



FINAL PROJECT - RA.141581

# ARCHITECTURE AS A SYNTAX FOR ELDERLY REJUVENATION FOR TROPICAL CLIMATE COUNTRY

Grace Novita Silalahi  
0811144000055

Supervisor:  
FX. Teddy Badai Samodra, ST., MT., Ph. D

Department of Architecture  
Faculty of Architecture, Design and Planning  
Institut Teknologi Sepuluh Nopember  
2018



**FINAL PROJECT - RA.141581**

# **ARCHITECTURE AS A SYNTAX FOR ELDERLY REJUVENATION FOR TROPICAL CLIMATE COUNTRY**

**Grace Novita Silalahi  
0811144000055**

**Supervisor:  
FX. Teddy Badai Samodra, ST., MT., Ph. D**

**Department of Architecture  
Faculty of Architecture, Design and Planning  
Institut Teknologi Sepuluh Nopember  
2018**

LEMBAR PENGESAHAN

**ARCHITECTURE AS A SYNTAX FOR  
ELDERLY REJUVENATION  
FOR TROPICAL CLIMATE COUNTRY**



Disusun oleh :

Grace Novita Silalahi  
NRP : 08111440000055

Telah dipertahankan dan diterima  
oleh Tim penguji Tugas Akhir RA.141581  
Departemen Arsitektur FADP-ITS pada tanggal 2 Juli 2018  
Nilai : AB

Mengetahui

Pembimbing

  
Fx. Teddy Badai Samodra, S.T, M.T, Ph. D  
NIP. 198004062008011008

Kaprodi Sarjana

  
Defry Agatha Ardianta, ST., MT  
NIP. 198008252006041004

  
Kepala Departemen Arsitektur FADP ITS  
  
Ir. I Gusti Ngurah Antaryama, Ph.D.  
NIP. 196804251992101001

## **Foreword**

First, I want to thank God for His blessings so that I can finish my final project report titled “Architecture as a syntax for Elderly Rejuvenation for Tropical Climate Country”.

All the effort that I put on this final project would not be enough without the support of my beloved family and friends.

Most of all I would like to show my highest appreciation and gratitude for my supervisor, FX. Teddy Badai Samodra, ST, MT, PhD, who kept an eye for making this final project. Without his help this final project would never possible to be finished. I also want to thank this people who has helped me to finis my final project titled:

1. Defry Agatha Ardianta, ST, MT and Angger Sukma Mahendra, ST, MT for their guidance during the final project proposal class
2. Dr. Arina Hayati, ST, MT, Ir. I Gusti Ngurah Antaryama, Ph. D and Nurfahmi Muchlis, ST, M.Ars for guidance, advice, and motivation
3. Mrs. Agnes the head of Griya Usiawan St. Yosef Surabaya for giving me a chance to interview the elderly and the system of collecting houses for elderly
4. The residents of Griya Usiawan St. Yosef Surabaya for giving me a chance to interview them and to learn the purpose of life
5. My Dad, Mom, and Brothers that always support and pray for me
6. Yunivur and Putri that always motivate me to finish my final project and stay strong in my darkness time
7. Adistria, Ruben, Kristina, Rini, Aurora, Bintang, Dhisa that always support me to finish my final project

Lastly, I realize that this final project proposal is so far from being outstanding. I expect all the readers can give all of your critics and suggestions about this final project proposal. However I hope that this thesis can give worth it information for the readers.

**ABSTRACT**

**ARCHITECTURE AS A SYNTAX FOR ELDERLY  
REJUVENATION  
FOR TROPICAL CLIMATE COUNTRY**

By:

**Grace Novita Silalahi**

**08111440000055**

Every year there are an additional number of elderly. Old age is the phase of human life cycle where the elderly feels this phase as the life phase with the longest journey. In this phase elderly mostly feel lost part of themselves and cause depression because elderly feeling lost part of themselves.

The elderly as an independent person doesn't want to depend on their child or their family both physically and economically. Architectural object design for productive elderly that still can fulfil their daily needs and they has desire to work again to spent the rest of their life time for aging productively in a community to work and for life. The proposed architectural object is SOHO (Small Office Home Office) for elderly and youth can both learning from each other and working together in one community.

Biomimetic from beehive ecosystem level to approach behaviour setting syntax for elderly rejuvenation. Beehive ecosystem level inspired how to create a sustainable ecosystem that can lead elderly rejuvenation by using space syntax that suitable with elderly behaviour setting.

**Keywords :** aging productively, beehive, behaviour setting, SOHO, space syntax.

## TABLE OF CONTENT

Foreword.....	i
ABSTRACT.....	ii
TABLE OF CONTENT .....	iii
LIST OF FIGURE.....	vi
LIST OF TABLE .....	x
CHAPTER 1 .....	1
INTRODUCTION .....	1
1.1    Background.....	1
1.2    Issue and Design Context .....	1
1.2.1    Issue.....	1
1.2.2    Relationship Between Elderly and Productivity .....	4
1.2.3    Design Context: Phenomenon On Surabaya .....	5
1.2.4    Precedent and Related Issue .....	8
1.2.5    Conclusion.....	9
1.3    Design Problem and Design Criteria .....	10
1.3.1    Design Problem .....	10
1.3.2    Design Criteria .....	13
CHAPTER 2 .....	15
DESIGN PROGRAM .....	15
2.1    Activity Program and Building Function.....	15
2.1.1    Architectural Object Description .....	15
2.1.2    Activity Program .....	16
.....	30

.....	30
2.1.3 Room Requirements Based on Related Activities .....	32
2.2 Site Description .....	43
2.2.1 Site Analysis .....	43
2.2.2 Environment Study .....	54
2.2.3 Site Regulation.....	54
CHAPTER 3.....	57
DESIGN APPROACH AND DESIGN METHOD.....	57
3.1 Design Approach.....	57
3.1.2 Behaviour Setting .....	57
3.2 Design Method .....	58
3.2.1 Framework.....	58
3.2.1 Biomimetic .....	59
A. Application of Depthmap(Space Syntax) .....	60
B. Ecotect.....	61
C. Field Measurement.....	61
CHAPTER 4.....	63
DESIGN CONCEPT .....	63
4.1 Formal Exploration .....	63
4.1.1 Main Concept.....	63
4.1.2 Integration between Site Analysis, Issue, and Method.....	69
4.2 Technical Exploration .....	72
4.2.1 Structural System.....	72
4.2.2 Building Utility System .....	72
CHAPTER 5.....	75
DESIGN .....	75

5.1	Formal Exploration .....	75
5.1.1	Site.....	75
5.1.2	Building.....	76
5.1.3	Interior .....	76
5.1.4	Open Courtyard .....	77
5.2	Technical Exploration.....	79
5.2.1	Sanitation System .....	79
5.2.2	Fire Protecting System .....	79
5.2.3	Structural System .....	80
5.3	Design Simulation.....	80
CHAPTER 6	.....	85
CONCLUSION	.....	85
REFERENCE	.....	86
APPENDIXES	.....	91
APPENDIX 1: INTERVIEW FORMS	.....	91
APPENDIX 2: Atmosphere of Griya Usiawan Santo Yosef	.....	94
APPENDIX 3: SITE CONDITION	.....	95



## LIST OF FIGURE

Figure 1.2.1 Young Children and Older People as a Percentage of Global Population: 1950-2050(WHO, 2011) .....	1
Figure 1.2.2 The Speed of Population Aging (WHO, 2011).....	2
Figure 1.2.3 Growth of the population aged 65 and Older in India and China: 2010-2050(WHO, 2011).....	3
Figure 1.2.4 Comparison of Citizen Amount based Age between Indonesia, Asia and World (Kementerian Kesehatan RI, 2013) .....	3
Figure 1.2.5 Illustration of Productive Elderly Activities (Author's data, 2017)....	4
Figure 1.2.6 Illustration of Activities that can be done by dependent Elderly to keep productive (Author's data, 2017) .....	5
Figure 1.2.7 The Amount of Elderly among Some of Indonesia Provinces ( <a href="http://www.ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms_346599.pdf">http://www.ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms_346599.pdf</a> , access: December 2017) .....	6
Figure 1.2.8 The Amount of Elderly among Some of Indonesia Provinces and Total of Elderly Amount in Indonesia ( <a href="http://www.ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms_346599.pdf">http://www.ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms_346599.pdf</a> , access: December 2017) .....	6
Figure 1.2.9 Percentage about amount of elderly in East Java (Susenas BPS,2012) .....	7
Figure 1.2.10 Living Arrangements of People Aged 65 and Over in Japan 1960 to 2005(WHO, 2011).....	8
Figure 1.2.11Jikka Tee-Pee in Japan (dezeen.com, 2016) .....	8
Figure 1.2.12 Asian Retirement Home that doubled with City House which is proposed by SPARK (dezeen.com, 2015).....	9
Figure 1.3.1 Activities that elderly do from Griya Usia Lanjut St. Yosef Surabaya (author's data, 2017).....	11
Figure 2.1.1 Activity Program Diagram (author's data, 2017) .....	16
Figure 2.1.2 Elderly Residents Activity (author's data, 2017).....	17
Figure 2.1.3 Elderly's Staff Activity (author's data, 2017).....	18
Figure 2.1.4 Guest's Activity (author's data, 2017) .....	18

Figure 2.1.5 Medical Staff Activities (author's data, 2017) .....	18
Figure 2.1.6 SOHO Building Administrations Activities (author's analyse, 2017) .....	19
Figure 2.1.7 The use of Space Syntax in Hospital Design (Google.com, 2017) ..	31
Figure 2.1.8 Building Mass Exploration using Depthmap for room programming(author's data, 2018).....	32
Figure 2.1.9 Diagram of Building Macro Organization.....	33
Figure 2.1.10 Basement Room Organization (author's data, 2018) .....	33
Figure 2.1.11 First Floor Room Organization (author's data, 2018) .....	34
Figure 2.1.12 Second Floor Room Organization (author's data, 2018).....	34
Figure 2.1.13 Third Floor Room Organization (author's data, 2018).....	35
Figure 2.1.14 Site Plan (author's data, 2017).....	36
Figure 2.2.1 Site Location (author's data, 2017) .....	43
Figure 2.2.2 Degree Hours in Surabaya (Ecotect, 2017) .....	44
Figure 2.2.3 Thermal Condition in Surabaya.....	45
Figure 2.2.4 Direct Solar Lighting in Surabaya (Ecotect, 2017) .....	45
Figure 2.2.5 Building Best Orientation (Ecotect, 2017) .....	46
Figure 2.2.6 Site Location (www.earth.google.com , 2017).....	46
Figure 2.2.7 Direct Solar Radiation in Surabaya (Ecotect, 2017).....	47
Figure 2.2.8 Elderly Comfort Temperature (Survey, 2017).....	47
Figure 2.2.9 Daylight Analysis in Site Location (Ecotect, 2017) .....	48
Figure 2.2.10 Building Mass Illustration based on Site Terrain Level and Tree Arrangement (Author's data, 2018) .....	49
Figure 2.2.11( <a href="https://sustainabilityworkshop.autodesk.com/buildings/apertures-daylighting">https://sustainabilityworkshop.autodesk.com/buildings/apertures- daylighting</a> , 2017) .....	49
Figure 2.2.12 Temperature rate at Surabaya (Ecotect, 2017) .....	50
Figure 2.2.13 Humidity rate at Surabaya (Ecotect, 2017).....	50
Figure 2.2.14 Elderly Humidity Comfort (Field Study, 2017) .....	51
Figure 2.2.15 Passive Cooling Strategy (google.com, 2017).....	52
Figure 2.2.16 Building Mass Programming (Author's data, 2017) .....	52
Figure 2.2.17 Site Noise Level (Author's data, 2018) .....	53
Figure 2.2.18 Site Plan Concept (Author's data, 2018) .....	53

Figure 2.2.19 Sound Barrier Concept (Author's data, 2018) .....	54
Figure 2.2.20 Site Environment (Google map, 2018) .....	54
Figure 2.2.21 Land Use of Proposed Site (Peta Peruntukan Surabaya, 2016) .....	55
Figure 3.1.1 The Fundamental Processes of Human Behaviour (Lang, 2010) .....	57
Figure 3.2.1 Design Framework (Author's data, 2018) .....	58
Figure 3.2.2 Structure Mapping Principle as Domain Transfer Method (Plowright, 2014).....	59
Figure 3.2.3 Domain to Domain Transfer from Beehive (Author's data, 2018)...	60
Figure 4.1.1 Green Spaces to trigger elderly movement (Author's data, 2018)....	69
Figure 4.1.2 Universal Design for Co-Working Space (Author's data).....	69
Figure 4.1.3 Community Garden (Author's data, 2018) .....	70
Figure 4.1.4 Bench under the tree (Author's data, 2018) .....	70
Figure 4.1.5 Rabbit Farming (Author's data, 2018) .....	71
Figure 4.1.6 Informal Co-Working Space Ambience (Author's data, 2018).....	71
Figure 4.1.7 Corridor with railing and bench (Author's data, 2018).....	72
Figure 4.2.1 Pipe Collecting Rainwater (Author's data, 2018).....	73
Figure 4.2.2 Emergency Sliding Ring Ramp (Zhang, 2017).....	74
Figure 5.1.1 Site Zoning Concept (Author's data, 2018) .....	75
Figure 5.1.2 Bird's Eye View Perspective (Author's data, 2018).....	76
Figure 5.1.3 Porous Wall (Author's data, 2018) .....	76
Figure 5.1.4 Sauna Stone Material Combine with wood floor (Author's data, 2018) .....	77
Figure 5.1.5 Open Courtyard at Housing Area (Author's data, 2018) .....	77
Figure 5.1.6 Place for Socializing (Author's data, 2018).....	78
Figure 5.2.1 Water Sanitation System (Author's data, 2018) .....	79
Figure 5.2.2 Fire Protecting System (Author's data, 2018) .....	79
Figure 5.2.3 Structural Systems (Author's data, 2018) .....	80
Figure 5.3.1 Building Circulation Axonometry (Author's data, 2018).....	80
Figure 5.3.2 Building Mass Design Simulation Analysis (Depthmap, 2018) .....	81
Figure 5.3.3 Layout Plan Simulation (Depthmap, 2018) .....	81
Figure 5.3.4 First Floor Design Simulation (Depthmap, 2018) .....	82
Figure 5.3.5 Design Simulation at Second Floor (Depthmap, 2018) .....	82

Figure 5.3.6 Design Simulation 3 <sup>rd</sup> Floor (Depthmap, 2018) .....	83
---	----

## LIST OF TABLE

Table 1.2.1 Relationship between Issue and Precedent.....	10
Table 1.3.1 Research Roadmap .....	12
Table 2.1.1 Room Needs Based on User's Activites.....	19
Table 2.1.2 Room Zoning Based on Building Function.....	24
Table 2.1.3 The Amount of Room Needed .....	25
Table 2.1.4 Total Room Area Requirement .....	30
Table 2.1.5 Bed Room Requirements.....	36
Table 2.1.6 Shared Kitchen Room Requirement.....	37
Table 2.1.7 Family Room Requirement .....	38
Table 2.1.8 Co-Working Space Requirement.....	38
Table 2.1.9 Healthcare Facilities Changing Room Requirement .....	39
Table 2.1.10 Healthcare Administration Requirement.....	40
Table 2.1.11 Healthcare Therapy Facilities Requirement .....	41
Table 2.1.12 Entertaining Facilities Requirement .....	42
Table 4.1.1 Design Concept Matrix.....	63

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The increasing amount in human life expectancy affect the increase number of elderly every year. Aging has become the phase of life cycle that feel to long because of the limitation of elderly physical ability. The limitation of elderly physical ability affect elderly activity. Elderly need to stay productive in order to maintain their psychological health. In order to stay productive, elderly need a place that respond to their physical limitation. In aging phase elderly need to productive not only physically but also psychologically.

### 1.2 Issue and Design Context

#### 1.2.1 Issue

Aging as one of the phases of human life cycle makes every year there was an additional number of elderly. According to Republic of Indonesia Law Number 13 about Elderly Welfare, Elderly is someone who has reached the age of 60 years old and above. Based on age, there are four types of elderly: Elderly(65 – 70 years old), Young Old(70 – 75 years old), Old(75 – 80 years old), Very Old(above 80 years old). The increase of quality of life expectancy causes an increase number of elderly people who will be far more than the number of productive age population (WHO, 2011).

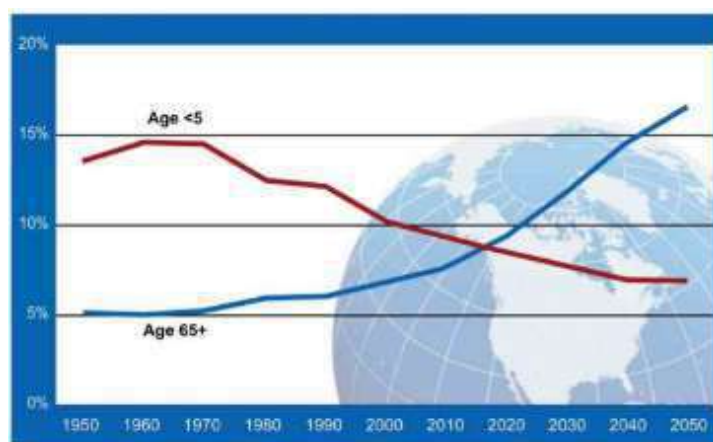


Figure 1.2.1 Young Children and Older People as a Percentage of Global Population: 1950-2050(WHO, 2011)

Based on Figure 1.2.1 we can see that on 2020 there will be an increase amount of Elderly and a decrease amount of Young Children. The increase in amount of elderly makes the society will be dominated by the elderly citizen than the young age people.

The increase in amount of elderly people affects economic and social growth. With the increase in the elderly population need to be empowered in order to contribute and restore their role back into a community in the society so that the elderly experience a quality aging process and develop into a better and more mature person.

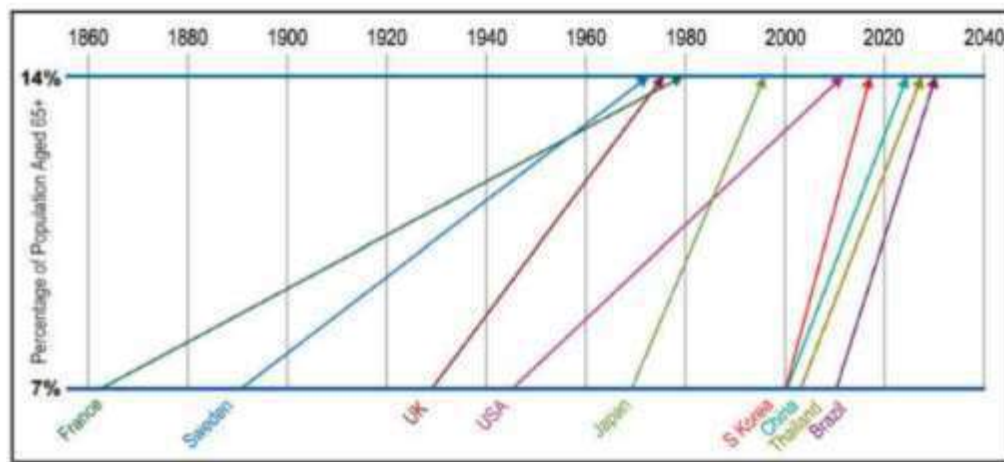


Figure 1.2.2 The Speed of Population Aging (WHO, 2011)

Based on figure 1.2.2 the percentage of aging percentage increase among all the country in the world. The increase amount of Population aged more than 65 in Japan had started since 2000 and the increase amount of elderly in some of Asian Countries (South Korea, China, and Thailand) started since 2020. Aging process needs an attention to develop the elderly citizen.

Aging is the process of development experienced by the elderly in the ego integrity phase versus despair, if the elderly can get through this phase they become a person who has a meaningful role in a community. The wise elderly will fill their old age with a variety of positive and active activities so that his old age becomes meaningful and has better health conditions than the elderly who experience the phase of despair due to a decline in physical and psychological conditions.

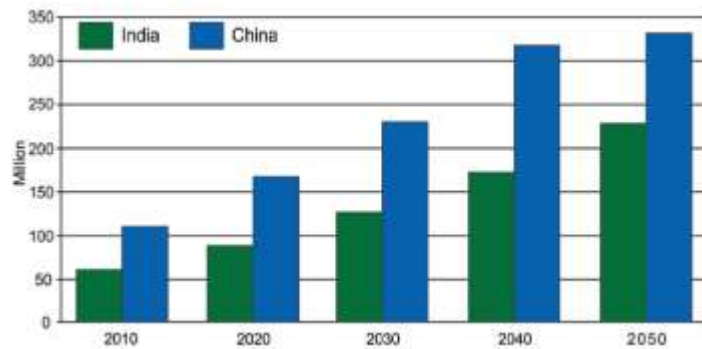


Figure 1.2.3 Growth of the population aged 65 and Older in India and China: 2010-2050(WHO, 2011)

Based on Figure 1.2.3 the increase amount of elderly people in Asia shows that in 2020 China has 150 Million Elderly Citizen while India has more than 50 Million Elderly and it will increase until 2050.

