variable is achieved poorly in the design. There are multiple elements related to this variable can affect its possibility for supporting students' interaction such as distribution of common and individual spaces, hierarchy and spatial depth, geometry of spaces, and spaces with minimal fragmentation.

While the individual spaces are mainly the bedrooms which are located indoor, there are various common spaces are distributed indoor and within the layout of the hostel as discussed previously in principle of responsiveness to social needs. To evaluate the distribution of those common spaces and their relevant spatial depth in relation to their encouragement for interaction, spaces syntax was used. Through, depth map x software, an axial analysis was run within the layout and indoor floors, to measure the connectivity, number of immediate neighbours that are directly connected to each space and integration, average depth of a space to all other spaces (Fig. 75 & 76).

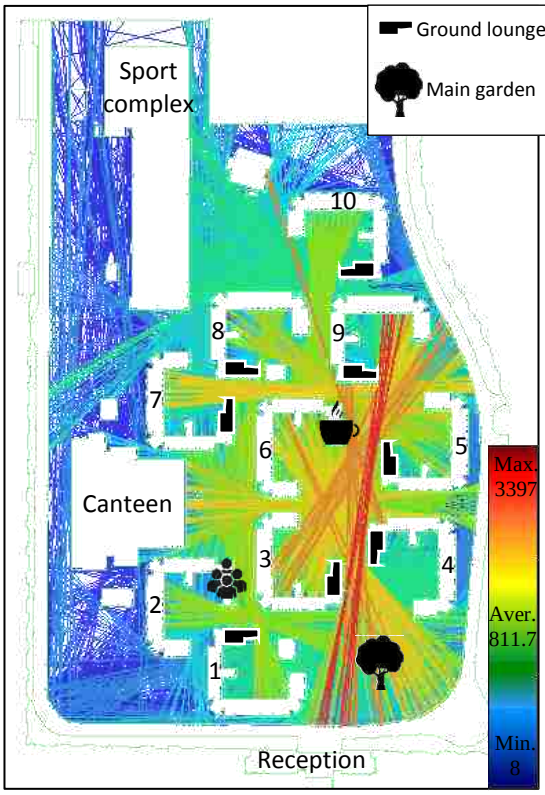


Figure 75: Connectivity in layout

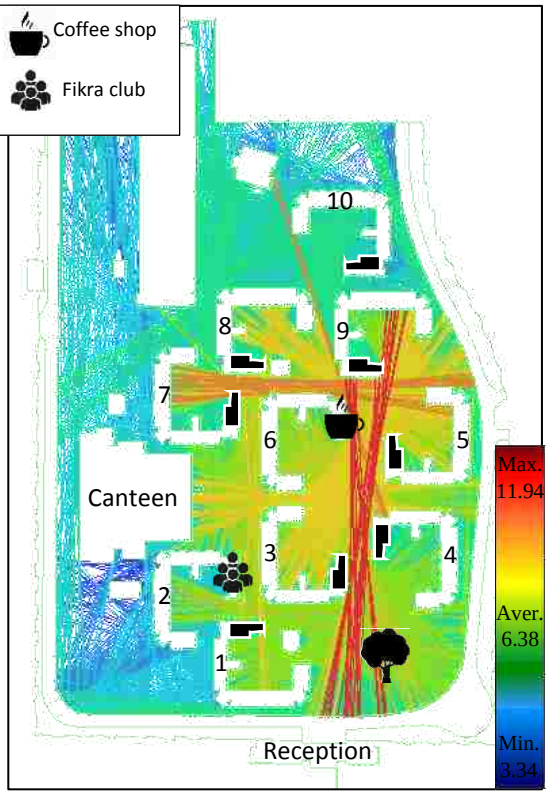


Figure 76: Integration in layout

The distribution of facilities within the layout of the hostel appeared having some problems to support the interaction. Although the outdoor common spaces among the residential buildings of the hostel are mostly within the range from maximum to average connectivity, but the range itself is too big. In other words, the areas among half of the buildings (A3, A5, A6, A7, & A9) are connected around three times the areas among the remaining half of the buildings (A1, A2, A4, A8, & A10). This unequal concentration of connectivity and integration within the outdoor space makes it unequally supporting for the unintentionally interaction. The interviews supported this result; less than half of the interviewees (41.7%) mentioned the outdoor as a space of unintentional interaction with other students.

In addition to the outdoor common spaces, the ground indoor lounges of buildings with higher connectivity and also integration (less depth) are more

encouraging for interaction than those of buildings with less connectivity and integration (more depth). For that reason, the coffee shop, in ground lounge of building A6, is common space with high possibility of interaction while Fikra club, in ground lounge of building A2, is common space with low possibility for interaction. Through interviews, 8.3% of the interviewees mentioned the coffee shop as a place of unintentional interaction with other students while 0% mentioned Fikra club.

The anticipated interaction in the areas with higher connectivity and integration within outdoor using space syntax, was largely supported through participant observations for their intentional interaction in outdoor space. Two observations were conducted to see the outdoor common spaces of students use. First observation was on 17th Sep. 2017 (Sunday from 4 pm to 7 pm). The date represents the middle of first month in fall semester after residents were settled and the study was not in its summit, and the hours represents afternoon time before the sunset when most students were coming back to hostel from their lectures (Fig. 77). Second observation was on 10th Oct. 2017 (Tuesday from 6 pm to 8:30 pm). The date represents the fall semester before the midterms when the weather started to be cooler encouraging going out more especially after sunset (Fig. 78). Through these observations, it was found that, the observed students who were outside, were representing around 1.5% of the total hostel population, and those students were generally found within outdoor areas ranging from maximum to average connectivity and integration.

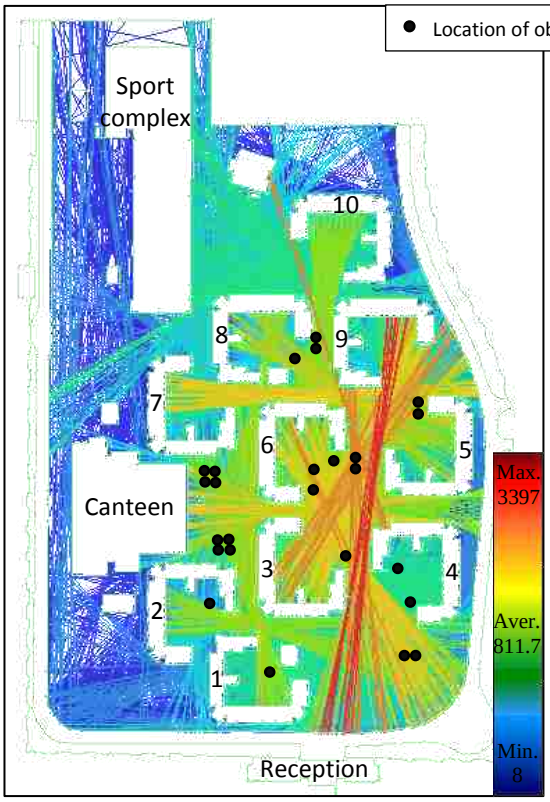


Figure 77: 1st Observation for common outdoor spaces of students use within connectivity measure of the layout

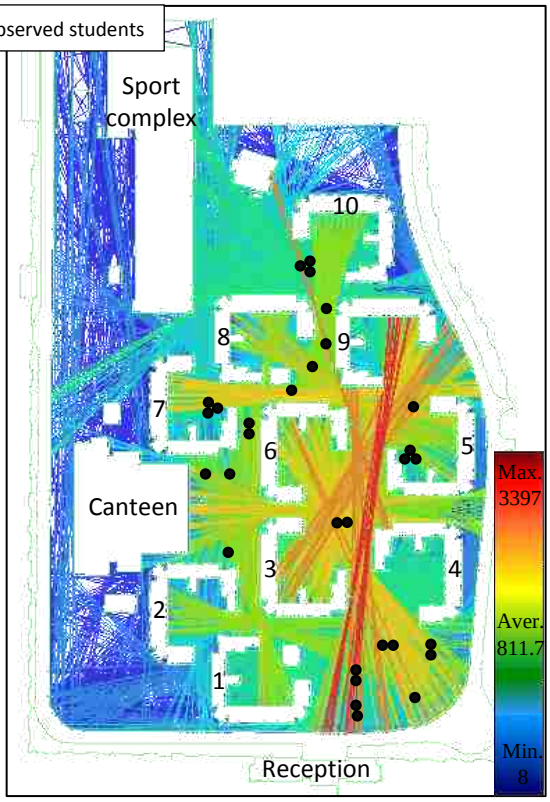


Figure 78: 2nd Observation for common outdoor spaces of students use within connectivity measure of the layout

Besides the observations, the interviews emphasized more the unequal concentration of connectivity and integration in the outdoor. 80% of the interviewees mentioned the outdoor as space where they agree to meet with their friends. All of them were asked to allocate the exact places where they usually meet; they allocated the places where they sit by plots and drew lines of their common ways of wandering (Fig. 79). The plots were concentrated in the main garden, area between A3 and A6 buildings, and area in front of the canteen. Those areas are within high connectivity and integration as shown previously in space syntax.

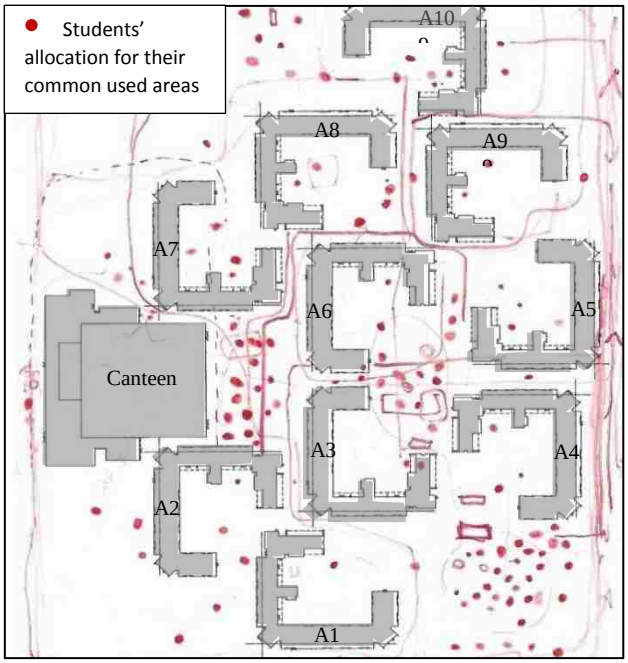


Figure 79: Results of interviewees' responses to common outdoor spaces of their use

Within indoor spaces, the axial analysis showed that the most connected and integrated areas are the long corridors. This result is supported through interviews, 23% of the interviewees mentioned the corridors as space of unintentional interaction. On the other hand, the lounge space, is among the least connected and integrated spaces (Fig. 80 & 81).

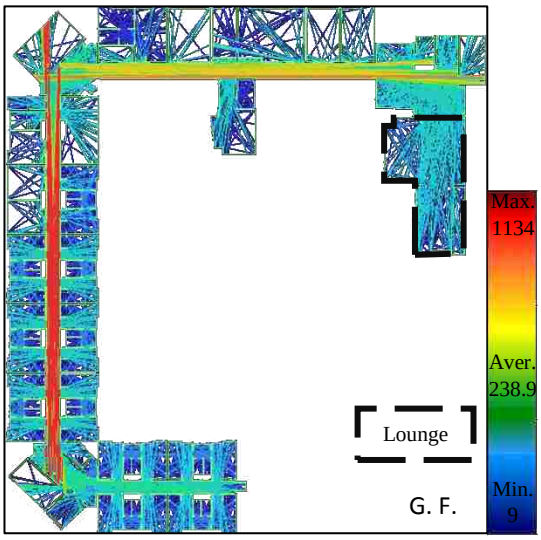


Figure 80: Connectivity in typical floor plans

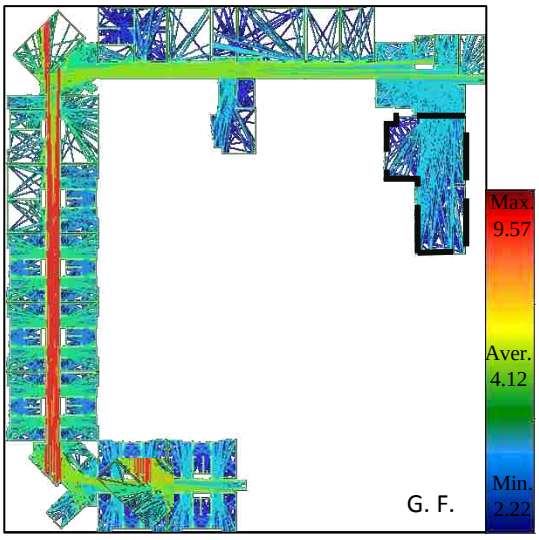
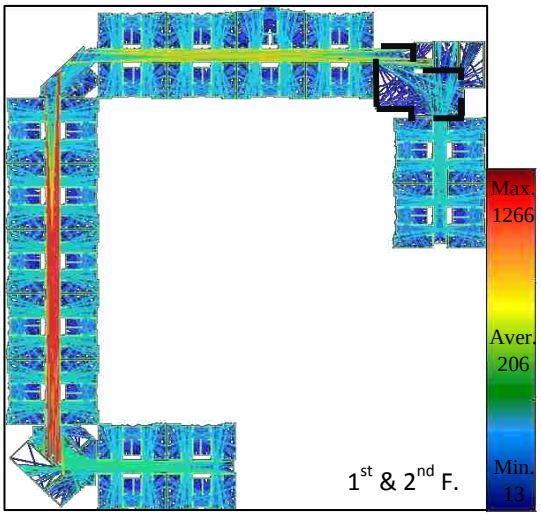
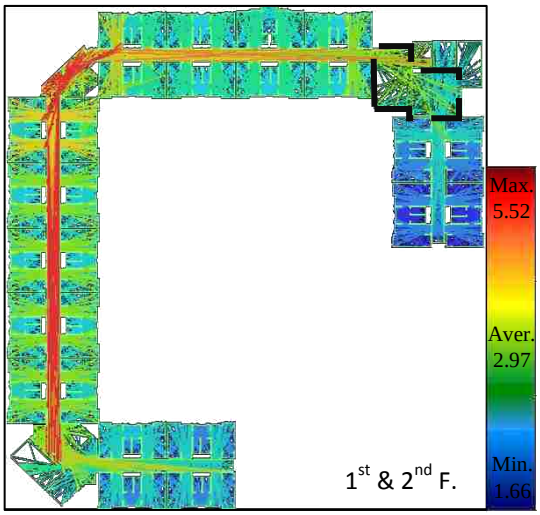
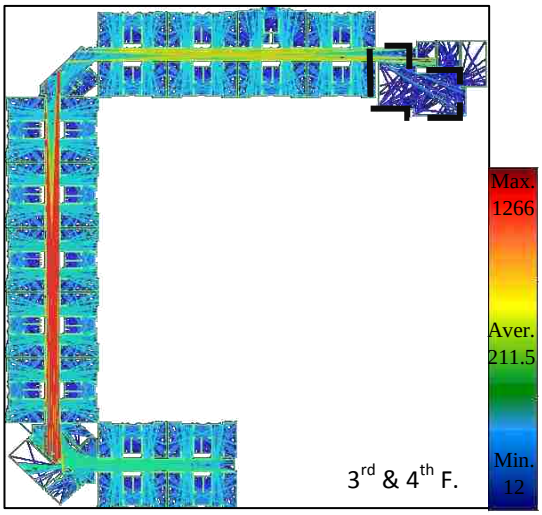
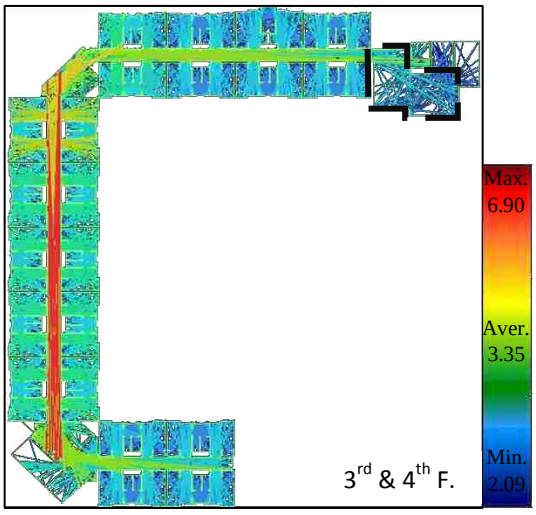


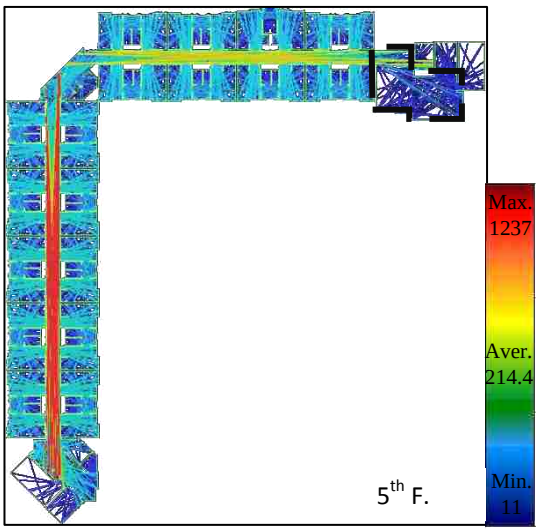
Figure 81: Integration in typical floor plans











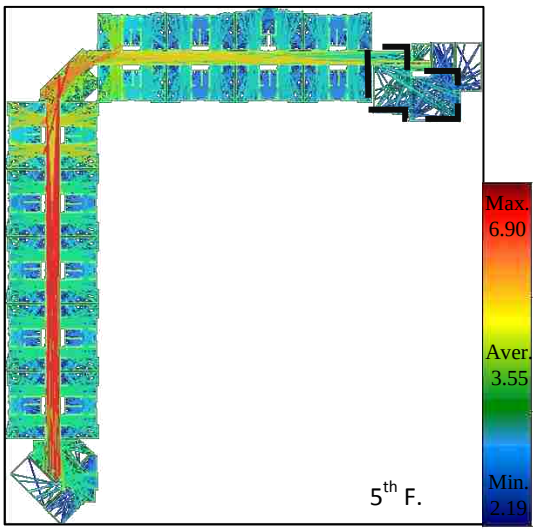


Figure 80: Connectivity in typical floor plans (Continued)

Figure 81: Integration in typical floor plans (Continued)

Although the indoor lounges are located within least connected and integrated spaces, the design analysis showed that the geometry of those lounges support the interaction. Those lounges have simple semi rectangular geometry and is not highly fragmented, which make the lounge appears as one open space easily allowing for unintentional interaction (Fig. 82). Through interviews, 38.3 % of the interviewees mentioned the lounges as spaces where they see other residents unintentionally.

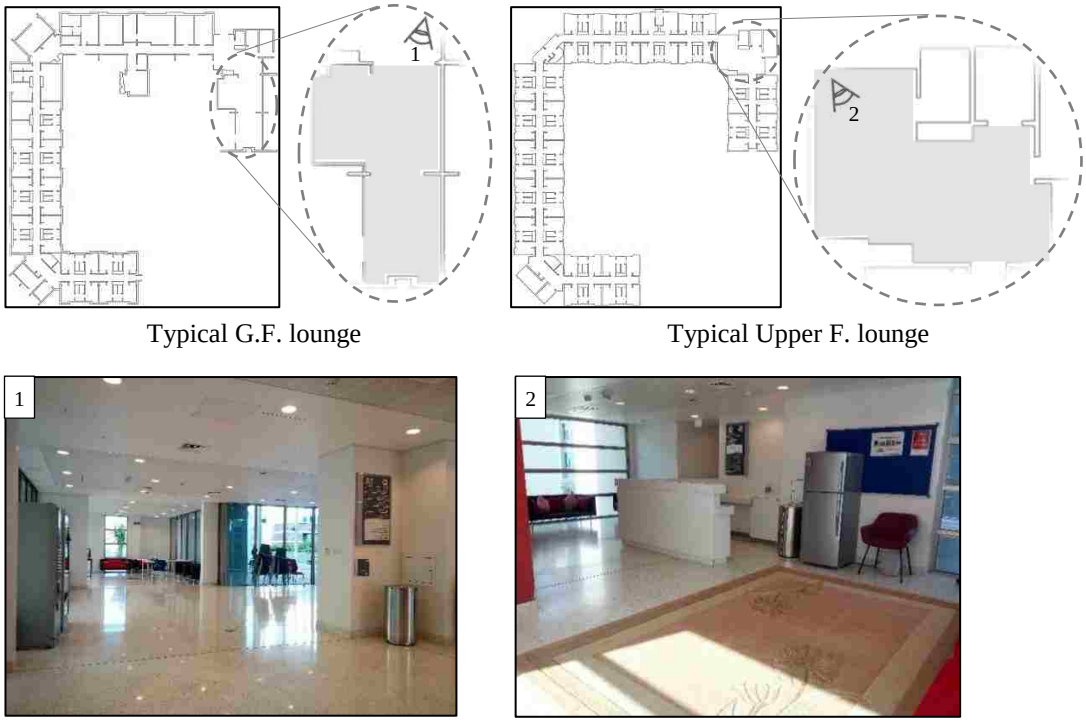


Figure 82: Supporting geometry of lounge spaces to unintentional students' interaction

B. *Quality of individual common spaces*

This variable is achieved partially in the design. There are multiple elements related to the quality of the common spaces such as selected colours, finishing materials, appropriate lighting, and translucent walls. Through observations, it was found that, in each building, the red and black colours were found as a touch to the dominant white colour in multiple common spaces such as the lounges, corridors, and lift zones (Fig. 83).

Figure 83: Colour theme in multiple common spaces of NC hostel

The colours of those common spaces and their smooth finishing materials were appropriately lit under yellowish cosy lighting especially in lounges where clear glass facades are found making the space environment clearly seen from outside (Fig. 84). Although the mentioned design quality of the lounges contributes positively to the interaction, 55% of the interviwees chose the lounges as space of gathering with their friends, the open space design of those lounges and the bad sound insulation made 76.7% of the interviwees chose the bedroom as space of gathering with their friends to have more privacy.

Figure 84: Glass facades of common spaces in NC hostel

In addition to those typical lounges, two of ground lounges are specially designed to create certain communal facility, as mentioned in previously discussed

principles, which are the coffee shop and Fikra club. In the coffee shop, the same theme of the mentioned colours is used with non-transparent glass facades, while in Fikra club a new theme of colours is used with a different furniture design (Fig. 85). Both were mentined by the interviwees as chosen spaces for gathering with frineds, 16.7% mentioned the coffee shop and 3% mentioend Fikra club.

Figure 85: Specially designed lounges

Besides the indoor spaces, through design analysis, it was found that there is an outdoor common space for each individual building designed to be within its layout (Fig. 86). This outdoor space was observed with poor design quality due to unused water pools which is an important landscape feature within this space and the absence of the lighting at night which makes the space undesirable for gathering.

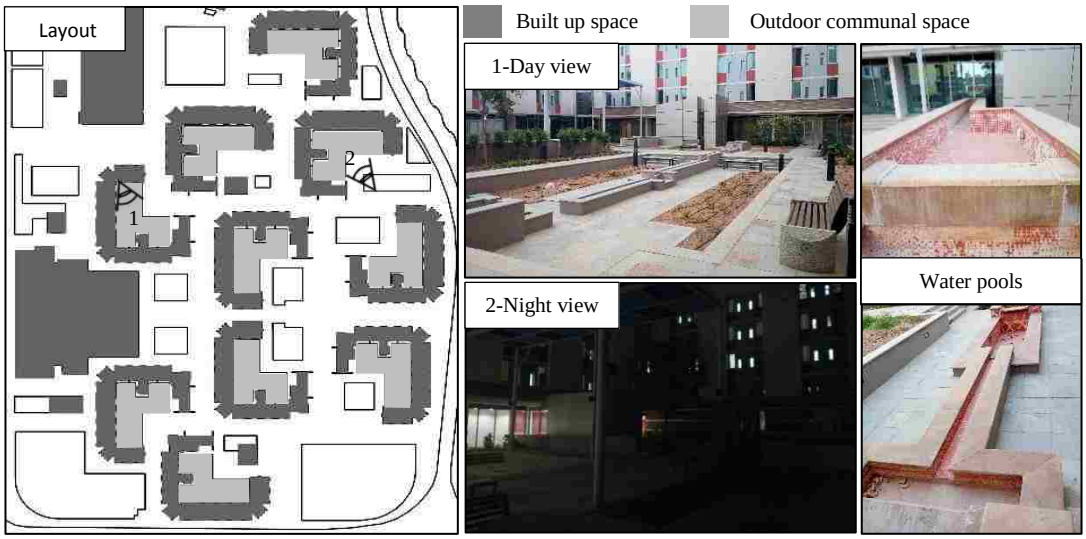


Figure 86: Outdoor common space for each individual building

Through both previously mentioned participant observations and interviewees allocation of their preferred spaces for gathering with friends, this outdoor space of each individual building was the least used space. 45% of the interviewees mentioned the reasons behind not using this space, and the most mentioned reason was the darkness (Fig. 87).

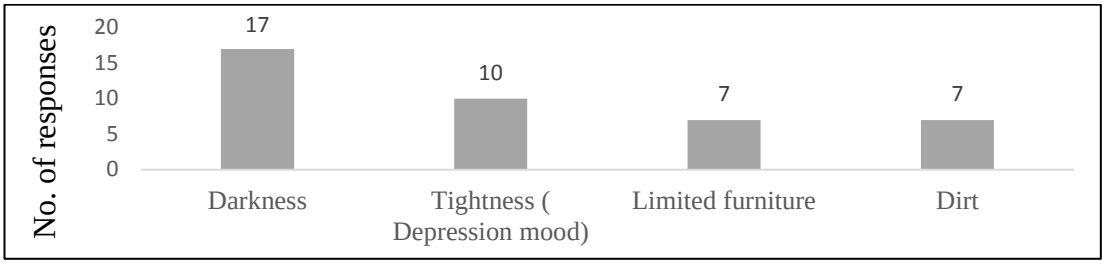


Figure 87: Results of interviewees' responses to reason of not using outdoor communal space

C. Use of communal services

This variable is achieved completely in the design. Through design analysis, it was found that there are multiple communal services serving the students at various levels and as a result encouraging the unintentional interaction. At the level of floors, there is the lounge with its pantry serving the students of each floor. At the level of the building, in the ground floor, there are the laundry room, prayer room, and administration office for daily signing serving the students of each building. At the level of the hostel, there is the canteen serving the students of the entire hostel with three meals per day. The effective interaction that those communal services provide was supported through interviews. The communal services represented 63.6% of the total responses about places of unintentional interaction and 37.6% of total responses about places of intentional interaction (Fig. 88).

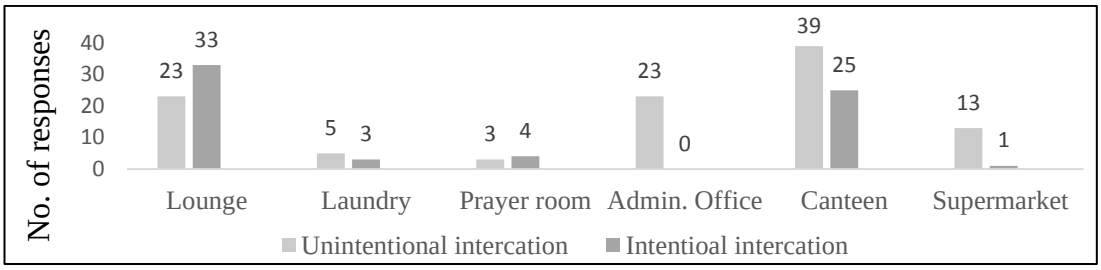


Figure 88: Results of interviewees' responses to communal services of interaction

The degrees of achievement of the three discussed variables concluded that the Indicator of 'Interaction' is partially achieved, and this partial achievement is compatible with the most common interviewees' response to the general question of the degree of social interaction with other students in the hostel (Fig. 89).

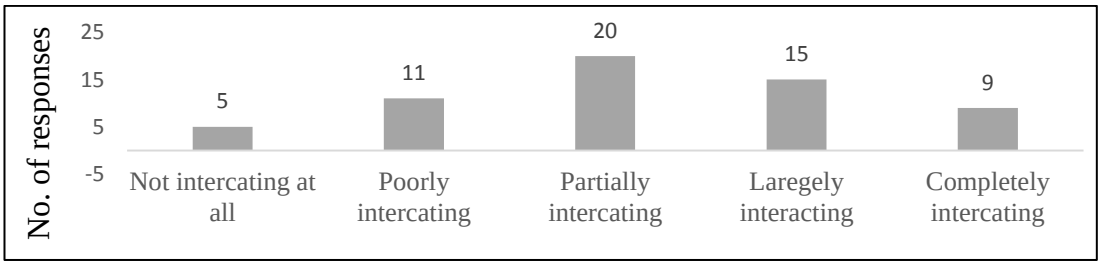


Figure 89: Results of interviewees' responses to degree of interaction with each other

Sequentially, the main principle is partially achieved (Fig. 90).