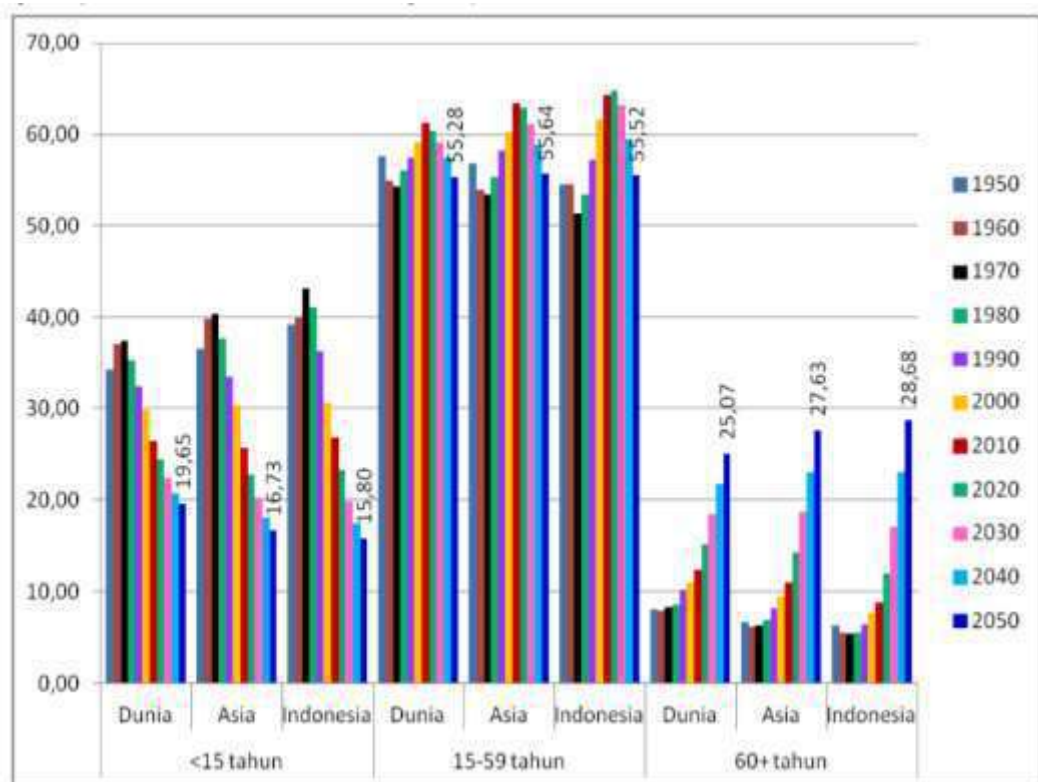


Figure 1.2.4 Comparison of Citizen Amount based Age between Indonesia, Asia and World (Kementerian Kesehatan RI, 2013)

Based on Figure 1.2.4 like other countries in the world and Asia, Indonesia is also facing the increase amount of elderly. In 2020 the amount of productive people (age 15-59 years old) will be higher than the other countries in the world and Asia but Indonesia will have the highest amount of old people more than 60 years old in 2050 and the lowest amount of teenager less than 15 years old in 2050.



The increase amount of age population in Indonesia increase since 1990 and it keep increasing until 2050. The increase amount of age population in Indonesia becomes a serious problem to give a better aging for elderly, not only provide healthcare facilities but also to empower the elderly so they still in the community to maintain their physical and psychological health. By Empowering the elderly, they can live productively and give their contribution to society and to make an interaction between elderly and younger generation. The elderly can share experiences and information to his fellow elderly and younger generation (Wijayanti, 2012).

### 1.2.2 Relationship Between Elderly and Productivity

Declining levels of physical and psychological conditions in the elderly are differently and it can affect the elderly way of life in living and interpreting their old age in different ways (Sulandri, 2009). Elderly with a physical condition that is still strong enough to work and fulfil their daily needs. The ability of elderly physical condition affect the level of elderly's independence so that based on the level of independence the elderly classified into three types of independent elderly, elderly partial dependence, and total dependency elderly (Rohaedi, 2016). The elderly who has partial dependence and total dependence has higher levels of depression than the independent elderly because the elderly feel there is a part of them that is missing.



Figure 1.2.5 Illustration of Productive Elderly Activities (Author's data, 2017)

Productive is the process for a person to remain fully functional, self-actualizing, improving the quality of his life, and continuously striving to develop himself. Based on Figure 1.2.5 Productive elderly is the elderly can keep on going on the basis of his physical ability so as to live his old age with more meaning for the people around them.



Figure 1.2.6 Illustration of Activities that can be done by dependent Elderly to keep productive (Author's data, 2017)

Based on Figure 1.2.6 Dependent elderly is elderly that can't fulfil their daily needs by themselves independently. They need helps from other to fulfil their daily needs. Dependent elderly has problem with their physical ability or their psychological ability.

The architectural object has to facilitate both independent elderly and dependent elderly to keep productive. Elderly needs to productive in order to keep their physical and psychological health. Productivity in this context not only how to keep they keep working but also to keep their mind productive.

### 1.2.3 Design Context: Phenomenon On Surabaya

Every year on Surabaya there is an additional number of elderly. Based on data from Surabaya City Health Department in 2010 there were 42.000 elderly in Surabaya and it is predicted to reach 1.5 million in 2020. Based on data from SUSENAS 2012 that was held by Badan Pusat Statistik RI shows that Jawa Timur

is the 2<sup>nd</sup> province in Indonesia with the highest elderly which is contain 10.4% old people population from the total amount of Indonesia's population.

Provinsi	1980	1990	2000	2010	2015	2020	2025	2030	2035	Momen Aging
Aceh	3.0	3.1	3.2	5.7	6.3	7.2	8.4	9.8	11.3	2031
Sumut	3.1	3.2	3.5	5.9	6.8	8.3	10.0	11.7	13.2	2025
Sumbar	4.2	4.4	5.5	8.1	8.8	10.1	11.4	12.7	13.9	2020
Riau	2.2	2.3	2.1	4.0	4.8	6.0	7.6	9.4	11.4	2032
Jambi	2.1	2.2	2.9	5.5	6.5	8.0	9.8	11.9	14.1	2026
Sumsel	2.6	2.8	3.2	6.2	7.0	8.4	10.0	11.8	13.7	2025
Bengkulu	2.8	2.8	3.1	5.8	6.5	7.8	9.6	11.4	13.3	2027
Lampung	1.9	2.6	3.8	7.2	7.8	9.3	11.2	13.3	15.6	2022
Babel	-	-	3.8	5.8	6.8	8.1	9.5	11.2	13.1	2027
Kep Riau	-	-	-	3.4	4.0	5.0	6.4	8.4	11.2	2033
Jakarta	1.5	1.7	2.4	5.1	6.5	8.4	10.8	13.5	16.4	2024
Jabar	3.0	3.6	4.5	7.0	8.1	9.7	11.6	13.8	16.0	2021
Jateng	3.6	4.7	6.3	10.3	11.8	13.9	16.4	18.7	20.6	2010
DI Yogya	5.8	7.3	8.9	12.9	13.4	14.7	16.4	18.1	19.5	1990an
Jatim	3.9	4.8	6.3	10.3	11.5	13.5	15.8	18.2	20.2	2010
Banten	-	-	3.7	4.6	5.3	6.7	8.5	10.7	13.0	2029
Bali	4.8	5.4	5.9	9.7	10.3	11.5	13.4	15.9	18.1	2013

Figure 1.2.7 The Amount of Elderly among Some of Indonesia Provinces

([http://www.ilo.org/wcmstp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms\\_346599.pdf](http://www.ilo.org/wcmstp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms_346599.pdf), access: December 2017)

Provinsi	1980	1990	2000	2010	2015	2020	2025	2030	2035	Momen Aging
NTT	3.1	3.4	3.5	7.1	7.7	8.7	10.0	11.5	13.2	2025
NTT	3.7	3.9	4.4	7.4	7.5	8.1	9.0	9.8	10.5	2032
Kalbar	2.5	2.6	2.8	5.8	6.8	8.2	9.8	11.5	13.3	2026
Kalteng	2.3	2.4	2.4	4.6	5.2	6.3	7.8	9.7	11.9	2031
Kalsel	2.6	2.9	3.3	5.7	6.5	7.9	9.7	11.8	14.0	2026
Kaltim	2.0	2.0	2.1	4.0	5.2	6.8	8.9	11.2	13.7	2028
Sulut	3.4	4.0	5.1	8.4	9.7	11.6	13.5	15.7	17.5	2016
Sulteng	2.5	2.6	3.0	6.6	7.3	8.4	9.9	11.7	13.7	2026
Sulsel	3.5	3.7	4.5	8.2	8.8	9.8	11.2	13.0	14.8	2021
Sultra	2.9	2.7	2.9	5.7	6.3	7.2	8.3	9.7	11.3	2031
Gorontalo	-	-	3.3	5.9	7.1	8.4	9.9	11.7	13.6	2026
Sulbar	-	-	-	6.2	6.3	6.8	7.6	8.9	10.6	2033
Maluku	3.1	3.2	4.0	6.2	6.6	7.4	8.3	9.3	10.2	2034
Malut	-	-	2.8	4.8	5.5	6.6	7.7	9.0	10.5	2034
Pabar	-	-	-	3.2	4.0	5.0	6.3	7.9	9.5	-
Papua	1.0	0.9	1.1	2.4	2.8	3.9	5.8	8.1	10.7	2034
<b>Indonesia</b>	<b>3.3</b>	<b>3.8</b>	<b>5.6</b>	<b>7.6</b>	<b>8.5</b>	<b>10.0</b>	<b>11.8</b>	<b>13.8</b>	<b>15.8</b>	<b>2020</b>

Figure 1.2.8 The Amount of Elderly among Some of Indonesia Provinces and Total of Elderly Amount in Indonesia

([http://www.ilo.org/wcmstp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms\\_346599.pdf](http://www.ilo.org/wcmstp5/groups/public/@asia/@ro-bangkok/@ilo-jakarta/documents/presentation/wcms_346599.pdf), access: December 2017)

Based on Figure 1.2.7 and Figure 1.2.8 the highest amount of elderly is located at DI Yogyakarta provinces which had started since 1990 and the second amount of elderly is located at East Java Provinces with the amount of elderly is 11.5% and it is higher than the percentage of total elderly in Indonesia with the percentage 8.5%. The moment of aging in Indonesia is predicted will start on 2020 while in East Java the moment of aging had started on 2010.

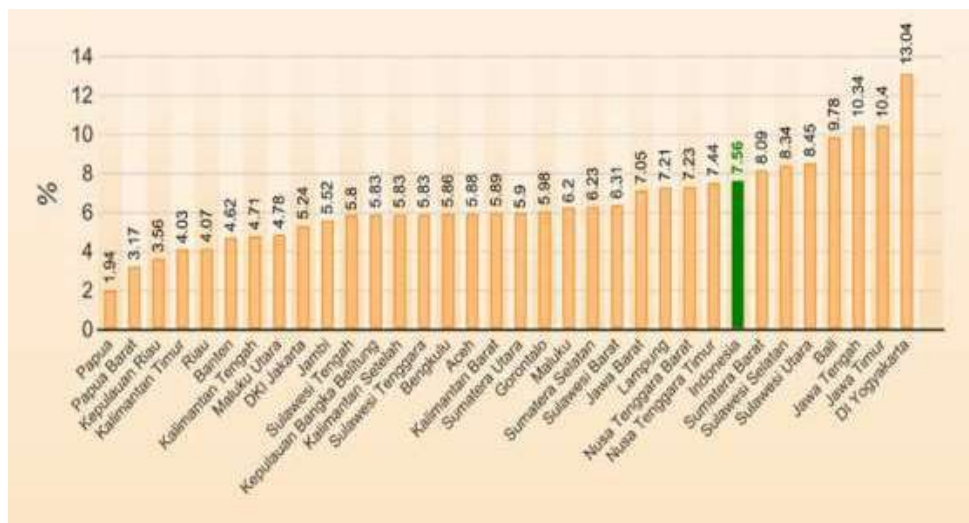


Figure 1.2.9 Percentage about amount of elderly in East Java (Susenas BPS,2012)

Based on Figure 1.2.9 the percentage of elderly in East Java is higher than the total percentage of elderly in Indonesia. This is make Surabaya as the capital city of East Java needs to consider this increase amount of aging to provide a better aging for the elderly so they can give contribution to the society.

Surabaya as one of the big cities in Indonesia can't avoid the changing role of the family from extended family to the nuclear family. Elderly's children will focus to their nuclear family (their partner and children) so that the elderly will lack of attention from their children. The elderly as an independent person doesn't want to rely on his/her child and prefers to live apart from their children. Elderly people who are still productive have the desire to return to work in addition to economic independence from their children they also want to keep their mind health and reduce the risk of dementia disease.



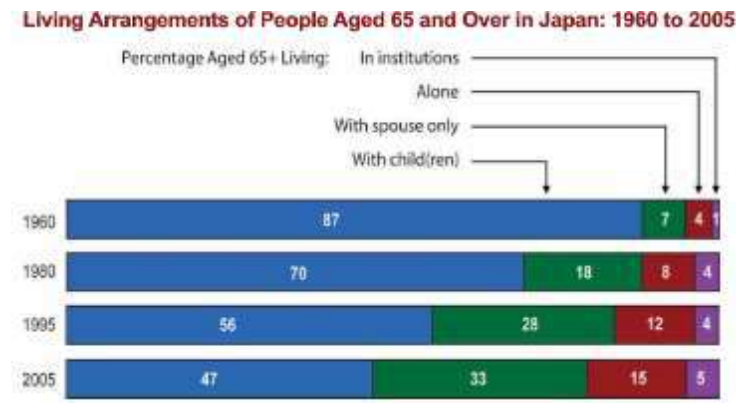


Figure 1.2.10 Living Arrangements of People Aged 65 and Over in Japan 1960 to 2005(WHO, 2011)

Based on Figure 1.2.10 the percentage of elderly that stay with their children is decreasing and there is an increase percentage where the elderly stay alone at their home and also living in institutions like nursing home. So, architecture must provide the elderly needs to living independently, active, and productive but also with friendly built environment that suitable with the limitations of elderly physical ability.

#### 1.2.4 Precedent and Related Issue

##### A. Jikka Tee-Pee House

Japanese architect, Issei Suma designing the building facilities for two ladies in their 60 years. The building can facilitate the user's activities not only for housing but their job as a food deliver for older people and also offers nursing care to people with disabilities.



Figure 1.2.11Jikka Tee-Pee in Japan (dezeen.com, 2016)

Based on figure 1.2.11 Jikka Tee-Pee house is designed with pointy shape which is inspired by tee – pee tents this Japanese home complex features five

buildings situated in a square formation. This building is a great example of an architecture project that features an unique and eye – catching aesthetic without compromise to its function.

#### B. Spark Design Model for Asian Retirement Communities that Double as City Farm

Spark is one of architect firm from Singapore that proposed a new model of Asian retirement house. By the time in 2020 Singapore will have more old age citizen than the young age. So, Singapore has to facilitate their old age citizen to bring back their role to city and also to keep them productive.



Figure 1.2.12 Asian Retirement Home that doubled with City House which is proposed by SPARK (dezeen.com, 2015)

Based on figure 1.2.12 the atmosphere between future Asian Retirement is to make the elderly as residents to keep productive. This kind of retirement housing is also called socio-economic where the elderly as the subject is empowered to keep working, get pay, and give contribution to the city.

This design is proposed because of two main issues there are the number of elderly citizen that increase rapidly, and the second is to fulfil their local food. This Home Farm concept is believed can solve that issues by transforming retirement communities into self – sufficient farming business by producing fruit and vegetable that can be sold to fund healthcare and other amenities for residents.

#### 1.2.5 Conclusion

From the explanation issue and precedent above, it is obvious that elderly housing nowadays is not suitable to keep elderly productive and need a new typology to provide place where elderly can work and still productive. By keeping inside the community elderly can keep healthy both physically and psychologically.

Table 1.2.1 Relationship between Issue and Precedent

ISSUE	Precedent 1 (Jikka Tee-Pee House)					SPARK Design Model for Asian Retirement Communities that Double as City Farm				
	Site Plan	Building Facade	Building Interior	Material	Structure	Site Plan	Building Facade	Building Interior	Building Material	Structure
Supporting elderly to keep working in their aging phase										
Supporting elderly to fulfil their daily needs independently										
Supporting elderly to socialize with other elderly										
Supporting elderly to socialize with their family										
Supporting elderly to socialize with younger generation										
Providing an atmosphere where elderly keep productive (physically and psychologically)										
Providing other facilities to maintain elderly health										
Suitable with tropical country										
Supporting elderly to work in home										
Providing atmosphere where elderly can contemplative										

Source: author's data, 2018

Based on Table 1.2.1 architecture object should change the elderly behaviour to keep them stay productive and to maintain their health. The productive elderly can get old with healthy mind and also can give their contribution to the society. Instead of productive elderly need to be in a community to socialize. Architectural object need to provide a place where elderly can socialize with other elderly or young generation.

### 1.3 Design Problem and Design Criteria

#### 1.3.1 Design Problem

The architectural object that can facilitate elderly needs nowadays only nursing home and elderly park. Elderly nursing home has a lack of facilities that can fulfil elderly desire for aging productively. Elderly nursing home nowadays just like a day care to take care the elderly without considering elderly participation to keep productive. Elderly in nursing home just follow the activities from the nursing home. From the interview result based on Appendix 1 and Appendix 2 the atmosphere of elderly housing nowadays only looks like a day care for elderly. Elderly is looked as the object and they need to be taken care by the staff of elderly housing. They don't give elderly a chance to work again to keep their mind healthy.



Figure 1.3.1 Activities that elderly do from Griya Usia Lanjut St. Yosef Surabaya (author's data, 2017)

From Figure 1.3.1 elderly nursing home only providing an atmosphere just like a home atmosphere and they don't consider the needs of the residents are differently. There are no different activities between independent elderly and dependent elderly. Mostly independent elderly feels bored because they want to do another activity based on their own needs not follow the activities from the nursing home. Nursing home need a differentiation where they can classification between productive elderly, elderly with healthy mind, and dependent elderly. By making dependent elderly and productive elderly in one group can change the productive elderly becomes dependent elderly with cognitive impairment.

According to table 1.2.2 this object design study will be a high – rise project located on low – density area, concerned in building thermal comfort, ventilation, lighting, and acoustic comfort that are used passive and active strategies to make a comfortable built environment for elderly. The object design study will be located at tropical climate country, Indonesia. The object design context will be focused on elderly tropical behaviour.



Table 1.3.1 Research Roadmap

<i>Research Road Map</i>		Context						Design Aspect										
		Climate	Lowland	Highland	Environment	Low Density	Kepadatan Tinggi	Performance Comfort	Thermal	Ventilation	Lighting	Acoustic	DESIGN STRATEGY	Passive	Active	HUMAN ADAPTATION	TECHNOLOGY	ENERGY
ARSITEKTUR TROPIS	<b>TRADITIONAL</b>																	
	Site Plan																	
	Building Form/Volume																	
	Room Configuration																	
	Building Element																	
	<b>CONTEMPORER</b>																	
	<i>LOW-RISE</i>																	
	Site Plan			X		X			X	X	X	X	X		X	X	X	X
	Building Form/Volume			X		X			X	X	X	X	X		X	X	X	X
	Room Configuration			X		X			X	X	X	X	X		X	X	X	X
	Building Element			X		X			X	X	X	X	X		X	X	X	X
	<b>CONTEMPORER</b>																	
	<i>HIGH-RISE</i>																	
	Site Plan																	
	Building Form/Volume																	
	Room Configuration																	
	Building Element																	
<i>Keterangan</i>			<i>Agenda of Environmental Architecture Research</i>															
			<i>Previous and Current Research (Independent, Master/PhD thesis)</i>															
		X	<i>This Study</i>															

Source: Supervisor's data, 2017

### **1.3.2 Design Criteria**

From the explanation of the issue above, it is obvious that Elderly Nursing Home isn't suitable for elderly for aging productively. Elderly nursing home needs to be upgraded. Nowadays the existing condition of Elderly Nursing Home just look like a day care to take care of elderly. Elderly is looked down as the person who needs to take care whereas there are two types of elderly, the productive elderly, and the dependent elderly. Productive elderly is an independent person and they still can fulfil their daily needs and have a wish to work again. In elderly nursing home productive elderly just can follow the activities that is provided by the administration of elderly nursing home.

Productive Elderly when combined with old age dependence over time will be affected by mental illness and cognitive decline. So, elderly needs an architectural object where they can keep productive and living independently.

Architectural object is the proposed object that will solve the problems of the issue above. There are the criteria of architectural object which is needed to solve the explained respond above:

- a. The proposed should provide an environment that can lead for elderly rejuvenation
- b. The proposed object should promote active participation by the residents and facilitate the learning between generations
- c. The proposed object should promote a sense of ownership and responsibility for elderly residents
- d. The proposed object should make elderly feel safe to do their activities



## **CHAPTER 2**

### **DESIGN PROGRAM**

#### **2.1 Activity Program and Building Function**

##### **2.1.1 Architectural Object Description**

The Object name is Sweet Home Sweet Office and the building typology is SOHO. Sweet Home Sweet Office is SOHO building form for Elderly. Sweet Home Sweet Office main goal as the media for Elderly Rejuvenation. Particularly, the functions of this object are:

- As a place to empower elderly through skills training and creativity such as handicraft, music, fine arts, sports, drama, and massage skills for active elderly and disabled elderly
- As a tool of intergeneration where the elderly and the community can exchange ideas, culture, and interact with each other
- As a public space for elderly for enjoying their free time, so they can relax and recreate

SoHo is a short for *Small Office Home Office*, namely: trend to work in the house (Akmal, 2010). So, we can conclude that SOHO is a dwelling (ie. house, apartment) which combine residential function with office which is also equipped with office support facilities. The Concept of SOHO allows owners and users of apartment unit to use their apartment units as residential units or as office units with legal permits.

Generally professions that often use SOHO are architects, designers, writers, cooks, photographers, and others (Akmal, 2010). Users of SOHO is usually an entrepreneur who tends to work alone or with a number of employees slightly less than 10 people.

With the concept of SOHO users can improve the effectiveness and efficiency of work, especially in terms of time. With the concept of SOHO users can save the time it takes to commute from office to home and this is perfectly suited to the current traffic conditions that are often jammed. So the concept of SOHO suitable applied to accommodate the desire of elderly who have the desire

to return to work. With the concept of SOHO elderly does not need to spend time and energy to travel from home to the office so that the elderly can live independent, active, and productive.

But the SOHO concept leads to a sense of laziness and the desire to delay work until the interruption and interruption of family members, so SOHO design is needed that can encourage the elderly to remain productive work and also provide privacy, sense of security, comfort and quiet at home. Sweet Home Sweet Office not only provides home and office but also provides medical and entertainment facilities to keep elderly's body and mind healthy and productive.

### 2.1.2 Activity Program

#### A. User and Activity

There are four facilities which are provided by this building Public Space, Craft Training, Healthcare, and Housing. From author's observation at Elderly Housing, elderly needs facilities that can make they are aging actively so they can spend their remaining life time actively. Beside that elderly also want to socialize with society so they can feel that they still be a part of society.

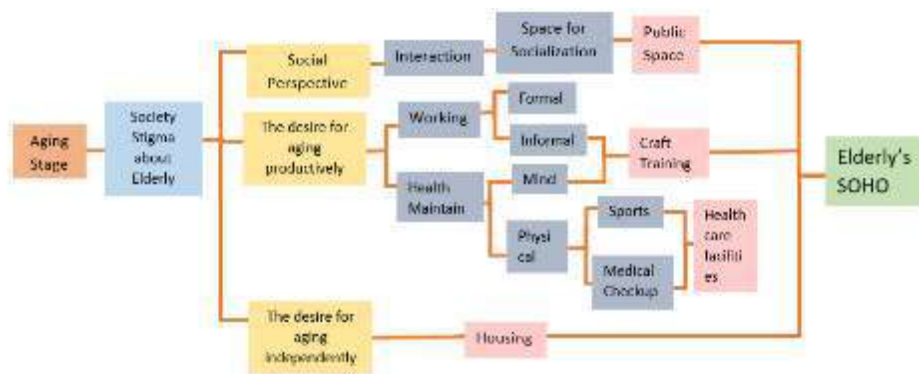


Figure 2.1.1 Activity Program Diagram (author's data, 2017)

According to Figure 4.1.1, Elderly's SOHO architectural object can be used not only by the resident elderly but also by other elderly. The dependent elderly can use healthcare and entertaining facilities in order to keep productive.

#### B. Room Requirements Based on User's Activities

The user of this building consists of Elderly Residents, Elderly Staff, Guests, Medical Staff, SOHO Administrator Staff.

##### 1. Elderly Residents

Elderly Residents are the residents of this Elderly SOHO building. Elderly Residents are elderly that still can take care of their daily activity needs and their age are around 60 – 80 or they are who still can active move independently without help from medical staff. These type of elderly is an Independent type elderly. They can move active and fulfil their own daily needs, beside that they also have a desire to come back to working environment because they still want to feel become a part of society (Figure 4.1.2)



Figure 2.1.2 Elderly Residents Activity (author's data, 2017)

## 2. Elderly's Staff

Elderly Staff are they who work with the residents elderly. Elderly staf age requirement start from 17 years old. Elderly more like if their employee or business partner are teenager and middle age adult because they believe that them still can be easier to built productive working atmosphere and they are more easily to control than other elderly.



Figure 2.1.3 Elderly's Staff Activity (author's data, 2017)

### 3. Guest

There are three types of Guest for this building that are Elderly's Visitors/Family/Friends, disabled elderly, and society that want to socialize with elderly. Guests can be from another land, age, and background.

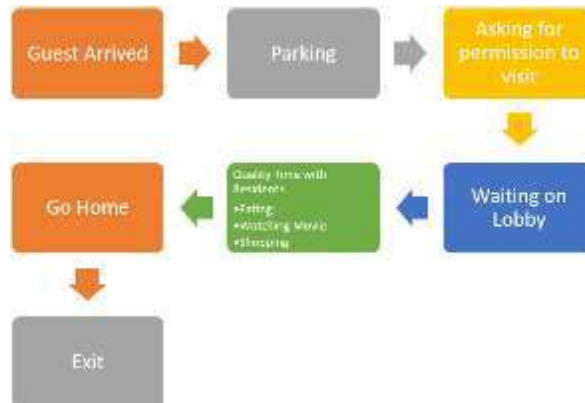


Figure 2.1.4 Guest's Activity (author's data, 2017)

### 4. Medical Staff Activities

Medical Staff Activities are the people that have responsibilities to take care of healthcare facilities and elderly's life and health (Figure 4.1.5)



Figure 2.1.5 Medical Staff Activities (author's data, 2017)

## 5. SOHO Building Administrators

SOHO Building Administrators are this building development and clean. SOHO building administrator works not only to keep the building systems still operate but also to develop this building (Figure 4.1.6).

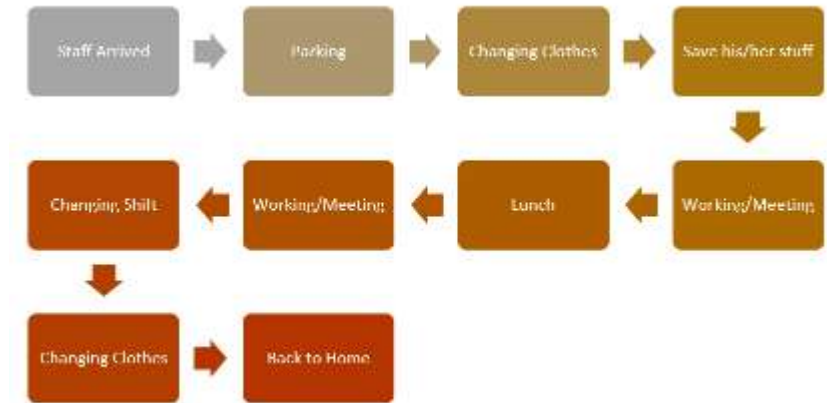


Figure 2.1.6 SOHO Building Administrations Activities (author's analyse, 2017)

From author's analyze based on users activities, these are rooms to accommodate Sweet Home Sweet Office activities.

Table 2.1.1 Room Needs Based on User's Activities

User	Activities	Rooms
Residents	Residents Come	Main Entrance
		Parking area
		Park/Green Area
		Drop Off
	Information Desk	Lobby
	Check in	Receptionist
		Lift Lobby
	Working	Office Room
	Trading	Handicraft Store
		Store
	Consultation	Consultation Room
	Exercise	Jogging Track
		Yoga Room
		Aerobik Room
		Fitness Room
		Swimming Pool
		Table Tennis
		Golf CourT
		Tennis Court



Table 4.2.1 Room Needs Based on User's Activities

	Meeting With Client	Lobby
		Office Room
		FoodCourt
	Physical Therapy	Whirlpool
		Therapy Room
	Mind Therapy	Yoga Room
		Theater Room
		Music Room
		Dance Studio
		Handicraft Training Room
		Fine Art Training Room
		Art Gallery Room
	Medical Check Up	Changing Room
		Medical Check Up Room
		Doctor's Room
	Massage	Changing Room
		Shower Room
		Toilet
		Sauna Room
		Jacuzzi
		Massage Room
	Daily Activities Sleeping Taking Bath	Resident's Room
		Bedroom
		Bathroom
	Socialize	Family Room
		Shared Kitchen and Dining Room
		Healing Garden
		Supermarket
		Foodcourt
		Entertaining Room
	Gardening	Healing Garden
	Eating	Shared Kitchen and Dining Room
		Foodcourt
	Shopping	Supermarket
		Medical Shop
	Worship	Mushalla
		Chapel
	Toilet	Toilet
Medical Staff	Staff Arrived	Main Entrance
		Drop Off

Table 4.2.1 Room Needs Based on User's Activities

		Park/Green Space
	Vehicle Parking	Parking Area
	Changing Clothes Taking Shower Saving Stuff	Changing Room
		Shower Room
		Locker Room
	Doing Consultation and Patient Diagnose	Consultation Room
		Medical Room
	Guiding Elderly to do Physical Therapy	Whirlpool
		Therapy Room
	Guiding Elderly doing Exercise	Gymnasium Room
	Taking Break/Rest	Medical's Staff Room
	Guiding and Giving Mind Therapy	Handicraft Training Room
		Fine Art Training Room
		Theater Room
		Music Room
	Guiding Yoga and Aerobik Activities	Yoga Room
		Aerobik Room
		Dance Room
	Saving Documents	Archive Room
	Saving Drugs	Drugs Store and Storage
	Saving Therapy Stuffs	Storage Room
	Sleeping/Rest	Medical Staff Bedroom
	Socialize	Medical Staff Room
	Eating	Medical Staff Pantry
		Shared Dining Room
	Worship/Praying	Mushalla
		Chapel
	Toilet	Toilet
Guest	Guest Arrived	Main Entrance
		Drop Off
		Park/ Green Area
	Parking Vehicles	Parking Area
	Asking Permission/ Information	Receptionist/Information Desk
	Waiting Residents	Lobby
	Register	Register Room
	Waiting Queue	Lobby
		Hall
	Socializing With Residents	Healing Garden
		Foodcourt

Table 4.2.1 Room Needs Based on User's Activities

		Elderly's Art Gallery
	Consultation	Consultation Room
	Shopping	Handicraft Shop
		Supermarket
	Physical Therapy	Physical Therapy Room
	Exercise	Gymnasium
	Mind Therapy	Handicraft Training Room
		Fine Art Training Room
		Yoga Room
	Relaxing	Massage
		Sauna
		Salon
		Karaoke Room
		Dance Studio
		Cinema Room
	Changing Clothes	Changing Room
		Shower Room
		Locker Room
	Eat and Drink	Foodcourt
		Food Display
		Cashier
		Foodcourt Kitchen
		Dining Hall
	Toilet	Toilet
	Worship Room	Mushalla
		Chapel
Resident's Staff	Arrived	Main Entrance
		Drop Off
		Park/Green Area
	Parking	Parking Area
	Check in	Receptionist
	Working	Office
	Break/ Taking	Office, Staff's Lounge
	Rest	Healing Garden
		Foodcourt
		Elderly's Art Gallery
	Makan	Mini Pantry
		Foodcourt
	Toilet	Toilet
	Worship Room	Mushalla
		Chapel

Table 4.2.1 Room Needs Based on User's Activities

SOHO Administrator's Staff	Arrive	Main Entrance
		Park/Green Area
		Drop Off
	Parking	Parking Area
	Changing Clothes	Changing Room
	Washing Body	Shower Room
	Saving her/his stuff	Locker Room
	Receive Guests	SOHO Administrator's Office
		Receptionist
	Administration	Administration Service Room
		Archive Room
	Serving Information	Information Room
	Maintaining Building Cleanliness	Janitor Room
	Maintaining and Controlling Building Utility System	Water Tank Room
		AHU Room
		Warehouse
		Panel Room
		Power House
		Security Office
		Water Pump Room
	Socializing	Administrator's Staff Room
		Healing Garden
		Mini Pantry
	Meeting	Meeting Room
	Break/ Taking Rest	Staff Rooms
	Eat and Drink	Mini Pantry
		Staff Shared Dining Room
	Worship Room	Mushalla
		Chapel
	Toilet	Toilet

After getting lists of rooms that needed based on users activities, these rooms are grouped by building function to be combined. This architectural object will combine Elderly's residents housing with Elderly's Co-Working Space Which is also supported by Health Care Facilities, Entertaining Facilities, and Administrator's Room and Service Room.

Table 2.1.2 Room Zoning Based on Building Function

<b>Elderly's Housing</b>	<b>Elderly's Co-Working Space</b>	<b>Healthcare Facilities</b>	<b>Entertaining Facilities</b>	<b>Administrator's and Service</b>
<b>Main Entrance</b>	Main Entrance	Main Entrance	Main Entrance	Main Entrance
<b>Drop Off</b>	Drop Off	Drop Off	Drop Off	Drop Off Area
<b>Park/Green Area</b>	Park/Green Area	Park/Green Area	Park/Green Area	Park/Green
<b>Resident's Parking Area</b>	Parking Area	Parking Area	Parking Area	Staff Parking Area
<b>Lobby</b>	Lobby	Lobby	Lobby	Administrator's Office Lobby
<b>Receptionist</b>	Receptionist	Receptionist	Receptionist	Receptionist
<b>Bedroom</b>	Elderly Co – Working Space	Changing Room	Supermarket	Locker Room/Changing Room
<b>Bathroom</b>	Toilet	Shower Room	Toilet	Toilet
<b>Family Room</b>	Resident's Staff Lounge	Locker Room	Karaoke Room	Staff Working Area
<b>Shared Kitchen</b>	Mini Library	Shower Room	Theatre Room	Archive Room
<b>Guard Room</b>	Multi Purpose Room	Swimming Pool	Dance Studio	General Manager Office Room
<b>Self – Service Laundry Room</b>	Meeting Room	Whirlpool	Cinema	Finance Manager Office Room
<b>Storage Room</b>	Archive Room	Sauna	Foodcourt	Information Room
<b>Worship Room</b>	Storage Room	Archive Room	Elderly's Art Gallery Space	Worship Room
<b>Toilet</b>	Mini Pantry	Storage Room	Storage Room	Water Tank Room
-	Cafeteria	Medical Check Up Room	Golf Course	Administrator's Staff Room
	Coffee Shop	Consultation Room	Tennis Court	Meeting Room
	Worship Room	Drugs Store	Handicraft Store	Panel Room
	Coffee Shop	Doctor's Room	Music Room	Power House
		Medical Staff Room	Healing Garden	Security Office
		Jogging Track	Worship Room	AHU ROOM
		Yoga Room	Mini Library	Water Pump Room
		Fitness Room	Salon	Mini Pantry
		Aerobic Room		Lift

		Mind Therapy Room		Emergency Stairs
		Massage Room		Mechanical and Electrical Room
		Physical Therapy Room		Garbage Dump
				Laundry Room

Source: author's data, 2017

Note:

Privat	Semi Public	Green Area
Public	Service	

Table 2.1.3 The Amount of Room Needed

Area	Room	Requirement	Unit	Amount Area of Room(m 2)	Source
Entrance	Main Entran ce	Car + Motorcycle = 15 m2 + 1.7 m2 = 16.7 m2	1	16.7	TSS
	Lobby Utama	Minimal 100 m2	1	100	DA
	Recepti onist	Receptionist = 1 table / 125 ft2 = 125 ft2 = 11. 6 m2	1	11.6	AS
	Parkin g	Car = 15m2	50	750	TSS
		Motorcycle = 2m2	70	140	
Total				1018.3	
Elde rly's Hous ing	Housin g	Single Person Bedroom = 37 m2	20	740	DA
		Two Person Bedroom = 58	20	1160	DA
		Bathroom (include in Bedroom) = @4.67 m2	40	-	TSS
		Family Room = @40m2 for each floor housing areas	3	120	TSS
		Shared Kitchen @32m2	4	128	TSS
		Self Service Laundry @28m2	3	84	AS
		Ruang Jaga Perawat @200	1	200	AS
		Gudang@40 m2	2	80	AS
		Total			

Table 4.2.3 The Amount of Room Needed

Elderly's Co-Working Space	Shared Kitchen	Vegetables Preparation $0,1 \times 50 = 5 \text{ m}^2$ Meat Preparation $0,09 \times 50 = 4,5 \text{ m}^2$ Kitchen Sink = $0,08 \times 50 = 4 \text{ m}^2$ <i>Dishwasher</i> = $0,1 \times 50 = 5 \text{ m}^2$ Food Storage = $0,04 \times 50 = 2 \text{ m}^2$ Kitchen Area = $0,6 \times 50 = 30 \text{ m}^2$	1	50.2	DA
	Rent Office	Office = 25m2 Meeting Room = 80 m2	5	525	DA
	Multipurpose room	145	1	145	<a href="https://enggunit.iitm.ac.in/oldsite/Community%20Centre.pdf">https://enggunit.iitm.ac.in/oldsite/Community%20Centre.pdf</a>
	Computer Room	@computer = $105 \text{ ft}^2 = 32 \text{ m}^2$	1	32	AS
	Internet Cafe	@computer = $105 \text{ ft}^2 = 32 \text{ m}^2$	1	32	AS
	Mini Library	- 8 volume / $\text{ft}^2 = 625 \text{ ft}^2 = 58 \text{ m}^2$ - Non print display $12 / \text{Ft}^2 = 40 \text{ ft}^2 = 3.7 \text{ m}^2$ - Non print Collection $2 / \text{ft}^2 = 40 \text{ ft}^2 = 3.7 \text{ m}^2$ - <i>Public Access Catalogue</i> = 1 PAC / $25 \text{ Ft}^2 = 125 \text{ ft}^2 = 11.6 \text{ m}^2$ - <i>Public Access Cataloge duduk</i> = 1 PAC / $35 \text{ ft}^2 = 70 \text{ ft}^2 = 6.5 \text{ m}^2$	1	200.7	DA

Table 4.2.3 The Amount of Room Needed

		<ul style="list-style-type: none"> <li>- Staff room = 1 ruang staff / 125 ft<sup>2</sup> = 125 ft<sup>2</sup> = 11.6 m<sup>2</sup></li> <li>- Study room = 1 orang / 30 ft<sup>2</sup> = 900 ft<sup>2</sup> = 80 m<sup>2</sup></li> <li>- Circulation table = 1 table each staff / 125 ft<sup>2</sup> = 125 ft<sup>2</sup> = 11.6 m<sup>2</sup></li> <li>- Reading room = 1 person per 10 ft<sup>2</sup> = 150 ft<sup>2</sup> = 14 m<sup>2</sup></li> </ul>			
	Staff Room	18 m <sup>2</sup>	2	36	DA
<b>Total</b>				<b>1420.9</b>	Assumption
<b>Health Care Facilities</b>	Conculation Room	17m <sup>2</sup> /unit	5	85	MHDG
	Changing Room	Locker and Changing Room @90m <sup>2</sup>	2	180	DA
	Shower Room	Shower Room@90m <sup>2</sup>	2	180	DA
	Workshop	Drawing Studio =85 m <sup>2</sup> Handicraft Studio = 65 m <sup>2</sup> Washing Stand = 20 m <sup>2</sup>	2	340	DA
	Massage Room	9,3 m <sup>2</sup> /orang 9,3 x 10 orang	2	186	TSS
	Physical Therapy	@200	1	200	DA
	Whirlpool	1 pool = @9m <sup>2</sup>	10	90	TS
	Sauna	@16m <sup>2</sup>	4	64	DA
	Medical Check Up	@30m <sup>2</sup>	5	150	DA