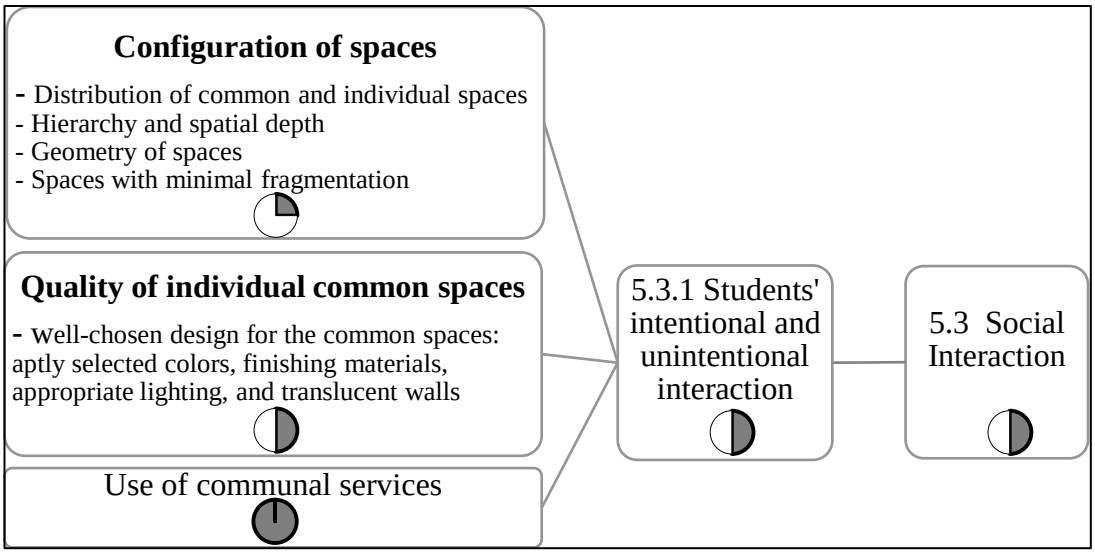


Figure 90: Concluded evaluation of third principle (Social Interaction)

5.4 Social Integration

There are two main indicators for this principle: 'Participating in activities within hostel community' and 'Active living'.

5.4.1 Participating in activities within hostel community

The activities that students can engage with include and not limited to sport/exercise, adult education, community/residents' groups, support groups, religious or other groups. There are three main found design variables affecting the students' participation with the activities happening in their hostel: '*Mixing land uses and increasing density'*, *'Legibility'*, and *'Quality of activity places'*.

A. *Mixing land uses and increasing density*

This variable is achieved partially in the design. It is measured using space syntax through connectivity and integration levels that shown in the previous principle of 'Social Interaction'. As more connected and integrated the spaces are, as higher mixing of uses and density they contain. The activities occurring within higher connectivity and integration areas will have higher possibility for students' participation. Through interviews, when the interviewees were asked about the places of the activities which they participated in, six places were mentioned, and the main garden was the most common answer (Fig. 91).

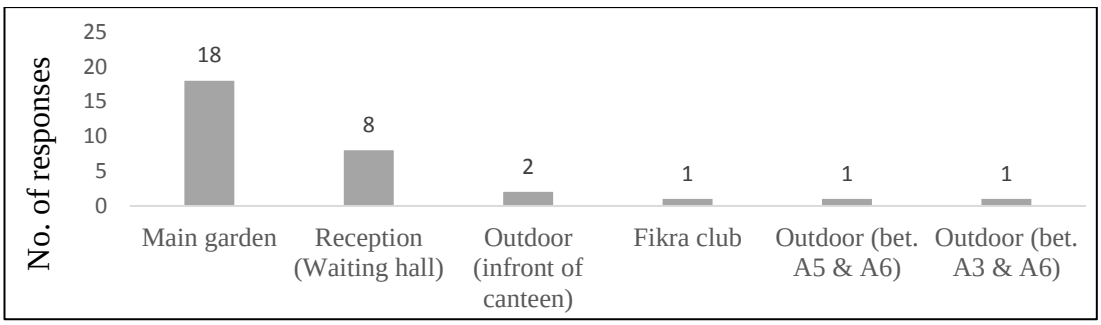


Figure 91: Results of interviewees' responses to places of participated activities

The aforementioned places were analysed through space syntax, by allocating them within the connectivity and integration measures of the layout (Fig. 92 & 93).

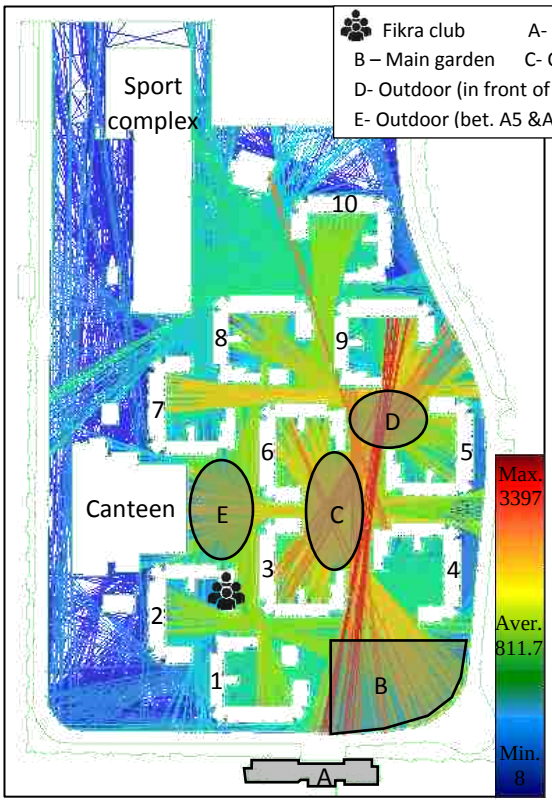


Figure 92: Location of places of participated activities within connectivity measure

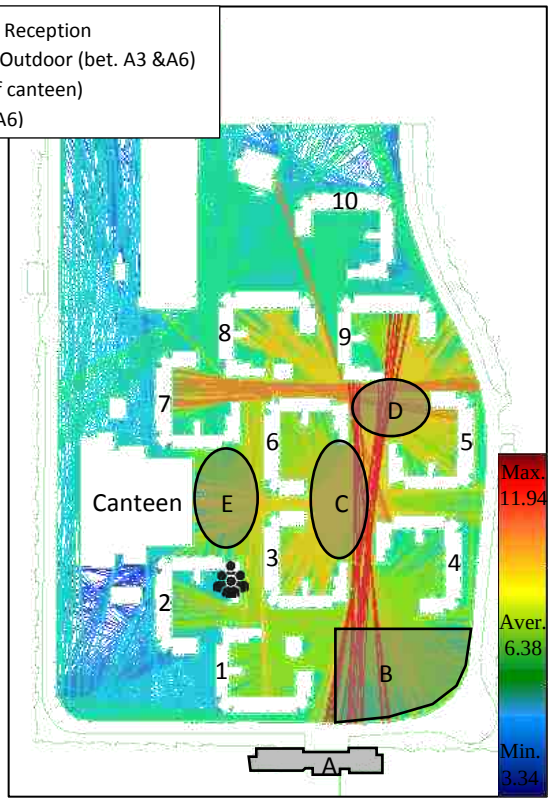


Figure 93: Location of places of participated activities within integration measure

Through this allocation, it had been found that four of these places were successfully chosen for the activities: the reception (A), the main garden (B), the outdoor area between A3 and A6 (C), the and outdoor area between A5 and A6 (D) as they are located within highly connected and integrated places, highly mixing of land uses and high density. On the other hand, Fikra club, and the outdoor area in front of the canteen (E) were within less connected and integrated places, low mixing of land uses and low density, which make them unsuccessful chosen places for activities. Through interviews, the allocation of those activity places was found affecting 45% of the interviewees to be engaged in the activities of those places.

B. *Legibility*

This variable is achieved partially in the design. There are multiple elements related to the legibility in the design that encourage the students' participation in activities in some places more than others. Those elements include wayfinding, identity of space through sufficient landmarks, easily recognizable buildings, and welcoming outdoors.

Back to the aforementioned places of activates, the way finding and the recognition of activity places within high connectivity and integration areas is much easier than those within less connectivity and integration. For that, the reception (A), the main garden (B), the outdoor area between A3 and A6 (C), the and outdoor area between A5 and A6 (D) are more easily finding places and more recognized than Fikra club, and the outdoor area in front of the canteen (E).

Besides, although all the outdoor areas have the same landscape features, the mentioned outdoor places of activities have little additional design features that make them have identities when an activity is mentioned in each of them (Fig. 94).

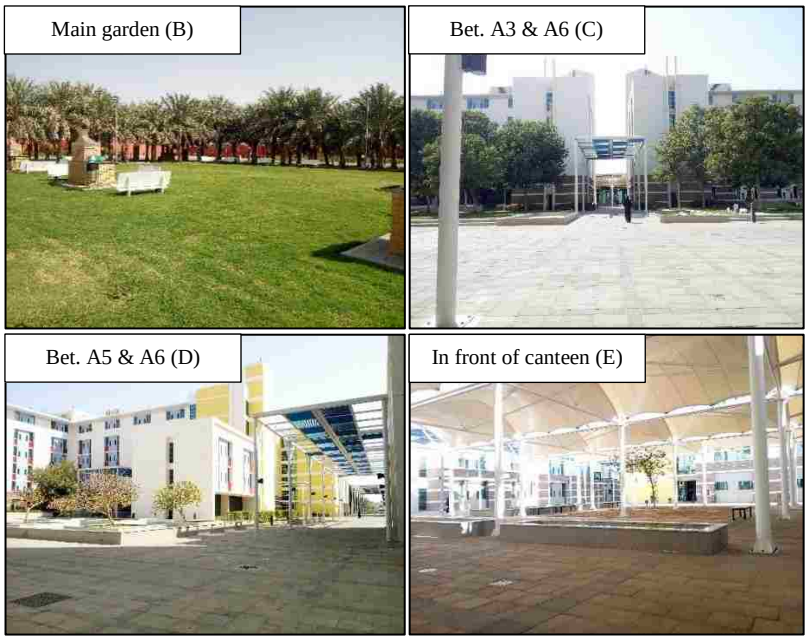


Figure 94: Outdoor places of activities

The main garden (B) is distinguished with its biggest greenery area in the hostel and the barbeque structures. The outdoor area between A3 and A6 (C) has two stepped gardens completing each other. The outdoor area between A5 and A6 (D) has the biggest fountain pool with six trees inside. Finally, the outdoor area in front of the canteen (E) is distinguished with its different canopies.

Through interviews, 83.3% of the interviewees mentioned the impact of those elements on their decision of participating in certain activities of certain places on scale of three measures: weakly affect, somehow affect, and strongly affect (Fig. 95).

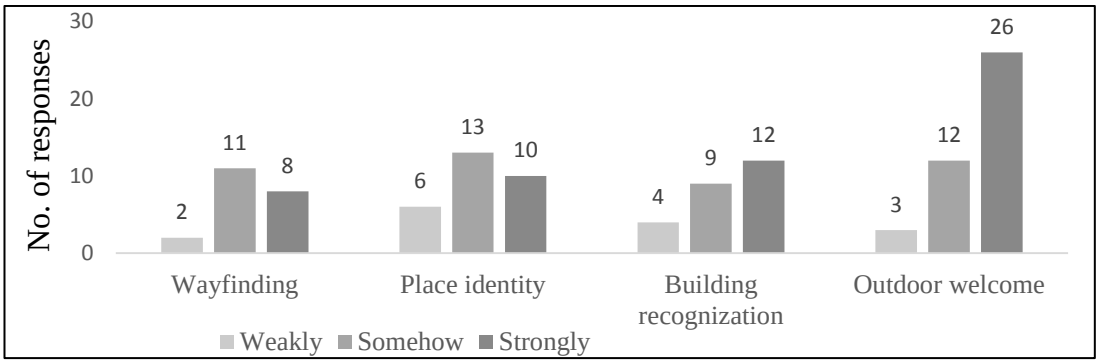


Figure 95: Results of interviewees' responses to degree of effect of legibility elements

As shown in Fig. 95, the way finding for the places of activities within the hostel was the least affecting element on students' decisions for participating which shows an overall large achievement for this element in the design. On the other hand, the degree of making the outdoor of activity place welcoming was the highest affecting element on students' decisions for participating which shows an overall critical achievement for this element in the places of activities. The place identity and its recognition were both moderately affecting students' decisions for participating which shows an overall partial achievement for these two elements in the places of activities.

C. Quality of activity places

This variable is achieved poorly in the design. This variable is related to the design quality features of places that are hosting the activities and the sufficiency of available facilities in them. Through interviews, 65% of the interviewees mentioned that the quality of the activity places affects their decision of participation.

Again, looking back at the aforementioned places of activities in terms of their design quality, they appeared having variances. Through observations, the two indoor mentioned places for the activities, Fikra club and the reception (waiting hall), shown in Fig. 96, were found designed properly in terms of their selected colours, finishing materials, and lighting as discussed previously in principle of 'Social Interaction' second variable of '*Quality of individual spaces'*.

Figure 96: Indoor places of activities

In addition, in each of these two indoor spaces there are close bathroom and prayer room can be considered as supportive facilities during the activity time. However, the sizes of these two spaces are observed small for hosting activities for the whole hostel students. The waiting hall in the reception was observed several times at weekends crowded when a lot of students were gathering at the same time to

sign for their leaving and coming back. Fikra club is a typical ground lounge area of building A2 like any other ground lounges in the remaining buildings, so its capacity is limited for the population of one building only.

The impact of the size of the activity places on students' participation was emphasized through interviews. 30% of the interviewees mentioned other features related to the design quality of activity places affect their decision of participation, and the major mentioned feature was the size of the space.

The design quality of the outdoor places of activities seems similar and lacking certain features. The fountain pools that are occupying large space in the area between A5 and A6 (D) and the area in front of canteen (E) are empty and dirty at the same time which reduce from the quality of these spaces to attract students for the activities. Moreover, the area in front of canteen has a large sandy space instead of being greenery space (Fig. 97).

Figure 97: Examples of bad design quality for outdoor activity places

Although the lighting among the buildings is generally dim, the main garden is an appropriately lit space which make it is suitable for night activities (Fig. 98).

Figure 98: Lighting in the main garden

5.4.2 Active living

There is one main design variable affect the active living of students in their hostel which is '*Landscape features*'.

A. *Landscape features*

This variable is achieved partially. There are multiple design features in the landscape contribute in making the student having an active living, such as: comfortable furniture and benches to study outside, roofed and guarded places for ordinary meetings, suitable and calm meeting spaces, elimination of nonemergency preventives, and treed pathway between pedestrian and its edge.

Regarding the availability of comfortable furniture and benches to study outside, through observations, it had been found that the available furniture in the landscape are poorly suitable for studying. There are no tables available, and the fixed benches are not suitable for long time of stay (Fig 99).

Figure 99: Four common different styles of benches in the landscape

Style (A) and (B), which were observed in some areas with additional cushions that students bring (Fig. 100), are used widely among the buildings. However, style (C) is used in the main garden only, and (D) is used in front of the canteen only.

Figure 100: Added cushions to benches

The unsuitability of the available furniture in the landscape for studying was also observed through the movable furniture that students brought from the indoor lounges and placed them outside for studying (Fig. 101).

Figure 101: Moved furniture from indoor space to outdoor space for studying

The interviews supported the observed poor suitability of landscape furniture for studying as most interviewees were between not agreeing (32.8%) and partially agreeing (26.2%) with the suitability of the existing landscape furniture for studying.

Regarding the availability of roofed and guarded places for ordinary meetings, through observations, it was found that those kinds of places are available partially in the design. They are located limitedly within the garden of each individual building beside the ground lounge space (Fig. 102).

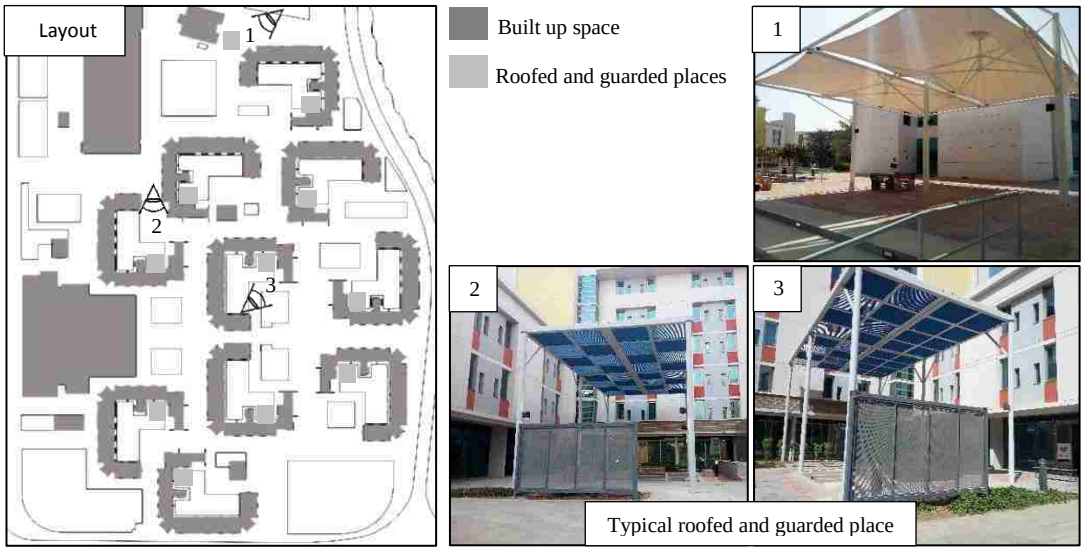


Figure 102: Roofed and guarded places for ordinary meetings

Eah of these typical places is roofed with shading device and guarded by the strcuture of the surrrounding buildng in addition to suplementary partion to provide more privacy for the space. Besides those typical places, there is one observed roofed place with two wooden benches in front of the mosque. The interviews supported the observed results about the roofed and guarded places for ordinary meetings as the majority of interviewees were either partially agree (24.6%) or largely agree (23%) with the availability of the roofed and guarded places for ordinary meetings.

Regarding the suitable and calm meeting spaces. Through participant observations that were shown before in principle of 'Social Interaction', the students were found gathering in different spaces within their landscape. The availability of such places for meetings was also found through interviews. The majority of the interviewees were either largely agree (31.1%) or completely agree (21.3%) with the availability of suitable and calm meeting spaces.

Regarding the elimination of nonemergency preventives, through observations, the outdoor areas were observed clear with minimal number of obstacles, and they are placed safely without obstructing the used open space (Fig. 103 & 104).

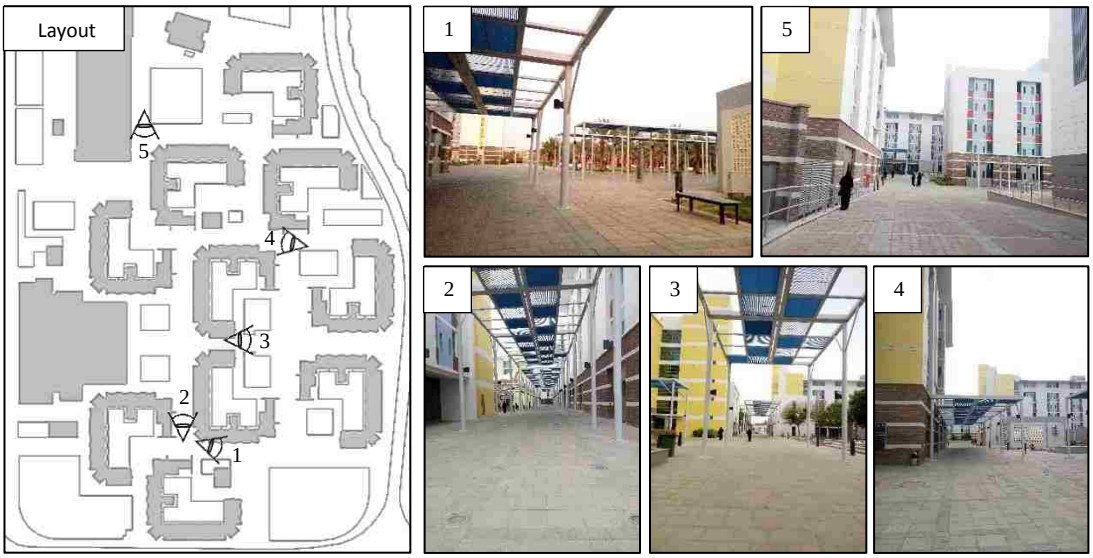


Figure 103: Views of the clear open spaces with minimal obstacles

Figure 104: Placement of the minimal landscape obstacles

The observed minimal number of obstacles in the landscape of the hostel was supported with the interviewees' responses. The majority of the interviewees were between largely agreeing (32.8%) and completely agreeing (39.3%) with the availability of least number of obstacles within their hostel landscape.

Regarding the treed pathway between pedestrian and its edge, particularly margin streets of hostel community, although the pedestrian pathways within the hostel, as shown in Fig. 116, were observed with no aligned trees, there are palm trees in some locations detaching the hostel from its surrounding main street (Fig. 105 & 106).

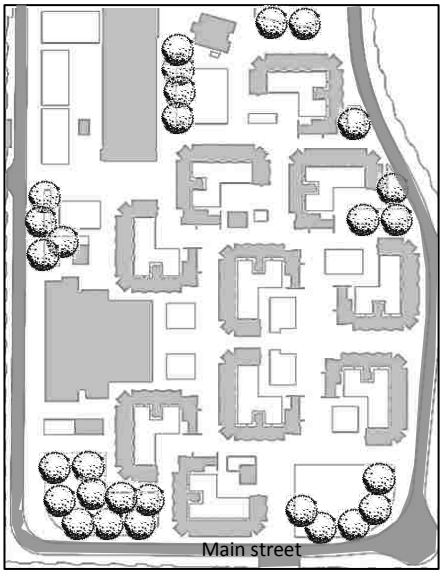


Figure 105: Location of trees surrounding the hostel

Figure 106: View towards the main garden showing the surrounding palm trees

Through interviews, most of the interviewees were between largely agreeing (24.6%) and completely agreeing (41%) with the availability of treed pathways.

In addition to the five discussed features of having an active living in the hostel, through interviews, one more feature was mentioned by 55.8% of the interviewees affecting their active living at night which is the suitability of lighting. They agreed on the availability of dim lighting in their landscape that affect their night active living badly (Fig. 107).

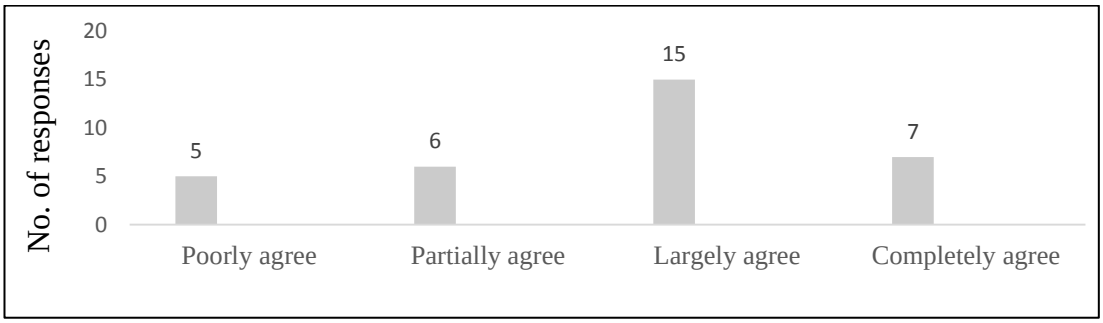


Figure 107: Results of interviewees' responses to degree of agreement with the dim lighting in the landscape

The degrees of achievement of the discuses variables for the indicator 'Participating in hostel activities' concluded a partial achievement for this indicator, and the degrees of achievement of the discuses variables for the indicator 'Active living' concluded a large achievement for this indicator. Sequentially, the main principle is largely achieved (Fig. 108).

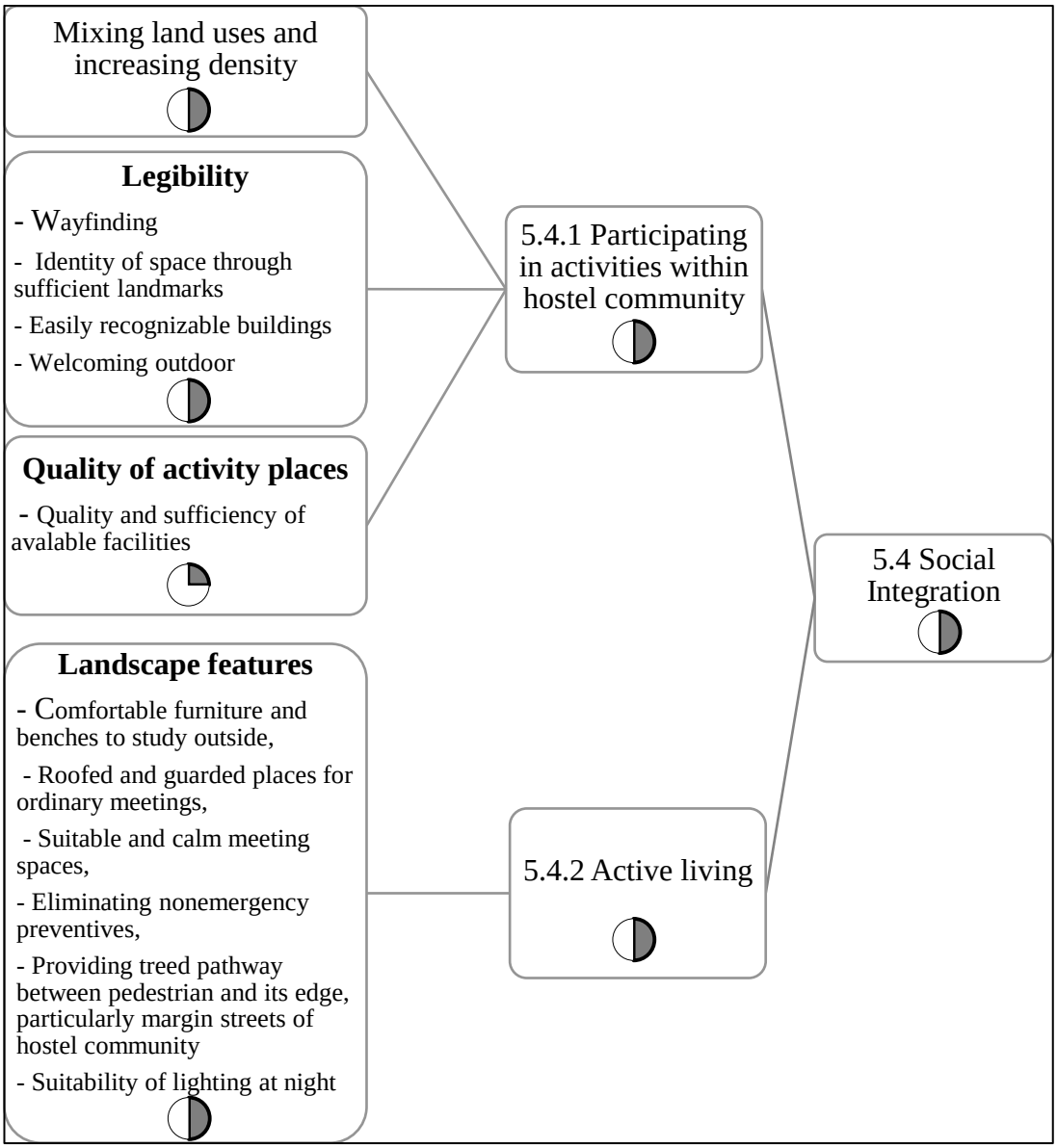


Figure 108: Concluded evaluation of fourth principle (Social Integration)

5.5 Accessibility

There are two main indicators for the achievement of this principle: 'Equitable access for everyday services and facilities' and 'Appropriate measures for handicapped'.

5.5.1 Equitable access for everyday services and facilities

There are three design variables contribute in the achievement of this indictor: *'Distribution of facilities', 'Floor layout', and 'Mode of access'.*

A. Distribution of facilities

This variable is achieved partially. Through design analysis, the distances within the layout among the residential buildings and distributed facilities were identified (in meters) to find out their variances and degree of equitability (Fig. 109).

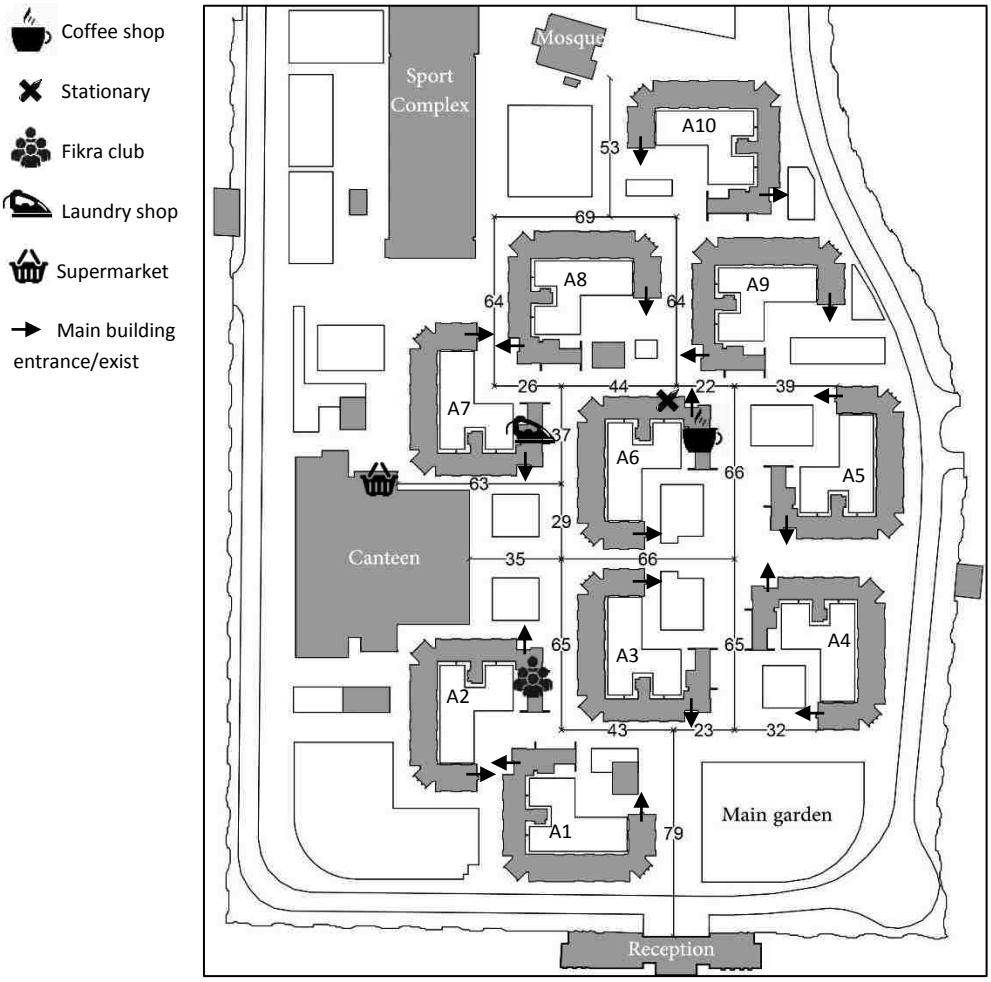


Figure 109: Distances among the different facilities within the layout

By looking at Fig.109, it can be seen that the distribution of all the buildings within the hostel makes the layout appear almost in a linear shape, reaching around 330 m from the mosque at the top till the reception at the end. This linearity creates unequitable access for the reception, main garden, mosque, and sport complex which are located at the far both ends of the layout shape. Moreover, the more daily used facilities, fikra club, coffee shop, stationary shop, laundry shop, canteen, and

supermarket are located mostly in the middle of the layout providing better equitable access from the nearby residential buildings; however, still the residential buildings at the far ends of the layout such as buildings A1 and A10 have farther access to those daily facilities. This result of the design analysis within the layout of the hostel are compile with the results of space syntax that were shown in principle of 'Social Interaction'. The highest connected and integrated areas (more accessible) were in the middle of the layout to the right, and by going to the ends and left side of the layout they started becoming less connected and more separated (less accessible).

The interviews supported more the above found results. Although the interviewees were largely satisfied with the overall distances in their hostel as spent time of walking; around 35% of them mentioned facilities with unsuitable location due to its far distance from their residential building location (Table 18).

Table 18: Results of interviewees responses to places of far distances

Location within hostel layout	Type of far facilities	No. of responses	No. of responses in relation to residential building location
At one end	Main garden	2	A8 (1) + A10 (1)
	Reception	18	A4 (1) + A5 (1) + A6(2) + A7(2) + A8(5) + A9 (1) + A10 (6)
At one end	Village facilities (especially clinic)	12	A1 (1) + A2(1) + A3(1) + A4 (1) + A5 (1) + A6 (3) + A7(2) + A9(1) + A10 (1)
	Sport complex	2	A3(1) + A6 (1)
	Mosque	4	A1 (1) + A2 (1) + A4 (2)
In the middle	Canteen,	15	A1(1) + A2(2) + A3 (1) + A4(1) + A5 (2) + A9 (1) + A10 (7)
	Supermarket	14	A1(2) + A4 (3) + A5 (4) + A9 (1) + A10 (4)
	Coffee shop	2	A1(1) + A9 (1)
	Laundry shop	1	A9 (1)

As shown in Table 18, there are four common mentioned facilities: reception, canteen, supermarket, and village facilities that are common between the hostel students and university students. The reception was mentioned majorly by interviewees who are in buildings A8 and A10, buildings at the opposite end of the

layout. The canteen and supermarket were mentioned by interviewees who are in buildings at the two opposite ends of the layout and also from the far-right side. Finally, the village facilities were mentioned also variously by interviewees from almost all building locations.

B. Floor layout

The floor layout contributed poorly in achieving equitable accessibility. Through design analysis, it had been found that the floor layout of each typical building weakens the equitability in accessing the facilities. The floor layout has a shape of uncompleted square; it has 4 ribs: two on the tips are small and two in between are long (Fig. 110). The allocation of the ground communal facilities in one of the long ribs and the typical lounge space and the circulation node in each typical floor are not equitably accessible by a lot of bedrooms.

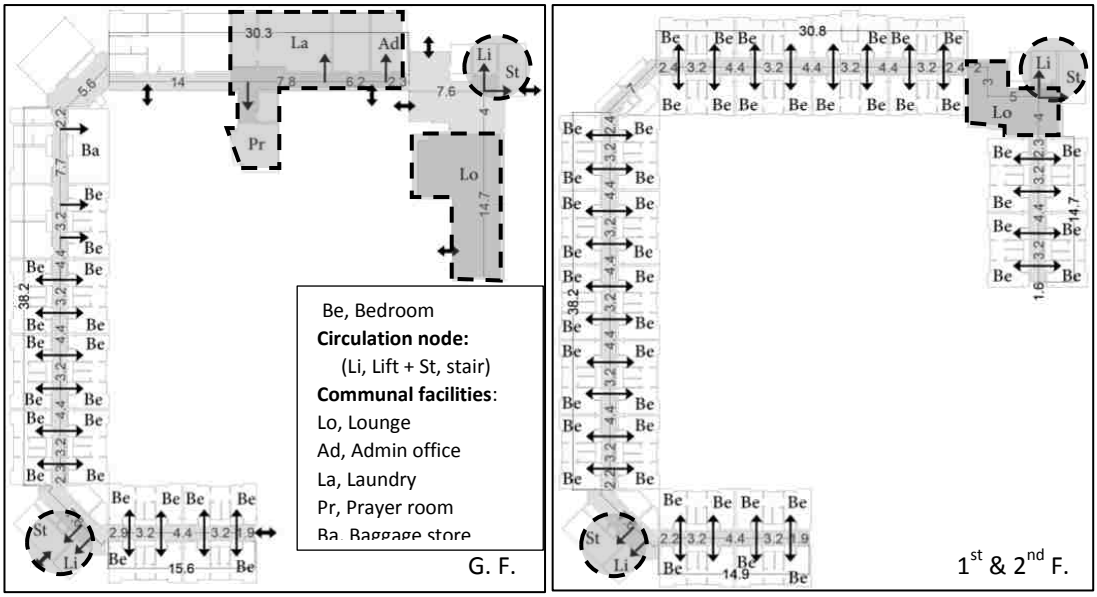


Figure 110: Distances in typical floor plans

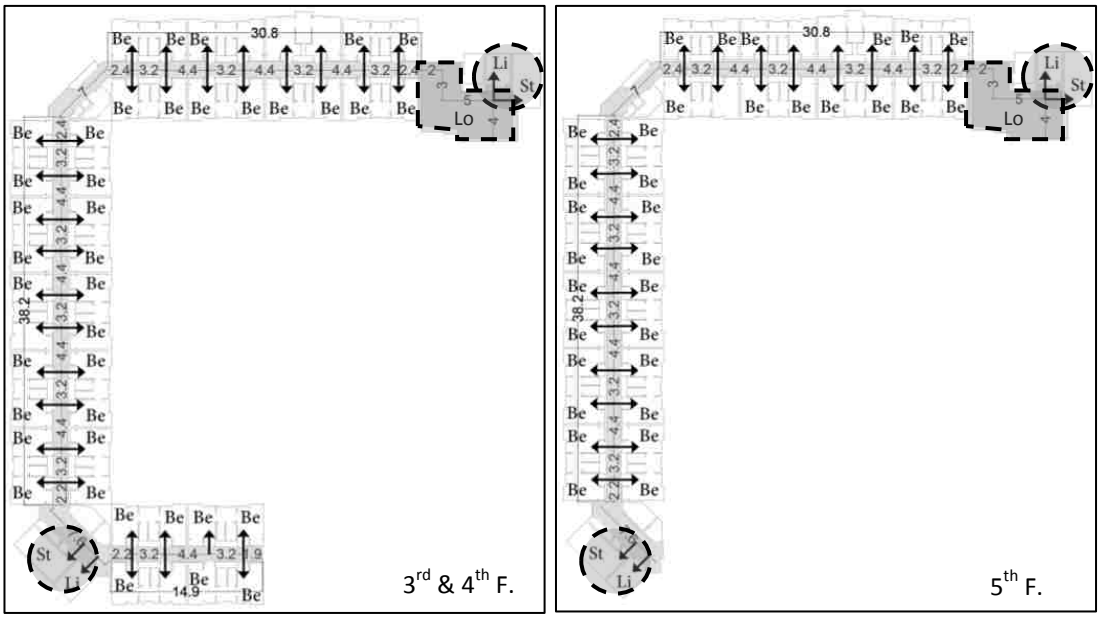


Figure 110: Distances in typical floor plans (Continued)

This inequitable accessibility, which can be seen in Fig. 110 by the big variance in distances from the different bedroom locations, was supported through space syntax analysis, shown previously in principle of 'Social Interaction'. The highest connected and integrated areas were concentrated in bedroom corridor of 38.2 m in length, which make it the more accessible corridor. On the other hand, the typical lounge space of each floor was within the lowest connected and more segregated areas, which make it less accessible than it should be. These findings were appeared also in interviews' results. 21.7% of the interviewees, who from different buildings and different floors, were dissatisfied with the location of the lounge space in each typical floor, and they wanted to be in the middle of the floor to be more equitably accessed (Fig. 111).

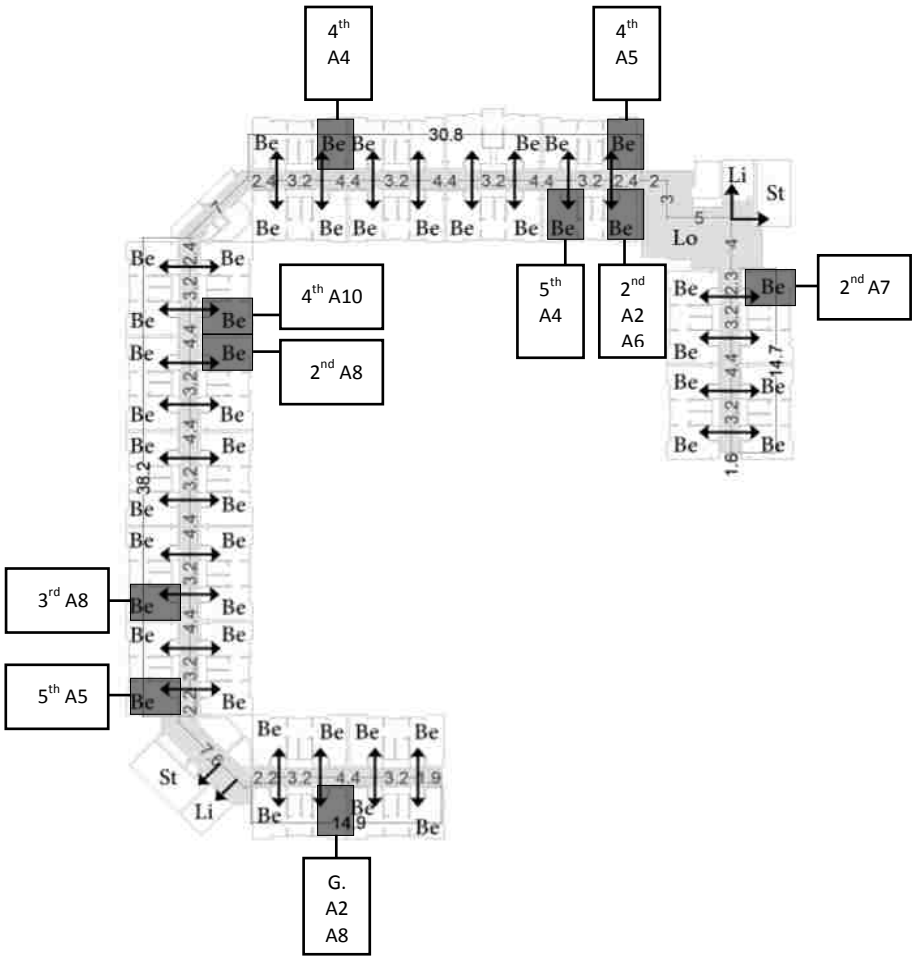


Figure 111: Location of dissatisfied interviewees with lounge space location

C. *Mode of access: horizontal/vertical, direct/indirect*

This variable contributed partially in achieving equitable access. Within the hostel layout, as shown before, there are certain facilities serving the whole hostel located within certain residential buildings rather than others which are Fikra club in A2, coffee shop and stationary shop in A6, and laundry shop in A7. Although the equitability can be seen within those three buildings as each of them has certain facility, the un-equitability can be seen when considering the remaining seven buildings. The allocation of those facilities creates unequitable access as the students of the buildings where those facilities are located have vertical access to those

facilities, while the students of the remaining buildings have longer horizontal mode of access to reach those facilities.

Additionally, the various facilities within the hostel have some unequitable variance as being directly or indirectly accessible. The following two examples of the drawn paths from the closest exit of the ground lounge of each building to the main garden and to the canteen illustrate how some buildings have more direct access than others (Fig. 112 & 113).

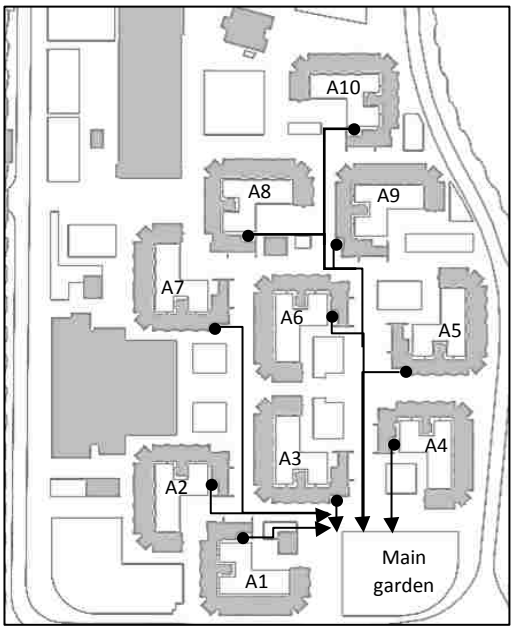


Figure 112: An example of the direct/indirect access of buildings to the main garden

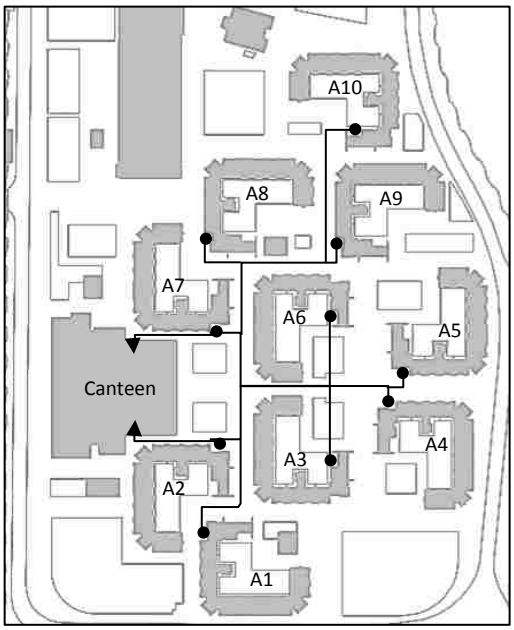


Figure 113: An example of the direct/indirect access of buildings to the canteen

Within the indoor of each building, the communal facilities are located in the ground floor. Although the lounge space is repeated in the upper floors to be accessed horizontally by students of each floor, the remaining facilities such as the laundry and prayer room appeared inequitably accessed from the upper floors. 11.7% of the interviewees were not satisfied with the vertical access to the facilities that are in ground floor only; they wanted to be in each typical floor especially the laundry.

5.5.2 Appropriate measures for handicapped

This indicator can be achieved through four main design variables: '*Doors of main entrance and common use area are accessible by students in wheelchair', 'Kitchens and bathrooms are designed to be useable by students in wheelchairs', 'Suitable width and access for car parking space' and 'Placing critical spaces on the lowest floor for ease of access'.*

A. *Doors of main entrance and common use area are accessible by students in wheelchair*

This variable is achieved completey in the deisgn. Through design analysis, all the doors in the deisgn were found accessible by persons in wheel chairs. The minmum available width of door openings is 0.8m such as the doors of stair exits and ablution space which is enough for the standard width of a wheel chair, 0.7m ("Accessibility Design Manual: 5-Appendices : 2-Anthropometrics 1/2", 2003). Besides, through the interview with an interviwee of mobile disability who was using a wheel chair, no problems realted to door access were mentioned.

B. *Kitchens and bathrooms are designed to be useable by students in wheelchairs*

This variable is achieved completely. As mentioned in principle of 'Responsiveness to Social Needs', no kitchen is available in the design; instead, there is a pantry within the open lounge space in each typical floor. Additionally, there are specially designed bedrooms with bathrooms suitable for students with wheel chairs.

C. *Suitable width and access for car parking space*

This variable in not applicable for measurement because car parking is not available as a facility for the students of the hostel as mentioned previously. Due to the location of this hostel within the university campus, the students of wheel chairs are suggested to stay in this hostel to move personally to their colleges. Besides, there

is car parking of 3m width outside the hostel and accessible from the reception of the hostel to be used by families who want to pick up their students.

D. Placing critical spaces on the lowest floor for ease of access

This variable is achieved completely in the design. As mentioned in previous indicator of this principle, the communal facilities of each building are placed in the ground floor. Moreover, the all community facilities such as canteen, supermarket, reception, and coffee shop are available within the ground level of the hostel.

All in all, the degrees of achievement of the variables resulted in partial achievement for the first indicator and complete achievement for the second indictor. As a result, the main principle is achieved largely (Fig. 114).

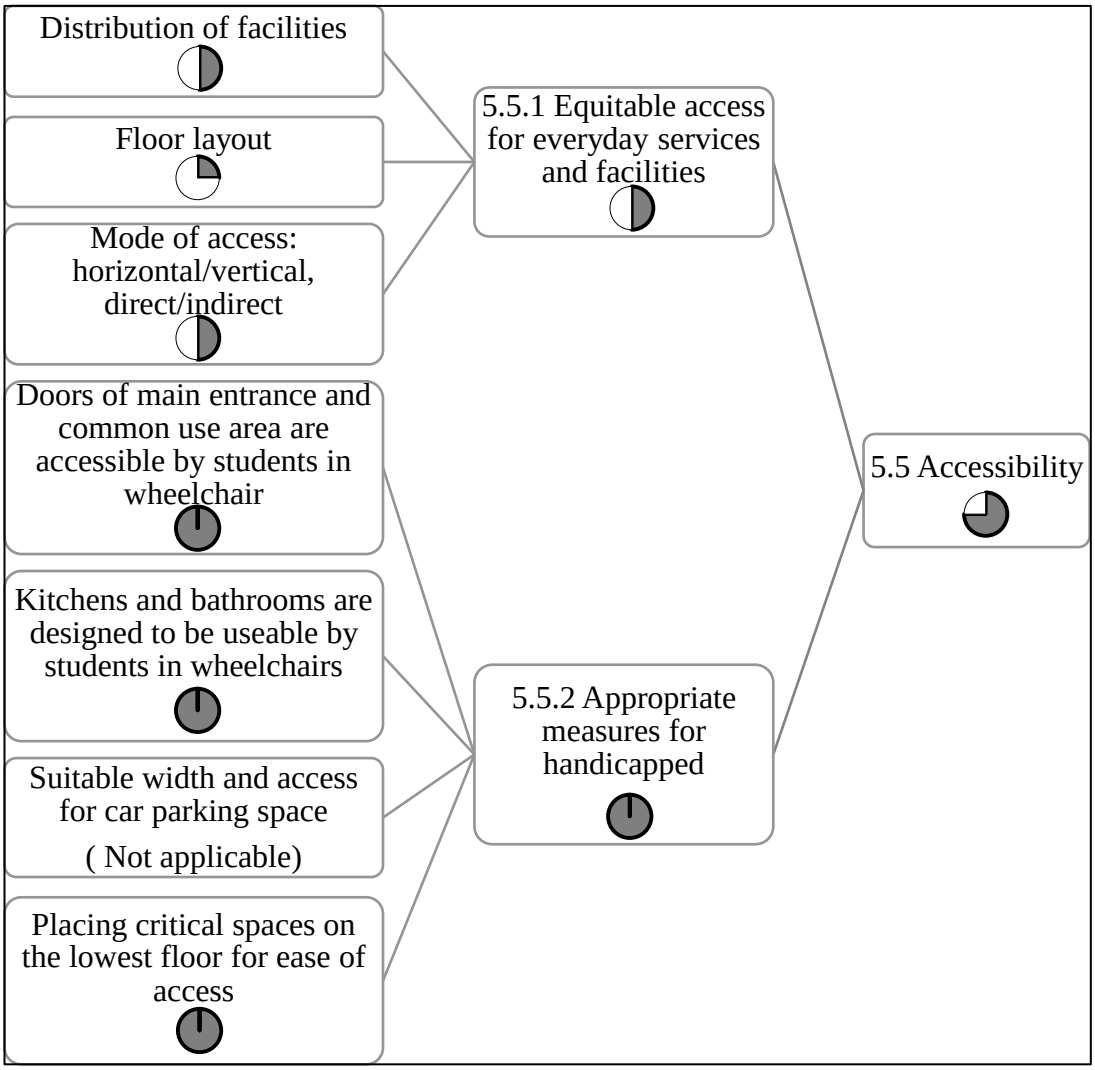


Figure 114: Concluded evaluation of fifth principle (Accessibility)

5.6 Mobility

There are two main indicators for this principle: 'Walkable and cycling hostel community' and 'Public transportation to outside hostel community'.

5.6.1 Walkable and cycling hostel community

This indicator can be achieved through three design variables: '*Availability of friendly pedestrian walk and bicycles ways', 'Availability of bike storage and bike rental service',* and *'Promoting walkability'.*

A. Availability of friendly pedestrian walk and bicycles ways

This variable is achieved partially. Through observations, the pedestrian walkways were observed friendly in terms of their overall surrounding landscape design almost everywhere in the hostel (Fig. 115). On the other hand, although there were some students observed using bicycles in the main street around the hostel at night time, no specially designed ways for bicycles are found within the hostel.

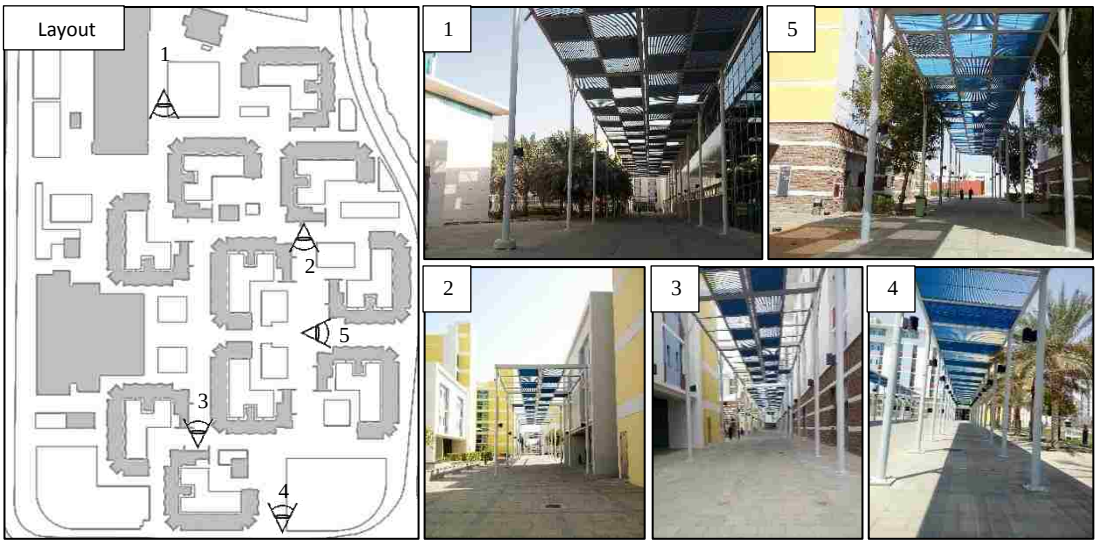


Figure 115: Views of multiple pedestrian walkways in NC hostel

The interviews showed a large satisfaction with the friendliness of the walkways and a partial preference for using cycling as a way of movement in the hostel.

B. Availability of bike storage and bike rental service

This variable is achieved poorly in the design. No facilities for using cycling such as bike storage and bike rental service are available in the hostel which is compatible with the answer of 33.3% of the interviewees who did not prefer at all to use cycling in the hostel. However, the absence of those facilities is contradicting

with the answers of 66.7% of the interviewees who preferred using cycling with an average of large preference.

C. Promoting walkability

This variable is achieved largely in the design. There are multiple found elements can promote walkability such as increased pedestrian connectivity, exposure to life area buildings (recreational buildings), and population density. Through design analysis, the walkways of the hostel were found well connected in terms of their intersection with each other and with the main street around the hostel (Fig. 116). This connectivity can be seen also through space syntax using Visibility Graph Analysis (VGA), shown in Fig. 117, as there are multiple areas within the walkways with higher visibility due to its intersection with others. The interviews supported these results as interviewees showed large satisfaction with the connectivity of the walkways in their hostel.

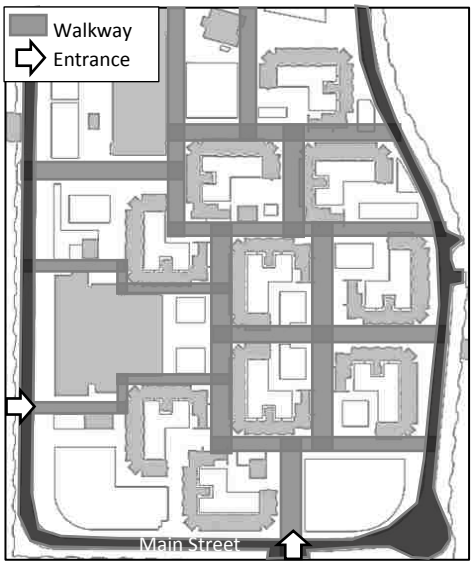


Figure 116: Connectivity of walkways

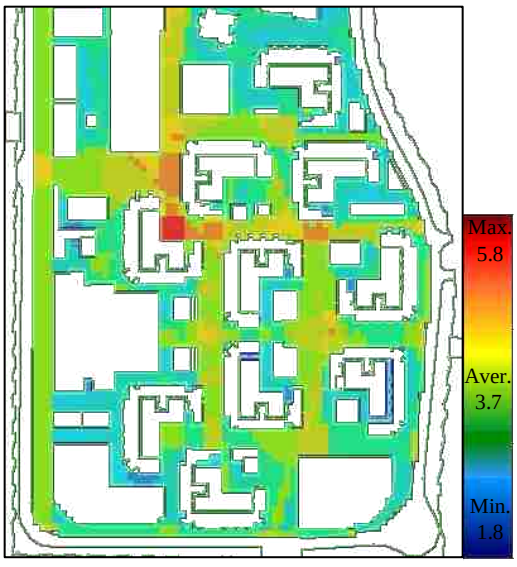


Figure 117: VGA in layout (walkways)

Through observations, those walkways were observed exposed to the surrounding residential buildings as shown before in the variable of '*Availability of*

friendly pedestrian walk and bicycles ways' and they are occupied most of the time by students of those buildings during their daily walking from and to their colleges, canteen, and supermarket. Additionally, the walkways around the hostel, adjacent to the main street, are also occupied most of the time by students of the university who are residing in other hostels and coming back and forth using the two showed entrances in Fig. 116.

Through interviews, the interviewees showed a large satisfaction with the exposure of the walkways to their surroundings and complete satisfaction with the population density in those walkways.

Besides the discussed elements, there are others mentioned by the interviewees affecting their satisfaction with walking and contributing in promoting their walkability (Fig. 118).

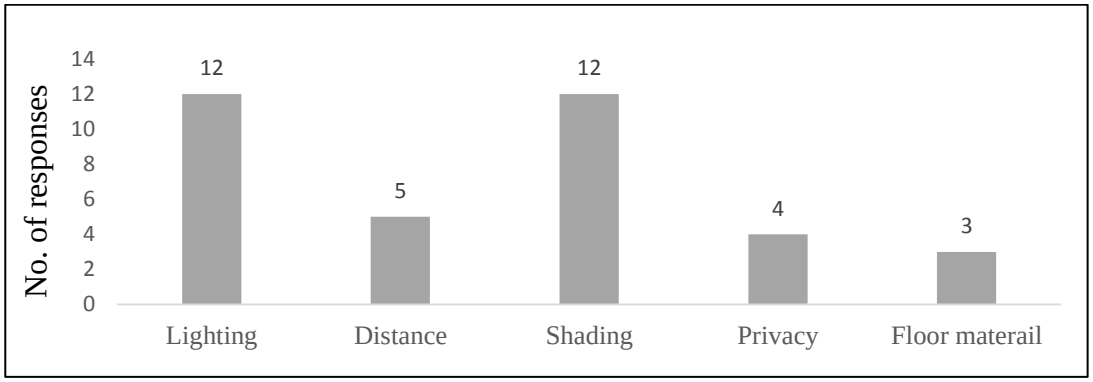


Figure 118: Results of interviewees' responses to other elements promoting walkability

As shown in Fig. 118, the most common mentioned elements were lighting at night time and shading at day time, and both were partially satisfying the students.

5.6.2 Public transportation to outside hostel community

This indicator can be achieved by variable of '*Availability of efficient public transportation system'*.

A. Availability of efficient public transportation system

This variable is not applicable for measurement in the design of NC hostel due to the fact that the students of the hostel are not allowed to go outside the hostel alone unless their relatives come and pick them up. This is one of the university rules that is related to the cultural context of the case study.

All in all, the degrees of achievement for the variables showed partial degree of achievement for the indicator of 'Walkable and cycling hostel community' and not applicable measurement for the indicator of 'Public transportation to outside hostel'. Sequentially, the main principle is partially achieved (Fig. 119).