Table 4.2.3 The Amount of Room Needed

	Swimming Pool	16.66 m x 25 m = 416.5	1	416.5	DA
	Medical Staff Changing Room	@0.40m <sup>2</sup> /Person	30	12	DA
	Medical Staff Sleeping Room	@12.25m <sup>2</sup>	1	12.25	DA
	Medical Staff Working Room	Nurse Work Station = 27.9m <sup>2</sup>	1	27.9	MHDG
		Therapist = 3m <sup>2</sup> /orang	10	30	
		Nurse Working Room = 11.2m <sup>2</sup>	1	11.2	
	Drugs Store	11.2 m <sup>2</sup>	1	11.2	
	Archive room	Assumption = 9m <sup>2</sup> /unit	1	9	
<b>Total</b>				<b>2005.05</b>	Assumption
<b>Entertaining Facilities</b>	Music Room	Music Room = 70 m <sup>2</sup> Storage = 65 m <sup>2</sup>	2	270	DA
	Auditorium	0,8 m <sup>2</sup> / person, 200 x 0.8 = 160 m <sup>2</sup> Stage = 80 m <sup>2</sup> , Backstage = 160 m <sup>2</sup> x 5% = 8m <sup>2</sup>	1	248	CCE
	Dance Studio	3 m <sup>2</sup> /person 3 x 30=90	2	180	TS
	Table Tennis	1.73 x 1.52 m = 4.1, 1.74 x 4 = 10.96 0.6 x 6 = 3.6	1 ruang	18.66	
	Healing Garden (Green Area, not Counting)	Garden, Jogging Track, Golf Court = 2500m <sup>2</sup> (Outdoor)	1	2500	
	Salon	@20m <sup>2</sup>	2	40	

Table 4.2.3 The Amount of Room Needed

	Foodcourt	@724m2/unit	1	724	
	Supermarket	400m2	1	400	
	Elderly's Handicraft Shops	@25m2/unit	2	50	
	Karaoke Room	@40m2	4	160	
	Cinemas	@60m2/unit	2	120	
	<b>Total</b>			<b>2210.66</b>	
<b>Administrator and Service</b>	Kantor Pengelola	146 m2	1	146	AS
	Storage Room	65 m2	1	65	
	Utility Room	Janitor Room = 2m2/Unit	4	8	
		Water Tank Room = 50m2/Unit	1	50	
		Chiller Room = 64m2	1	64	
		Panel Room = 50m2/unit	1	50	
		Power House = 60m2	1	60	
		Water Pump Room = 50m2	1	50	
		Lift @6.25m2/unit	4	25	
		Emergency Stairs @36m2/unit	2	72	
	Laundry Room	Washing Room = 12m2	1	12	
		Ironing Room = 10m2	1	10	
		Drying Room = 12m2	1	12	
		Storage Room = 6m2	1	6	
	Garbage Dump	Garbage Dump @9m2/unit	2	18	
	Musholla	Praying Room 60m2/unit	1	60	
		Wudhu 12m2/unit	1	12	
	Chapel	60m2	1	60	

Table 4.2.3 The Amount of Room Needed

	Toilet	Man = 25m <sup>2</sup> Woman = 25m <sup>2</sup>	2	100	<a href="http://www.washroomcubicles.co.uk/how-many-toilets-do-you-need/">http://www.washroomcubicles.co.uk/how-many-toilets-do-you-need/</a> Neufert
<b>Total</b>				<b>880</b>	

Source: author's observation, 2017

Table 2.1.4 Total Room Area Requirement

<b>Zoning Area</b>	<b>Luasan (m<sup>2</sup>)</b>
<b>Entrance</b>	1018.3
<b>Elderly's Housing</b>	2512
<b>Co-Working Space</b>	1420.9
<b>Healthcare Facilities</b>	2005.05
<b>Entertaining Facilities</b>	2210
<b>Building Administrator and Service</b>	880
<b>Total Area</b>	10046.91

Source: author's observation, 2017

### C. Application of Space Syntax Method in Determining Space Properties

After the spaces are grouped based on the typology of the building to determine the nature of space by using Space Syntax Method. Based on the preferred approach of Architecture and Human Sense for interiority, space syntax method determined in combining the programs of several different building typologies. The first step to do is to separate spaces that are public and Private based on the depth (depth) of space and the relationship of space with other space (connectivity).

Depthmap is a software to perform a complete analysis of the different space syntax parameters. Depthmap is used to analyse how often an element is passed, calculating the shortest paths between elements, distance of an element to all other elements in relation to the number of elements in the complete systems in building. For the syntactic analysis, first an axial analysis is performed through Depthmap and the connectivity, integration, and choice measures are calculated and illustrated in graphs (Monokrousou, 2016).

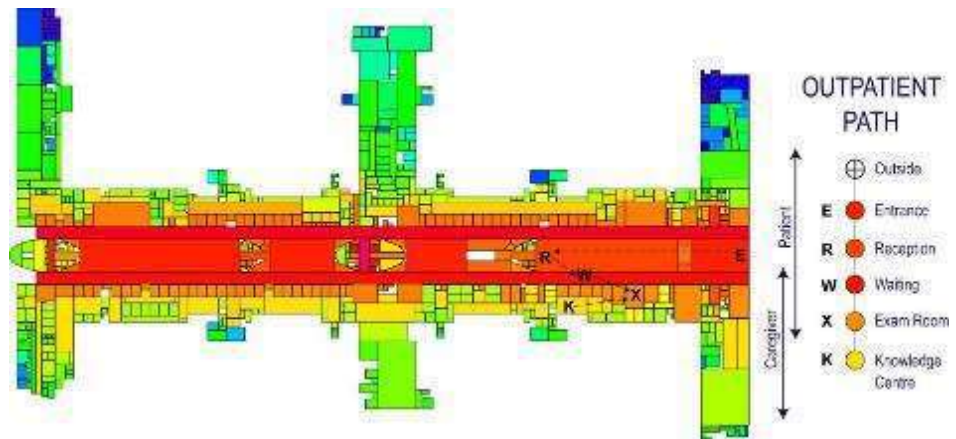


Figure 2.1.7 The use of Space Syntax in Hospital Design (Google.com, 2017)

According to Figure 4.2.1, we can see that the room that central areas with strategically short paths to all others areas in the building (integrated spaces) has warming color (ie. red, yellow, orange) and the area with cold color (ie. green, blue, purple) shows more distant and inaccessible areas for building users.

Depthmap is also used to explore the building mass organization and building mass shape which one from author's mass shape idea that have an efficient shape for elderly movement. The analysis results from Depthmap is used to determine the room organization that have more a warm connection and integration to create a place where elderly can socialize.

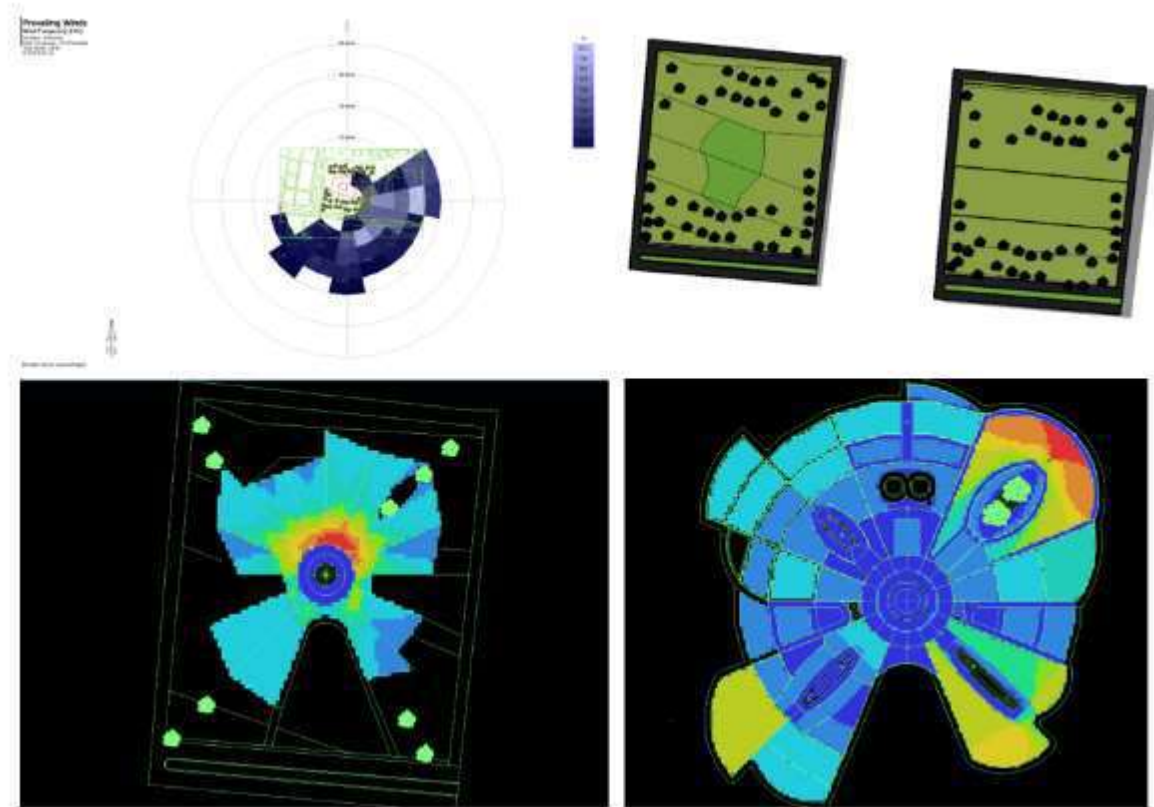


Figure 2.1.8 Building Mass Exploration using Depthmap for room programming(author's data, 2018)

According to Figure 2.1.8 the room that the building mass shape and the radial distribution of the room shape affect connectivity, integrity, and intelligibility of building room configuration value distribution. From the simulation according to Figure 2.1.8 we can see that the radius of space serves as the unifying of the space structure, as the main collecting chamber and causes the affordability of the space more easily to be reached from all other spaces.

### 2.1.3 Room Requirements Based on Related Activities

#### A. Spatial Organization

##### 1) Building Makro Organization

According to Figure 2.1.9, the building macro organization on the site is based on the building function it will be grouped by the function of each facilities. The elderly housing will be located at the backside of the side to make peace atmosphere for elderly to relax. Meanwhile for public facilities such as entertaining facilities and healthcare facilities will be located at the front side of the site. The circulation is

radial circulation to give free access for the user to explore the building atmosphere and choose their own path to enjoy the building atmosphere and to socialize.

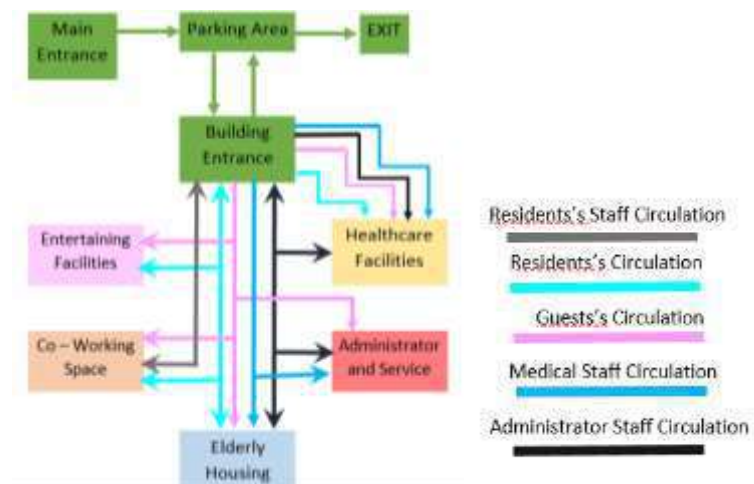


Figure 2.1.9 Diagram of Building Macro Organization

#### 1) Room Organization

- Basement Room Organization



Figure 2.1.10 Basement Room Organization (author's data, 2018)

- First Floor Room Organization

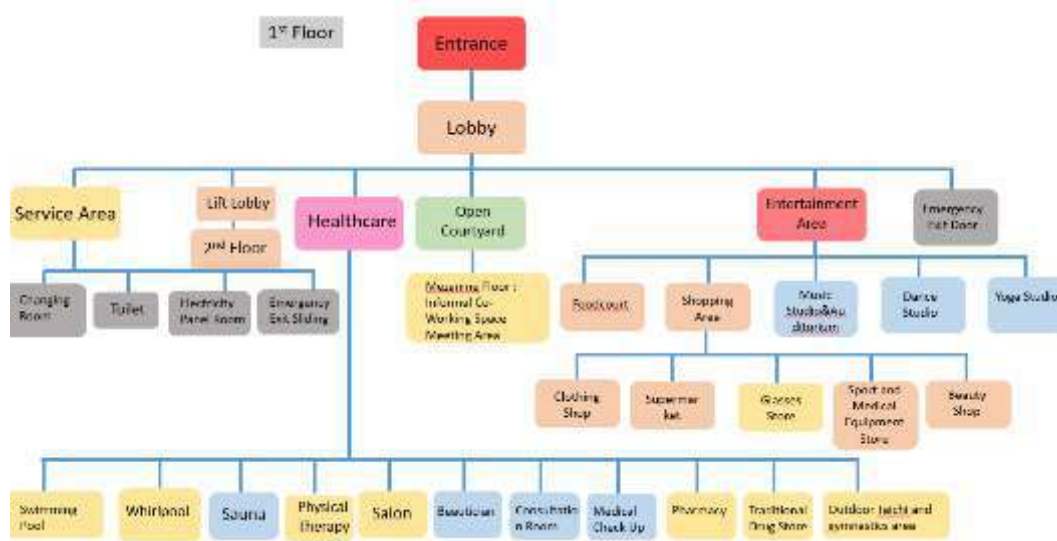


Figure 2.1.11 First Floor Room Organization (author's data, 2018)

- Second Floor Room Organization

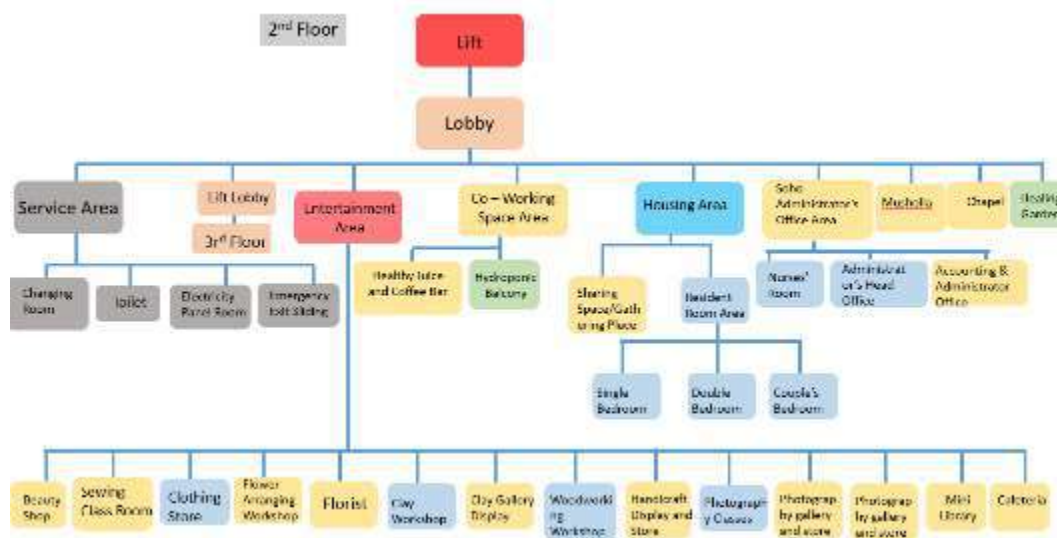


Figure 2.1.12 Second Floor Room Organization (author's data, 2018)



- Third Floor Room Organization

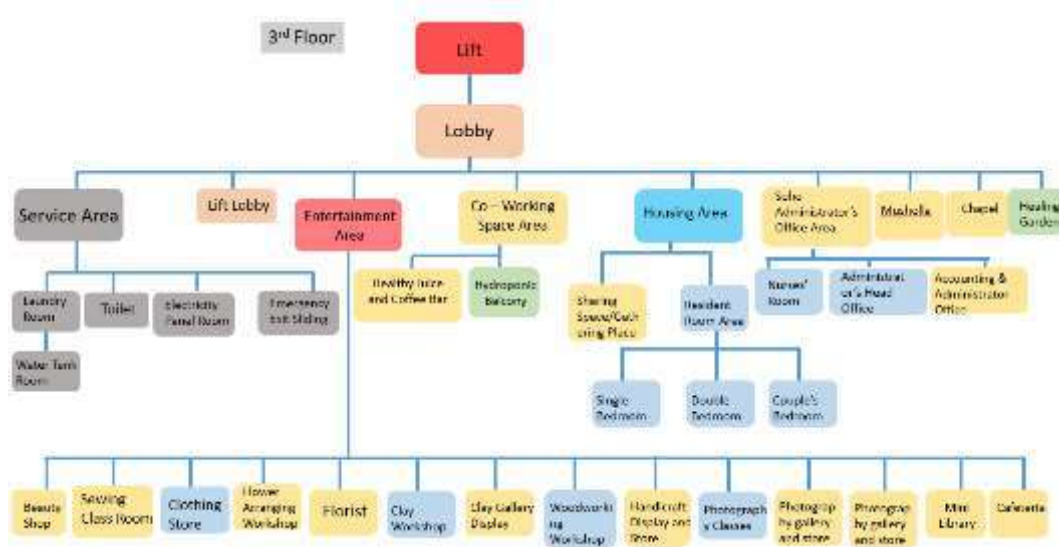


Figure 2.1.13 Third Floor Room Organization (author's data, 2018)



## B. Room Programming

### 1. Site

According to Figure 4.3.1, the site programming the building entrance gate facing the road and pedestrian way because at the existing condition there is pedestrian way. The building site programming is based on the zoning area for room requirement. Public facilities will be located in front side of the site and located near lobby. Lobby is the centre unit for vertical and horizontal circulation. The building exit gate is located at the east side of the site to reduce traffic jam in front of the site.