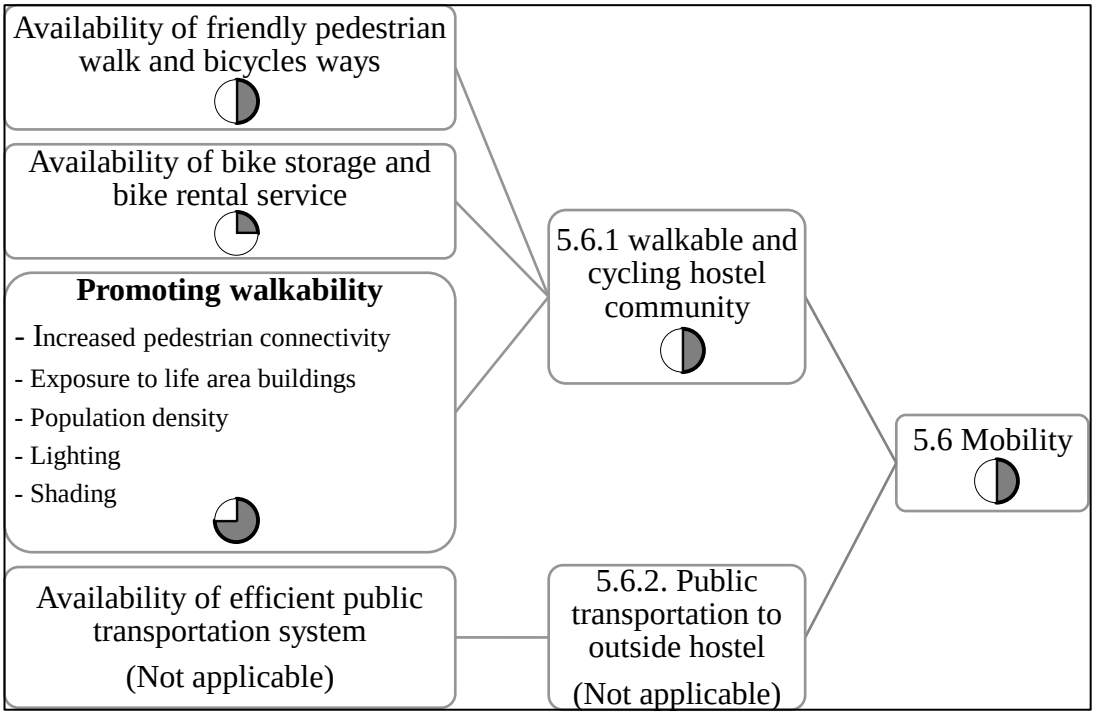


Figure 119: Concluded evaluation of sixth principle (Mobility)

5.7 Privacy

There are two main indicators for the achievement of this principle: 'Perception of privacy within hostel community' and 'Perception of privacy from nearby adjunct hostel surroundings'.

5.7.1 Perception of privacy within hostel community

This indicator can be achieved through six various design variables: '*Hierarchy of distribution of spaces', 'Clustering kind of room planning', 'Area for common space in private room', 'Attachment of bathroom within the room unit', 'Single type of bedroom',* and *'Use of bed curtains in shared bedroom'.*

A. *Hierarchy of distribution of spaces*

This variable is achieved partially. Through design analysis, it was found that the hierarchy of distribution of all facilities within the hostel from public to semi-public/semi-private/ to private are contributing positively for the sense of privacy in the hostel. As discussed in previous principles, the most public facilitates that are used by both hostel students and university students, such as sport complex, food court, students' village and reception are located at the far ends of the hostel layout. The public facilities that are serving the population of the hostel, such as the canteen, supermarket, and outdoor greenery are located exteriorly within the layout of the hostel. The semi-public facilities that are serving the students of each building, such as prayer room, laundry, and admin office are located in the ground floors. The most private facilities which are basically bedrooms are located interiorly in all floors.

This hierarchical distribution of facilities was found not sufficient for satisfying the students' sense of privacy. Through, interviews, 68.3% of the interviewees agreed on lack of privacy within their hostel outdoor area while accessing their public facilities such as gym and supermarket due to the availability of men workers even at night times.

Moreover, the space syntax analysis showed that some allocations of facilities are contributing negatively for the sense of privacy. As discussed earlier in principle of 'Social Interaction', the highly connected and integrated areas within the indoor

typical floors was concentrated in a bedroom corridor while the lounge space, communal space, was within the lowest connected and most segregated spaces. This reduces form the required privacy for the bedrooms and increases the unintentional privacy for the lounge space while it is designed as open communal space. The same results can be seen through Visibility Graph Analysis (VGA) that shows the visual integration in each typical floor (Fig. 120).

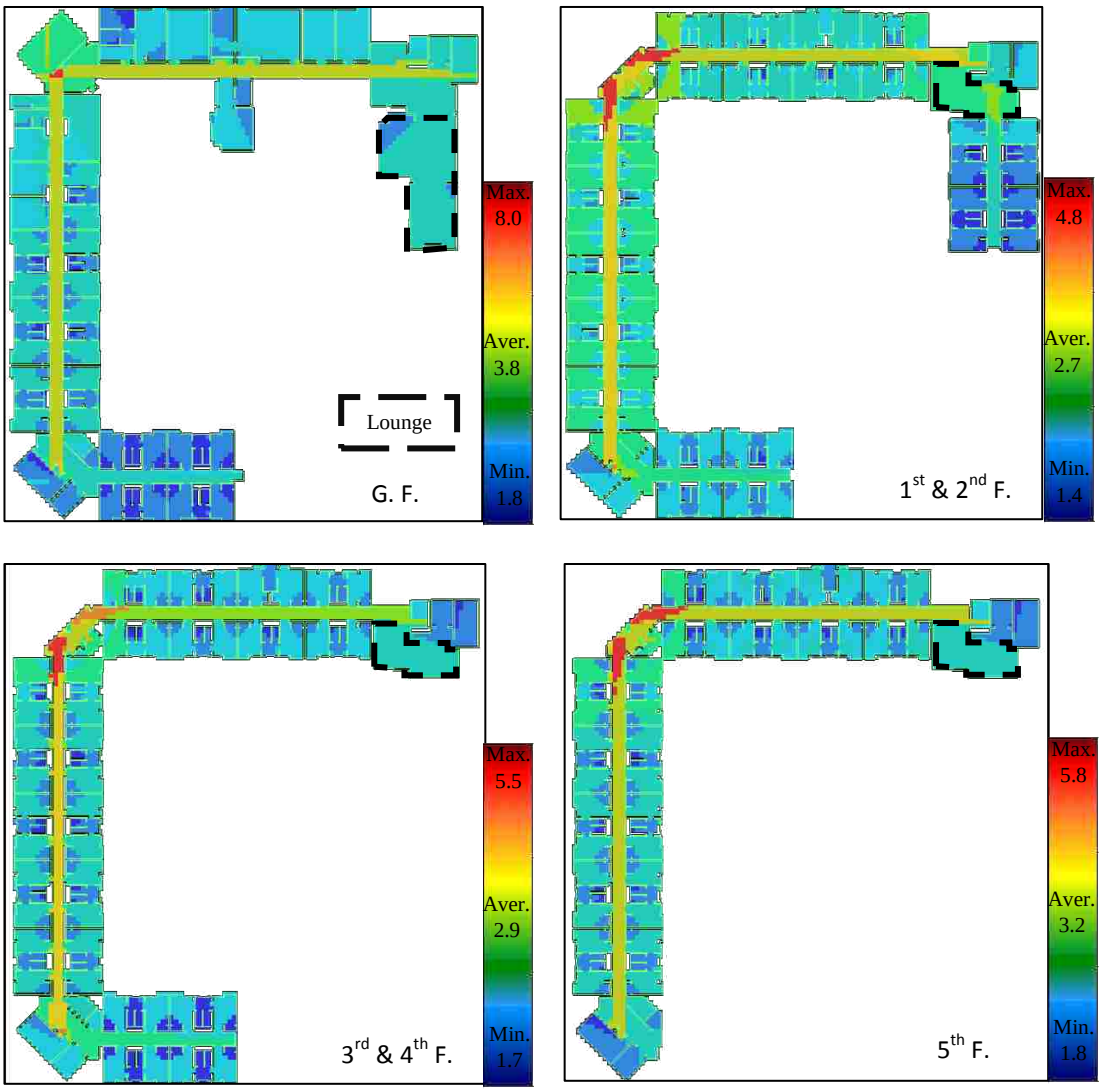


Figure 120: VGA in typical floor plans

As shown in Fig. 120, the lounge space of each floor, outlined with black dash line, is located within the less visible areas which adds privacy for it. In spite, 21.7%

of the interviewees were not satisfied with the level of privacy in the lounge space due to its design as open space linked with the circulation node.

B. Clustering kind of room planning

This variable is achieved poorly in the design. Through design analysis, it was found that the bedrooms are planned in all floors and buildings in two linear rows opposite to each other. Theses bedrooms of both rows are directly accessed from the same corridor, and they have face to face door openings. Although this type of planning for the bedrooms create a direct visual contact between the opposite bedrooms, the door is placed within not active place of the bedroom (Fig. 121). Through interviews, none of the interviewees mentioned this direct visual contact between the opposite bedrooms as a reason that hurt their privacy.

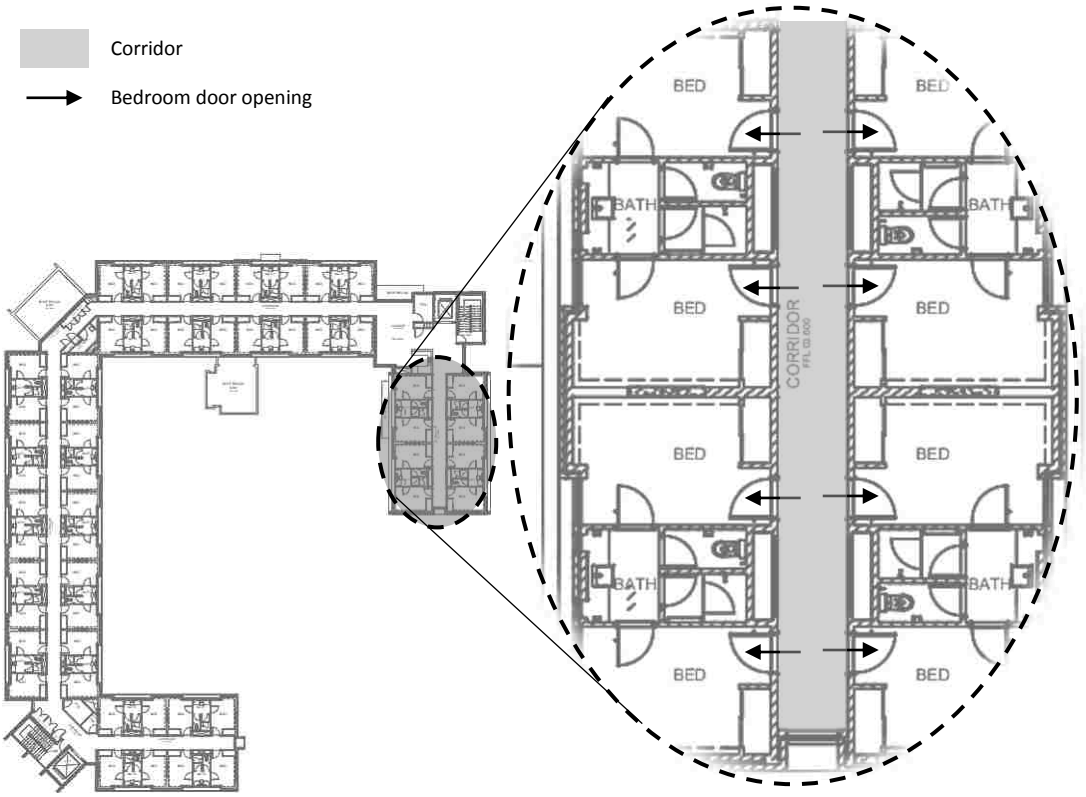


Figure 121: Bedroom planning in typical 1st F. plan

C. *Area for common space in private room*

This variable is achieved partially. Within the bedrooms there is no common area acting as an intermediate space between guests and owner personal space. However, a lounge space is provided in each floor to be used for gathering with others. The weak effect of the absence of this intermediate space in each bedroom on the sense of privacy can be seen through interviews. While conducting the interviews, 65% of the interviewees preferred conducting the interviews in their own bedrooms, and 35% of them preferred going to the lounge space of the floor. Beside the fact that none of the interviewees mentioned the absence of this intermediate space as a reason for lack of privacy, 76.7% of them mentioned the bedroom as space of gathering with their friends to have more privacy than the lounge space as mentioned earlier in principle of ' Social Intercation'.

D. *Attachment of bathroom within the room unit*

This variable is achieved largely. The bathrooms are not communal shared by group of students; instead, they are located between each two adjacent bedrooms, as shown above in Fig. 121. Although they are directly connected to the bedrooms and shared between only two students, they are still not private enough for each individual student as shown in the interviews. 30% of the interviewees mentioned that the shared bathroom between them and their roommates hurt their own privacy.

E. *Single type of bedroom*

This variable is achieved completely. All the bedrooms in the hostel are single type, and 13.3% of the interviewees mentioned this as a distinguished design element in their hostel.

F. *Use of bed curtains in shared bedroom*

This variable is not applicable for measurement as there are no shared bedroom in the design as mentioned in previous variable.

In addition to the above discussed variables, 83.3% of the interviewees mentioned other variables affecting their sense of privacy within the hostel and the most common one was the bad sound insulation in multiple private spaces specifically in bedrooms which shows a poor achievement for this variable in maintaining the perception of privacy (Fig. 122).

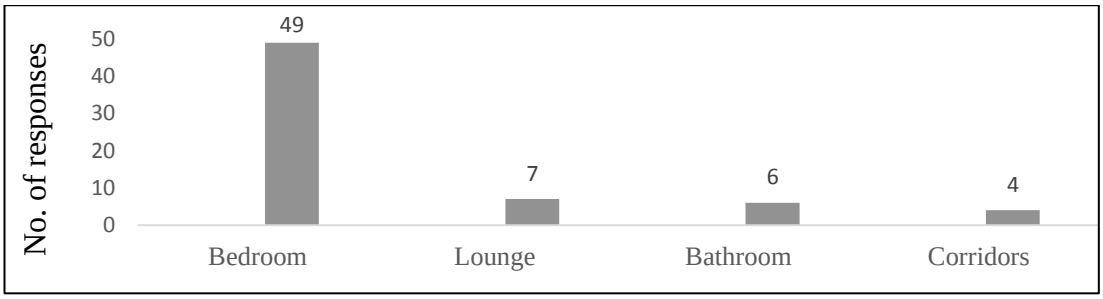


Figure 122: Results of interviewees' responses to places with hurt privacy due to bad sound insulation

5.7.2 Perception of privacy from nearby adjacent hostel surroundings

There are three main design variables for this indicator: '*Form of hostel building/s', 'Orientation of the hostel building/s',* and *'Locations of fenestrations in relation to surroundings'.*

A. *Form of hostel building/s*

This variable is achieved largely. The form of each of the hostel buildings is uncompleted rectangle; each surrounds its own outdoor space as shown previously in principle of 'Social Integration'. This form provides a privacy for the outdoor surrounded open space which can be seen through space syntax using Visibility Graph Analysis (VGA) (Fig. 123). Then the distribution of the ten buildings within

the layout affect the perception of privacy. The buildings in the middle such as A3 and A6, surrounded by other buildings, are expected to have more privacy from the surroundings than the buildings at the edges overlooking the main street.

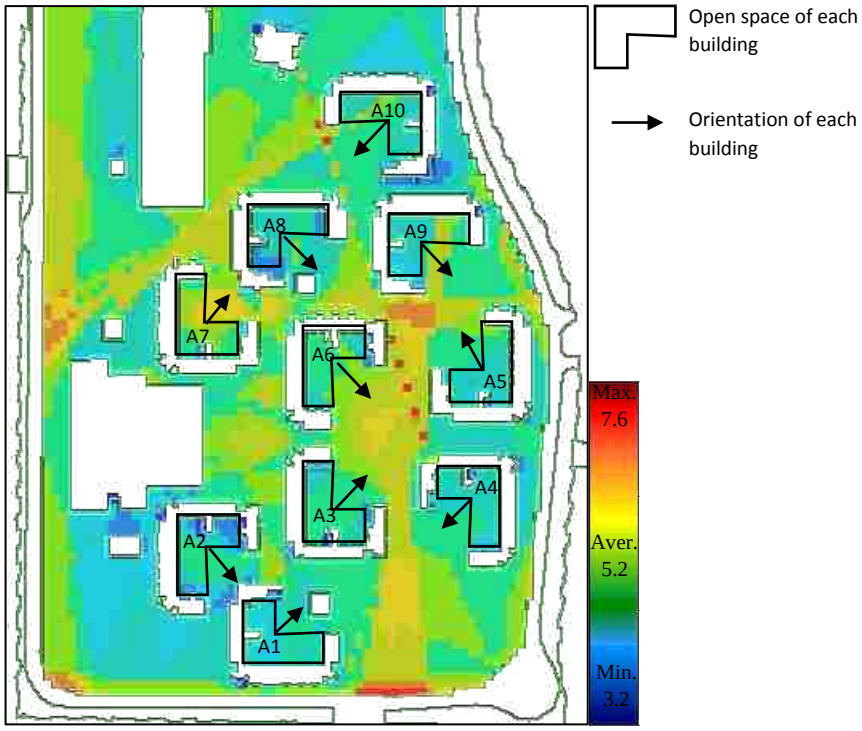


Figure 123: VGA in layout of NC hostel

B. *Orientation of the hostel building/s*

This variable is achieved largely. The orientation of the buildings in the hostel varies from one to another. Although none of the buildings is oriented towards the main street directly, but some of them have more private orientation for their outdoor open space than others (Fig. 123). For example, the open spaces of buildings A1, A4, and A9 are oriented more towards the main street than towards the indoor space of the hostel to have common area with other buildings such as the area between buildings A3 and A6.

C. Locations of fenestrations in relation to surroundings

This variable is achieved partially. All the bedrooms have windows located in all the sides of each building. Some of these buildings such as A1, A4, A5, and A10 have one side of bedrooms overlooking the main street closely. In spite, through interviews, none of the interviewees whose bedrooms overlooking directly the main street mentioned this as a reason that affect their privacy. However, there were eight interviewees, shown in their bedroom locations in Fig. 124, mentioned that the windows of their bedrooms cause un privacy at night time due to pass of men workers. The transparency of bedrooms' windows can be controlled through closing curtains or covering part of the window through papers as observed in some interviewees' bedrooms. However, there are two dominant glass facades in each building continue till the fifth floor with no control for its transparency: one with 2 m width in a corridor corner, and the other with 4m width in the lounge space (Fig. 125). Some of these glass facades are directly overlooking to the main street such as of buildings A1, A4, A5, and A10, and through interviews 6.7% of the interviewees mentioned these glass facades as a reason reducing their privacy.

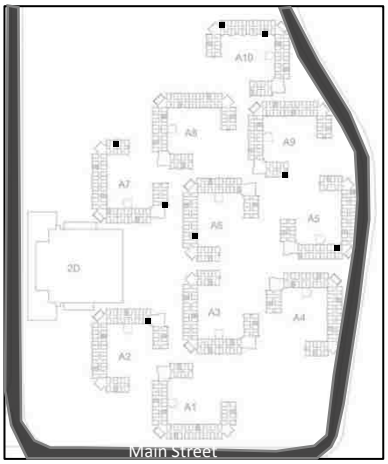


Figure 124: Interviewees' locations who mentioned their windows as reason of un privacy

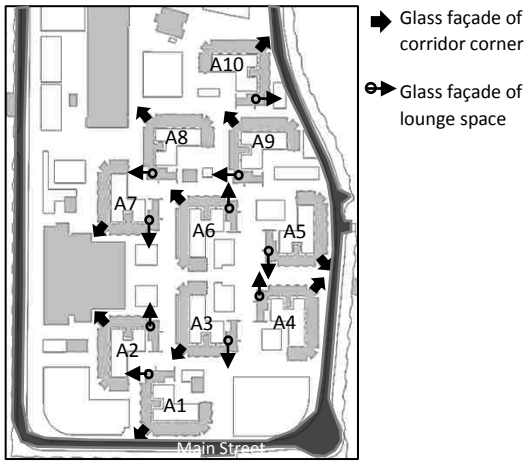


Figure 125: Location of buildings' glass facades

To conclude, the degrees of achievement for the variables resulted in partial achievement for the indicator of 'Perception of privacy within hostel community' and large achievement for the indicator of 'Perception of privacy from nearby adjunct hostel surroundings'. Sequentially, the main principle is partially achieved (Fig. 126).

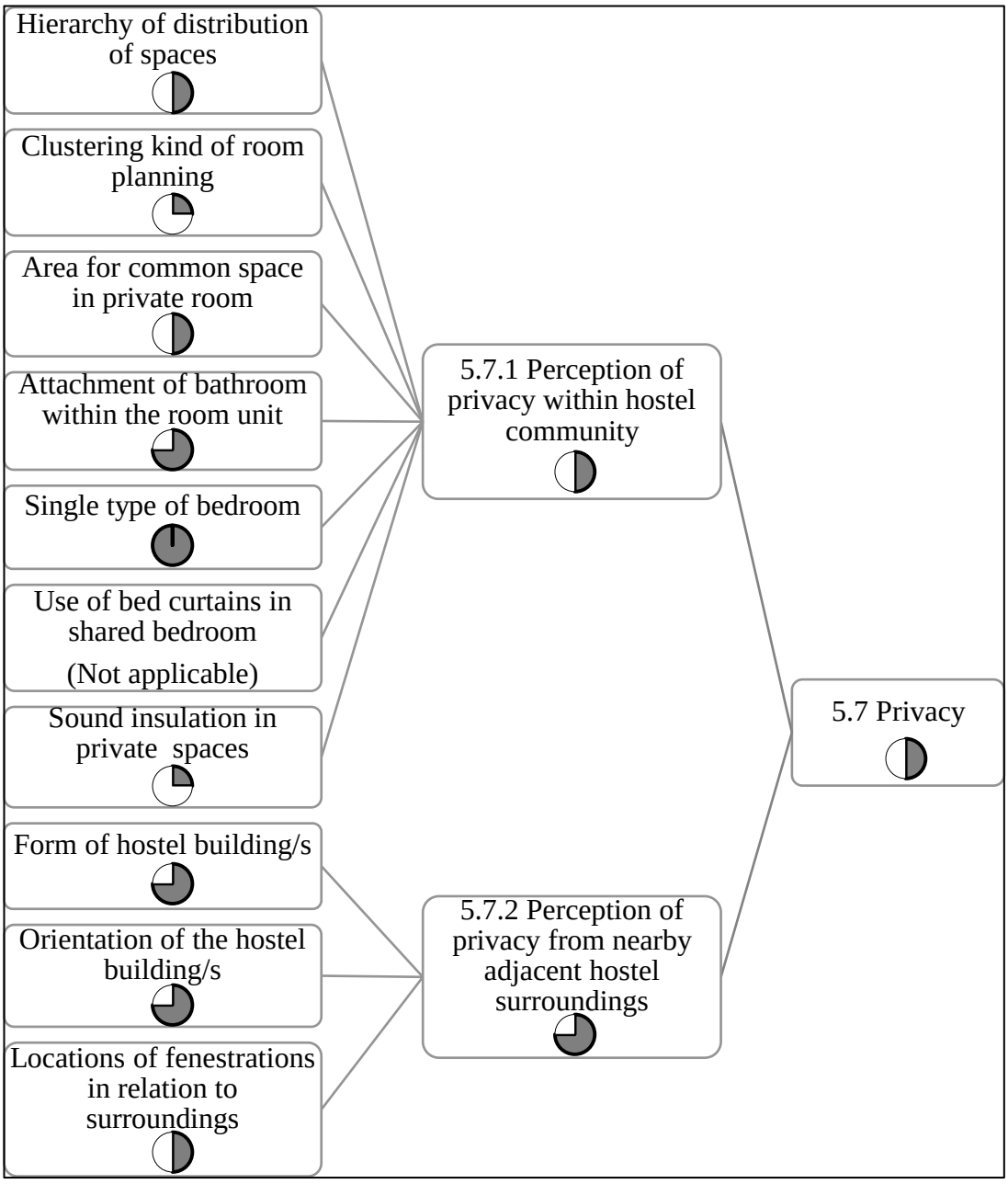


Figure 126: Concluded evaluation of seventh principle (Privacy)

5.8 Safety

There are two main indicators for this principle: 'Students' sense of safety' and 'Protection from Hazards'.

5.8.1 Students' sense of safety

This indicator can be achieved through the variable of '*Condition and maintenance of the built environment'.*

A. Condition and maintenance of the built environment

This variable is achieved largely. This hostel is considered one of the new hostels of UAE University, and as observed all its buildings are in a very well condition. Besides, there is a maintenance team located in the hostel to provide emergency maintenance and support services 24 hours a day. There is also quarterly maintenance for all buildings before the beginning of each semester ("Residential Life - Other Services", 2017). The well condition and maintained status of the hostel's buildings was supported with the responses of the majority of the interviewees; 51.7% of interviewees were completely satisfied about the condition and maintenance of their hostel's building and 38.3% were largely satisfied. In spite of the overall interviewees' high degree of satisfaction, there is a problem of rain leakage and wall crack that was mentioned by 8.3% of the interviewees, residing in different floors of different buildings.

5.8.2 Protection from hazards

This indicator can be achieved through three main variables: '*Means of fire resistance in the design, Anti-slippery floorings,* and *'Means of escape in case of emergency'.*

A. Means of fire resistance in the design

This variable is achieved completely. Latest alarm systems are available in all student rooms and buildings for early warning in case of fire in addition to fire hoses and extinguishers ("Residential Life - Other Services", 2017). The existence of these means of fire resistance such as smoke detectors, sprinklers, and fire extinguishers were observed also in all hostel (Fig. 127).

Figure 127: Views showing the existence of the means of fire resistance indoor and outdoor

Through design analysis, fire resistance materials were found as shown in the Fire Separation Plans (FSP) for each typical floor for all buildings (Fig. 128).

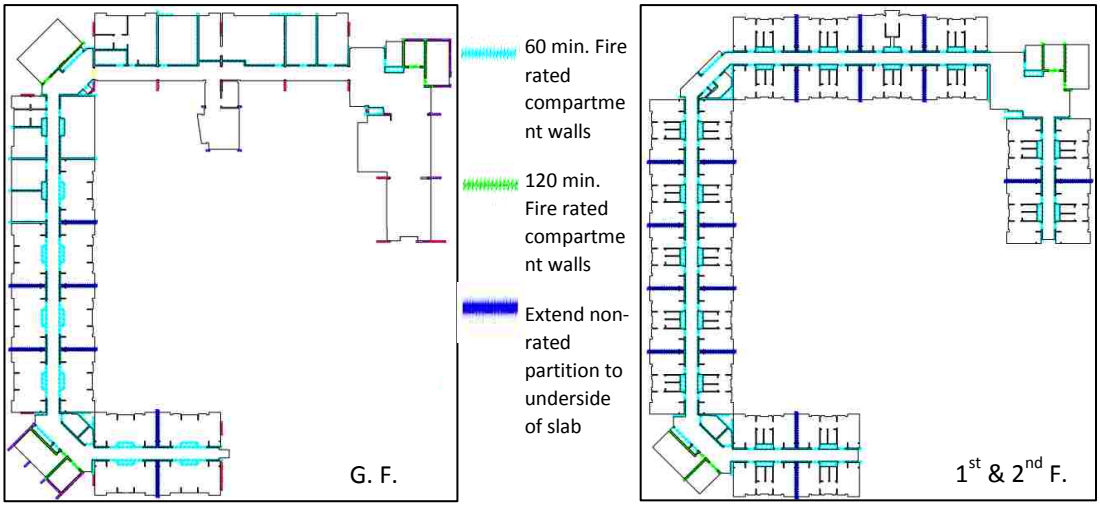
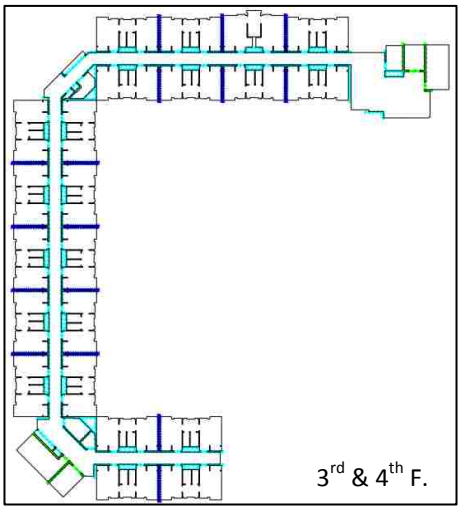


Figure 128: Typical Fire Separation Plans (FSP) in NC hostel



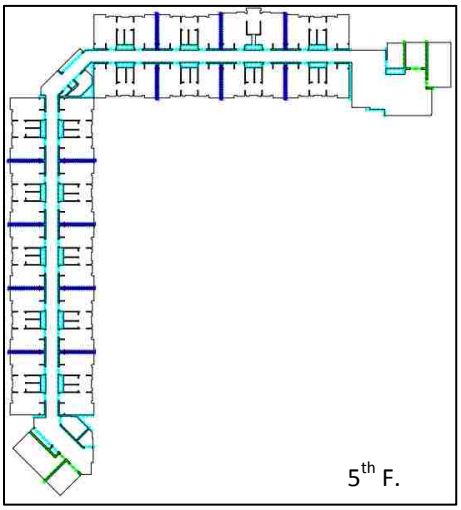


Figure 128: Typical Fire Separation Plans (FSP) in NC hostel (Continued)

B. Anti-slippery floorings

This variable is achieved largely. The interviews showed high degree of satisfaction of the students with their different indoor and outdoor tiles. There are three interviewees mentioned an un safety reason that is related to the slippery ceramic floor of the bathroom especially because the sill of the shower is very low to stop water flowing to the rest of bathroom (Fig. 129). Furthermore, there are six interviewees mentioned the same slippery issue for the outdoor stone tiles when rain water gathers.

Figure 129: Shower sill in typical bathroom

C. *Means of escape in case of emergency*

This variable is achieved largely. Emergency stairs and exits were observed available in all the floors of all the buildings, but the location of the stairs at the far ends of the floor, as shown before in principle of 'Accessibility', weakens their positive contribution for the escape in case of an emergency. Moreover, all the individual bedroom doors can be opened from outside by the master card in any induvial case that requires an urgent access to the bedroom.

In addition to the discussed variables, through interviews there were other mentioned variables by the interviewees that might expose them to harm such as heavy building door, slippery cupboard door, wide manhole openings, and outdoor insects, but none of these mentioned variables was emphasized.

All in all, the degrees of achievement for the discussed variables resulted in large degree of achievement for the first indicator of 'Residents' sense of safety' and also for the second variable of 'Protection from Hazards'. Sequentially the principle is largely achieved (Fig. 130).

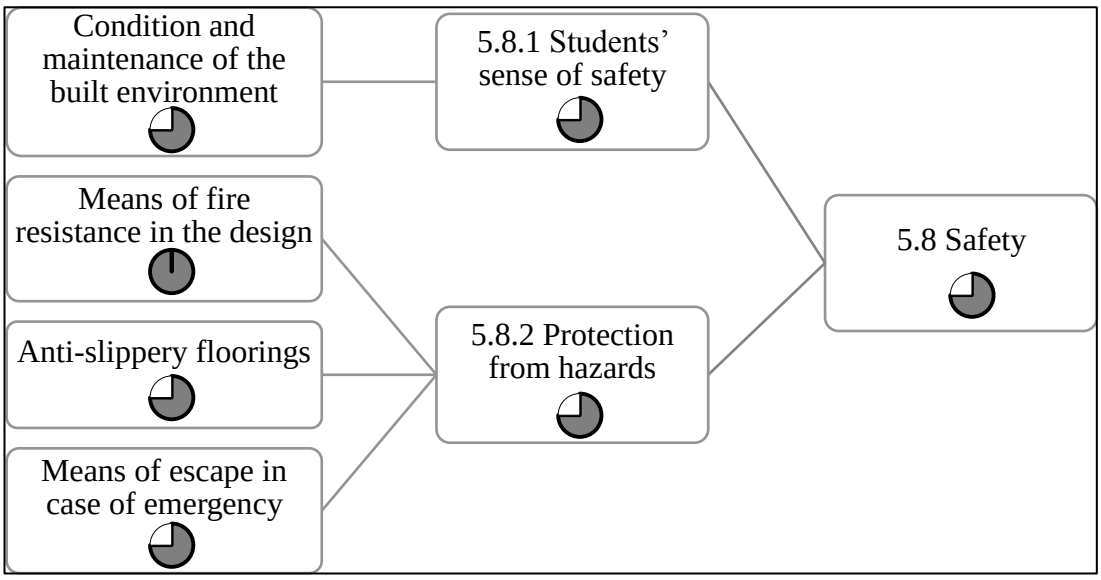


Figure 130: Concluded evaluation of eighth principle (Safety)

5.9 Security

This principle can be achieved through two main indicators: 'Students' sense of security' and 'Protection from crimes'.

5.9.1 Students' sense of security

This indicator can be achieved through two variables: '*Location of the hostel in a safe part of the town'* and *'Natural surveillance through active frontage'.*

A. *Location of the hostel in a safe part of the town*

This variable is achieved completely. The hostel is located in at the outskirts of Al Ain city that is belong to the emirate of Abu Dhabi, the safest city in the world in 2017 ("Abu Dhabi is the safest city in the world in 2017", 2017). Along with this information, the hostel is not located independently; it is within the university campus. Through interviews, the vast majority of the interviewees highly agreed that their hostel is locating within a safe part of Al Ain city according to their perceptions; 70% of them completely agreed and 26.7% largely agreed.

B. *Natural surveillance through active frontage*

This variable is achieved partially. Due to the location of the hostel within the campus, the views surrounded the hostel are related to the campus and they are not active at night time. However, there is one main active frontage which is the main street called Al Jamia street (Fig. 131). The views that the windows of the hostel are overlooking at vary based on different buildings' sides. Those different views were found through interviews affecting positively the interviewees sense of security. 37.3% of the interviewees largely agree that the views of the windows in the hostel are supporting their sense of security, and 35.6% of them completely agree on that.

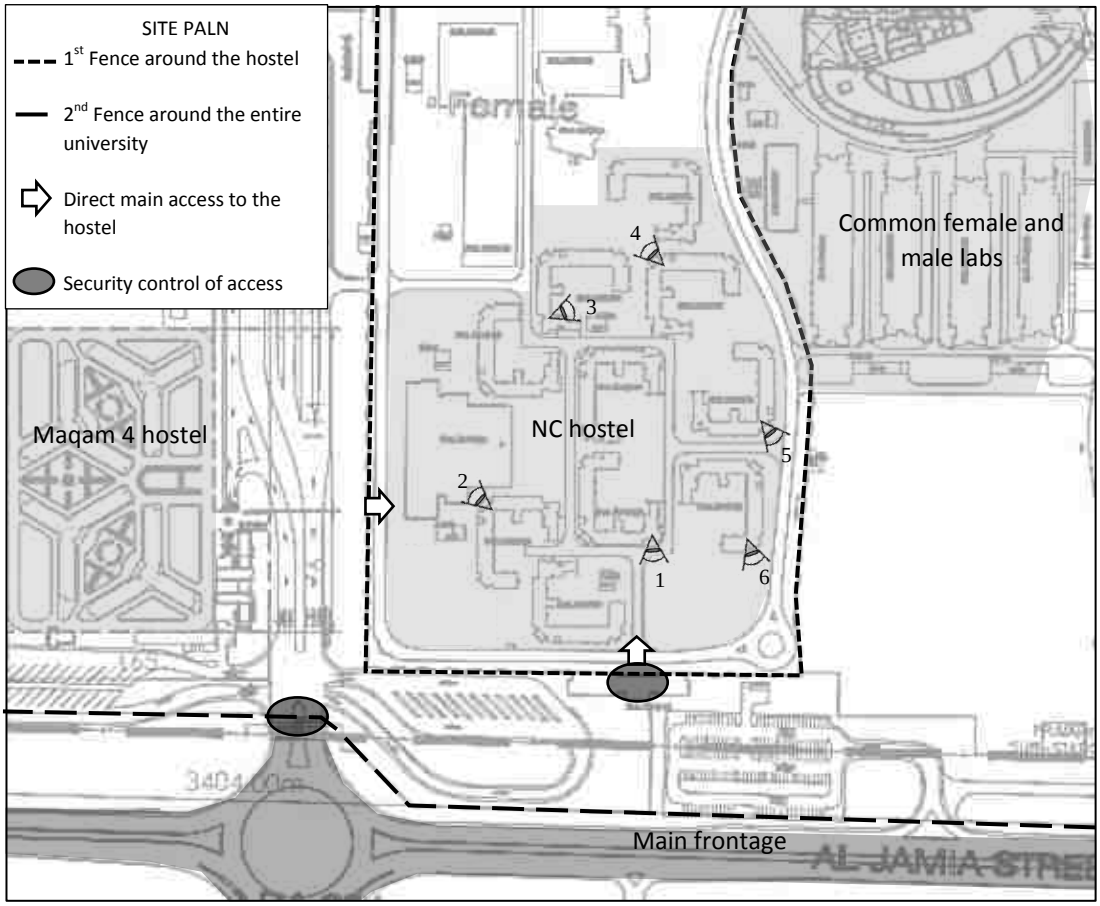


Figure 131: Surroundings of NC hostel

5.9.2 Protection from crimes

This indicator can be achieved through four variables: '*Means of security in design details', 'Relative position (control) for each space in the plan', 'Degree of visibility among internal/external spaces',* and *'Availability of one main entrance entry'.*

A. *Means of security in design details*

This variable is achieved partially. The first provided mean of security in the hostel is the fence. There are two fences surround this hostel as shown above in Fig. 131. The first fence separates the hostel and the female side of the campus from the buses routes and male side, and the second fence separates the entire university area from its neighbours. Although these fences provide security to the hostel from its surroundings, the hostel students are still sharing the same area with the other female students who are not residing in this hostel. Within the landscape area of the hostel, the dim light was observed and also mentioned through interviews as explained previously in principle of 'Social Integration'. This dim light reduces the sense of security for the students as 15% of the interviewees mentioned that there are girls fighting in the outdoor areas especially within those of less lighting cause them unsecured feeling. Within the all indoor spaces of the hostel, no cameras are provided as it is a hostel for females. Although, the absence of the cameras is due to privacy issue, but it contributed in a lot of theft crimes in multiple spaces as mentioned through interviews (Fig. 132).

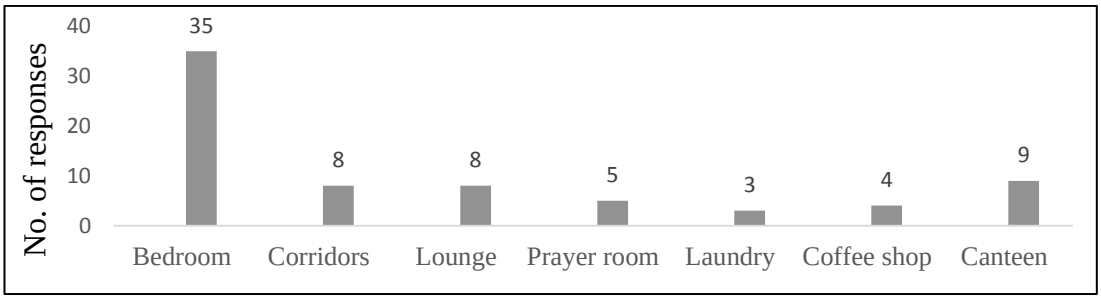


Figure 132: Results of interviewees' responses to places they are exposed to theft crimes

Within each individual bedroom, there is a problem of insecurity that had been mentioned through interviews due to locks. 13.3% of the interviewees mentioned that they feel they are unsecured in their bedrooms due to the easily opened lock of the shared bath between each two bedrooms by any card or a coin. Moreover, 11.7% of the interviewees mentioned that they feel unsecured due to the lock of the bedroom's door that can be opened from outside by the master card of the cleaners as there is no indoor lock. Additionally, it was observed inside the bedrooms that while the drawers of the desk have a lock, the cupboard was designed with no lock (Fig. 133).

Figure 133: Type of locks in the bedroom

B. *Relative position (control) for each space in the plan*

This variable is achieved poorly. As shown previously in the Visibility Graph Analysis (VGA) for the floor layout in principle of 'Privacy', the communal facilities in the ground floor and the lounge of each floor are within the least visible spaces. This make those communal spaces under low visual control and as a result the possibility for theft crime, that were mentioned in these spaces through interviews, increases.

C. *Degree of visibility among internal/external spaces*

This variable is achieved largely. As discussed in previous indicator, the windows of the bedrooms overlooking at all the outdoor spaces of the hostel as they are located in all the sides of each buildings. In addition to the window of each individual bedroom, there are the glass facades that are available in the corridors' corners and lounge spaces especially the ground floor of each building where the glass façade along the corridor and lounge space provide high visual control over large area of the outdoor space (Fig. 134).

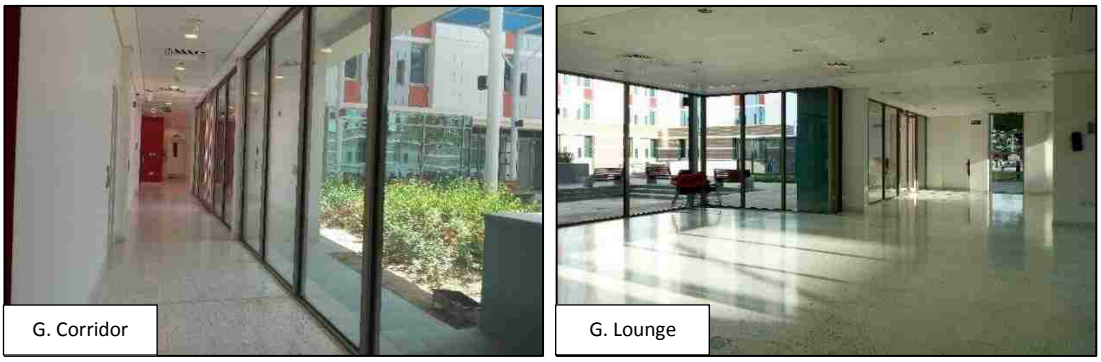


Figure 134: Glass facades in the ground floor overlooking at outdoor areas

On the other hand, there are communal spaces with glass facades overlooking wide area of the outdoor, but they are covered with papers to provide privacy for the

indoor rather than providing visual control over the outdoor such as the coffeeshop and the canteen (Fig. 135).

Figure 135: Covered glass facades in some communal spaces

D. *Availability of one main entrance entry*

This variable is achieved poorly. Although the common direct access to the hostel is one that is controlled by a security guard, the hostel can still be reached by who can access the female side of the university (Fig. 136). This access can be from the main entrance of the university, the access points between the male and female sides, or the entrance of the female students who are not residing in the hostel.

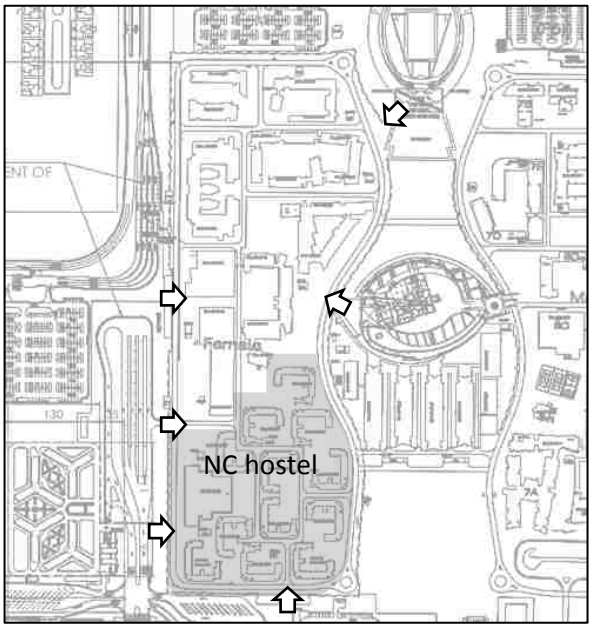


Figure 136: Possible point of access to the hostel

In conclusion of this principle, the degrees of achievement for the discussed variables resulted in large degree of achievement for the indicator of ‘Students’ sense of security’ and partial degree of achievement for the indicator of ‘Protection from crimes’ that is compile with interviewees’ partial satisfaction with the security from crimes. Sequentially, the main principle is partially achieved (Fig. 137).

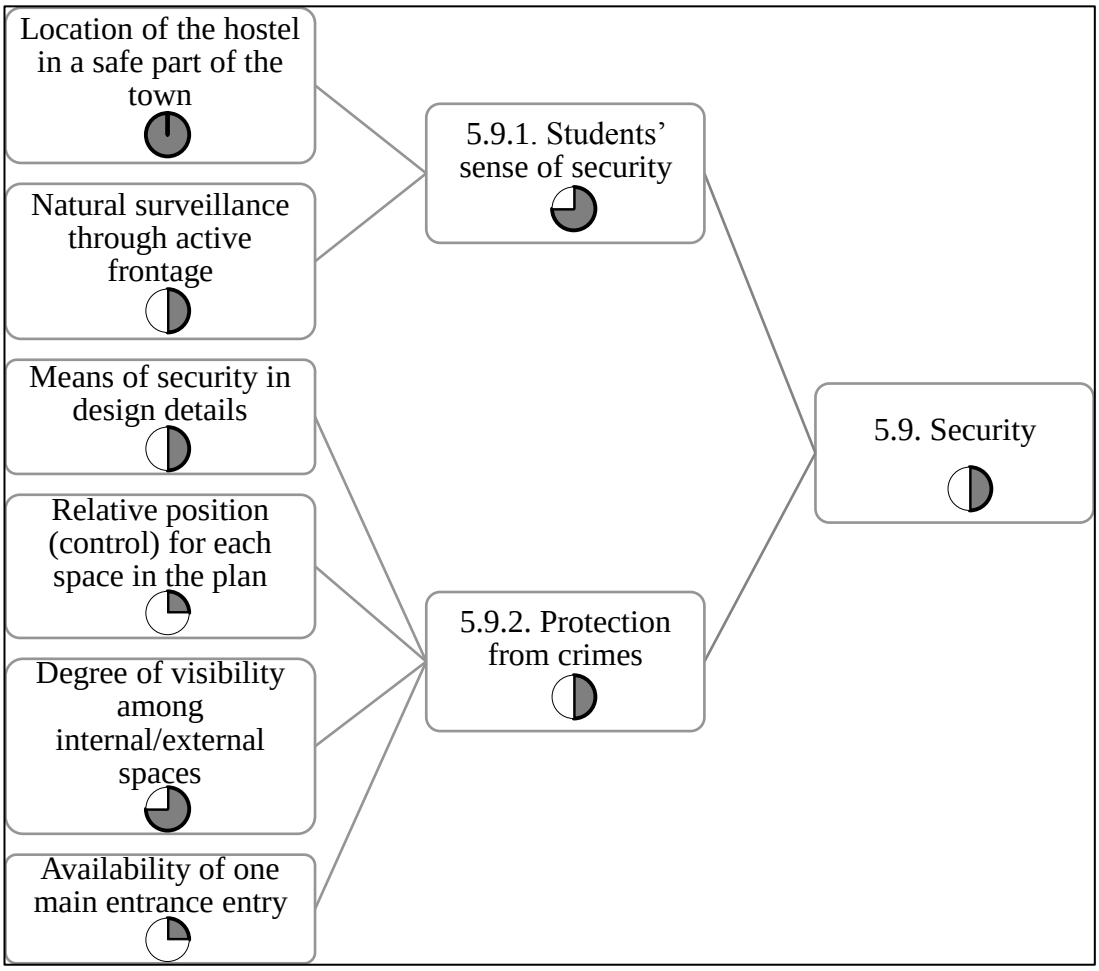


Figure 137: Concluded evaluation of ninth principle (Security)

5.10 Local Environmental Quality

There are five found indicators resembling the aspects of this principle: ‘Visual quality’, ‘Acoustic and noise control’, ‘Daylight’, ‘Thermal comfort’, and ‘Healthy indoor quality’.

5.10.1 Visual quality

This indicator can be achieved through three variables: '*Students' colour perception and preference for hostel room', 'Availability of street lighting',* and *'Provision of good views to green areas'.*

A. *Students' colour perception and preference for hostel room*

This variable is achieved largely. The bedrooms of the hostel were observed with neutral colours. The walls and the ceiling are painted with white, and the floor tiles are black. In addition, there are white cupboard and doors, beige shelf, desk, bed, and also curtain, and red chair. In addition to the bedroom, the theme of white and grey colours is used in the shared bathroom (Fig. 138).

Figure 138 : Colours of the bedrooms and bathrooms

Through interviews, these colours were found highly satisfying the students. 38.3% of the interviewees were completely satisfied with the colours and 28.3% were largely satisfied. The interviewees who showed low satisfaction with the used colour in their bedrooms mentioned the reasons behind their level of satisfaction, and the most common reason was the dark (black) colour of the floor tile (Fig. 139).

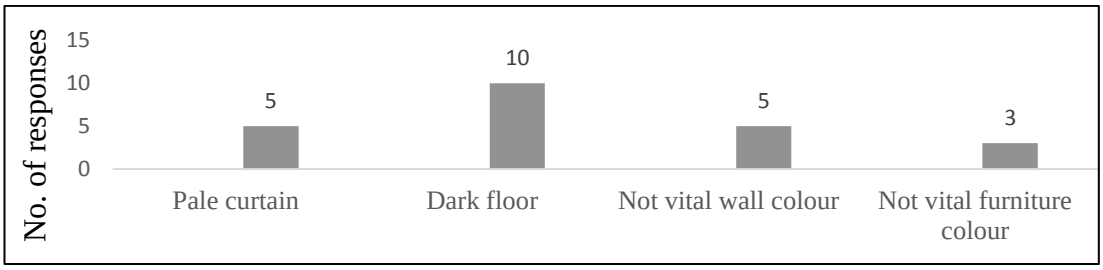


Figure 139: Results of interviewees' responses to reasons of the low satisfaction with the bedroom colours

B. *Availability of street lighting*

This variable is achieved partially. As discussed before in the principles of 'Social Integration' and 'Security', the outdoor of the hostel is observed generally with dim light in multiple spaces especially in the individual open spaces of each building. However, there are well lit spaces concentrated in the shaded walkways, the main garden, and the main street surrounding the hostel. This unbalanced availability of lighting, shown in Fig. 140, was found also through interviewees' responses. 33.3% of the interviewees were partially satisfied with the availability of the lighting in the outdoor of their hostel, and 30% were largely satisfied.

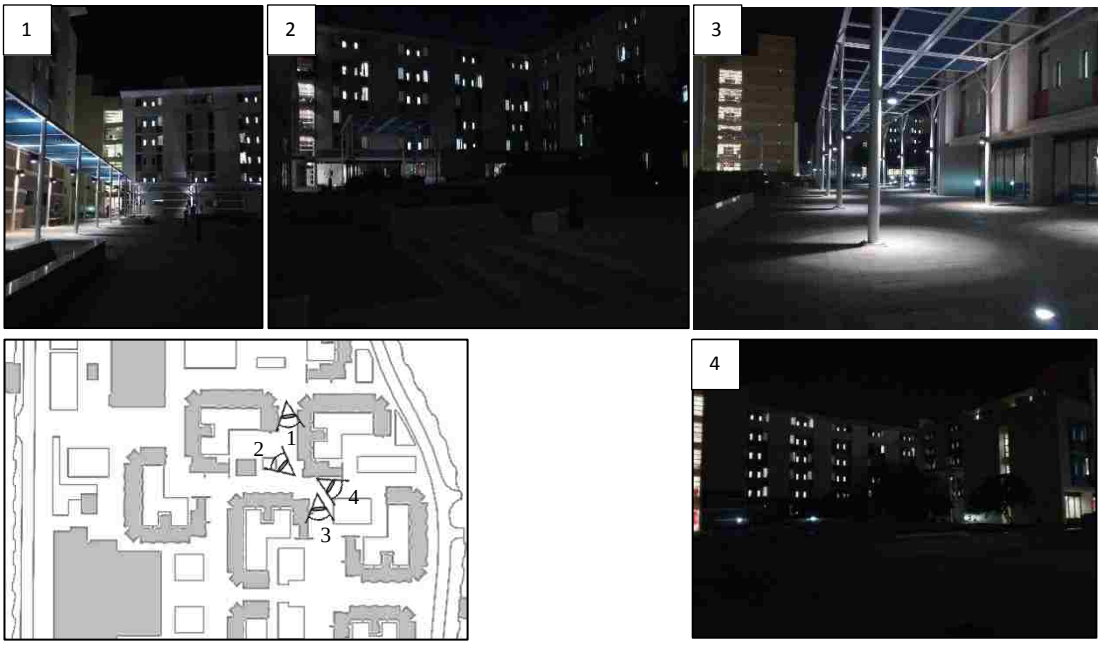


Figure 140: Views for the outdoor space of the hostel at night time

C. Provision of good views to green areas

This variable is achieved largely. As shown before in multiple principles, the outdoor of the hostel is well planted, and the greenery areas can be seen greatly in almost all the hostel. This provision to green areas were supported through the majority of interviewees' responses. 40% of the interviewees were largely satisfied with the provision to green areas and 31.7% were completely satisfied.

In addition to the discussed variables for the indicator of 'Visual Quality', there are other variables mentioned through the interviews affecting the visual quality for the students. The most emphasized variable that was mentioned by 76.7% of the interviewees is the bedroom artificial lighting. This variable is achieved poorly in the design. As mentioned in principle of 'Responsiveness to social needs', the bedrooms have no ceiling light; there is only one side lighting recessed in the fixed shelf on the wall, and it is yellowish. The majority of the interviewees were unsatisfied with this lighting in terms of its amount and colour. 28.3% of the interviewees were not satisfied at all, and the same percentage were poorly satisfied.

5.10.2 Acoustic and noise control

There are two found variables contributing in achieving this indicator: '*Use of acoustic insulation design features'* and *'Prevention of overcrowding'*.

A. Use of acoustic insulation design features

This variable is achieved poorly in the design. As mentioned in the principle of 'Privacy', the bad sound insulation in many indoor spaces was a major reason for reducing the sense of privacy. Through interviews, the vast majority of the interviewees were unsatisfied with the sound insulation in the hostel. 65% of them

were not satisfied at all and 21.7% were poorly satisfied. This un satisfaction with the sound insulation was mentioned in all the indoor spaces especially the bedroom.

B. *Prevention of overcrowding*

This variable is achieved partially. Through observations, two places were found overcrowded through multiple times. The first place is the canteen; it was observed with too much noise in the three times of the daily meals. This canteen is not only serving the students of NC hostel but also the students of Maqam 4 hostel that was built also within the university campus but after NC hostel by around 6 years. The second place, which was observed overcrowded at weekends specifically when the students move from and to the hostel, is the Reception. These two places were mentioned also by the interviewees as crowded places with high concentration on the canteen and less concentration on the reception. Additionally, the supermarket and the lounge space of the upper floors were also among the common mentioned overcrowded places due to their limited area (Fig. 141).

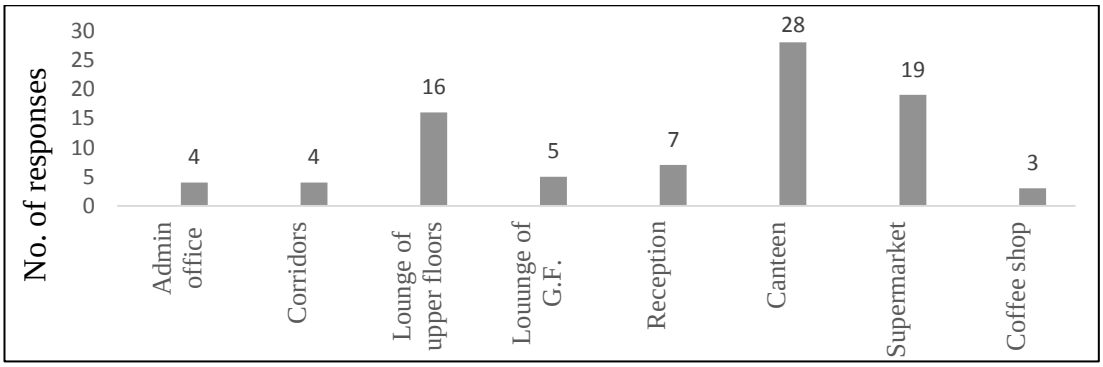


Figure 141: Results of interviewees' responses to indoor spaces with overcrowding

Besides the above mentioned indoor spaces, there were also some overcrowded outdoor spaces mentioned by the interviewees (Fig. 142). The most common space is the area between buildings A6 and A3 that was found the highest connected and integrated spaces in the hostel.

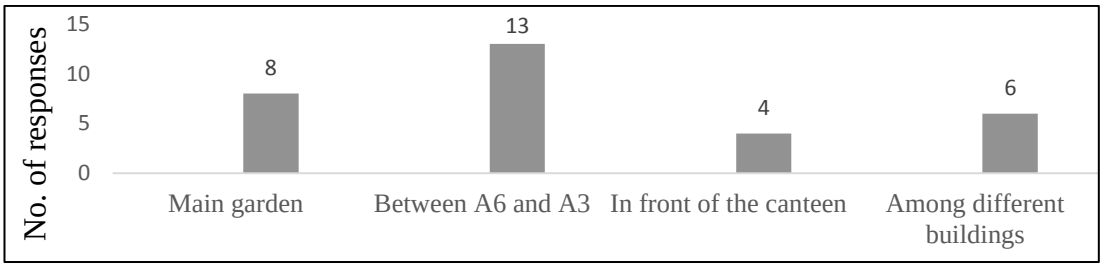


Figure 142: Results of interviewees' responses to outdoor spaces with overcrowding

5.10.3 Daylight

This indicator can be achieved by '*Availability of natural lighting'*.

A. *Availability of natural lighting*

This variable is achieved largely. To find out the natural light that the bedrooms gain, a design analysis for the shading was utilized using sketch up. This analysis occurs at three different time of the day in two months: October, representing the middle month of the fall semester and March, representing the middle month of the spring semester (Fig. 143 & 144).