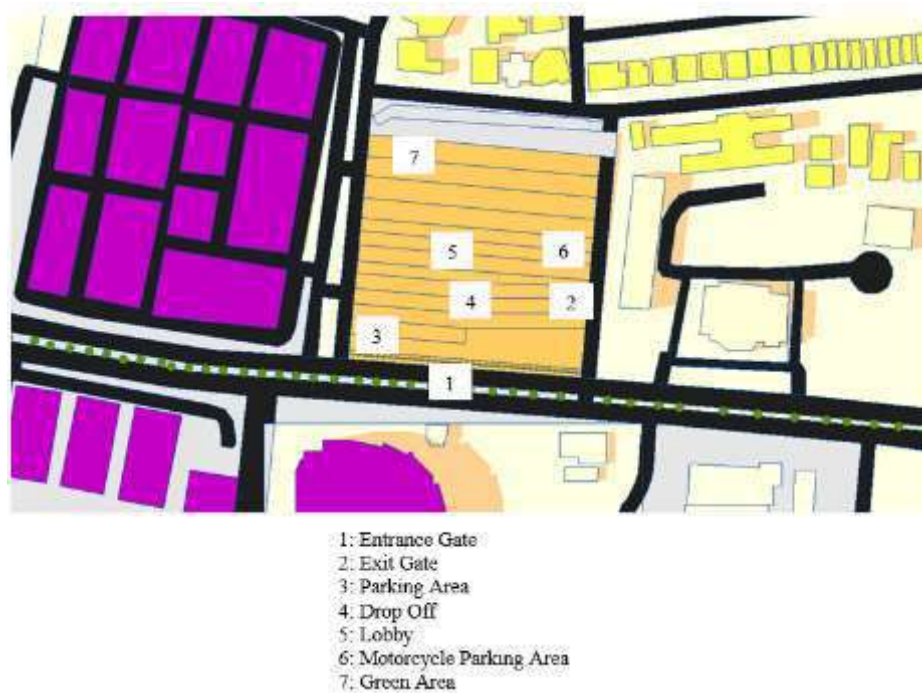


Figure 2.1.14 Site Plan (author's data, 2017)

## 2. Building

### a) Elderly Housing Unit

Table 2.1.5 Bed Room Requirements

Table 2.11: Bed Room Requirements						
No.	Room/Facility	Area	Dimension	Occupant		
				User	Activity	Clothes
1	Bedroom	37m2(single)	PxL= 6 x 6.167	Man/Woman Elderly	<ul style="list-style-type: none"><li>• Sleeping</li><li>• Cooking</li><li>• Taking Bath</li><li>• Watching Television</li><li>• Reading</li></ul>	T-shirt, shorts, daster
		58 m2(double)	PxL = 8 x 7.25	Elderly's Family/Child /Guest	<ul style="list-style-type: none"><li>• Sleeping</li><li>• Taking Bath</li><li>• Reading</li><li>• Cooking</li></ul>	T-Shirt, Shorts, daster
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>• Comfortable</li><li>• Adequate opening for light and wind penetration</li></ul>			
21.00-05.00		06.00-18.00				
Typical Layout						

<p>Rumah untuk 1 orang, luas 37 m<sup>2</sup></p>	<p>Rumah untuk 2 orang, luas 58 m<sup>2</sup></p>	
References		
Data Arsitek Jilid 2		
Permen PU No.30 tahun 2002		

Table 2.1.6 Shared Kitchen Room Requirement

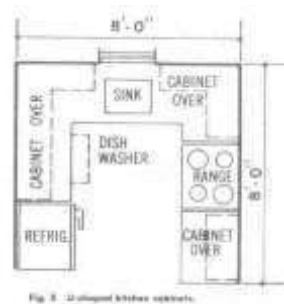
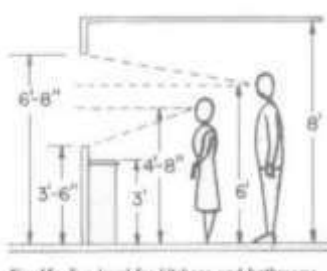
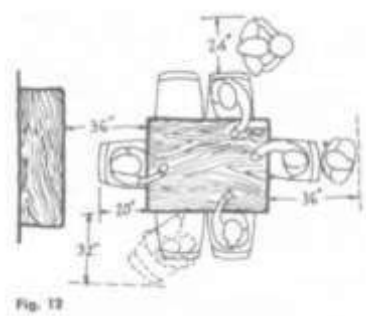
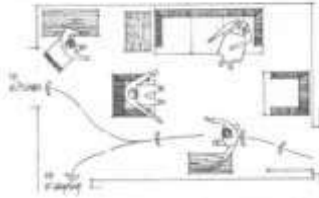
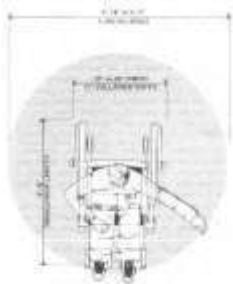
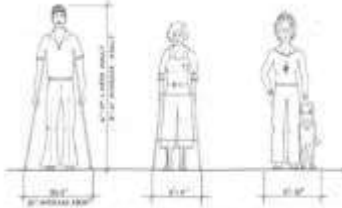
No	Room/Facility	Area	Dimension	Occupant		
				User	Activity	Clothes
2	Shared Kitchen	32m2	PxL= 8 x 4	Man/Woman Elderly	<ul style="list-style-type: none"><li>• Washing Dish</li><li>• Cooking</li><li>• Eating</li></ul>	T-shirt, shorts, daster
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>• Hygiene</li><li>• Adequate Ventilation</li><li>• Adequate Lighting</li></ul>			
07.00-19.00		07.00-18.00				
Typical Layout						
<div><div><p>Fig. 14: U-shaped kitchen layout.</p></div><div><p>Fig. 15: Eye-level for kitchens and bathrooms.</p></div><div><p>Fig. 12</p></div></div>						
References						
Time Saver Standards For Building Types						

Table 2.1.7 Family Room Requirement

No	Room/Facility	Area	Dimension	Occupant		
				User	Activity	Clothes
3	Family Room	40m2	PxL= 8 x 5	Man/Woman Elderly	<ul style="list-style-type: none"><li>• Watching Television</li><li>• Talking</li><li>• Reading</li></ul>	T-shirt, shorts, daster
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>• Comfortable to sit and speak each other</li><li>• Close to kitchen</li><li>• Adequate opening for light and wind penetration</li></ul>			
08.00-20.00		08.00-18.00				
Typical Layout						
<div><div><p>Fig. 11 - Monitor placement, circulation, and conversation areas for living rooms.</p></div><div><p>Fig. 12 - Wheelchair dimensions.</p></div><div><p>Fig. 13 - Average dimensions of the human body.</p></div></div>						
References						
Time Saver Standards For Building Types						

## b) Co-Working Space Area

Table 2.1.8 Co-Working Space Requirement

No	Room/Facility	Area	Dimension	Occupant		
				User	Activity	Clothes
1	Rent Office	25m <sup>2</sup>	PxL= 5 x 5	Man/Woman Elderly	<ul style="list-style-type: none"> <li>Working</li> <li>Talking</li> <li>Selling</li> <li>Reading</li> </ul>	Shirt, Trousers
2	Meeting Room	80m <sup>2</sup>	P x L = 8 x 10	Man/Woman Elderly	<ul style="list-style-type: none"> <li>Meeting with staff and client</li> <li>Discussing</li> </ul>	Shirt, Trousers
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"> <li>Comfortable to work</li> <li>Productivity atmosphere</li> <li>Easy to Access</li> </ul>			
08.00-16.00		08.00-18.00				

		<ul style="list-style-type: none"> <li>Adequate opening for light and wind penetration</li> <li>Providing railing</li> </ul>
Typical Layout		
References		
Time Saver Standards For Building Types		

### c) Healthcare Facilities Area

Table 2.1.9 Healthcare Facilities Changing Room Requirement

No	Room/Facility	Area	Dimension	Occupant		
				User	Activity	Clothes
1	Changing Room	Locker and Changing Room @90m2	P x L= 15 x 6	Man/Woman Elderly Residents	<ul style="list-style-type: none"><li>Changing Clothes</li><li>Saving stuff</li><li>Lock</li></ul>	Tank, Swimming Suit, Shorts
				Elderly Guest(Non Residents)	<ul style="list-style-type: none"><li>Changing Clothes</li><li>Saving stuff</li><li>Lock</li></ul>	Tank, Swimming Suit, Shorts
	Shower Room	90m2	P x L = 9x10	Man/Woman Elderly	<ul style="list-style-type: none"><li>Washing Body</li></ul>	-
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>Hygiene</li><li>Non Slippery Floor</li><li>Adequate Ventilation and Lighting</li><li>Providing railing</li></ul>			
08.00-20.00		08.00-18.00				
Typical Layout						

<p>SECTION A-A</p> <p>DENAH</p> <p>DETAIL</p>			<p>SECTION A-A</p> <p>DENAH</p> <p>DETAIL</p>					
GAMBAR 4.0 BALK PANCURAN TANPA TEMPAT DUDUK			GAMBAR 4.1 BALK PANCURAN DENGAN TEMPAT DUDUK			GAMBAR 4.2 TIGA ORANG DENGAN TINGGI BADAN YANG BERBEDA-BEDA		
References								
Permen PU No.30 th 2006								

Table 2.1.10 Healthcare Administration Requirement

No	Room/Facility	Area	Dimension	Occupant		
				Capacity	Activity	Clothes
1	Waiting Room	150 m2	P x L= 15 m x 10 m	30 persons	<ul style="list-style-type: none"><li>Waiting</li><li>Sitting</li><li>Reading</li><li>Watching</li></ul>	Shirt, T-shirt, trousers
2	Registration Area	35 m2	P x L = 5m x 7m	4 persons	<ul style="list-style-type: none"><li>Sitting</li><li>Typing</li></ul>	T-Shirt, Skirt, Trousers
3	Treatment Room	7.5 m2	P x L = 2.5 m x 3 m	2 persons	<ul style="list-style-type: none"><li>Sitting</li><li>Examining</li></ul>	Shirt, trousers
4	Consultation room	6 m2	P x L = 2 m x 3 m	2 persons	<ul style="list-style-type: none"><li>Sitting</li><li>Writing</li></ul>	Shirt, trousers
5	Pharmacy	12 m2	3 m x 4 m	2 Persons	<ul style="list-style-type: none"><li>Sitting</li><li>Organizing</li><li>Checking Stock</li></ul>	Shirt, trousers
6	Toilet	3 m2(@1.5m <sup>2</sup> x 2 unit)	1.5 m x 1 m	1person @unit	<ul style="list-style-type: none"><li>Urinating</li><li>Defecating</li></ul>	Shirt, trousers
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>Hygiene</li><li>Non - Slippery Floor</li><li>Adequate Ventilation and Lighting</li><li>Easy to grab railing in the wall</li></ul>			
08.00-21.00		08.00-18.00				
Typical Layout						

References			
Permen PU No.30 th 2006 Neufert, Architect's Data: Third Edition			

Table 2.1.11 Healthcare Therapy Facilities Requirement


No	Room/Facility	Area	Dimension	Occupant		
				Capacity	Activity	Clothes
1	Physiotherapy	200 m2	P x L= 20 m x 10 m	40 persons	<ul style="list-style-type: none"><li>Waiting</li><li>Gymnastic</li><li>Physical therapy</li></ul>	Shirt, T-shirt, trousers
2	Urological Treatment	25 m2	P x L = 5m x 7m	3 persons	<ul style="list-style-type: none"><li>Investigating and Examining</li><li>Consulting</li></ul>	T-Shirt, Skirt, Trousers
3	Eye Treatment	25 m2	P x L = 2.5 m x 3 m	3 persons	<ul style="list-style-type: none"><li>Investigating and Examining</li><li>Consulting</li></ul>	Shirt, trousers
4	Ear, Nose and Throat Treatment	25 m2	P x L = 5 m x 5 m	3 persons	<ul style="list-style-type: none"><li>Investigating and Examining</li><li>Consulting</li></ul>	Shirt, trousers
5	Dental Treatment	25 m2	5 m x 5 m	3 Persons	<ul style="list-style-type: none"><li>Investigating and Examining</li><li>Consulting</li></ul>	Shirt, trousers
6	Toilet	3 m2(@1.5m <sup>2</sup> x 2 unit)	1.5 m x 1 m	1person @unit	<ul style="list-style-type: none"><li>Urinating</li><li>Defecating</li></ul>	Shirt, trousers
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>Hygiene</li><li>Non - Slippery Floor</li><li>Adequate Ventilation and Lighting</li><li>Easy to grab railing in the wall</li></ul>			
08.00-21.00		08.00-18.00				
Typical Layout						

References		
Neufert, Architect's Data: Third Edition		

#### d) Entertainment Facilities Area

Table 2.1.12 Entertaining Facilities Requirement

No	Room/Facility	Area	Dimension	Occupant		
				User	Activity	Clothes
1	Foodcourt	724m <sup>2</sup>	PxL= 28 x 26	Man/Woman Elderly	<ul style="list-style-type: none"><li>Eating</li><li>Talking</li><li>Cooking</li></ul>	Shirt, shorts, T-Shirt Trouser s
				Guest	<ul style="list-style-type: none"><li>Eating</li><li>Talking</li><li>Cooking</li></ul>	Shirt, shorts, T-Shirt Trouser s
	Supermarket	400m <sup>2</sup>	P x L =20 x 20	Man/Woman Elderly	<ul style="list-style-type: none"><li>Shopping</li><li>Selling</li></ul>	Shirt, shorts, T-Shirt Trouser s
				Guest	<ul style="list-style-type: none"><li>Shopping</li></ul>	Shirt, shorts, T-Shirt Trouser s
Occupancy			Architectural Technical Requirement			
Usage hours		Ventilation	<ul style="list-style-type: none"><li>Easy to access</li><li>Circulation Clear</li><li>Hygiene</li><li>Adequate opening for light and wind penetration</li></ul>			
09.00-22.00		08.00 - 18.00				
Typical Layout						


<p style="text-align: center;">References Data Arsitek Jilid 2</p>

## 2.2 Site Description

### 2.2.1 Site Analysis

#### A. Site Location

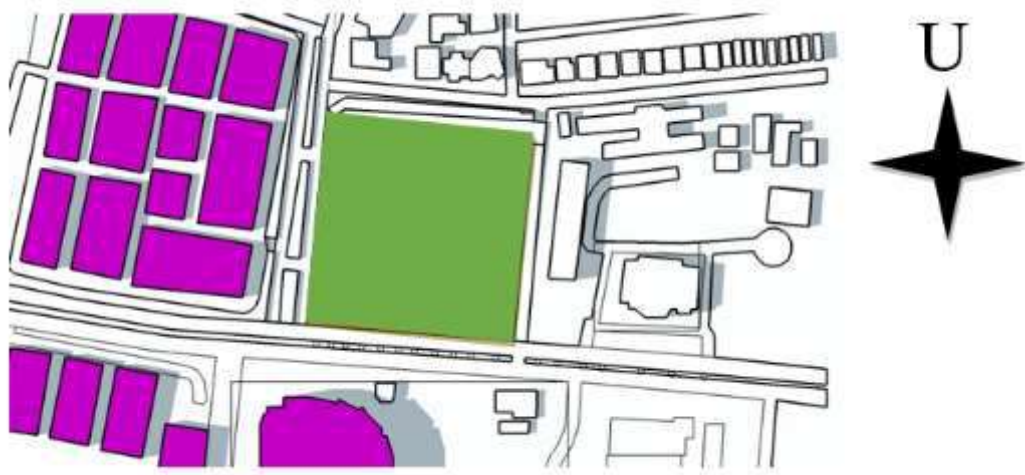


Figure 2.2.1 Site Location (author's data, 2017)

According to Figure 2.2.1 the site is located in Jalan Mayjend Sungkono, Dukuh Pakis, Surabaya Barat this site is chosen because it is located in tropical country and it uses is for trading and commercial serving. Based on urban context this site is suitable for this building function as SOHO for elderly. The site location is far from beach and less windy, so the climate on the site is quite suitable for elderly needs of neutral climate. The site is an empty land with contour and its shape is rectangle with dimension: 130 m x 142 m. The total surface of the site is 18.460 m<sup>2</sup>. The site surroundings are described below (google earth, access: 2017):

- Latitude: -7.290788



- Longitude: 112.719698
- Altitude : 16 m
- North side : Small shops
- South side : Ciputra World
- East side : UNTAG

West side : Police office, shop, bank, repair shop

## B. Climate Analysis

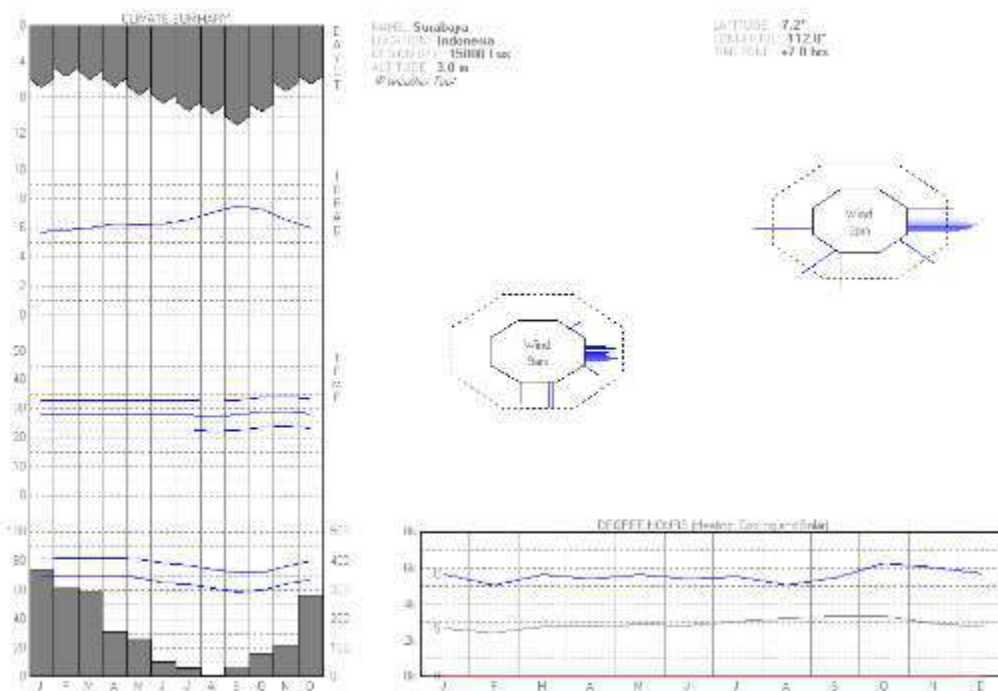


Figure 2.2.2 Degree Hours in Surabaya (Ecotect, 2017)

Figure 2.2.2 Shows that on average Surabaya has long duration of sun hours so that the temperature of Surabaya is always high. According to the field measurement that was held on October 21<sup>st</sup> 2017 the temperature of the site is 34.4<sup>0</sup>C at 9 am and 36<sup>0</sup>C at 12 pm.

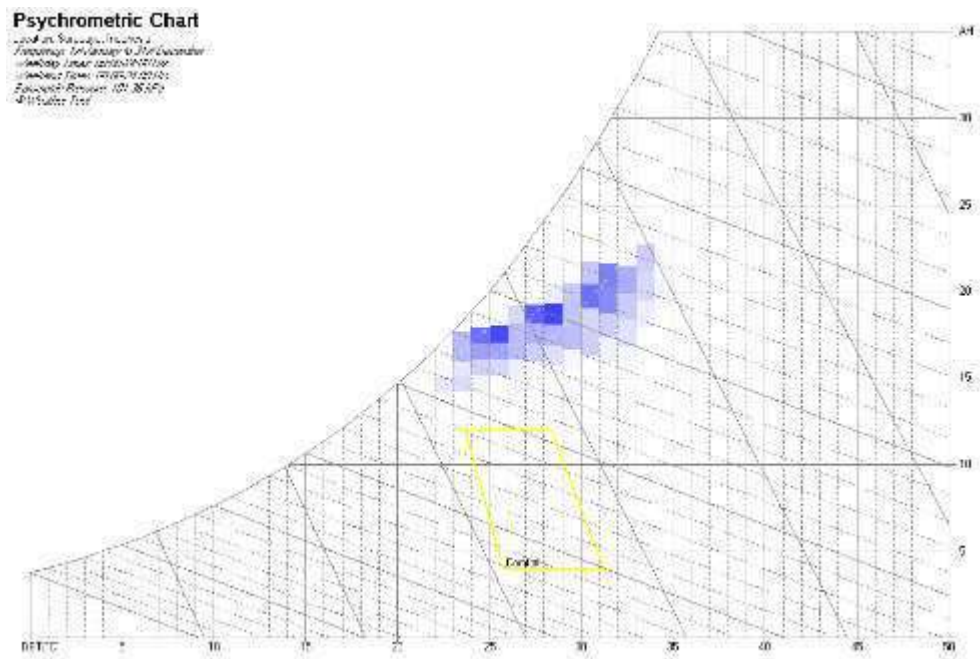


Figure 2.2.3 Thermal Condition in Surabaya

According to Figure 2.2.3 shows that the current thermal condition of Surabaya is out of the thermal comfort area. To gain the thermal comfort in building by using active and passive cooling strategy.

### Sun Light and Shadowing

#### a) Data

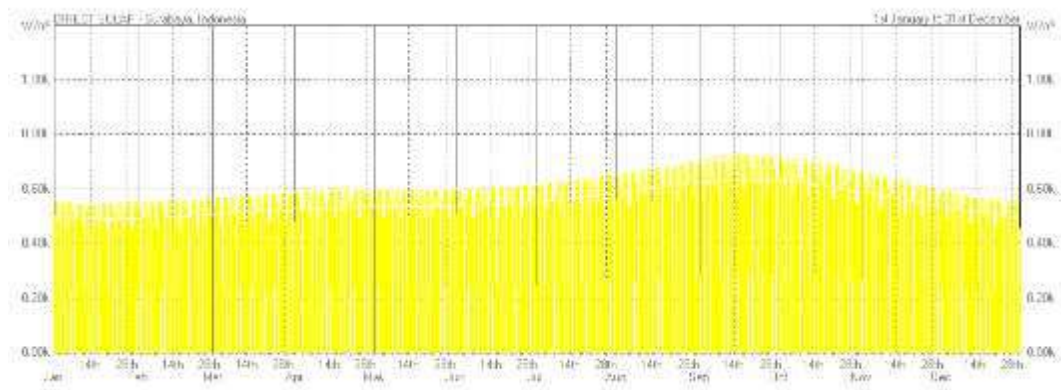


Figure 2.2.4 Direct Solar Lighting in Surabaya (Ecotect, 2017)

From Figure 2.2.4 Surabaya has high amount of sun hours. October has the longest sun hours than other months, and followed by September and November.

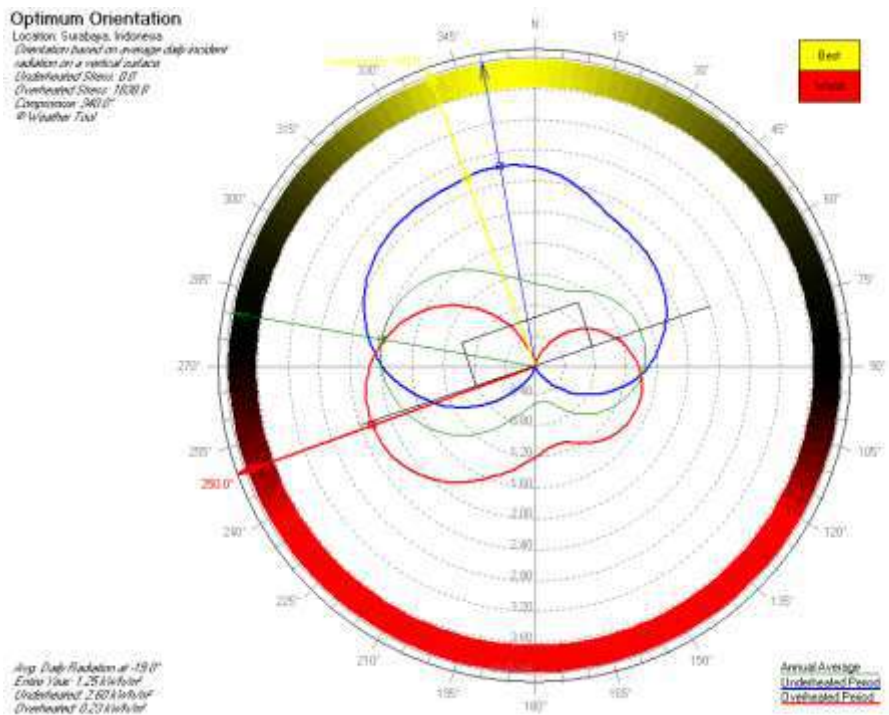


Figure 2.2.5 Building Best Orientation (Ecotect, 2017)

According to Figure 2.2.5 the best orientation for the building is at the North Side and the worst orientation is at the South, West, and East side for the building in Surabaya.

## b) Analysis



Figure 2.2.6 Site Location (www.earth.google.com, 2017)

Best orientation for the building is at the north side, but at the north side there are some small shops so the building orientation can't be placed at north side.

Exposing exterior walls to long hours solar radiation can make the building transfer some heat inside the building and it also can be rereleased back into the room on nights to maintain internal temperature.

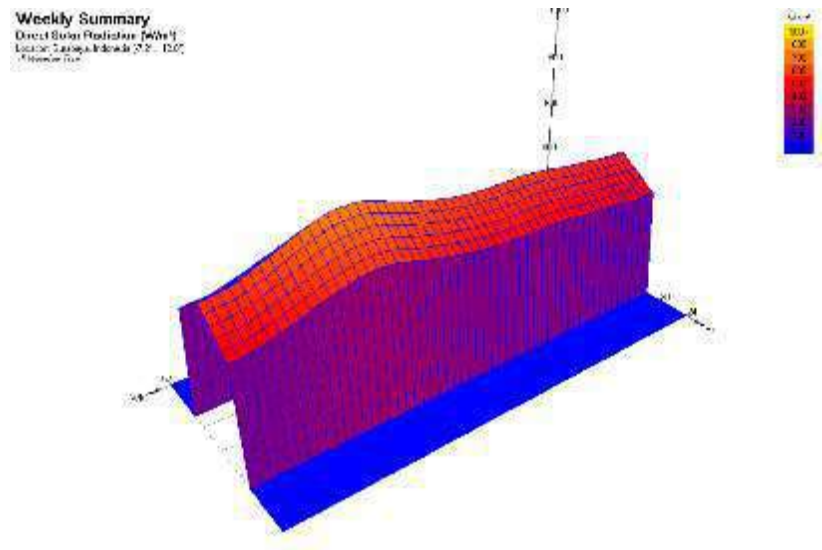


Figure 2.2.7 Direct Solar Radiation in Surabaya (Ecotect, 2017)

From Figure 2.2.7 we can see that the site area has directly high rate of direct solar radiation and it is less shadowed. High rate of direct solar radiation cause heat gain that can disrupt the thermal comfort.

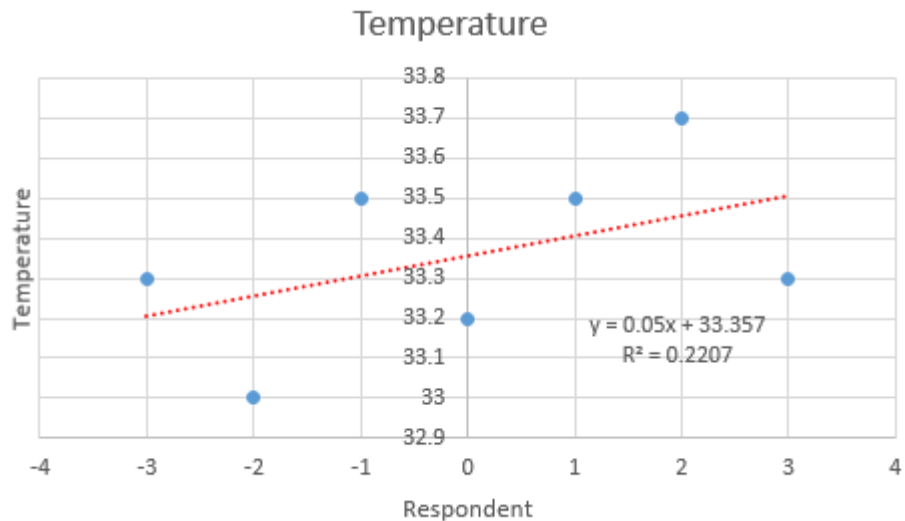


Figure 2.2.8 Elderly Comfort Temperature (Survey, 2017)

From Figure 2.2.8 based on field study to Griya Usia Lanjut St. Yosef Surabaya, by using the thermometer and analysing from Scatter we get the

temperature that make the elderly comfort is around 33.3<sup>0</sup>C. Elderly needs a warm temperature. (Figure 2.2.8)

### c) Concept

There are some concepts to reduce heat gain at day to make a built environment to increase elderly's productivity:

- Avoid long blocks that run north – south to less the heat gain at the day time,
- Reducing the amount of wall that accept the heat gain at the day time so the thermal comfort of the building can be suitable both for the elderly and the guests,
- The housing area for elderly is facing north side to gain heat at the day So it can be rereleased at night,
- Add shading devices to minimizing the glare and heat gain inside the building at day time,
- Breezeways that can be used to cool the building by opening windows or door, and
- Using vegetation such as tree that has big diameter for shadowing the north side and also to make the relationship between architecture and nature

## Day Lighting

### a) Data

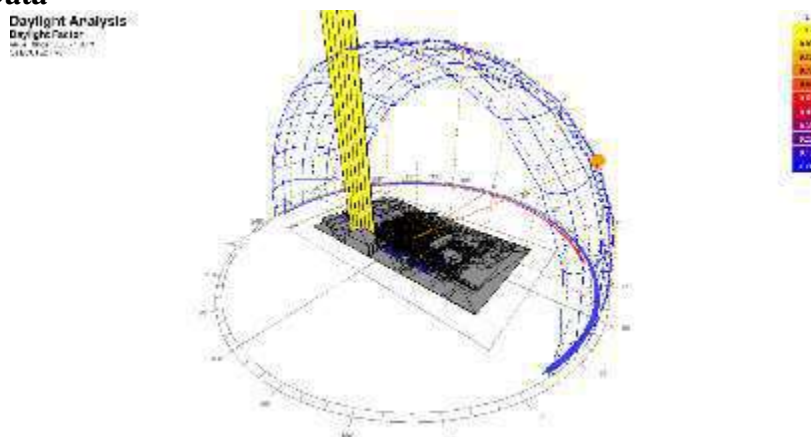


Figure 2.2.9 Daylight Analysis in Site Location (Ecotect, 2017)

From Figure 2.2.9, the daylight rate at the site is high. The building density at the site area is low. From the field measurement we can get the daylight level at the site area is 1792 at 9am and 350 x 100 lux at 12 pm.

#### **b) Analysis**

According to Chart 3.1.8 and field measurement, the site daylighting rate is high so we can use the daylighting for lighting at the day time. Daylighting can increase the user's productivity and elderly needs high daylighting rate for their daily activities. But if the building opening is maximized, it can caused glare.

#### **c) Concept**

These are some concept to gain comfort daylighting for elderly's activity:

- Having central open space in to spread daylight come inside the building (Figure 3.1.9)

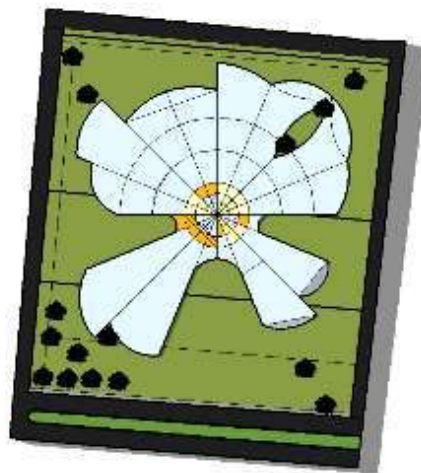


Figure 2.2.10 Building Mass Illustration based on Site Terrain Level and Tree Arrangement (Author's data, 2018)

- Having 2 types of windows there are daylight windows and for view windows (Figure 3.1.10)

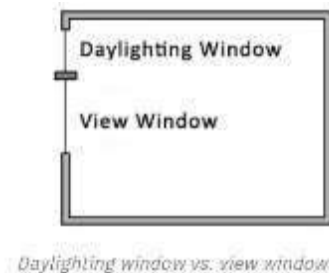


Figure 2.2.11(<https://sustainabilityworkshop.autodesk.com/buildings/apertures-daylighting>, 2017)



## Temperature and Relative Humidity

### a) Data

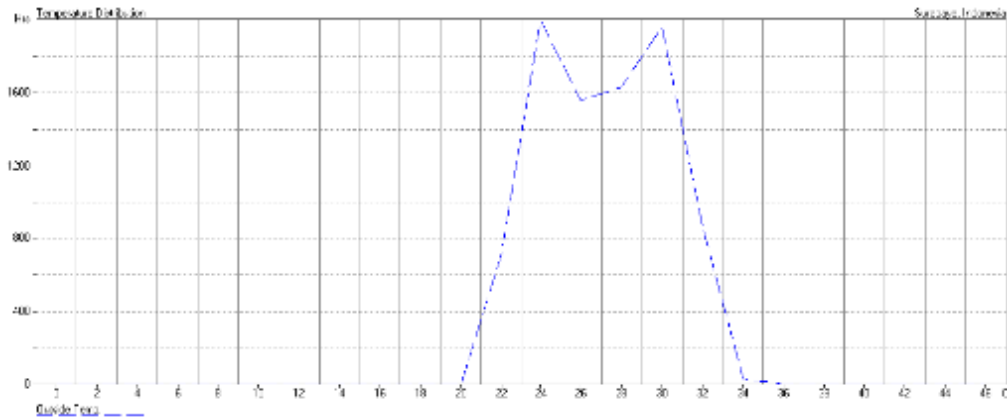


Figure 2.2.12 Temperature rate at Surabaya (Ecotect, 2017)

According to Figure 3.1.11, the temperature rate at Surabaya is always high. According to field measurement that was held on October 21<sup>st</sup> 2017 the temperature at the site area is 34.4<sup>0</sup>C at 9am and 36<sup>0</sup>C at 12pm. From Figure 3.1.4 when the temperature is 33.3<sup>0</sup>C is a neutral temperature for elderly. The interview is held on October which is a dry season. Most of respondents feel that the temperature at Griya Usiawan St. Yosef is suitable for them.

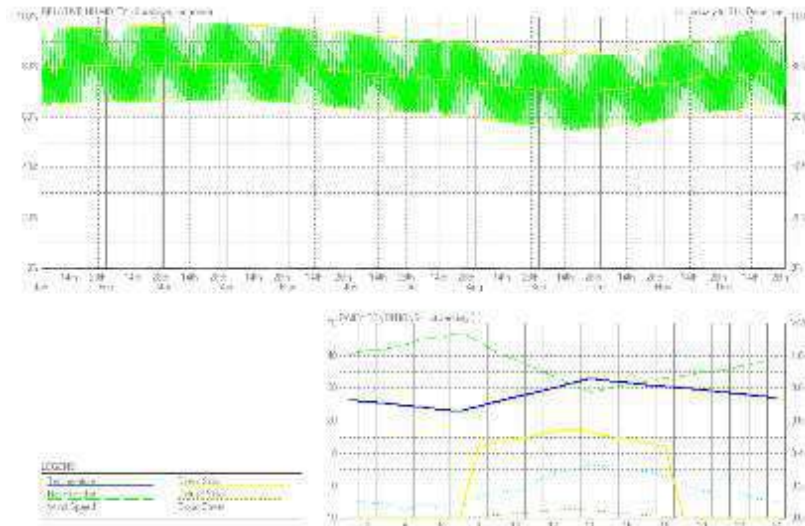


Figure 2.2.13 Humidity rate at Surabaya (Ecotect, 2017)

From Figure 3.1.12 we can see that the humidity rate at Surabaya is high with the Relative Humidity highest rate is on November – December and January

– May with the relative humidity rate is more than 80%. Based on the field measurement which was held on October 21<sup>st</sup> 2017 at the site area, the average humidity rate is 57.7% by that time Surabaya was on dry season. (Figure 3.1.9)

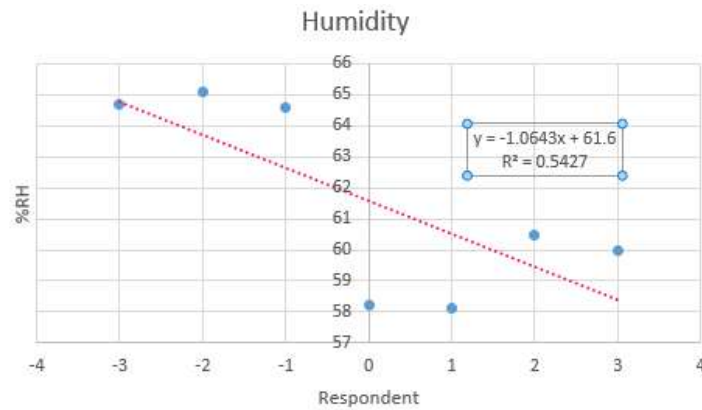


Figure 2.2.14 Elderly Humidity Comfort (Field Study, 2017)

According to Figure 3.1.13 the respondent data shows that the relative humidity is neutral at the point around 61%RH.

#### b) Analysis

High rate of temperature is caused by several factors such as heat transfer, sun radiation, internal heat gain(user activity and the usage of electricity)

Based on interview with the elderly they feel that the temperature and humidity rate is neutral and suitable with them, but from the interview data with the nurse of Griya Usiawan St. Yosef they feel that the weather being too hot especially at that month on October.

#### c) Concept

- Using passive cooling strategies to decrease heat gain



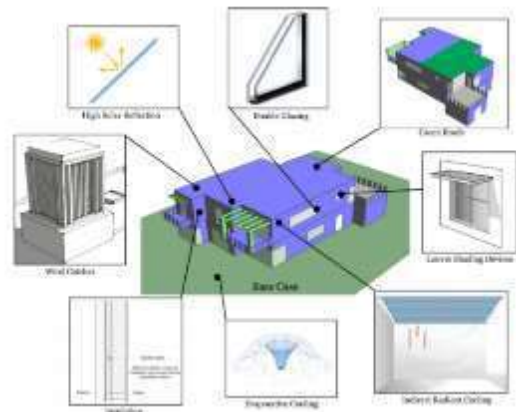


Figure 2.2.15 Passive Cooling Strategy (google.com, 2017)

According to Figure 3.1.14 In order to make indoor temperature and outdoor temperature balance passive cooling strategy is going to use. To stimulate the elderly to do activity in both outdoor and indoor. These are some of passive cooling strategy that are going to use:

- Using building material that has low time lag to make the building heat gain can be faster to loss
- Having yard in the centre of building mass for building air circulation

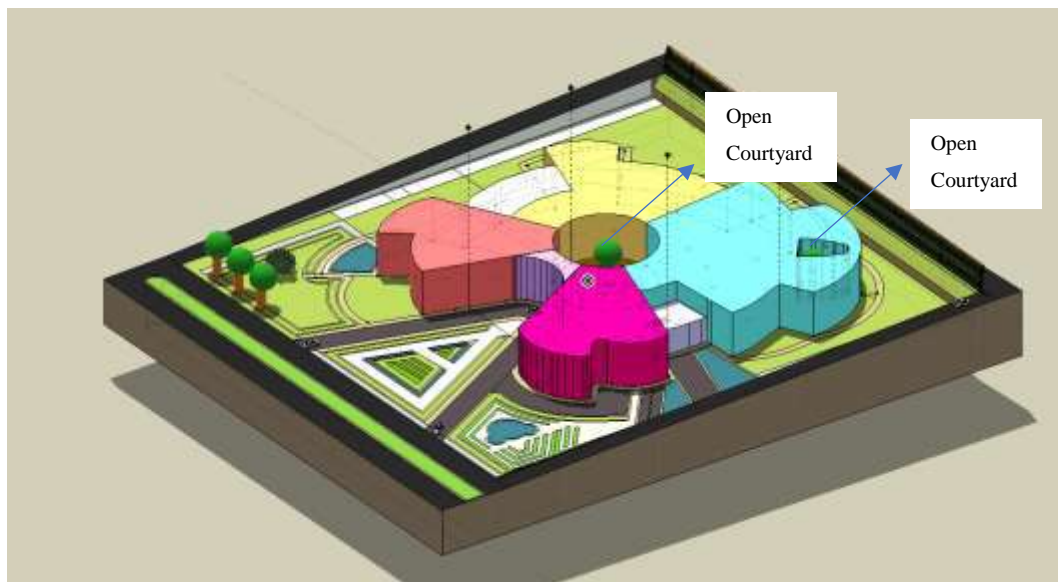


Figure 2.2.16 Building Mass Programming (Author's data, 2017)

## Noise Comfort Level

### a) Data

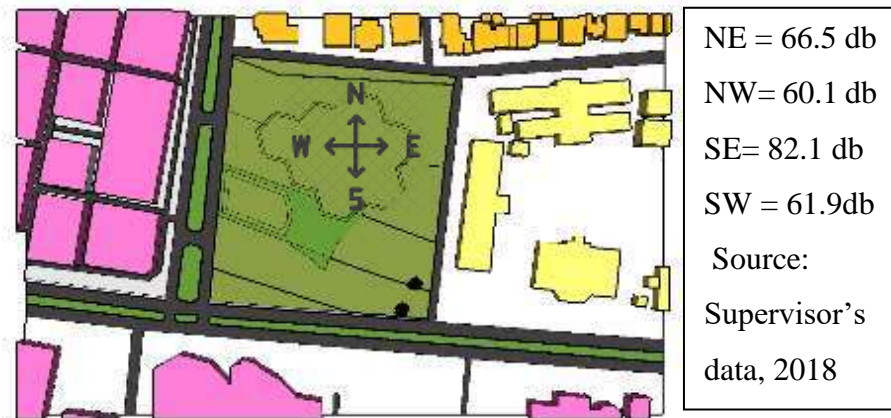


Figure 2.2.17 Site Noise Level (Author's data, 2018)

### b) Analysis

At the south east side the noise level is 82.1db because it is located in front of artery street meanwhile at the north west side the noise level is 60.1db because it's rarely passed by the vehicle. Based on author's interview at Griya Usiawan St. Yosef elderly feel comfortable with noise level around 54 db.

### c) Concept

To reduce noise level at the site by using tree that have large diameter and leafy to absorb noise and using sound barrier at the housing side area to create comfort noise level for elderly. Tree that has been at the site can still use and laid out based on building mass.