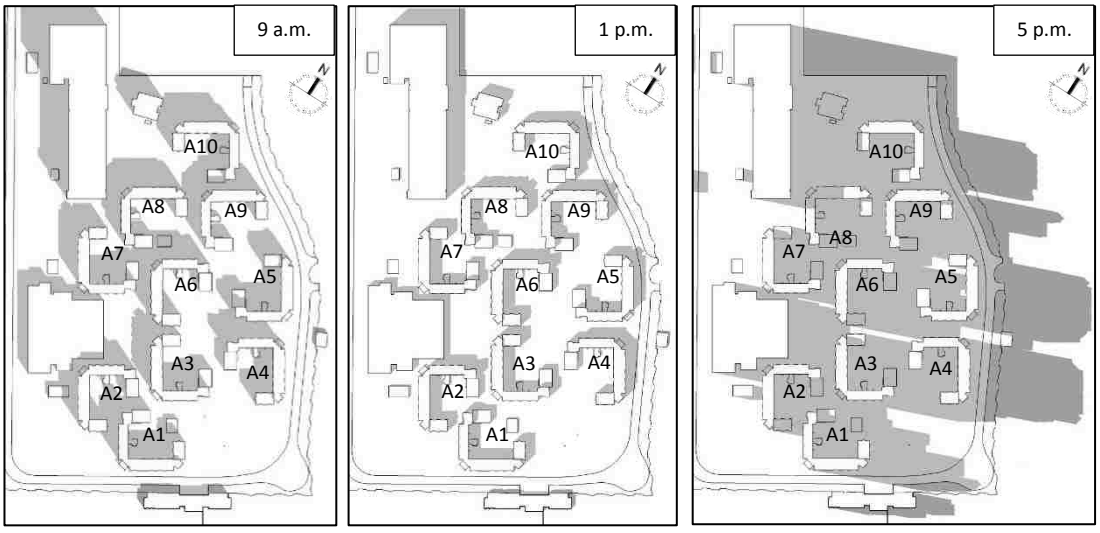


Figure 143: Sun shadows at different times in October

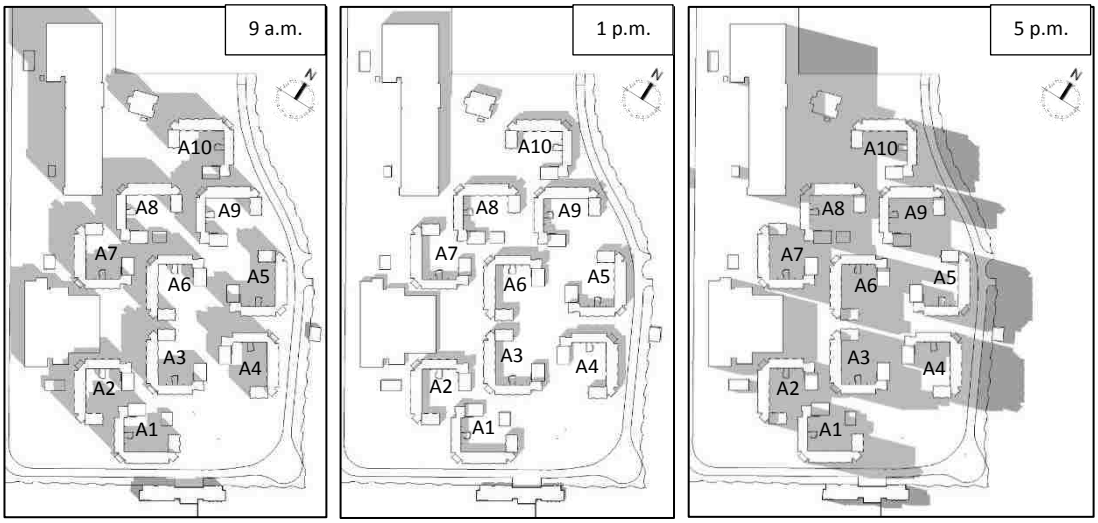


Figure 144: Sun shadows at different times in March

The results showed that the bedrooms on the north west direction are shaded in all the times; they are not getting direct natural light. Additionally, the bedrooms that are oriented towards the indoor sides of the building are getting less direct natural light than those oriented towards the outer sides. Through interviews, 21.7% of the interviewees, shown in Fig. 145, mentioned that they are getting low natural light in their own bedrooms. On the other hand, 16.7% of the interviewees, shown in Fig. 146, mentioned the opposite. They are getting over natural light in their own bedrooms especially in the morning time, and for that, they suggested to have thick curtain to obscure the sun light.

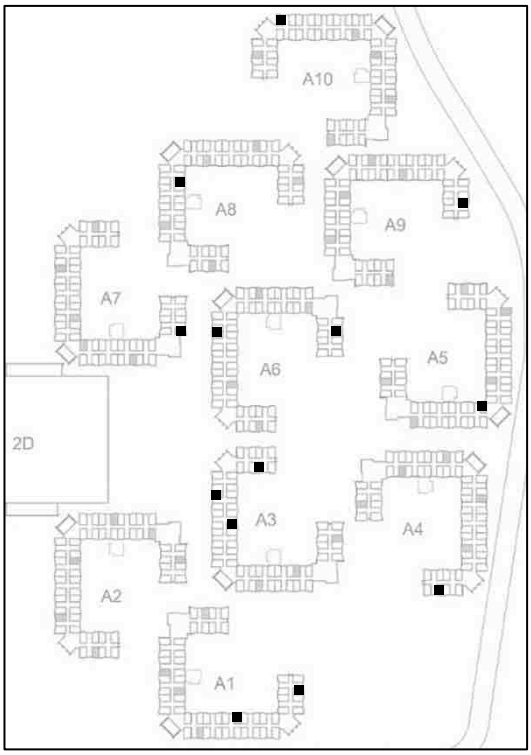


Figure 145: Interviewees' locations who mentioned low natural light in their bedrooms

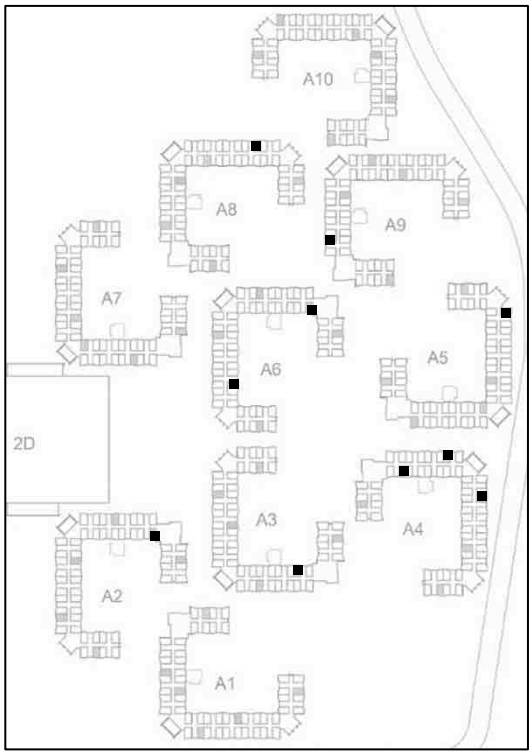


Figure 146: Interviewees' locations who mentioned over natural light in their bedrooms

The shown locations of the interviewees who are getting low and over natural light support the results of the shading analysis to a large extent. In addition to the bedrooms, the other indoor spaces were observed properly lit naturally in almost all the buildings through different times of the day. However, the prayer room, that was mentioned used for studying, was observed with low natural light due to the narrow window that is located at the side of the room (Fig. 147). Moreover, the canteen was observed also with low natural light as the surrounding glass facades of it are covered mostly with paper for a privacy issue, and there are high canopies obscuring the sun light from the non-covered part of the glass (Fig. 148).

Figure 147: Window of the prayer room

Figure 148: Glass façade of the canteen

The prayer room and the canteen in addition to the lounges and corridors were mentioned through interviews as spaces with low natural light by less than 8% of the interviewees. The overall available amount of natural lighting in the hostel was found highly satisfying the majority of the interviewees; 41.7% of the interviewees were completely satisfied, and 30% were largely satisfied.

5.10.4 Thermal comfort

This indicator can be achieved through two variables: '*Availability of ample ventilation and convenient temperature'* and *'Use of proper material in respond to hostel climate location'.*

A. *Availability of ample ventilation and convenient temperature*

This variable is achieved partially. 41.7% of the interviewees were unsatisfied with the ventilation in their bedrooms due to the limited opening of the window. The windows are designed to be rotated from the middle by around 30 degrees. This opening was found inconvenient to provide proper ventilation; in most of the interviewees' bedrooms, the students were found increasing this opening by breaking the piece that stop the rotation (Fig. 149).

Figure 149: Window opening of the bedroom

In addition to the bedrooms, the lounge spaces of the upper floors were mentioned also by some interveiwees as spaces with un satisfying ventilation due to the fixed window type in spite of the availability of a pantry in each lounge.

Beside the ventilation, the perceived temperature in the hostel was not convenient for half of the interviewees especially in bedrooms. 40% of the interviewees were not satisfied with the cold atmosphere in their bedrooms even when they switched off the air conditioner, and they justified this issue with two reasons: the cold air that comes from the corridor and the shared bath, and the cold ceramic floor material all the time. The overall indoor atmosphere of the hostel was found highly satisfying most of the interviewees. 31.7% of the interviewees were completely satisfied and another similar percentage were largely satisfied.

B. Use of proper material in respond to hostel climate location

This variable is achieved largely. The used construction material in the hostel is concrete block wall which is suitable for the climate of UAE as a material that is unaffected by the extreme temperatures and provide insulation against heat (Guerra, n.d.). Additionally, an insualtion is used also in the walls and roofs.

5.10.5 Healthy indoor quality

This indicator can be achieved by two design variables: '*Fittings resisting insects',* and *'Adequacy of available facilities to avoid high occupancy ratio'.*

A. *Fittings resisting insects*

This variable is achieved partially. Although the window of the bedroom has limited opening, it has no screen to avoid the insects that can enter through this opening. Through interviews, 10% of the interviewees mentioned the insects that enter their bedrooms from the windows in the upper floors as a reason for unhealthy quality. Furthermore, 15% of the interviewees mentioned the insects that comes from the nearby outdoor garden and enter their bedrooms due to their locations in the ground floor and the absence of screens for the doors of the buildings. Other 11.7% of the interviewees mentioned the communal spaces of the ground floor as un healthy for the same reason of coming insects from the nearby outdoor garden.

B. *Adequacy of available facilities to avoid high occupancy ratio*

This variable is achieved largely. As discussed in previous principle, the facilities were distributed at different levels to serve the students at different scales. First, the bedroom is a single type serving each individual student alone. Second, the bathroom is shared between each two students only. Third, the lounge of each floor serving the students of the floor. Fourth, the communal facilities in the ground floor of each building serving the students of the building. Finally, the communal services within the hostel layout such as the canteen and supermarket serving the students of the whole hostel. These different scales of facilities reduced from the high occupancy ratio. However, 6.7% of the interviewees mentioned the indoor quality of the canteen as unhealthy due to the huge number of students who are using this space, students of

NC hostel and also Maqam 4 hostel, with no available opened windows for ventilation.

In the conclusion, the degrees of achievement for the discussed variables resulted in partial achievement for the two indicators: 'Visual quality' and 'Acoustic and noise control' and large achievement for the remaining three variables: 'Daylight', 'Thermal comfort', and 'Healthy indoor quality'. Sequentially, the main principle is partially achieved (Fig. 150).

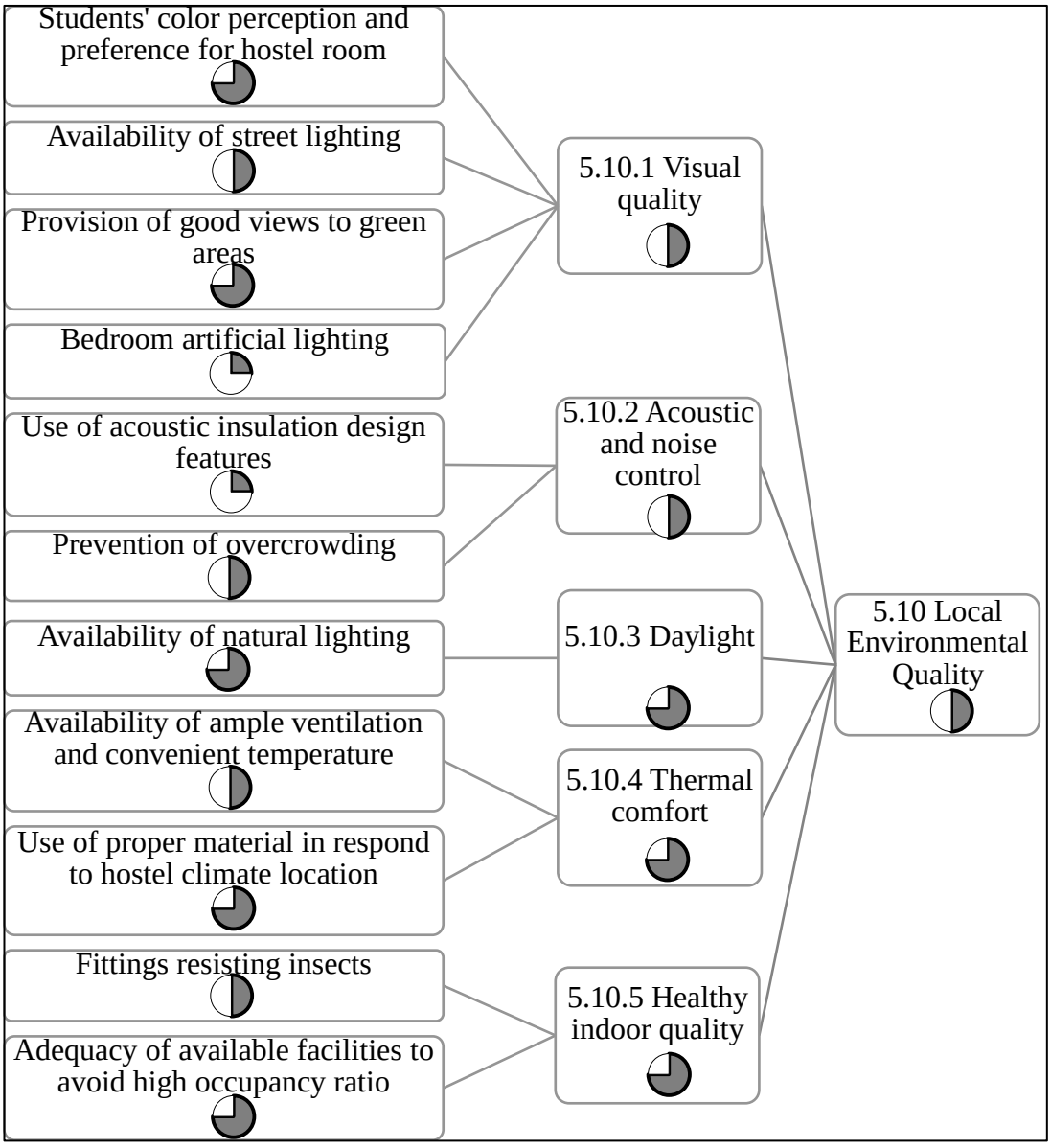


Figure 150: Concluded evaluation of tenth principle (Local Environmental Quality)

5.11 Participation

The achievement of this principle is indicated by 'Involvement of students in design'

5.11.1 Involvement of students in design

There are two main variables: '*Involving students within hostel design process'* and *'Involving students with hostel design-oriented decision making'.*

A. *Involving students within hostel design process*

This variable is not achieved at all as there was not any form of engagement for the students in the design process of this hostel.

B. *Involving students with hostel design-oriented decision making*

This variable is achieved partially. Through interviews, the majority of the interviewees mentioned that they feel they are involved in the hostel design-oriented decision making. 36.7% of the interviewees felt partially involved and 21.7% felt largely involved. On the other hand, 41.7% of the interviewees got involved in actual various participations related to decision making about hostel facilities during their periods of stay in the hostel. The participations varied between filling surveys, suggesting facilities, and in engaged in meetings with the supervisor.

The degrees of achievement for the discussed two variables results in poor achievement for their indicator and sequentially for the principle (Fig. 151).

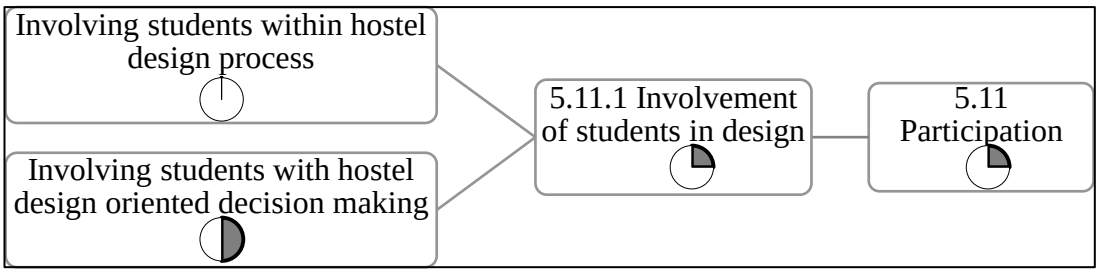


Figure 151: Concluded evaluation of eleventh principle (Participation)

5.12 Pride/Sense of Place

The achievement of this principle is indicated by 'Feelings of pride, identification, and belonging'.

5.12.1 Feelings of pride, identification, and belonging

This indicator can be achieved through four variables: '*A hostel with character of its own', 'Hostel design promoting shared characteristics of its students', 'Students' satisfaction with perceived design quality of the hostel',* and *'Involvement of students in designing their hostel'.*

A. A hostel with character of its own

This variable is achieved largely. Through Interviews, 75% of the interviewees agreed that their hostel has a distinguished character of its own. Furthermore, the common mentioned types of character varied between multiple design features that distinguish this hostel from the other female hostels of the university especially the old ones that had been built prior to this hostel (Fig. 152).

Figure 152: Results of interviewees' common responses to the type of their hostel's character

B. Hostel design promoting shared characteristics of its students

This variable is achieved largely. Through interviews, most of the interviewees agreed that their hostel design promote their shared characteristics as females, singles, students, and UAE nationals mostly. 38.3% of the interviewees completely

agreed on that, and 33.3% largely agreed. On the other hand, the interviewees, who showed less agreement, mentioned some common reasons related to the previous discussed principles such as the privacy (Fig. 153).

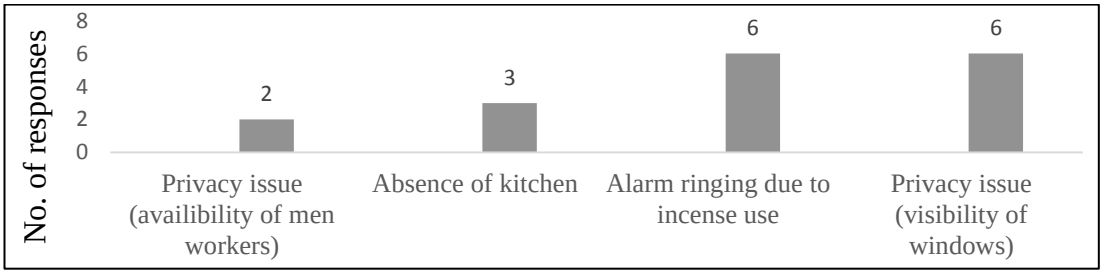


Figure 153: Results of interviewees' common responses to reasons of low agreement with the promotion of hostel design to the shared characteristics of its students

C. Students' satisfaction with perceived design quality of the hostel

This variable is achieved largely. When the interviewees were asked about their overall satisfaction with the design quality of their hostel, 55% were largely satisfied, and 28.3% were partially satisfied. Moreover, among the type of factors that the interviewees mentioned to enhance their sense of belonging, the design variables that are related to the different mentioned principles were the highest (Fig. 154).

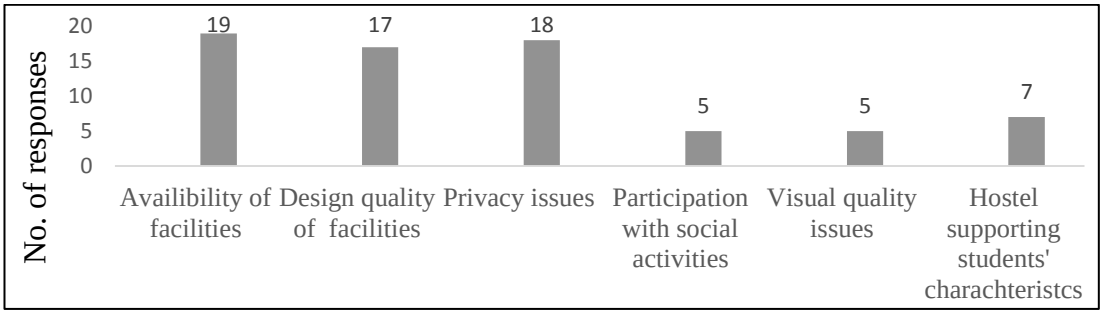


Figure 154: Categorical classification for interviewees' common responses to factors enhancing their sense of belonging

D. Involvement of students in designing their hostel

This variable is not achieved as mentioned in the principle of 'Participation'.

All in all, the degrees of achievement of the variables resulted in partial achievement for their indicator and sequentially for its principle (Fig. 155). This partial achievement for the indicator is somehow compatible with the interviewees' sense of belonging through interviews. 25% of the interviewees felt partially belong and other 25% felt largely belong.

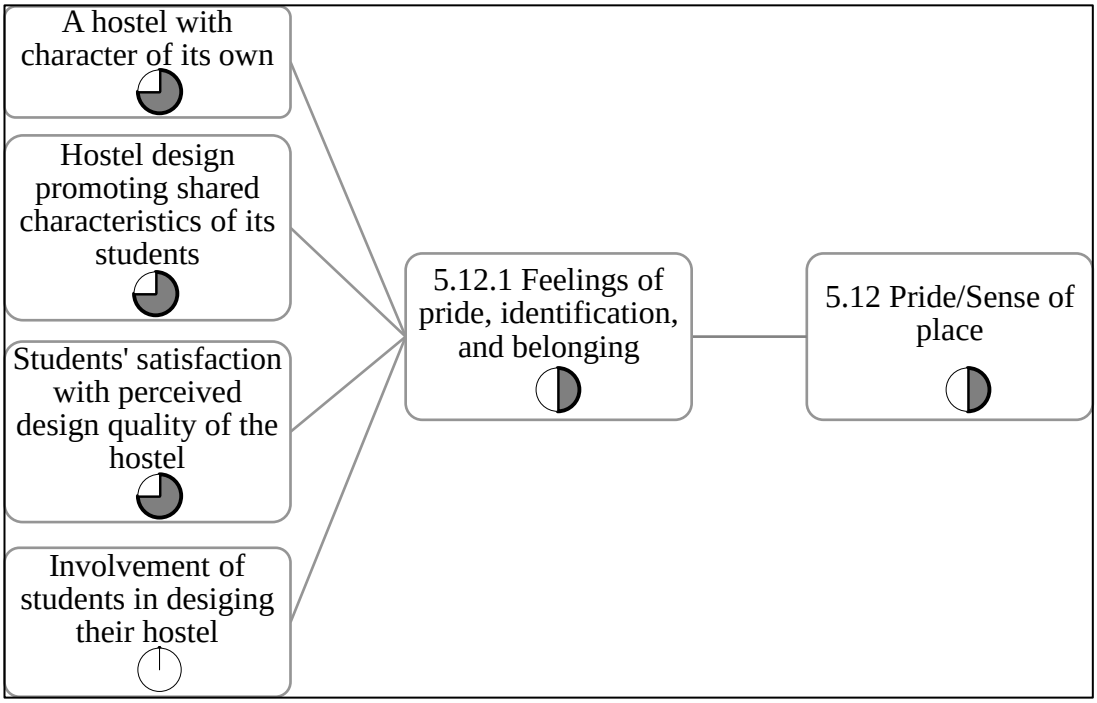


Figure 155: Concluded evaluation of twelfth principle (Pride/Sense of place)

In the conclusion of this chapter, it was found that the least achieved principle in the design of NC hostel is 'Participation' that is poorly achieved. There are eight principles were achieved partially which are 'Flexibility', 'Social Interaction', 'Social Integration', 'Mobility', 'Privacy', 'Security', 'Local Environmental Quality', and 'Pride/Sense of Place'. The remaining three principles of 'Responsiveness to Social Needs', 'Accessibility', and 'Safety' were found largely achieved. The degrees of achievement of these principles concluded that the NC hostel has been designed to a partial extent to be socially sustainable.

Chapter 6: Discussion

This chapter discusses the findings of the research in relation to its main and sub-questions. Moreover, it links the outcome of the investigated case study to the global theory of a socially sustainable student hostel design, the established conceptual framework.

The research answered all its sub-questions and sequentially its main question. It was found that there are twelve principles for a socially sustainable student hostel design: 'Responsiveness to Social Needs', 'Flexibility', 'Social Interaction', 'Social Integration', 'Accessibility', 'Mobility', 'Privacy', 'Safety', 'Security', 'Local Environmental Quality', 'Participation', and 'Pride/Sense of Place'. Finding the listed principles answered the following first research sub-question:

1. What are the principles of a socially sustainable student hostel design?

For each of the twelve aforementioned principles, multiple indicators were found to answer the following second research sub-question:

2. What indicates the achievement of each principle?

Various design variables that contribute to the achievement of each of the indicators were found to answer the following third research sub-question:

3. What design variables can be used to achieve each indicator?

Multiple tools were assigned to each design variable to investigate its degree of achievement in a case study of an existing student hostel. Observations, design analysis, interviews, and space syntax were the four used tools that answered the following fourth research sub-question:

4. What are the tools that can be used to investigate the achievement of the design variables in a case study of an existing student hostel?

Using a qualitative scale of five measures: not achieved, poorly achieved, partially achieved, largely achieved, and completely achieved, the degrees of achievement for each variable, sequentially for their indicators, and sequentially for their main principles in a case study of New Campus hostel were assessed, as illustrated in chapter 5, to answer following fifth and last research sub-question:

5. How can the design of an existing student hostel be evaluated using the conceptual framework including its principles, indicators, variables, and tools?

In the investigated case study of NC hostel, the poor achievement for the principle of 'Participation', the partial achievement for the eight principles of 'Flexibility', 'Social Interaction', 'Social Integration', 'Mobility', 'Privacy', 'Security', 'Local Environmental Quality', and 'Pride/Sense of Place', and the large achievement for the remaining three principles of 'Responsiveness to Social Needs', 'Accessibility', and 'Safety' concluded a fact that this existing hostel has been designed to a partial extent to be socially sustainable. This fact answered the following main research question:

- To what extent have the existing student hostels been designed to be socially sustainable?

It is important to note that the aforementioned degrees of achievement for the principles in NC hostel was found in relation the local context of the investigated case study. First, for the principle of 'Responsiveness to Social Needs' and regarding the first indicator, availability of needed facilities and services, although a canteen

was not found within the basic functional spaces in the conceptual framework, it is available as a basic facility that replaces the kitchen in NC hostel. Despite the availability of this canteen and pantries also, the absence of a kitchen was one of the weak points in this indicator in addition to the study rooms. Besides, car parking, which was listed also within the basic functional spaces in the conceptual framework, is not considered as a basic facility in NC hostel due to the rules of the hostel that allow students to use only the university buses or their relatives' cars. Moreover, in spite of the big and various outdoor areas, the need for a balcony, especially in the bedrooms, was greatly emphasized although the hostel is for females. Regarding the second indicator, quality of the available facilities and services, the size of the bedroom in NC hostel, 10.5 $\boldsymbol{m^2}$, was found as one of the main issues. It was found as unsatisfying size for a single student especially with the available restriction of the opening of the bathroom door.

Second, for the principle of 'Flexibility' and regarding the first indicator, capability for different social uses, although none of the spaces in the hostel was found allowing for changing their areas, the capability of the spaces to change their functions, as found in the lounges and prayer rooms, was more satisfying. Regarding the second indicator, capability of different physical arrangements, the use of the movable furniture was the only existing design variable in NC hostel allowing for different physical arrangements. In addition to the weak achievement of this variable, as fixed furniture was used also, the small size of the spaces especially bedrooms increased the weak capability of having different physical arrangements. Finally, regarding the third indicator, capability for future expansion, the NC hostel showed a very good example for the achievement of this indicator. The hostel is placed on its site within the university premises which it belongs to, and a place for two additional

future buildings for the hostel was found reserved. Additionally, the shape of buildings of the hostel can be extended.

Third, for the principle of 'Social Interaction', it was found that not all the indoor and outdoor communal spaces of NC were successfully designed to encourage the students' unintentional interaction as they are located in low connected and highly segregated areas. However, the quality of the communal spaces including their selected colours, finishing materials, lighting, and translucent walls was found successfully supporting the intentional interaction. Moreover, the use of the communal services to encourage the students' interaction was found not limited to the services of each building such as the laundry room in the ground floor, but also it includes the use of the canteen that serves the whole hostel three times daily.

Fourth, for the principle of 'Social Integration' and regarding the first indicator, participating in activities within hostel community, not all the spaces of the activities were found encouraging the students' involvement as some of them are located within low mixed of land uses. In addition, not all the activity spaces were well considered in terms of the legibility factors, such as wayfinding, sufficient landmarks, identity of space, and easily recognizable buildings and also in terms of their design qualities. Regarding the second indicator, active living, in addition to the five landscape features affecting the students' active living, suitability of lighting at night was an additional feature that was not found in the conceptual framework; however, it was found through investigating the case study of NC hostel.

Fifth, for the principle of 'Accessibility' and regarding the first indicator, equitable access for everyday facilities, the distribution of the facilities within the longitudinal layout of NC hostel and the shape of the indoor floor layout was contributing badly in achieving this indicator. Regarding the second indicator,

appropriate measures for handicapped, although the communal facilities of each building and of the whole hostel were placed in the ground floor, the placement of bedrooms for students with wheelchairs in the upper floors created unsuitable access for the facilities. This explained the interviewed student's preference, who was in a wheelchair, to reside in a normal bedroom in the ground floor rather than the specially designed bedroom for students with disabilities in the upper floors.

Sixth, for the principle of 'Mobility' and regarding the first indicator, walkable and cycling hostel community, the proper lighting and shading were additional elements, not found in the conceptual framework, affecting the variable of promoting walkability. Moreover, cycling was not found in NC hostel as a must; it is a matter of preference that was not greatly emphasized. The moderate preference for using cycling in NC hostel refers to some contextual considerations, such as the hot climate the encourages using the buses more and the students' characteristics as female Muslims who are usually wearing Hijab and Abaya. The second indicator, public transportation to outside hostel community, was found inapplicable for assessment in NC hostel as the students are not allowed to go outside the hostel alone without their families. In addition, all the students' movements are organized by the university buses.

Seventh, for the principle of 'Privacy' and regarding the first indicator, perception of privacy within hostel community, the use of single bedroom type in NC hostel was found the strongest design variable that supports each individual's privacy. However, having the bathroom shared between every two bedrooms was found hurting this privacy. Moreover, although the bedrooms are designed in a linear kind of planning in which there is face to face doors openings allowing for direct visual contact, it was not emphasized as a reason for hurting privacy as the active

space of the bedroom is located aside from the door opening view. Furthermore, the absence of an intermediate space in the bedroom to separate the guests from the owner personal space was not emphasized as a reason for hurting privacy. In addition to the found design variables in the conceptual framework that contribute to the perception of privacy within the hostel, a good sound insulation to preserve the privacy of each space, especially the bedrooms, was found the most critical reason hurting the privacy of the students in NC hostel. Regarding the second indicator, perception of privacy from nearby adjacent surroundings, the location of the fenestrations in relation to surroundings was the most design variable contributing badly in preserving the students' privacy. As the students are female Muslims, the use of the glass facades overlooking the streets without any control over its transparency was found as a weak design aspect hurting the students' privacy in their indoor spaces, such as the lounges and the corridors.

Eighth, for the principle of 'Safety' and regarding the first indicator, students' sense of safety, the condition and maintenance of the built environment of NC hostel was found contributing positively in achieving a good sense of safety. Moreover, the design has all the variables for the second indicator, protection from hazards.

Ninth, for the principle of 'Security' and regarding the first indicator, students' sense of security, although this indicator was found well achieved, there is a design aspect affecting negatively the students' sense of security which is the easily opened door lock of the shared bathroom between every two bedrooms. Regarding the second indicator, protection form crimes, the crime of theft was found widespread. The relative position (control) for each space in the plan was found as a weak design variable contributing negatively to avoid the theft.

Tenth, for the principle of 'Local Environmental Quality' and regarding the first indicator, visual quality, the most design variable in NC hostel that was found affecting students' satisfaction with the visual quality negatively is the dim bedroom lighting which was not found in the conceptual framework. Regarding the second indicator, acoustic and noise control, the poor use of acoustic insulation was the most critical issue in achieving this indicator. Regarding the third indicator, daylight, the natural lighting was found well in the hostel. Regarding the fourth indicator, thermal comfort, the restricted opening of bedroom windows was found as a design issue that affected negatively the students' satisfaction with having ample ventilation. Finally, regarding the fifth indicator, healthy indoor quality, the absence of screens, as fittings resisting insects on the doors and windows, was found contributing negatively to achieve a well healthy indoor quality.

Eleventh, for the principle of 'Participation', due to the total non-involvement of the students in the design process of their NC hostel and the weak involvement in design-oriented decisions making, this principle was the least achieved.

Twelfth, for the last principle of 'Pride/Sense of Belonging', the enhancement of NC hostel design through two principles: 'Responsiveness to social needs' and 'Privacy' was found as the most factors that can increase the students' partial sense of belonging.

Chapter 7: Conclusion and Recommendations

On one side, social sustainability is the least explored realm of sustainability, as the focus is usually about the economic and environmental realms. Locally in UAE, multiple initiatives were emerged to encourage adopting sustainability in designing buildings and communities. On the other side, the design of student hostels got little attention by focusing on two main points: energy savings and students' satisfaction. Locally in UAE, the design of student hostels was tackled rarely in spite of the great UAE government focus towards the higher education and attractiveness of international students. This research tried to highlight the social part of sustainability in the design of student hostels using case study method within a mix of qualitative and quantitative approach.

The methodology had two stages. In the first stage, a conceptual framework of a socially sustainable student hostel design was established using literature review. This framework included twelve main principles: 'Responsiveness to Social Needs', 'Flexibility', Social Interaction', 'Social Integration', 'Accessibility', 'Mobility', 'Privacy', 'Safety', 'Security', 'Local Environmental Quality', 'Participation', and 'Pride/Sense of Place'. Each of these principles had its own indicators, and each indicator had its own design variables. In the next stage, the established conceptual framework was used to evaluate a case study of New Campus hostel, one of UAE University female student hostels case study in terms of its extent of being designed as socially sustainable. The evaluation was utilized using four main tools: observations, design analysis, structured interviews, and space syntax. Each design variable was investigated within the selected case study using multiple tools, and through data triangulation, the degrees of achievement of the variables were assessed

in a qualitative scale of five measures: not achieved, poorly achieved, partially achieved, largely achieved, and completely achieved. Then, the degrees of achievement for the variables resulted with the degrees of achievement for their indicators, and sequentially the degrees of achievement for their main principles.

This evaluation showed that the NC hostel has been designed to a partial extent to be socially sustainable. Eight of the principle including 'Flexibility', 'Social Interaction', 'Social Integration', 'Mobility', 'Privacy', 'Security', 'Local Environmental Quality', and 'Pride/Sense of Place' were found partially achieved. The principle of 'Participation' was poorly achieved, and the remaining three principles of 'Responsiveness to Social Needs', 'Accessibility', and 'Safety', were found largely achieved.

The discussion of the research findings revealed the guidelines that should be considered to design new hostels in a more socially sustainable manner and to renovate the existing student hostels to be more socially sustainable (Table 19). Some of the design variables were found less considered comparing with the others while establishing the conceptual framework and also through investigating the selected case study. For that reason, they had been highlighted, written in bold text, in Table 19 to make the designers and planners give it more considerable attention as design guidelines.

Table 19: Suggested design/redesign guidelines for a socially sustainable student hostel

Principles	Indicators	Design/Redesign Guidelines
7.1 Responsiveness to Social Needs	7.1.1 Availability of needed facilities and services	A. Availability of basic functional spaces B. Availability of aspects of everyday life of hostel community C. Availability of specific facilities in respond to students' cultural preferences D. Availability of suitable facilities for students with disabilities **E. Need for a balcony**
	7.1.2 Quality of provided facilities and services	A. Suitability of areas B. Suitability of spatial organization (zoning) C. Availability of modern amenities
7.2 Flexibility	7.2.1 Capability of different social uses	**A. Design allowance for changing space areas** B. Design allowance for changing space functions: • Designing areas to serve more than one function • Furnishing to separate different functional spaces
	7.2.2 Capability of different physical arrangement	**A. Provide unit modules for flexible spatial organization** **B. Use of folding furniture for flexible configurations** C. Use of movable furniture
	7.2.3 Capability of future expansion	A. Placing the building on its site to leave room for an addition B. Giving the building a shape that is easily extended
7.3 Social Interaction	7.3.1 Intentional and unintentional students' Interaction	**A. Configuration of spaces:** • Distribution of common and individual spaces • Hierarchy and spatial depth • Geometry of spaces • Spaces with minimal fragmentation B. Quality of individual common spaces: • Well-chosen design through aptly selected colours, finishing materials, appropriate lighting, and translucent walls C. Use of communal services such as kitchen to serve groups of residents
7.4 Social Integration	7.4.1 Participating in activities within hostel community	A. Mixing land uses and increasing density B. Legibility: • Wayfinding • Identity of space through sufficient landmarks • Easily recognizable buildings • Welcoming outdoor C. **Quality of activity places:** • Quality and sufficiency of available facilities

Table 19: Suggested design/redesign guidelines for a socially sustainable student hostel (Continued)

Principles	Indicators	Design/Redesign Guidelines
	7.4.2 Active living	A. Landscape features: • Comfortable furniture and benches to study outside, • Roofed and guarded places for ordinary meetings, • Suitable and calm meeting spaces, • Eliminating nonemergency preventives, • Providing treed pathway between pedestrian and its edge, particularly margin streets of hostel community • Suitability of lighting at night
7.5 Accessibility	7.5.1 Equitable access for everyday services and facilities	A. Distribution of facilities **B. Floor layout** C. Mode of access: horizontal/vertical, direct/indirect
	7.5.2 Appropriate measures for handicapped	A. The doors of main entrance and common use area are accessible by students in wheelchairs B. Kitchens and bathrooms are designed to be useable by students in wheelchairs C. Suitable width and access for car parking space D. Placing critical spaces on the lowest floor for ease of access
7.6 Mobility	7.6.1 Walkable and cycling community	A. Availability of friendly pedestrian walk and bicycles ways **B. Availability of bike storage and bike rental service** C. Promoting walkability: • Increased pedestrian connectivity, • Exposure to life area buildings (recreational buildings) • Population density • Lighting • Shading
	7.6.2 Public transportation to outside hostel community	A. Availability of efficient public transportation system
7.7 Privacy	7.7.1 Perception of privacy within hostel community	A. Hierarchy of distribution of spaces from public to semi-public/semi-private to private **B. Clustering kind of room planning to avoid direct visual contact from the opposite room** C. Area for common space in private room acting as an intermediate space between guests and owner personal space D. Attachment of bathroom within the room unit rather than communal shared bathroom E. Single type of bedroom rather than shared F. Use of bed curtains in shared bedroom **G. Sound insulation in private spaces**

Table 19: Suggested design/redesign guidelines for a socially sustainable student hostel (Continued)

Principles	Indicators	Design/Redesign Guidelines
	7.7.2 Perception of privacy from nearby adjacent hostel surroundings	A. Form of hostel building/s B. Orientation of the hostel building/s C. Locations of fenestrations in relation to surroundings
7.8 Safety	7.8.1 Students' sense of safety	A. Condition and maintenance of the built environment
	7.8.2 Protection from Hazards	A. Means of fire resistance in the design such as smoke detector and alarms and fire resistance materials B. Anti-slippery floorings C. Means of escape in case of emergency
7.9 Security	7.9.1 Students' sense of security	A. Location of hostel in a safe part of town B. Natural surveillance through active frontage such as having windows directly overlooking streets
	7.9.2 Protection from crimes	A. Means of security in design details such as fences, suitable building materials, lockers, alarms, and lighting sensors **B. Relative position (control) for each space in the plan** C. Degree of visibility among internal/external spaces **D. One main entrance entry**
7.10 Local Environmental Quality	7.10.1 Visual quality	A. Students' colour perception and preference for hostel room B. Availability of street lighting C. Provision of good views to green areas **D. Suitability of bedroom artificial lighting**
	7.10.2 Acoustic and noise control	**A. Use of acoustic insulation design features** B. Prevention of overcrowding
	7.10.3 Daylight	A. Availability of natural lighting
	7.10.4 Thermal comfort	A. Availability of ample ventilation B. Use of proper material in respond to hostel climate location
	7.10.5 Healthy indoor quality	A. Fittings resisting insects such as (windows and doors screens) B. Adequacy of available facilities to avoid high occupancy ratio
7.11 Participation	7.11.1 Involvement of students in design	**A. Involving students within hostel design process** B. Involving students with hostel design-oriented decision making
7.12 Pride/Sense of Place	7.12.1 Feelings of pride, identification, and belonging	A. Hostel with character of its own B. Hostel design promoting shared common characteristics of its students C. Students' satisfaction with perceived design quality of the hostel **D. Involvement of students in designing their hostel**

All in all, this research tried to spot the light on the area of a socially sustainable student hostel design and opening horizons for multiple future research. The established conceptual framework is limited with the amount of the reviewed literature, so it can be expanded in future research by looking for more principles, indicators, and design variables contributing in designing a more socially sustainable student hostel. Moreover, as this research is limited with its longitudinal approach in which all the found twelve principles were investigated at the same time within the selected case study and as a result a single case study is selected; there is a great future capability to study each of the principles further by comparing its capability of achievement in multiple case studies of student hostels. Furthermore, there are multiple correlations that can be an interested research questions to be addressed in future research, such as correlating the findings of the investigated case studies of student hostels with the gender of students as the selected investigated case study for this research is for female students only.

References

Abdulqader. (2017, September 25). Required data for UAE University Female Hostel Students

Abu Dhabi is the safest city in the world in 2017. (2017, August 15). [news]. Retrieved February 27, 2018, from http://www.alarabiya.net/ar/last-page/2017/08/15/2017-عام-في-أماناً-العالم-مدن-أكثر-أبوظبي-.html

Accessibility Design Manual: 5-Appendices: 2-Anthropometrics 1/2. (2003). [Organization]. Retrieved February 22, 2018, from http://www.un.org/esa/socdev/enable/designm/AD5-02.htm

Ajayi, M., Nwosu, A., & Ajani, Y. (2015). Students 'satisfaction With Hostel Facilities In Federal University Of Technology, Akure, Nigeria. *European Scientific Journal, ESJ*, *11*(34) 402-415.

Akinpelu, O. P. (2015). Students' Assessment of Hostel Facilities in the Polytechnic Ibadan, Ibadan, Nigeria: Realities and Challenges, *5*, 74–82.

Ali, H. H., & Al Nsairat, S. F. (2009). Developing a green building assessment tool for developing countries–Case of Jordan. *Building and Environment*, *44*(5), 1053–1064.

Amole, D. (2009). Residential satisfaction in students' housing. *Journal of Environmental Psychology*, *29*(1), 76–85.

Anna, V., Zoltán, F., Miklós, O., & György, P. (2008). Indicators of Social Sustainability, 107–117.

Anokye, P. A., & Mohammed, A. (2016). Students' Accommodation and Security Implications: A study of some selected hostels of the Kwame Nkrumah University of Science and Technology; Ghana. *Imperial Journal of Interdisciplinary Research*, *2*(8). Retrieved from http://imperialjournals.com/index.php/IJIR/article/view/1464

Basket Apartments. (2017). Retrieved March 8, 2018, from https://architizer.com/projects/basket-apartments/

Bastyr University Student Village / collinswoerman. (2010, December 17). Retrieved March 6, 2017, from http://www.archdaily.com/96482/bastyr-university-student-village-collinswoerman/

Bayreuth Youth Hostel. (2015). Retrieved March 7, 2018, from http://www.l-a-v-a.net/projects/bayreuth-youth-hostel/

Bondinuba, F. K., Nimako, S. G., & Karley, N. K. (2013). Developing student housing quality scale in higher institutions of learning: a factor analysis approach. *Urban Studies Research, 2013*.

Bramley, G., Dempsey, N., Power, S., & Brown, C. (2006). What is "social sustainability", and how do our existing urban forms perform in nurturing it. In *Sustainable Communities and Green Futures' Conference, Bartlett School of Planning, University College London, London*. Retrieved from http://www.academia.edu/download/45826797/Pubs_Bramleyetal06.pdf

Caistor-Arendar, L., Bacon, N., Woodcraft, S., & Hackett, T. (2011). *Design for Social Sustainability*. The Young Foundation. Retrieved from https://youngfoundation.org/publications/design-for-social-sustainability/

Carlaw Park Student Accommodation / Warren and Mahoney. (2014a, July 17). Retrieved March 8, 2018, from http://www.archdaily.com/525918/carlaw-park-student-accommodation-warren-and-mahoney/

Caso Environmental Group Limited | caso (HK) Engineering Co., Ltd. (n.d.). Retrieved March 19, 2017, from http://www.caso.com.hk/caso_engineering.php?Pagenum_rsppt=5

Chaix, B., Kestens, Y., Perchoux, C., Karusisi, N., Merlo, J., & Labadi, K. (2012). An interactive mapping tool to assess individual mobility patterns in neighborhood studies. *American Journal of Preventive Medicine*, *43*(4), 440–450.

Cities - United Nations Sustainable Development Action 2015. (2015, September 25). [Organization]. Retrieved January 29, 2018, from http://www.un.org/sustainabledevelopment/cities/

Clarke, K. (2016, September 11). Wanted: Affordable student housing options in Dubai. *Khaleej Times Education*. Retrieved from https://www.khaleejtimes.com/nation/education/wanted-affordable-student-housing-options

Cvetković, R., Stojić, D., Krasić, S., & Marković, N. (2015). Innovative structural CLT system in projecting and building of student houses. *Facta Universitatis-Series: Architecture and Civil Engineering*, *13*(1), 57–64.

Dempsey, N., Bramley, G., Power, S., & Brown, C. (2011). The social dimension of sustainable development: Defining urban social sustainability. *Sustainable Development*, *19*(5), 289–300. Https://doi.org/10.1002/sd.417

Department of Higher Education & Training, Republic of South Africa. (2011). *The Ministerial Committee for the Review of the Provision of Student Housing at South African Universities* (p. 20). Retrieved from https://www.google.ae/search?Q=the+Ministerial+Committee+for+the+Review+of+the+Provision+of+Student+Housing+at+South+African+Universities

Dursun, P. (2007). Space syntax in architectural design. In *6th international space syntax symposium* (pp. 01–56).

Edwards, G. (2012). *College Students 'knowledge of Hostels and What Factors Influence Their Intent to Stay*. Kansas State University. Retrieved from https://core.ac.uk/download/pdf/10652937.pdf

Galal Ahmed, K. (2011). Evaluation of social and cultural sustainability in typical public house models in Al Ain, UAE. *International Journal of Sustainable Development and Planning*, *6*(1), 49–80.

Gibson, E. (2016, May). Hamonic+Masson completes student housing with a facade of golden cubes. Retrieved March 8, 2018, from https://www.dezeen.com/2016/05/17/golden-cube-hamonicmasson-associes-student-housing-boulogne-billancourt-france/

Gilbert, N. (1993). *Researching Social Life*. SAGE Publications.

Green Building in Dubai. (2018, January 24). [Govermental]. Retrieved January 29, 2018, from https://www.dm.gov.ae/wps/portal

Groat, L. (2002). Qualitative Research. In *Architectural Research Methods* (1st ed., pp. 173–202).

Guerra, T. (n.d.). The Pros & Cons of Concrete Block House Construction. Retrieved March 2, 2018, from http://homeguides.sfgate.com/pros-cons-concrete-block-house-construction-65954.html

Häfele - Youth Lab. (2013, January 21). Retrieved March 7, 2018, from http://hafele.com/id/en/news-and-events/news/965.asp

Hancock, T. (n.d.). Social Sustainability. Retrieved January 29, 2018, from http://newcity.ca/Pages/social_sustainability.html

Handy. (2002). Accessibility- Vs. Mobility-Enhancing Strategies for Addressing Automobile Dependence In The U.S. Presented at the European Conference of Ministers of Transport. Retrieved from http://www.des.ucdavis.edu/faculty/handy/ECMT_report.pdf

Hossini, S. B., Azemati, S., Elyasi, N., & Mozaffar, F. (2015). The Effect of the Vitality Level of University Campuses on Increasing Social Interactions and Makin. *Procedia-Social and Behavioral Sciences*, *170*, 225–233.

Hostel CONII / Estudio ODS. (2016, June 26). Retrieved March 8, 2018, from http://www.archdaily.com/789909/hostel-conii-estudio-ods

Ibem, E. O., Opoko, A. P., Adeboye, A. B., & Amole, D. (2013). Performance evaluation of residential buildings in public housing estates in Ogun State, Nigeria: Users' satisfaction perspective. *Frontiers of Architectural Research*, *2*(2), 178–190.

Iftikhar, A., & Ajmal, A. (2015b). A Qualitative Study Investigating the Impact of Hostel Life, *17*(2), 511–515.

Ihouse Dormitory / Studio SUMO. (2016, December 5). Retrieved March 8, 2018, from http://www.archdaily.com/800834/ihouse-dormitory-studio-sumo

Ismail, A. S., Abdullah, A. M., & Siang, A. Y. (n.d.). A Study of Living Spaces in UTM Hostel. Retrieved from http://www.academia.edu/download/32095046/A_Study_of_living_spaces_in__UTM_hostelnasdec.pdf

Jalil, N. A., Yunus, R. M., & Said, N. S. (2013). Students' colour perception and preference: an empirical analysis of its relationship. *Procedia-Social and Behavioral Sciences*, *90*, 575–582.

Kales, M. Z. (2014). A Study of Attitude of University Girls Towards Hostel Life, *III*(IV), 265–273.

Kaya, N., & Erkip, F. (2001). Satisfaction in a dormitory building: The effects of floor height on the perception of room size and crowding. *Environment and Behavior*, *33*(1), 35–53.

Kebony. (2015, September 18). SOPP Lillehammer – 2016 Youth Olympic Games Student Housing in Norway by Kebony. Retrieved March 19, 2017, from https://www10.aeccafe.com/blogs/arch-showcase/category/hostel/page/2/

Khozaei, F., Ayub, N., Hassan, A. S., & Khozaei, Z. (2010). The factors predicting students' satisfaction with university hostels, case study, Universiti Sains Malaysia. *Asian Culture and History*, *2*(2), 148-158.

Khozaei, F., Hassan, A. S., & Khozaei, Z. (2010). Undergraduate students' satisfaction with hostel and sense of attachment to place: Case study of university sains Malaysia. *American Journal of Engineering and Applied Sciences*, *3*(3), 516–520.

Kolhatkar, S. (2014, February 11). Students Hostel for the differently-abled brings out the good in Pune. Retrieved March 7, 2018, from http://www.dnaindia.com/pune/report-students-hostel-for-the-differently-abled-brings-out-the-good-in-pune-1961067

Linked Hybrid / Steven Holl Architects. (2009, September 9). Retrieved March 8, 2018, from http://www.archdaily.com/34302/linked-hybrid-steven-holl-architects/

M6B1 Student Housing. (n.d.). Retrieved March 8, 2018, from http://jdsa.eu/m6b1/

Massachusetts College of Art and Design's Student Residence Hall / ADD Inc. (2014, January 24). Retrieved March 6, 2017, from http://www.archdaily.com/469699/massachusetts-college-of-art-and-design-s-student-residence-hall-add-inc/

Mohammad, M. I., Gambo, Y. L., & Omirin, M. M. (2012). Assessing facilities management service in postgraduate hostel using servqual technique. *Journal of Emerging Trends in Economics and Management Sciences, 3*(3), 252-256.

Monash Student Housing by BVN | Architecture & Design. (2012, March 12). Retrieved March 8, 2018, from https://www.indesignlive.com/projects/monash-student-housing-by-bvn

New security plan for QAU hostels. (2003, August 18). Retrieved March 19, 2017, from https://www.dawn.com/news/135472

Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. (2009, September). Why Sustainability Is Now the Key Driver of Innovation. *Harvard Business Review*. Retrieved from https://hbr.org/2009/09/why-sustainability-is-now-the-key-driver-of-innovation

Nos, P. (2013). Health Implication of Student Housing in Nigeria Tertiary Institutions: A Study Of Kaduna State College Of Education Gidan Waya. *Journal Homepage: Www. Cepajournal. Com*, *4*(2). Retrieved from http://www.academia.edu/download/33654080/Health 4a_Implcation_Of_Student_Housing_In_Nigeria_Tertiary_Institutions.pdf

Nwadiogwa, N. E. (2011). *Proposed Design of a Female Postgraduate Hostel, University of Nigeria Enugu Campus: Strategies for Achieving Spatial Flexibility in Hostels* (Architecture). University of Nigeria.

OFIS_Paris Student Apartments. (n.d.). Retrieved March 8, 2018, from http://www.ofis-a.si/str_9%20-%20housing/7_paris_student_apartments/ofis_paris_student_apartments.html

Rahimi, S. (2015). Social interaction in student residence halls: An architectural perspective.

Residential Life. (2018, February 26). [Govermental]. Retrieved March 3, 2018, from https://www.uaeu.ac.ae/en/campus_life/residential/

Residential Life - Other Services. (2017, September 13). [Education]. Retrieved February 27, 2018, from https://www.uaeu.ac.ae/en/campus_life/residential/services.shtml

Sathyabama. (2018). Retrieved March 7, 2018, from http://www.sathyabama.ac.in/

Schneider, T., & Till, J. (2005). Flexible housing: opportunities and limits. *ARQ: Architectural Research Quarterly*, *9*(2), 157-166.

Sedaghatnia, S., Lamit, H., Abdullah, A. S., & Ghahramanpouri, A. (2015). Experience of social inclusion among students in University Campuses of Malaysia. *Procedia-Social and Behavioral Sciences*, *170*, 89–98.

Space Syntax Network. (2018). Retrieved February 15, 2018, from http://www.spacesyntax.net/

Student Hostel. (2011). Retrieved March 19, 2017, from http://www.ift.edu.mo/EN/Hostel/Home/Index/1059

Student Housing / C.F. Møller. (2016, April 21). Retrieved March 8, 2018, from http://www.archdaily.com/785806/student-housing-cf-moller

Student Housing in Elsevier Office Building / Knevel Architecten. (2015, November 14). Retrieved March 6, 2017, from http://www.archdaily.com/777123/student-housing-in-elsevier-office-building-knevel-architecten

Suki, N. M., & Chowdhury, I. A. (2015). Students' Attitude and Satisfaction Living in Sustainable On-Campus Hostels. *Malaysian Journal of Business and Economics (MJBE)*, *2*(1), 35-47.

Sun, G., Oreskovic, N. M., & Lin, H. (2014). How do changes to the built environment influence walking behaviors? A longitudinal study within a university campus in Hong Kong. *International Journal of Health Geographics*, *13*(1), 28, 1-10.

Tietgen Dormitory / Lundgaard & Tranberg Architects. (2014, February 7). Retrieved March 6, 2017, from http://www.archdaily.com/474237/tietgen-dormitory-lundgaard-and-tranberg-architects/

Tower Bridge Student Accommodation in the Heart of London. (n.d.). Retrieved March 7, 2018, from http://uk.urbanest.com/locations/tower-bridge/

Trondheim Student Housing / MEK Architects. (2012, October 22). Retrieved March 8, 2018, from http://www.archdaily.com/284331/trondheim-student-housing-mek-architects/

UAEU Legend Information. (2018, January 3). [Education]. Retrieved March 3, 2018, from https://www.uaeu.ac.ae/en/

University of Chicago Campus North Residential Commons / Studio Gang. (2016, November 15). Retrieved March 7, 2017, from http://www.archdaily.com/799351/university-of-chicago-campus-north-residential-commons-studio-gang

US EPA, O. (2013, December 11). Sustainability [Overviews and Factsheets]. Retrieved January 29, 2018, from https://www.epa.gov/sustainability

Volosin, S. E. (2014). *A Study of University Student Travel Behavior*. Arizona State University. Retrieved from https://repository.asu.edu/attachments/143315/content/Volosin_asu_0010E_14461.pdf

Warwick Accommodation. (2018, January). Retrieved March 8, 2018, from https://warwick.ac.uk/services/accommodation/

West Campus Housing - Phase I | Mahlum. (2017). Retrieved March 6, 2017, from http://www.mahlum.com/projects/uwplan/index.asp#

West Campus Housing Phase I - Mahlum - 2013 AIA/WA Civic Design Awards. (n.d.). Retrieved March 7, 2017, from http://aiawa.org/portfolio/west-campus-housing-phase/

West Campus Student Housing / Mahlum. (2013, July 31). Retrieved March 6, 2017, from http://www.archdaily.com/408376/west-campus-student-housing-mahlum-architects/

Yeung, A. (2013, December 3). Stakeholders That Impact Social Sustainability [Education]. Retrieved January 29, 2018, from https://www.whu.edu/en/faculty-research/entrepreneurship-and-innovation-group/chair-of-entrepreneurship-i/sustainability-blog/stakeholders-that-impact-social-sustainability/

Yin, R. K. (2009). *Case Study Research Design and Methods* (Fourth, Vols. 1–5). SAGE.

Appendices

Appendix 1: Interview Questions

Appendix 1.1: Initial questions for semi-structured interviews

Interview (No.) Hostel Name: .....

Subject: To what extent the exiting students' hostels had been designed to be socially sustainable

It is expectecd that the interview will take around **30 minutes**

I am Fanan, master student of architectural engineering in UAE University. For the purpose of my thesis which is about to what extent the exiting students' hostel is designed to support the social life of its residents, I took UAE University female hostels as a case studies.

Thanks for accepting being my interviewee. All your answers will be treated confidentially and will be used for the research purpose only.

There are two set of questions: first short part about yourself and second major part about your living experience in your hostel

First, before we start talking about your hostel, tell me about yourself little through the following:

1. What is your age?
2. What is your educational level?
3. What is your nationality?
4. Where does your family live in UAE (permanent residency)?
5. How long had you been in your current hostel (temporary residency)?

Second, now let's move to the questions related to the hostel that you reside in currently:

General question

6. How did you see your current hostel?

Section 1: The availability and quality of the required facilities and services

7. Looking at the current available facilities in your hostel starting from the basic ones such as bedroom and bathrooms going through others like restaurant and supermarket, do you feel that you are in need for certain type of facilities that is not available in your hostel? (What is it? Why?)
8. How do you see the quality of those available facilities?
9. How do you see the quality of the available services like water, electricity, and internet?

Section2: The capability of using the spaces and arrange the furniture differently

10. Have you ever tried using certain space in your hostel for different uses? (What is it? How did you use it?)
11. Have you ever tried rearrange the furniture in your room or any space in the hostel you wanted to use it in certain way? (What is the space? Why?)

Section 3: The social interaction with others

12. Do you know girls live with you in the same hostel? (Do you see them frequently? Where do you usually meet? What do you usually do when you meet?)
13. Do you feel in the hostel that you are in a place where people care about each other? (How?)

Section 4: The engagement with the social activities of the hostel

14. Do you like to join any activity in the hostel as an audience or participants? (Why?)
15. Have you ever joined an activity related to the hostel? (what? Why?)

Section 5: The capability of reaching the different facilities of the hostels

16. Do you find any difficulty in reaching any of hostel spaces? (What? Why?)

Section 6: The capability of movement

17. How do you move among the hostel spaces?
18. Do you find any difficulty in your way of movement? (Why?)
20. Do you prefer any another way of movement? (What? Why?)
20. Do you use the public transportation or feel that you need to use it to reach certain spaces outside the hostel?

Section 7: The sense of privacy

21. Do you feel the exitance of what can hurt your privacy in certain space in the hostel? (How?)
23. Do you feel private when you are in the outdoor space of the hostel? (How?)

Section 8: The feeling of Safety from Hazards

23. Do you feel any form of un safety in the hostel? (How? Why?)
24. Do you think that the hostel cannot provide you with safety against certain environmental hazards? (Why?)

Section 9: The feeling of Security from crimes

25. Do you feel that you are proposed to any type of crimes in the hostel? (How? Why?)
26. Do you think that the hostel cannot provide you with security against certain type of crimes? (Why?)

Section 10: The Local environmental quality

28. How do you see the visual surrounding scenes in the hostel?
28. Do you feel any type of noise? (When? How?)
29. Do you feel that there is not efficient amount of daylight in certain space in the hostel? (Where?)
30. Do you feel cold or hot in certain space in the hostel? (Where?)

Section 11: The participation in making decisions related to the hostel

31. Have you ever suggested something for the hostel or participated in making any decision related to your hostel? (What? How?)
32. Do you feel that your voice is heard if you would suggest something about your hostel? (Why?)

Section 12: The sense of belonging to the hostel

33. Do you feel that you are belonging to your hostel?
34. Do you do any behavior in the hostel because your feeling of belonging not following obligatory rules? (What?)

Thank you... We finished the questions, do you like to say anything about your hostel or the interview?

Appendix 1.2: Piloted questions for structured interviews

Subject: To what extent the exiting students' hostels had been designed to be socially sustainable

It is expecteod that the survey will take around **15 minutes**

I am Eman, master student of architectural engineering in UAE University. For the purpose of my thesis which is about investigation to what extent the exiting students' hostels had been designed to support the social life of its residents. I took UAE University female hostels as a case studies.

There are two set of questions: first short part is about yourself and second major part is about your hostel. All your answers will be treated confidentially and will be used for the research purpose only.