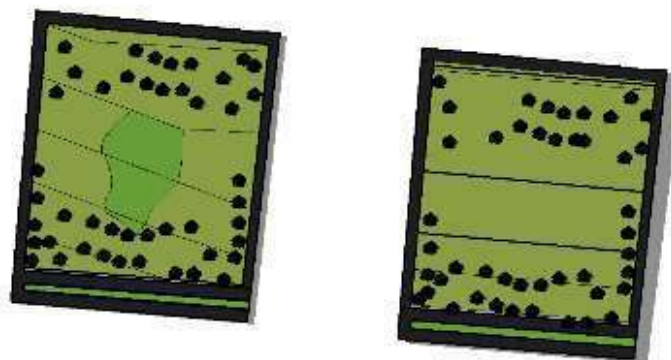


Figure 2.2.18 Site Plan Concept (Author's data, 2018)



Figure 2.2.19 Sound Barrier Concept (Author's data, 2018)

## 2.2.2 Environment Study

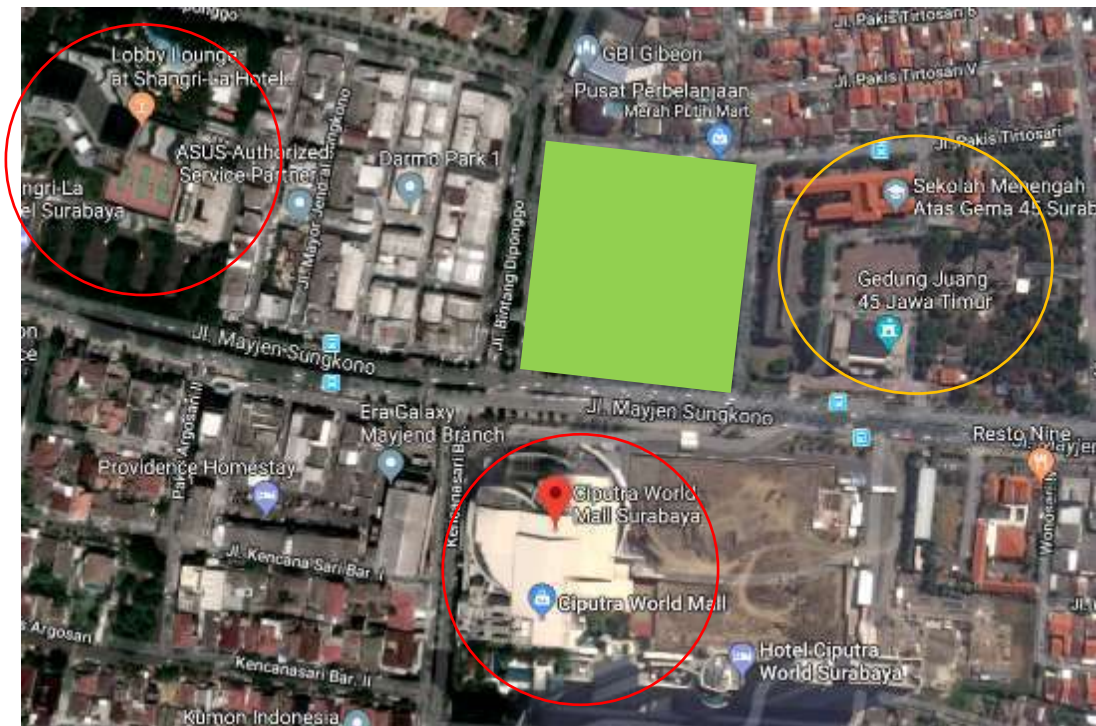


Figure 2.2.20 Site Environment (Google map, 2018)

From Figure 2.2.19 the site is located around commercial building, and at the North – East side of the site there is a complex of school that we can gain benefit from it to create interaction between generation.

## 2.2.3 Site Regulation

### a) Data

According from field observation site area condition now is an empty land. In front of the site is a trading and commercial building (Ciputra World), at the back

of the site is a small shops from the local society, at the west side of the site are shops area, and the east side of the site is a school area.



Figure 2.2.21 Land Use of Proposed Site (Peta Peruntukan Surabaya, 2016)

- Site area: 21883.5 m<sup>2</sup>
- Land use: Trading and Commercial Services
- KDB(Building Coverage Ratio): 50-70% of total site area
- GSB (Building Set Back): 6m
- KDH: 40%

b) Analysis

The site is located at trading and commercial building and it is a premium location for trading and commercial services. According to Figure 3.3.1 the land use of proposed site is for trading and commercial services, so the proposed building function is suitable with site's land use.

c) Concept

- SOHO + Green Open Space

To fulfil the land use function based on Surabaya Government Regulation the architectural object that is proposed is SOHO (Small Office Home Office). So elderly can work from their home. The land use of the site is divided into two parts with the ratio 60% for the building area and 40% for green open space.





## CHAPTER 3

### DESIGN APPROACH AND DESIGN METHOD

#### 3.1 Design Approach

##### 3.1.2 Behaviour Setting

According to Figure 3.1.1 Human behaviour is a goal – directed activity that unifies perception, cognition, and action. Our motivations arise from our needs. Users of the building will seek ways to relieve hunger and thirst, to be able to rest, eliminate waste from our bodies, and psychological social and cultural variations.

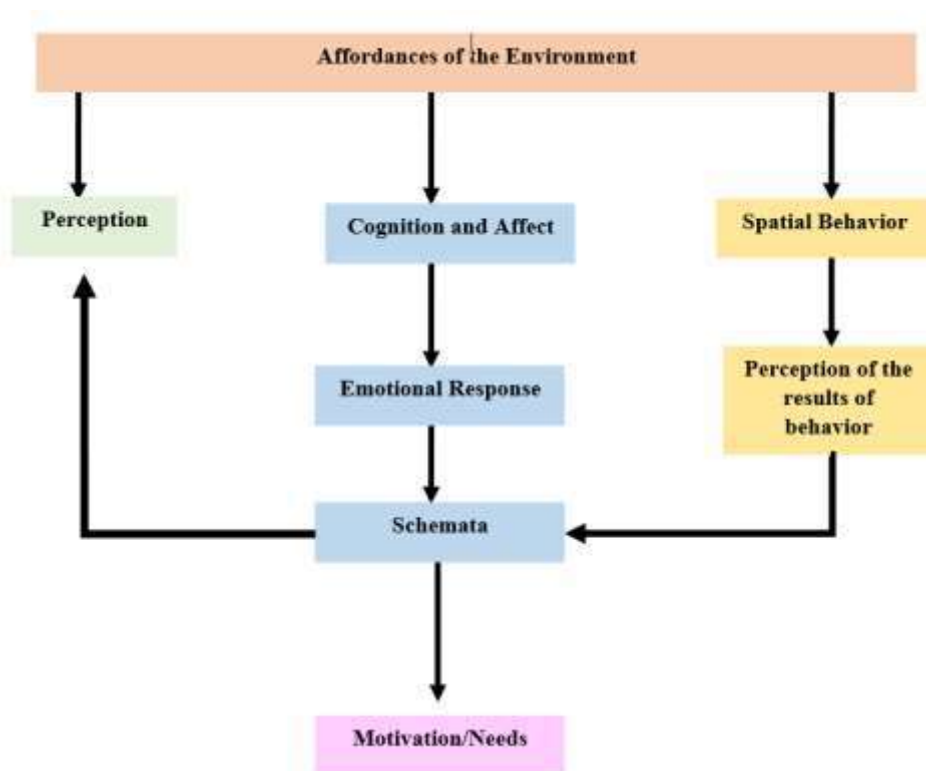


Figure 3.1.1 The Fundamental Processes of Human Behaviour (Lang, 2010)

Built environment as an artificial part of our terrestrial world should have big attention to the pleasure it brings for users and its aesthetic qualities. Behaviour setting is the setting for life that consists of a standing or recurrent, pattern of behaviour or activities and a particular configuration or pattern of the world.

Two contrasting types of behaviour settings are important to architects: localized settings, places, and the links among them.



### 3.2.1 Biomimetic

Biomimetic which is also known as Biomimicry is one of design method where biology or nature inspired design (Zari, 2014). Successful biomimetic mimic from nature process that apply into building technology. Biomimetic method is used in this project that I propose for creating a built environment that can lead elderly productivity in natural ecosystems.

Biomimetic is used in this project to mimic the process of beehive natural ecosystem into architecture object that I propose. As a design process, biomimetic method that is used by defining elderly need and design problem and looking to the ways how bee colony maintain their hive to stay sustain for their living activity, how they create a workplace that can make they move and work efficiently with less energy. Using biomimetic as method to resolve my design problem I used structure mapping as domain transfer through analogy and metaphor transfer (Figure 3.2.2).

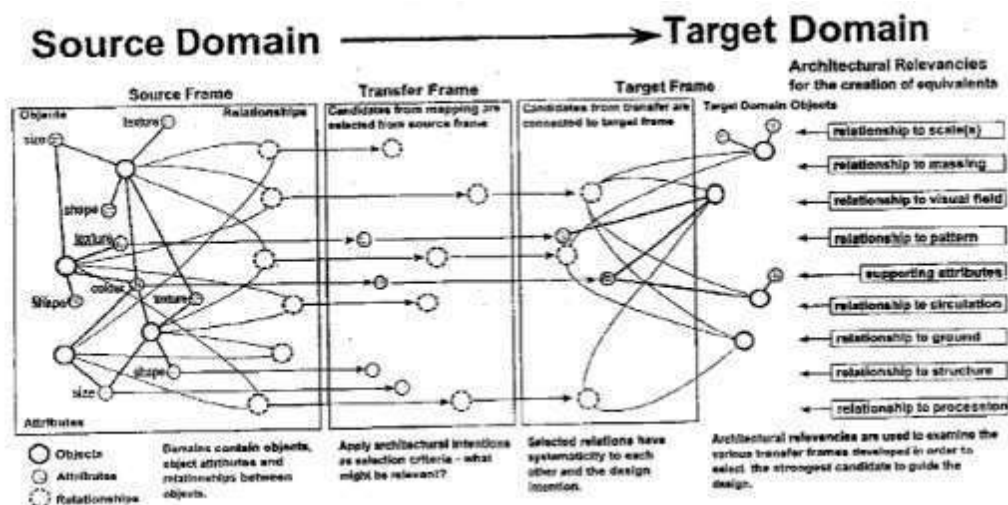


Figure 3.2.2 Structure Mapping Principle as Domain Transfer Method (Plowright, 2014)



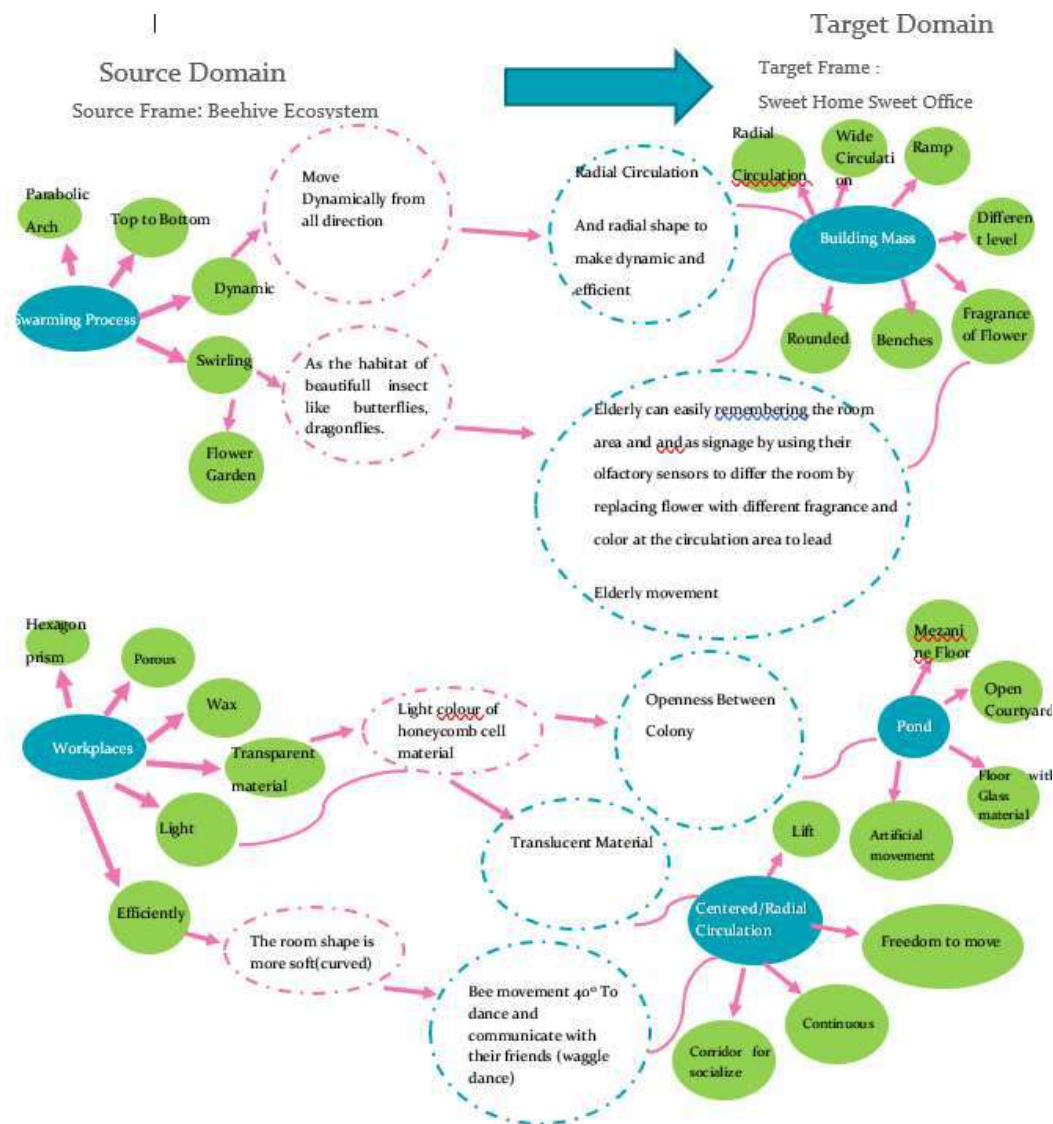


Figure 3.2.3 Domain to Domain Transfer from Beehive (Author's data, 2018)

According to Figure 3.2.3 domain transfer system is being used to get concept design from beehive ecosystem level as source domain in order to create a setting of behavior for elderly rejuvenation.

### A. Application of Depthmap(Space Syntax)

Depthmap is used to perform a complete analysis of the different space syntax parameters. The different variables estimated through the Depthmap software include the connectivity measure, which is the number of elements that are connected to a certain element, the integration measure which is the distance of an element to all other elements in relation to the number of elements in the complete system and the choice measure which indicates how often an element is

passed, when calculating the shortest paths between elements (Monokrousou, 2016).

Space Syntax is being used for proposed object interior to predict the building warmness and coldness for users of the building. The first step to do is to separate spaces that are public and Private based on the depth (depth) of space and the relationship of space with other space (connectivity). After that the building rooms are programming based on the typology of the building to determine the nature of the space by space syntax.

### **B. Ecotect**

Ecotect is a software which is used as a climate data analyse. Instead of it is used to analyse climate data of the site it is also used to simulate the design response of the building to the climatic conditions of the site.

### **C. Field Measurement**

One of the process to answer the questions in problem formulation is managed by research method, which is equal to the objectives of this research. The research method that is used to reach the goal is qualitative method which is based on strategy, paradigm, and model implementation. The qualitative method is being used to gain the environment comfort parameter for the elderly, the activities that elderly needs, elderly behaviour, the facts of proposed building site. Beside of qualitative method, this research also need quantitative method to formulate the gained data from qualitative method becomes simple statistic range of data.



## CHAPTER 4

### DESIGN CONCEPT

#### 4.1 Formal Exploration

##### 4.1.1 Main Concept

Beehiveour is the main concept of my proposed design that mimic from beehive process by using beehive as the model to solve my design problem. Based on domain to domain translate from structure mapping principle these are my architecture design concept idea:

Table 4.1.1 Design Concept Matrix

Aspect		Bee + Beehives	Elderly	Architecture	
Room Comfort	Physical Comfort	Thermal regulation Behaviour(35 <sup>0</sup> C)	Thermal regulation Behaviour:	Site	Building
				 <p>C.1 Building mass orientation at the south side (facing artery road)</p>  <p>C2. Placing Water fountain at the wind direction</p> <p>C3. Placing tree for windbreaking</p> <p>C4. Maximizing inlet in the wind direction</p> <p>C4. Green Open Space (patio) between building mass</p>	 <p>C1. Solar chimney in the middle of building mass → with fan: analogy from bee wings</p> <p>C2. Ventilation between wall and plafond → outlet</p>  <p>C3. Porous Building Facade</p> <p>C4. Sun Shading with 109<sup>0</sup> like honeycomb cell degree</p> <p>C5. Transparent material for public space</p>

Table 4.1.1 Design Concept Matrix

	Psychological Comfort	<p>Queen in healthy condition = good mood</p> <p>Queen die = panic attack inside the hive</p>	<p>Healthy body</p> <p>Interaction with natural environment</p> <p>Clean environment</p> <p>Safe environment</p> <p>Barrier free</p> <p>Social Interaction between generation</p>	<p>C1. Grow fruit tree and flower garden to invite local bird, butterfly, and bee to make natural environment (bird sound, butterfly)</p> <p>C2. Flower garden with different smell and colour for every patio</p> <p>C3. Playground for children</p>	<p>C1. Chimney columnar tree structure using different colour glass when touch the sunlight</p> <p>C2. Every patio have different landscape feature, ex. Sound of water movement, different smell of flower, different fruit tree, to invite different bird</p> <p>C3. Green Spaces with good visibility and under supervision</p>
Accessibility	Circulation	<p>Foraging (collect nectar): using colour sensor from their eye, sensitive to red and blue</p> <p>Using UV sensor from flower surface</p> <p>Using their olfactory sense to detect flower with many pollen/sweet pollen</p> <p>Using Sun angle to know the location of flower and to calculate their speed</p> <p>Inside their hive they move 40° (x, y, z)</p> <p>Their hive circulation can be used for efficient move, easier for access from honey cell, pollen cell,</p>	<p>Different circulation between productive and dependent elderly</p> <p>Elderly react to olfactory sense/more easier to remember smell</p> <p>Elderly more easier to know light colour (primary colour)</p> <p>Need barrier to move(safety)</p> <p>Non-slippery floor material</p> <p>Circulation that can be used for socialization and take a break when walk</p>	<p>C1. Short, narrow well connected trails for easy comprehension</p> <p>C2. Barrier free and the slope less than 5% (ramp less than 5%)</p> <p>C3. Predictable environments</p> <p>C4. Wild animals to watch</p> <p>C5. Naturalness with various sorts of vegetation varieties in colour and height</p> <p>C6. Different circulation between Vehicle and pedestrian way</p> <p>C7. Circulation that provide area for golf car to pass and group of elderly to walk</p>	<p>C1. Radial Circulation to make elderly easier to move</p> <p>C2. Corridor for walk have a focus to green area to make elderly want to walk</p> <p>C3. Pavements with anti – slip and water-resistant material (porous like honeycomb)</p> <p>C4. Easier circulation/corridor or network with good connectivity that can make elderly people easily to move from any location</p> <p>C5. Wide circulation corridor that can be used to socialize</p> <p>C6. Different level of floor for room transition</p>

Table 4.1.1 Design Concept Matrix

		brood cell, queen cell			C7. Shortcuts across corners
		They can socialize/dance in their circulation area(wide circulation area)			
	Territory	Hierarchy based on their role (Queen, Drone, Worker, Larvae)  Room Organization in the cell based on their role  Tropical bee saving heat in their abdomen to fight intruder	Different room for public/private area  Physically proclaiming temporary or permanent ownership of place by group's marking boundaries/ individual marking boundaries  Easier to adapt for changing situation : from productive to dependent, healthy condition to sick	C1. Building not located at Site GSB but more far around 6 m far away from GSB C2. At the artery road side, we use big tree as natural fence  C3. Building is located at higher slope than road  C4. Frame social interaction view from outside/ parks to co-working/ inside the building	C1.Sound absorbing materials in exterior corridor/ circulation corridor  C2. Double Glazed Windows for Private area(housing unit, swimming pool, gymnasium, healthcare)  C3. Wall Insulation  C4. Sliding Glass Doors with drapes  C5. Big Windows with moveable covering  C6. Tall Slit Windows  C7. At housing unit there's access for balcony  C8. Change floor levels
	Interaction	Communication between their colony using pheromone hormone  Division of Work based on their age (Clean hives, making honeycomb cells, food processing, takes care of	Friendly environment to make interaction between elderly and between generation  Groups activity	C1. Sharing green open space for society to access  C2. Give welcoming image for visitors to building public area  C3. Street network to pedestrian way  C4. Access to recreational	C1. A place to drink good coffee/ healthy drink/ quality time with friends  C2. Bulletin boards and electronic information at circulation corridor