Thanks for your participation in this survey. Please provide accurate answers for all the questions.

First, before we start talking about your hostel, tell me about yourself little through the following:

1. What is your age group?
   - Less than 20 years old
   - Between [20 – 25] years old
   - Between [26 – 30] years old
   - More than 30 years old
2. To which college are you referring?
   - College of Business & Economics
   - College of Education
   - College of Engineering
   - College of Food & Agriculture
   - College of Humanities & Social Sciences
   - College of Information Technology
   - College of Law
   - College of Medicine & Health Sciences
   - College of Science
3. What is your nationality?
   - Emirati citizen
   - Arabic citizen
   - Non- Arabic citizen
4. Where does your family live (main permanent residency)?
   - Abu Dhabi
   - Ajman
   - Al Fujairah
   - Dubai
   - Ras Al Khaimah
   - Sharjah
   - Umm Al Quwain
   - Outside UAE
5. How long had you been in your current hostel (including current spring semester)?
   - Less than 1 academic year
   - Between [1 – 2] academic years
   - Between [2.5 - 3.5] academic years
   - Between [4 – 5] academic years
   - More than 5 academic years

Second, now let's move to the questions related to the hostel where you live currently:

Section 1: The availability and quality of the required facilities and services

6. Looking at the various available functional spaces in your hostel and the spaces that you need personally to be available, to what extent are you satisfied with the types of facilities that is available in each of the following category of functional spaces in your hostel?

Available types of facilities:	Strongly not satisfied	Somehow not satisfied	Neutral (do not know)	Somehow satisfied	Strongly satisfied
- For your everyday life needs in hostel community such as clinic, post office, supermarket, bank, etc.	☐	☐	☐	☐	☐
- For your basic living functions such as kitchen, living room, laundry, store, etc.	☐	☐	☐	☐	☐
- For disabled students.	☐	☐	☐	☐	☐
- For your cultural preferences	☐	☐	☐	☐	☐

7. Which of the following quality measures is achieved in each of the basic functional spaces in your hostel? (You can check more than one quality measure)

Quality measures: / Basic functional spaces:	Have suitable area	Are up to the required industry standards	Are well maintained	Have modern amenities (appliances)
- Bedroom	☐	☐	☐	☐
- Bathroom	☐	☐	☐	☐
- Lounge area	☐	☐	☐	☐
- Kitchen	☐	☐	☐	☐
- Laundry	☐	☐	☐	☐
- Store	☐	☐	☐	☐
- Study area	☐	☐	☐	☐
- Computer lab	☐	☐	☐	☐
- Parking	☐	☐	☐	☐

8. To what extent do you prefer having a balcony or terrace in each of the following specified spaces?

Utilities:	Strongly not prefer	Somehow not prefer	Neutral (do not know)	Somehow prefer	Strongly prefer
- Bedroom	☐	☐	☐	☐	☐
- Any other social space such as lounge area, restaurant, coffee shop, studying area, etc.	☐	☐	☐	☐	☐

9. To what extent are you satisfied with the availability of each of the following utilities (services) in your hostel?

Utilities:	Strongly not satisfied	Somehow not satisfied	Neutral (do not know)	Somehow satisfied	Strongly satisfied
- Electricity	☐	☐	☐	☐	☐
- Water supply	☐	☐	☐	☐	☐
- Waste disposal	☐	☐	☐	☐	☐
- Internet	☐	☐	☐	☐	☐

Section2: The capability of using the spaces and arrange the furniture differently

10. To What extent are you satisfied with your capability of using the multipurpose spaces in your hostel so that you can have different social uses such as sleeping, eating, studying, socializing with friends, etc in the same place?

Types of multipurpose spaces:	Strongly not satisfied	Somehow not satisfied	Neutral (do not know)	Somehow satisfied	Strongly satisfied
- Bed room	☐	☐	☐	☐	☐
- Lounge area	☐	☐	☐	☐	☐
- Any other multipurpose indoor space	☐	☐	☐	☐	☐

11. Which of the following design features does help you more to have different social uses in each of the multipurpose spaces? (You can check more than one design feature if does not affect any other feature)

Design feature: / Multipurpose space:	Design allowance to change space function	Design allowance to change space area	Design allowance to change space capacity	Design allowance to change space configuration (ex. day and night uses)	Use of movable or folding furniture
- Bed room	☐	☐	☐	☐	☐
- Lounge area	☐	☐	☐	☐	☐
- Any other multipurpose indoor space	☐	☐	☐	☐	☐

12. To what extent are you satisfied with your capability of changing the physical arrangement (furniture distribution) in the following spaces?

Types of multipurpose spaces:	Strongly not satisfied	Somehow not satisfied	Neutral (do not know)	Somehow satisfied	Strongly satisfied
- Bed room	☐	☐	☐	☐	☐
- Lounge area	☐	☐	☐	☐	☐
- Any other multipurpose indoor space	☐	☐	☐	☐	☐

Section 3: The social interaction with others

13. Where do you usually see other residents in your hostel and how frequent do you see them in each of the spaces you chose? (You can check more than one space)

Possible spaces of seeing other residents:	Rarely	sometimes	Always
☐ Communal short period service space such as kitchen, bathroom, laundry, prayer room, supermarket, etc.	☐	☐	☐
☐ Communal long period service space such as gym, studying area, library, etc.	☐	☐	☐
☐ Socializing gathering spaces such as lounge area, coffee shop, restaurant, outdoor space, etc.	☐	☐	☐
☐ Circulation spaces such as corridors, elevators, stairs, outdoor walkways, etc.	☐	☐	☐

14. Which of the specified features is influencing why the chosen space is where you can see other residents? (You can check more than one feature if does not affect any other ones)

	Due to space design that supports seeing others	Due to space location that is through the way	Due to Space function that is needed	Other features
☐ Communal short period service space such as kitchen, bathroom, laundry, prayer room, etc.	☐	☐	☐	☐
☐ Communal long period service space such as gym, studying area, library etc.	☐	☐	☐	☐
☐ Socializing gathering spaces such as lounge area, coffee shop, restaurant, outdoor space, etc.	☐	☐	☐	☐
☐ Circulation spaces such as corridors, , stairs, outdoor walkways, etc.	☐	☐	☐	☐

15. To what extent do you feel that your hostel is a place where residents look out for each other or are friendly?
    - o Strongly agree
    - o Somehow agree
    - o Neutral (do not know)
    - o Somehow disagree
    - o Strongly disagree

Section 4: The engagement with the social activities of the hostel

16. How many times had you been engaged (as participant or audience) within social activity in your hostel?
    - o Never
    - o Once
    - o Twice
    - o Three times
    - o More than three times

17. To what extent can each of the following feature affect your integration within your hostel activities and environment?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- You are legible to integrate due to hostel design aspects (wayfinding, sufficient landmarks, easily recognizable buildings and welcoming outdoor)	☐	☐	☐	☐	☐
- You are encouraged to integrate due to supportive hostel quality (Comfortable living condition, maintenance & cleanliness, quality and sufficiency of facilities, and helpful staff)	☐	☐	☐	☐	☐
- You have an opportunity to integrate due to hostel active living (public open spaces with comfortable furniture and benches to study outside, roofed and guarded places for ordinary meetings, treed pathway for walking)	☐	☐	☐	☐	☐

Section 5: The capability of reaching the multiple spaces in the hostel

18. Do you have any type of disability?
    - ○ Yes
    - ○ No

19. Looking at the various spaces in your hostel that you need to go to from your bedroom, to what extent do you feel that you have an equitable access to the overall spaces in your hostel community?
    - ○ Strongly equitable access
    - ○ Somehow equitable access
    - ○ Neutral (do not know)
    - ○ Somehow unequitable access
    - ○ Strongly unequitable access

20. To what extent does each of the following features affect your equitable accessibility to the various spaces in your hostel?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Distribution of facilities within hostel community	☐	☐	☐	☐	☐
- Distribution of spaces within your same floor	☐	☐	☐	☐	☐
- Mode of access: horizontal/vertical, direct/indirect	☐	☐	☐	☐	☐
- Accessibility measures for disabled residents	☐	☐	☐	☐	☐

Section 6: The capability of movement

21. To what extent are you satisfied with the walkability in your hostel?
    - ○ Strongly satisfied
    - ○ satisfied
    - ○ Neutral (do not know)
    - ○ Not satisfied
    - ○ Strongly not satisfied

22. To what extent does each of the following feature affect your satisfaction level with the walkability in your hostel?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Availability of pedestrian ways	☐	☐	☐	☐	☐
- Connectivity of pedestrian ways	☐	☐	☐	☐	☐
- Exposure of pedestrian ways to its surrounding	☐	☐	☐	☐	☐
- Population density	☐	☐	☐	☐	☐

23. To what extent are you satisfied with the cycling as a mean of movement in your hostel?
    - o Strongly satisfied
    - o satisfied
    - o Neutral (do not know)
    - o Not satisfied
    - o Strongly not satisfied

24. To what extent does each of the following features affect satisfaction level with using cycling in your hostel?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Availability of bicycles ways	☐	☐	☐	☐	☐
- Availability of bike storage	☐	☐	☐	☐	☐
- Availability of bike rental service	☐	☐	☐	☐	☐

25. To what extent are you satisfied with the public transportation system such as the public buses of Al Ain to reach spaces that are far from your hostel community in down town Al Ain?
    - o Strongly satisfied
    - o satisfied
    - o Neutral (do not know)
    - o Not satisfied
    - o Strongly not satisfied

Section 7: The sense of privacy

26. To what extent are you satisfied with the level of privacy that you have in your hostel enclosed spaces?
    - o Strongly satisfied
    - o satisfied
    - o Neutral (do not know)
    - o Not satisfied
    - o Strongly not satisfied

27. To what extent are you satisfied with the level of privacy that you have in your hostel outdoor spaces?
    - o Strongly satisfied
    - o satisfied
    - o Neutral (do not know)
    - o Not satisfied
    - o Strongly not satisfied

28. To what extent does each of the following features affect your level of satisfaction with the privacy?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Distribution of spaces within the building	☐	☐	☐	☐	☐
- Communal shared bathroom	☐	☐	☐	☐	☐
- Direct visual contact from the opposite room	☐	☐	☐	☐	☐
- Shared bedroom	☐	☐	☐	☐	☐
- Relationship between the bedroom and corridor	☐	☐	☐	☐	☐
- Visibility of beds within shared bedroom	☐	☐	☐	☐	☐
- Accessibility among hostel buildings	☐	☐	☐	☐	☐

Section 8: The feeling of Safety from Hazards

29. To what extent do you feel safe in your hostel?
    - ○ Strongly safe
    - ○ Somehow safe
    - ○ Neutral (do not know)
    - ○ Somehow not safe
    - ○ Strongly not safe

30. To what extent does each of the following features affect your sense of safety in your hostel?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Having windows directly overlooking streets	☐	☐	☐	☐	☐
- Seeing people walking alone after dark	☐	☐	☐	☐	☐
- Disturbance by others or traffic	☐	☐	☐	☐	☐
- Condition of the built environment 66	☐	☐	☐	☐	☐
- Feeling safe waiting for public transport.	☐	☐	☐	☐	☐
- Providing lighting in the interactive space such as study room and library at night time.	☐	☐	☐	☐	☐
- Means of fire resistance in the design such as smoke detector and alarms.	☐	☐	☐	☐	☐
- Anti-slippery floorings	☐	☐	☐	☐	☐
- Means of escape in case of emergency.	☐	☐	☐	☐	☐
- Availability of fire safety management	☐	☐	☐	☐	☐

31. To what extent do you feel that your hostel can protect you from hazards such as fire condition?
    - ○ Strongly protected
    - ○ Somehow protected
    - ○ Neutral (do not know)
    - ○ Somehow not protected
    - ○ Strongly not protected

Section 9: The feeling of Security from crimes

32. To what extent do you feel secured in your hostel?
    - o Strongly secured
    - o Somehow secured
    - o Neutral (do not know)
    - o Somehow not secured
    - o Strongly not secured

33. To what extent does each of the following features affect your sense of security in your hostel?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Availability of means of security in design details such as fences, suitable building materials, lockers, alarms, and lighting sensors.	☐	☐	☐	☐	☐
- Relative position for each room in the plan	☐	☐	☐	☐	☐
- Degree of visibility among internal/external spaces	☐	☐	☐	☐	☐

34. To what extent do you feel that your hostel can protect you from crimes such as theft?
    - o Strongly protected
    - o Somehow protected
    - o Neutral (do not know)
    - o Somehow not protected
    - o Strongly not protected

Section 10: The Local environmental quality

35. To what extent are you satisfied with the quality of views that you see in your hostel?
    - o Strongly satisfied / totally nice views
    - o Satisfied / somehow good views
    - o Neutral (do not know)
    - o Not satisfied / somehow bad views
    - o Strongly not satisfied / totally bad views

36. To what extent are you satisfied with the quality of the sound that you hear in your hostel?
    - o Strongly satisfied / totally calm
    - o Satisfied / somehow calm
    - o Neutral (do not know)
    - o Not satisfied / somehow noisy
    - o Strongly not satisfied / totally noisy

37. To what extent are you satisfied with the quality of natural lighting that you have in your hostel?
    - o Strongly satisfied / totally available
    - o Satisfied / somehow available
    - o Neutral (do not know)
    - o Not satisfied / somehow not available
    - o Strongly not satisfied / totally not available

38. To what extent are you satisfied with the quality of the temperature (cold/hot) in your hostel?
    - o Strongly satisfied / totally comfortable
    - o Satisfied / somehow comfortable
    - o Neutral (do not know)
    - o Not satisfied / somehow not comfortable
    - o Strongly not satisfied / totally not comfortable

Section 11: The participation in making decisions related to the hostel

39. To what extent are you satisfied with the involvement of your voice in hostel oriented decision making?
    - Strongly satisfied
    - Satisfied
    - Neutral (do not know)
    - Not satisfied
    - Strongly not satisfied

40. To what extent does each of the following features affect your satisfaction of being involved in hostel oriented decision making?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Involving you within the design process of the hostel	☐	☐	☐	☐	☐
- Involving you in decision making related to hostel	☐	☐	☐	☐	☐
- Matching between your expectations and reality	☐	☐	☐	☐	☐
- Availability of resident's council within the administration	☐	☐	☐	☐	☐

Section 12: The sense of belonging to the hostel

41. To what extent do you have feeling of belonging and identification towards your hostel?
    - Strongly have
    - Somehow have
    - Neutral (do not know)
    - Somehow not have
    - Strongly not have

42. To what extent does each of the following feature affect your feeling of belonging to your hostel?

Features:	Strongly not affecting	Somehow not affecting	Neutral (do not know)	Somehow affecting	Strongly affecting
- Length of your residency	☐	☐	☐	☐	☐
- Distinguished character for your hostel	☐	☐	☐	☐	☐
- Shared common history with other residents	☐	☐	☐	☐	☐
- Percentage of people leaving their doors open	☐	☐	☐	☐	☐
- People are respectful of shared space in the hostel	☐	☐	☐	☐	☐
- Good norms and behaviors with unwritten rule about different hostel spaces	☐	☐	☐	☐	☐

General question

43. To what extent do you see your hostel supporting your social life?
    - Totally supportive
    - Somehow supportive
    - Neutral (do not know)
    - Somehow not supportive
    - Totally not supportive

Thanks for your cooperation in answering this survey... have a nice day

Appendix 1.3: Final questions for structured interviews

Subject: To what extent the exiting new students' hostels had been designed to be socially sustainable

The interview is expected to take aroud **45 minutes**.

I am Fanan, master student of architectural engineering in UAE University. For the purpose of my thesis which is about investigation to what extent the exiting students' hostels had been designed to support the social life of its residents, I took UAE University female hostels as a case studies.

There are two set of questions: first short part is about yourself and second major part is about your hostel. All your answers will be treated confidentially and will be used for the research purpose only.

Thanks for your participation in this survey. Please provide accurate answers for all the questions.

-No. - Date: / / 2017 -Time:

- Name: - Contact: - Location:

Hostel Name	Building No.	Floor No.	Room No.

1. tell me about yourself little through the following:

1.1. What is your age group?
- 1- Less than 20 years old
- 2- Between [20 – 25] years old
- 3- Between [26 – 30] years old
- 4- More than 30 years old

1.2. What is your major?
- 1- College of Business & Economics
- 2- College of Education
- 3- College of Engineering
- 4- College of Food & Agriculture
- 5- College of Humanities & Social Sciences
- 6- College of Information Technology
- 7- College of Law
- 8- College of Medicine & Health Sciences
- 9- College of Science

1.3. What is your nationality?
- 1- Emirati citizen
- 2- Arabic citizen
- 3- Non- Arabic citizen

1.4. Where does your family (your permanent residency) live?
- 1- Abu Dhabi - 2- Ajman - 3- Al Fujairah - 4- Dubai - 5- Ras Al Khaimah - 6- Sharjah -7- Umm Al Quwain

1.5. How long had been in your current hostel (**not including** current fall 2017 semester)?
- 1- Less than 1 academic year
- 2- Between [1 – 2] academic years
- 3- Between [2.5 - 3.5] academic years
- 4- Between [4 – 5] academic years
- 5- More than 5 academic years

2. Now let's move to the questions about the hostel where you live currently:

2.1. Availability of Needed Facilities and Services

2.1.1. To what extent do you feel that the available facilities in your hostel are sufficiently matching your needs?

Not sufficient at all	Poorly sufficient	Partially sufficient	largely sufficient	Completely sufficient
1	2	3	4	5

2.1.2. Do you miss any type of facilities or services in your hostel and you want to be exist?

- 1- Yes, please specify the facilities that you are missing.....
- 2- No

2.1.3. To what extent do you agree with having a balcony in your bedroom?

Not agree at all	Poorly agree	Partially agree	largely agree	Completely agree
1	2	3	4	5

2.1.4. Do you prefer having a balcony or terrace in any other place (rather than the bedroom) in your hostel?

- 1-Yes, please specify where.....
- 2-No

2.2. Quality of Provided Facilities and Services

2.2.1. To what extent do you feel that the areas of the spaces in your hostel are suitable?

Not suitable at all	Poorly suitable	Partially suitable	largely suitable	Completely suitable
1	2	3	4	5

2.2.2. Is there any space in your hostel with unsuitable area (too small or too big)?

- 1-Yes, please specify.....
- 2-No

2.2.3. To what extent do you feel that the distribution of the facilities in your hostel is suitable?

Not suitable at all	Poorly suitable	Partially suitable	largely suitable	Completely suitable
1	2	3	4	5

2.2.4. Is there any space in your hostel with unsuitable relative location (Farther or nearer than it should be)?

- 1-Yes, please specify .....
- 2-No

2.2.5. To what extent are you satisfied with the design of provided facilities and services in your hostel in terms of its **Modernity**?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.2.6. To what extent are you satisfied with the design of provided facilities and services in you hostel in terms of its **Maintenance**?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.3. Capability of different social uses

2.3.1. In which spaces in your hostel do you feel that you might like/need to change function of the space (use it differently) and to what extent do you feel the design of the space allows you for this change?

	Not allows at all	Poorly allows	Partially allows	largely allows	Completely allows
Space	1	2	3	4	5

2.3.3. In which spaces in your hostel do you feel that you might like/need to change area of the space (make it bigger or smaller than its usual) and to what extent do you feel the design of the space allows you for this change?

	Not allows at all	Poorly allows	Partially allows	largely allows	Completely allows
Space	1	2	3	4	5

2.4. Capability of different physical arrangement

2.4.1. In which spaces in your hostel do you feel that you might like/need to change the physical arrangement of the spaces and how much are you satisfied with your ability of changing the arrangement in each space?

	Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
Space	1	2	3	4	5

2.4.2. What are the main reason/s behind your level of satisfaction?

.....

2.5. Social interaction with other residents

2.5.1. To what extent are you interacting (seeing, chatting, knowing by names) with other residents in your hostel?

Not interacting at all	Poorly interacting	Partially interacting	largely interacting	Completely interacting
1	2	3	4	5

2.5.2. Where in the hostel do you interact with other residents by chance (without agreeing to meet)?

	Rarely	Sometimes	Frequently
○			
○			
○			

2.5.3. Where in your hostel do you agree to meet with your friends? And why are you choosing each space?

○ ..... Because .....

○ ..... Because .....

○ ..... Because .....

2.6. Participation with the social activities of the hostel

2.6.1. Through your period of staying in your hostel how many times have you been engaged (as participant or audience) with social activities such as sport/exercise, groups gathering happened in your hostel?

	Never	1	2	3	4
Place of activity/ies	-				

2.6.2. In your opinion did any of the following feature affect your engagement (as knowledge about the activity or/and decision about participation) with activities that happened in your hostel?

	Weakly affect	Somehow affect	Strongly affect
o Location of the activity (separated or in mixed space)			
o Way to the activity place (easily or difficulty finding)			
o Identity of space (presence or absence of landmarks)			
o Place of the activity (easily or difficulty recognizable)			
o Outdoor (welcoming or not)			
o Living condition (Comfortable or not)			
o Maintenance and cleanliness level			
o Quality and sufficiency of facilities			
o Others, please specify.....			

2.7. Active living

2.7.1. To what extent do you agree with the following sentences about your living using hostel landscape?

	Not agree at all	Poorly agree	Partially agree	largely agree	Completely agree	Not applicable
	1	2	3	4	5	
There is comfortable furniture and benches to study outside						
There are roofed and guarded places for ordinary meetings						
There are suitable and calm meeting spaces						
There are Least number of Obstacles (for emergency only)						
There are Treed pathways						
Other features						

2.8. Equitable access for everyday services and facilities

2.8.1. To what extent are you satisfied with the distances to the multiple services and facilities from your own room in your hostel (not including colleges)?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.8.2. What are the reasons behind your level of satisfaction?

.....

2.9. Walkable and cycling community

2.9.1. To what extent are you satisfied with walking as mode of movement among the various hostel facilities in terms of each of following feature?

	Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied	Not applicable
	1	2	3	4	5	
Availability of friendly pedestrian ways						
Connectivity of pedestrian ways						
Exposure of pedestrian ways to its surrounding						
Population density						
Other features						

2.9.2. To what extent do you prefer using cycling as mode of movement among the various hostel facilities?

Not prefer at all	Poorly prefer	Partially prefer	largely prefer	Completely prefer
1	2	3	4	5

2.10. Perception of privacy within hostel community

2.10.1. To what extent are you satisfied with your sense of privacy in your hostel?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.10.2. Where in your hostel do you feel that your sense of privacy is hurt?

	sometimes	Most of the time	always	
○				Because .....
○				Because .....
○				Because .....
○				Because .....

2.11. Residents' sense of safety

2.11.1. To what extent are you satisfied with the condition and maintenance of your hostel as safe environment for living?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.11.2. Where in your hostel do you feel that your sense of safety is hurt?

	sometimes	Most of the time	always	
o				Because .....
o				Because .....
o				Because .....
o				Because .....

2.12. Residents' sense of security

2.12.1. To what extent do you agree that your hostel is located in a safe part in Al Ain city?

Not agree at all	Poorly agree	Partially agree	largely agree	Completely agree
1	2	3	4	5

2.12.2. To what extent do you feel that the views that windows overlooking at support you sense of security?

Not support at all	Poorly support	Partially support	largely support	Completely support
1	2	3	4	5

2.13. Protection from crimes

2.13.1. To what extent do you feel secured from crimes in your hostel?

Not secured at all	Poorly secured	Partially secured	largely secured	Completely secured
1	2	3	4	5

2.13.2. Where in your hostel do you feel that your sense of security is hurt?

	sometimes	Most of the time	always	
o				Because .....
o				Because .....
o				Because .....
o				Because .....

2.14. Visual Quality

2.14.1. To what extent are you satisfied with the visual quality of each of the following features?

	Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied	Not applicable
	1	2	3	4	5	
color of your hostel room						
availability of street lighting						
Provision of good views to green areas						
Other features						

2.15. Acoustic and noise control

2.15.1. To what extent are you satisfied with the **level of sound insulation** in your hostel?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.15.2. Where in your hostel do you experience **bad acoustic control**?

	sometimes	Most of the time	always	
o				Because .....
o				Because .....
o				Because .....
o				Because .....

2.15.3. Where in your hostel do you experience **overcrowding**?

	sometimes	Most of the time	always	
o				Because .....
o				Because .....
o				Because .....
o				Because .....

2.16. Daylight

2.16.1. To what extent are you satisfied with the available amount of daylight in your hostel?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.16.2. Where in your hostel do you experience lack of natural lighting?

	sometimes	Most of the time	always	
o				Because .....
o				Because .....
o				Because .....
o				Because .....

2.17. Thermal comfort

2.17.1. To what extent do you feel comfortable with the atmosphere (cold/hot) (wet/dry) in your hostel?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.17.2. Where in your hostel do you experience bad atmosphere (cold /hot) (wet/dry)?

	sometimes	Most of the time	always	
o				Because .....
o				Because .....
o				Because .....
o				Because .....

2.18. Healthy indoor quality

2.18.1. To what extent do you agree that the indoor quality of your hostel is healthy?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

2.18.2. Where in your hostel do you experience bad health quality such as existing of insects, overuse of certain facility?

	sometimes	Most of the time	always	
○				Because .....
○				Because .....
○				Because .....
○				Because .....

2.19. Involvement of residents' voice in shaping their surroundings

2.19.1. To what extent do you feel that your voice is involved in hostel design oriented decision making?

Not involved at all	Poorly involved	Partially involved	largely involved	Completely involved
1	2	3	4	5

2.19.2. Have you been participated in any hostel design orientated decision making?

- ○ 1-Yes, please specify.....
- ○ No

2.20. Feelings of pride, identification, and belonging

2.20.1. To what extent do you feel that you are belonging to your hostel?

Not belong at all	Poorly belong	Partially belong	largely belong	Completely belong
1	2	3	4	5

2.20.2. Do you see your hostel has a character of its own?

- ○ 1-Yes, please specify.....
- ○ 2-No

2.20.3. To what extent do agree that your hostel is supporting your common characteristics as Single Emirati female students?

Not agree at all	Poorly agree	Partially agree	largely agree	Completely agree
1	2	3	4	5

2.20.4. To what extent do you see each of the following design features affect your sense of belonging to your hostel?

	Not affecting at all	Poorly affecting	Partially affecting	largely affecting	Completely affecting	Not applicable
	1	2	3	4	5	
Wither your hostel has a character of its own or not						
Wither your hostel design is promoting shared common characteristics of its residents as single Emirati female students						
Your satisfaction with the perceived quality of space						
Your Involvement in designing your hostel						
Other features						

3. To what extent are you satisfied with the overall design of your hostel?

Not satisfied at all	Poorly satisfied	Partially satisfied	largely satisfied	Completely satisfied
1	2	3	4	5

Thanks for your cooperation in answering this survey... have a nice day

Appendix 2: List of Available Facilities in New Campus Hostel

Available type of facilities	No.	Location	Area (m^2)
○ Basic functional spaces:			
- Bedroom (Single type)	2440	There are 244 bedrooms in each of the 10 buildings distributed in the 6 floors as follows: 22 in G.F. 52 in 1st F. 50 in 2nd F . 42 in 3rd F. 42 in 4th F. 36 in 5th F.	10.5/ bedroom
- Bathroom (Shared between each two single bed rooms)	1220	Distributed in the 10 residential buildings. There are 122 bathrooms in each of the 10 buildings distributed in 6 floors as follows: 11 in G.F. 26 in 1st F. 25 in 2nd F. 21 in 3rd F. 21 in 4th F. 18 in 5th F.	6.3/bathroom includes: shower room: 1.7 toilet room: 1.4 sink passage area: 2
- Lounge area with kitchenette	59	Distributed in the 10 residential buildings as: - 50 similar lounge areas located in 1st, 2nd, 3rd, 4th, & 5th floors of each building & - 9 similar lounge areas located in G.F of buildings (A1, A2, A3, A4, A5, A7, A8, A9, & A10)	- 55/space - 100/space -
- Laundry (Washing machine + ironing)	10	Distributed in the 10 buildings: There is 1 main laundry space in G.F. of each building	56.9/space includes: 42.5 / washing room 14.3/ ironing room
- Baggage Store	10	Distributed in the 10 residential buildings. There is 1 main store space in G.F. of each building	29.3 / store
- Admin office (for daily signing in)	10	Distributed in the 10 buildings: There is 1 main admin office in G.F. of each building	21.6 / admin office
- Canteen	1	Located separately in building 2D	4028
○ Aspects of everyday life of hostel community:			
- Reception	1	Located separately in building 1B	1000
- Stationary shop	1	Located in the G.F of building A6	21.2

- Coffee shop	1	Located in the G.F lounge space of building A6	100
- Supermarket	1	Located separately attached to restaurant within building 2D	~ 15
- Laundry shop	1	Located in G.F lounge space of building A7	20
- Public open/green spaces		- 10 green spaces; each is located privately within each of the 10 residential buildings - Multiple green spaces are located semi-privately among buildings: P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 - Main garden is located separately as more public near reception	- ~ 890 - ~ 390 - ~ 160 ~ 240 ~ 446 ~ 368 ~ 468 ~ 468 ~ 260 ~ 300 ~ 1500 ~ 1128 ~ 3360 ~ 440 - ~ 3400
○ <u>Specific facilities and services in respond to residents' preferences</u>:			
- Prayer room with ablution area	10	Distributed in the 10 residential buildings. There is 1 main prayer room with ablution space in G.F. of each building	Prayer room: 22 Ablution: 5.8
○ <u>Availability of suitable facilities and services for disabled students:</u>			
- Special units for students with disabilities who require a company (two single bedrooms with shared bathroom)	30 units	3 units resembled by: Unit (2014 & 2016) in 2nd F. Unit (3008 & 3010) in 3rd F. Unit (4004 & 4006) in 4th F. Located in each of the 10 buildings	40.17 / unit includes: 12.8 / bedroom 12.8/ bedroom 4.9/ bathroom
- Special bedrooms with ceiling lighting for students with problems of vision	8	They are part of the 22 bedrooms in in G.F. of building A6	10.5 / bedroom