Table 4.1.1 Design Concept Matrix

		larvae, secure hives, foraging(adult bee)  Waggle Dance  Olfactory sense to detect pheromone/sme ll	Social – friendly interchange for its own sake  Provide place where elderly can socialize with society, other elderly, and co – working space that can be used for socialization	facilities such as outdoor exercise equipment, ball game fields, or bicycle trails  C5. Playground for children	C3. Display areas near work areas  C4. Comfortable Places to sit and major displays to talk about  C5. Places to sit near major circulation paths
	Privacy	Openness, nothing is hidden in colony, Nuptial Flight: In the middle of air (openness)  Have their own space for work in colony based on their age	Elderly in tropical country is openness, need place for socialize  Working in individual and group space  The ability to control the boundaries, the regulation of interaction	C1. Using fences to protect elderly privacy from being seen for outside  C2. Site organization based on the road, facility that need high privacy is located behind  C3. The building mass is not located near the site's GSB	C1. Large windows to circulation/paths  C2. Glass doors  C3. Rotating window/ tall slit windows  C4. Sliding glass doors with drapes to public area  C5. Transition green open space between public and private area  C6. Different entrance between residence and visitors
Formal & Spatial	Image	Tropical beehive is built in open space/tree branch (without shell/walls)  Parabolic arch  Openness hive (tropical bee) have more darker honeycomb cell  Beehive in 4 seasons country have small space in the bottom to enter the hive	Place that can be easily recognized visually by elderly  Easily recognizable visual patterns and relationship  Status/hierarchy: the communicated value of importance of a place or a person occupying a place that can	C1. Site entrance give welcoming image for outsiders  C2. Building mass have variations in floor height  C3. Open space/ Landscape as focal point. Readily Identifiable Landscape Elements  C4. Entry Icons	C1. Side lighting  C2. Low barriers  C3. Pools of light at the middle of circulation pathway  C4. Studios and offices along regularly travelled paths  C5. Three dimensions views to other area  C6. Parabolic Arch Roof

Table 4.1.1 Design Concept Matrix

			be easily recognised by elderly		
	Form	<p>Parabolic Arch, bee built from top to bottom</p> <p>Hierarchy: Honey cells, pollen, brood cells, drone cells, queen cells.</p> <p>Easily to recognize their colony member with their olfactory sense (pheromone smell)</p>	<p>Form that have efficient volume and efficient to access</p> <p>The building have landmarks or distinctive features</p> <p>Elderly need open views with a visual center</p> <p>Map information, signage to make elderly easier to move</p>	<p>C1. Compact and Dynamic Form</p> <p>C2. Building mass have different high</p> <p>C3. Different entrance between residence and visitors</p> <p>C4. Building Mass organization is based on their privacy needs, building with high privacy is located at the back</p>	<p>C1. Shared Open Spaces</p> <p>C2. Balconies</p> <p>C3. Exhibition Space along Path</p> <p>C4. Activity patio along busy path</p> <p>C5. Activity Viewed from above</p> <p>C6. Orient Spaces toward each other</p> <p>C7. Central circulation</p> <p>C8. Landscape Dramatizes Entry</p> <p>C9. Repeat details</p> <p>C10. Change in scale leading to entry</p>
	Mood/Ambience	<p>Tropical bee attract to sunlight, red, and blue colour</p> <p>Bee that foraging in one group sleep together(grouping)</p> <p>If it is too crowded inside their hive, they'll go out from the hive and starting a new hive with the old queen</p>	<p>Elderly needs building facility that has spirit of place with rich experience of a place as being recognizable and whole</p> <p>Natural sounds, like birdsongs and sounds of water and wind to persuade elderly movement</p> <p>Chairs in green spaces optimally with</p>	<p>C1. Access to recreational facilities such as outdoor exercise equipment, ball game fields, or bicycle trails</p> <p>C2. Café and restaurant room is located near public green space on the site</p> <p>C3. Opportunities to perform Do – It – Yourself cultivating with local society/youth community</p> <p>C4. Tree/flower with different colour, height, and smell</p>	<p>C1. Open Space/ Landscape focal point</p> <p>C2. Its roof give access to moonlight/sunlight</p> <p>C3. Different smell of flower/tree at each patio</p> <p>C4. Landscape dramatizes entry</p> <p>C5. Paths Go in the direction of walls</p>



Table 4.1.1 Design Concept Matrix

			seatbacks and armrests		
Utility	Life – Cycle	<p>Re-use brood cells after its larvae hatched</p> <p>Using organic material, from their secretion activity (re-use waste from secretion) as hive protection(propolis), honeycomb cell</p> <p>Their abdomen can save heat from outside the hive</p> <p>Folded and light material with the same size</p> <p>Throw away the dead bees outside of the hives</p>	<p>Elderly need natural lighting and warmer indoor temperature, minimum humidity (dry air)</p> <p>Green spaces with good visibility and under supervision</p> <p>Pavements that are clean of litter, surface water, and fallen leaves</p> <p>Well – maintained chairs, lights, and exercise facilities</p>	<p>C1. Permeable pavements that can restore rain water</p> <p>C2. Using Water Sewage treatment to collect rain water and dirty water to re-use</p> <p>C3. Building masses are organized with 120° for wind breaking</p> <p>C4. On the area with high noise raise some land and place sound barrier</p>	<p>C1. Solar chimney tube for collecting rain water</p> <p>C2. Different circulation for dependent elderly, more widely, the room for dependent elderly is located at lower level</p> <p>C3. Co – Working space area brightly lit, enabling inspection from dependent elderly that can't work to look the process interaction at the co – working space</p>
Structure	Building Structure	<p>Light and rigid structure</p> <p>Grid Structure</p>	<p>Rigid/Strong Structure</p> <p>Efficient structure, free column area</p>	<p>C1. Cut and fill to organize the site</p> <p>C2. Grid structure and light column image (tree shape)</p>	<p>C1. Building using : Grid, rigid space frame structure</p> <p>C2. Roof System : Undulated roof</p> <p>C3. Light concrete wall, partition wall(flexibility to arrange the room for co-working space)</p>
	Construction	<p>Cheap cost → Compact Shape, efficiency in shape storage, no space is wasted, similar shape of hexagon</p> <p>Easy to construct</p>	<p>Cheap maintenance</p> <p>Easy for maintenance</p>	<p>C1. Pavements that are clean of litter, absorbing water</p> <p>C2. Lights in green space</p> <p>C3. Porous paving</p>	<p>C1. Material and Finishing System:</p> <p>Wall : Concrete, Stone, Glass</p> <p>Floor : Glass, wood, concrete</p> <p>C2. Flooring system : elevated floor</p>

Source: Author's Data, 2018

#### 4.1.2 Integration between Site Analysis, Issue, and Method

From Design Criteria:

##### 1. Elderly Rejuvenation



Figure 4.1.1 Green Spaces to trigger elderly movement (Author's data, 2018)

- Open Courtyard as the vocal point to make elderly easier for wayfinding
- Placing flower with different scent to make elderly easier to remember place
- Open Courtyard as place for elderly for gathering and socializing

##### 2. Learning Between Generations

- Universal Design



Figure 4.1.2 Universal Design for Co-Working Space (Author's data)

Both elderly and youth have the same character that they are easily to get bored and they like colourful color, using furniture with colourful colour(contrast colour like flower) and colourful material.

- Mixed Used Building

Elderly and Youth need a working place where the ambience of work is informal, so they need building room programming that have a mixed use function. Where while they work they can interact having a quality time at the healthy cafeteria, shopping area

- Community Garden : Elderly and society can plant together

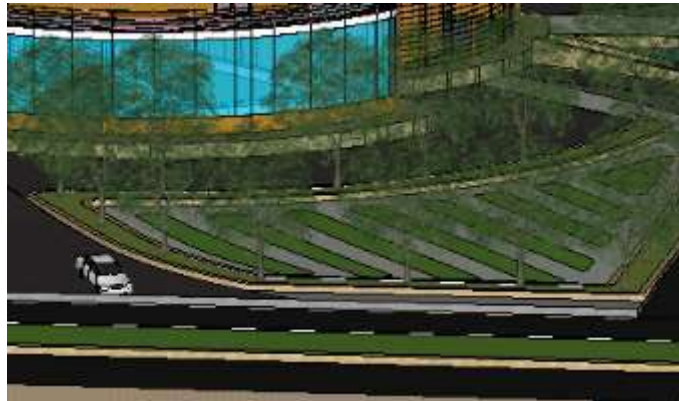


Figure 4.1.3 Community Garden (Author's data, 2018)

- Outdoor Facility have friendly image that invite people to visiting



Figure 4.1.4 Bench under the tree (Author's data, 2018)

- Healing Garden: Trigger Elderly to do outdoor activities
- Watching animal like rabbit, walking dog around their environment



Figure 4.1.5 Rabbit Farming (Author's data, 2018)

### 3. Sweet Home, Sweet Office Environment

- Ambience to work without pressure, with informal ambience for work. If elderly tired they can rest for a while like sleeping at the office couch, chatting with friends at the coffee bar and healthy juice bar



Figure 4.1.6 Informal Co-Working Space Ambience (Author's data, 2018)

### 4. Safety

- Barrier free design : using railing at the wall corridor with contrast colour that elderly can easily recognized
- Placing Bench at the circulation area for elderly to take rest if they are tired to walk

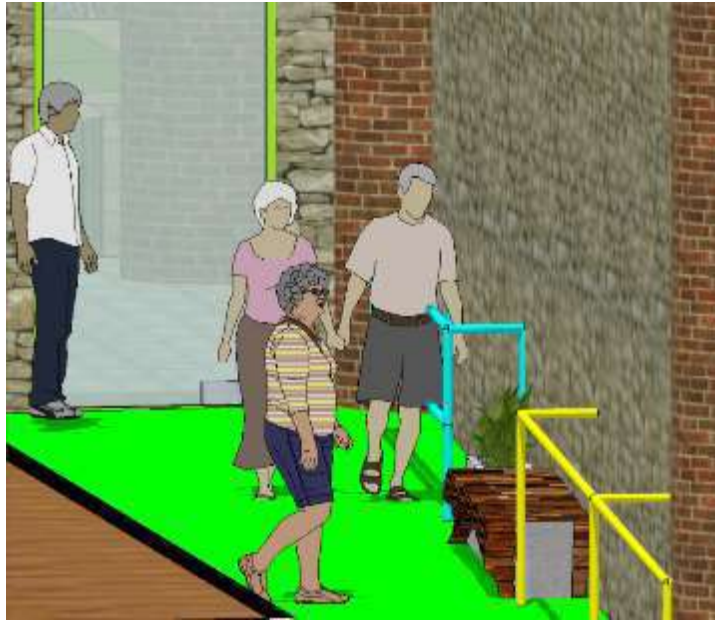


Figure 4.1.7 Corridor with railing and bench (Author's data, 2018)

## 4.2 Technical Exploration

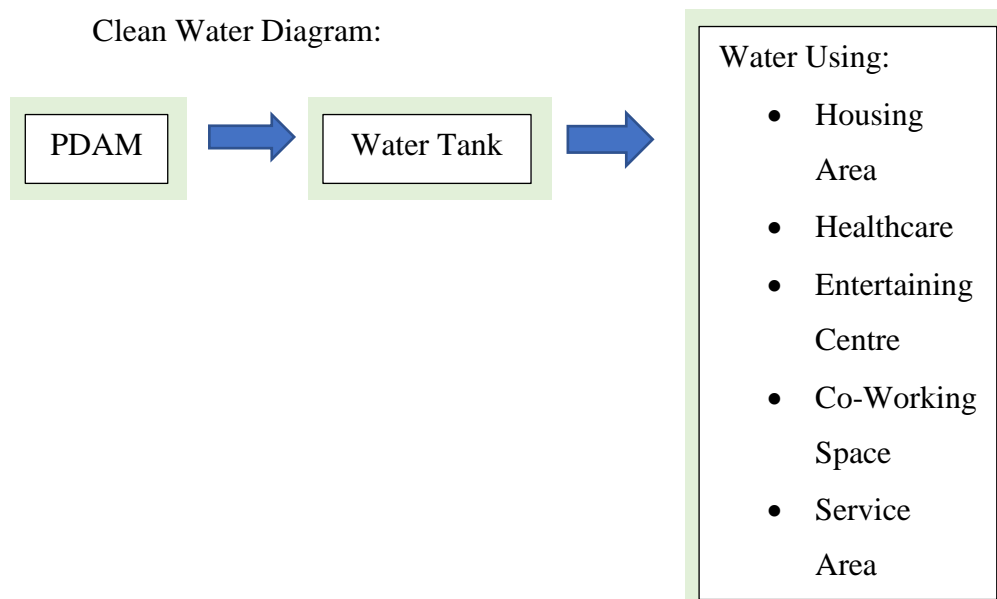
### 4.2.1 Structural System

### 4.2.2 Building Utility System

#### 1) Water

For cleaning water the water system is using water from PDAM down-feed system. For the black and grey water using SPT pump to recycle the water for garden watering. For drainage system using pipe inside the column to collect rainwater and reuse it again.

Clean Water Diagram:





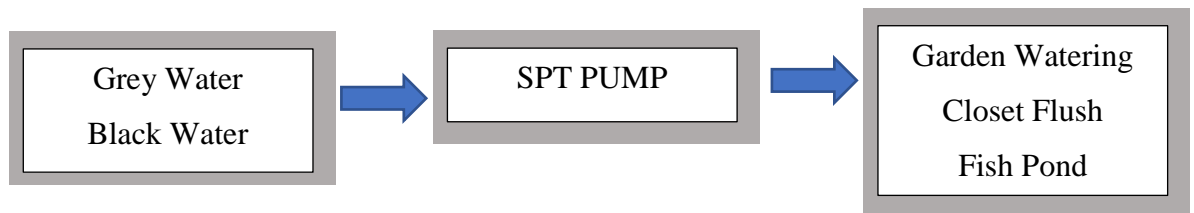
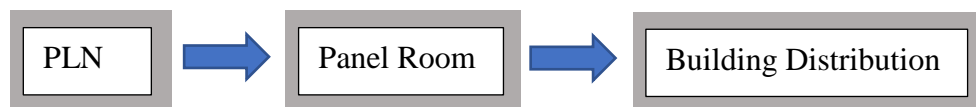


Figure 4.2.1 Pipe Collecting Rainwater (Author's data, 2018)

## 2) Electricity



## 3) Security

The architectural object doesn't use fence but for elderly safety we use security camera to see elderly activity and using alarm system that connect in their room if something happen with them like falling.

## 4) Emergency Exit

### A) Emergency Stair

For Basement to Ground level using emergency stair that ended up to open space as an assembly point.

### B) Emergency Sliding Ramp

From 3<sup>rd</sup> and 2<sup>nd</sup> floor using emergency sliding ramp with 2 sliding section to make elderly more easier and faster while evacuation. By using this fast emergency slide away for fire evacuation could make elderly and disable people

move more faster slide down to ground floor without using electricity and physical strength.

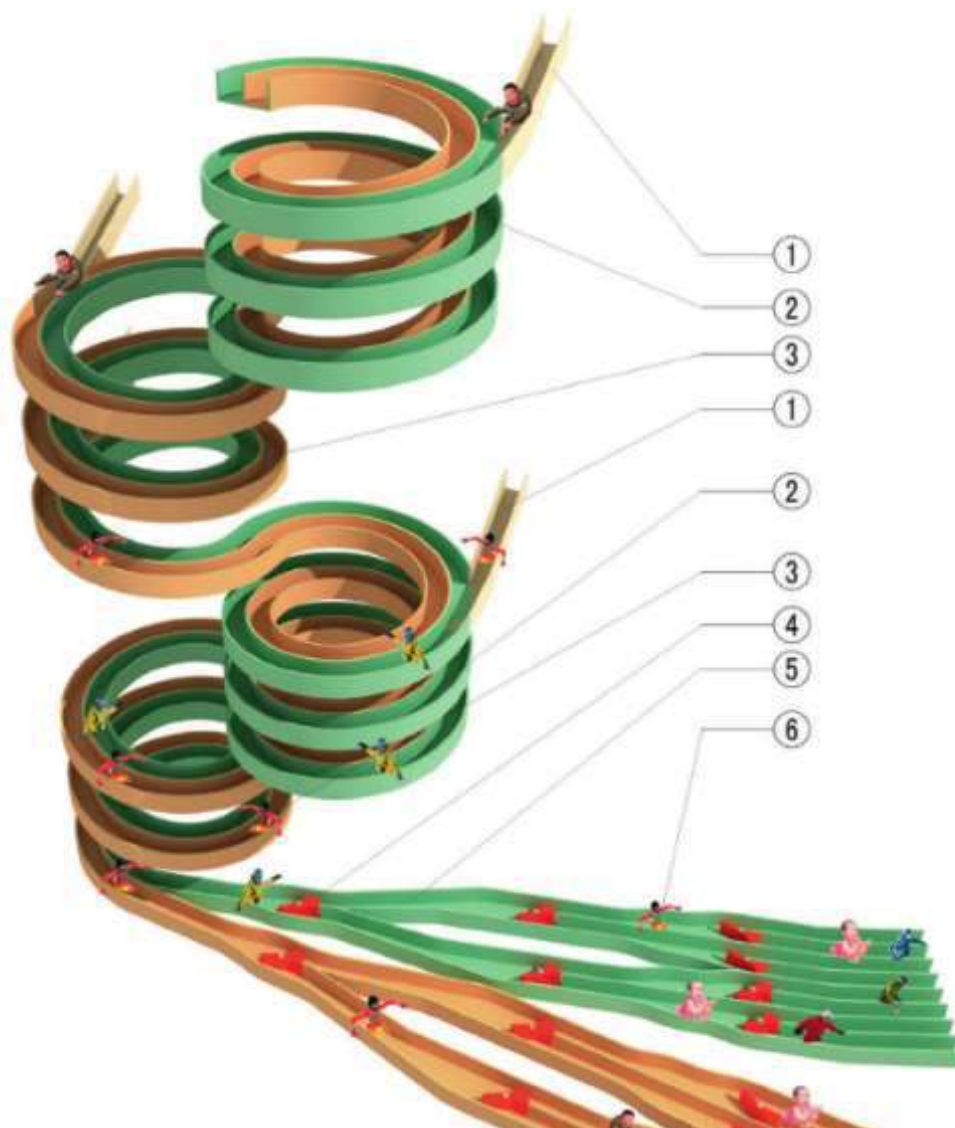


Figure 4.2.2 Emergency Sliding Ring Ramp (Zhang, 2017)

## CHAPTER 5

### DESIGN

#### 5.1 Formal Exploration

##### 5.1.1 Site



Figure 5.1.1 Site Zoning Concept (Author's data, 2018)

A = Entrance

E= Fishing Area

I= Tennis Court

B = Dropoff

F= Golf Court

J= Rabbit Farming

C= Exit Gate

G= Service Entrance

D= Community Garden

H= Motorcycle Entrance and Exit

- Site Area =  $24000\text{m}^2$
- KDB =  $60\% \times 24000\text{m}^2 = 14400\text{m}^2$



### 5.1.2 Building

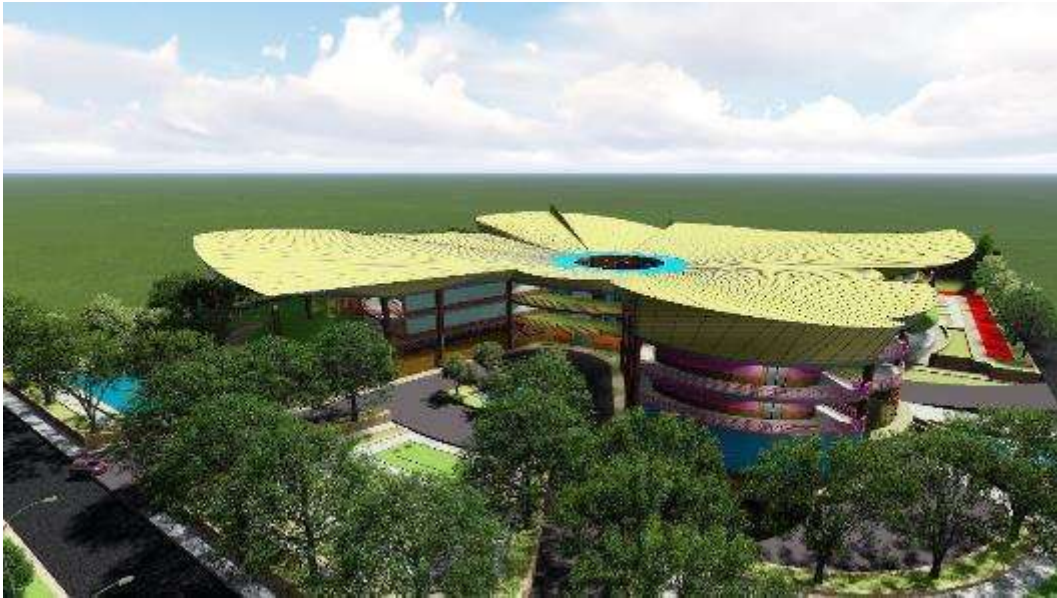


Figure 5.1.2 Bird's Eye View Perspective (Author's data, 2018)

Architecture object has 4 area that become one mass like beehive mass programming where every area is unite becomes one (mixed used). The dynamic shape analogy from bee swarming activity.

The roof shape is undulated roof, parabolic arc and at the centre as open courtyard is flat roof to collect rain water.

### 5.1.3 Interior

#### a. Wall

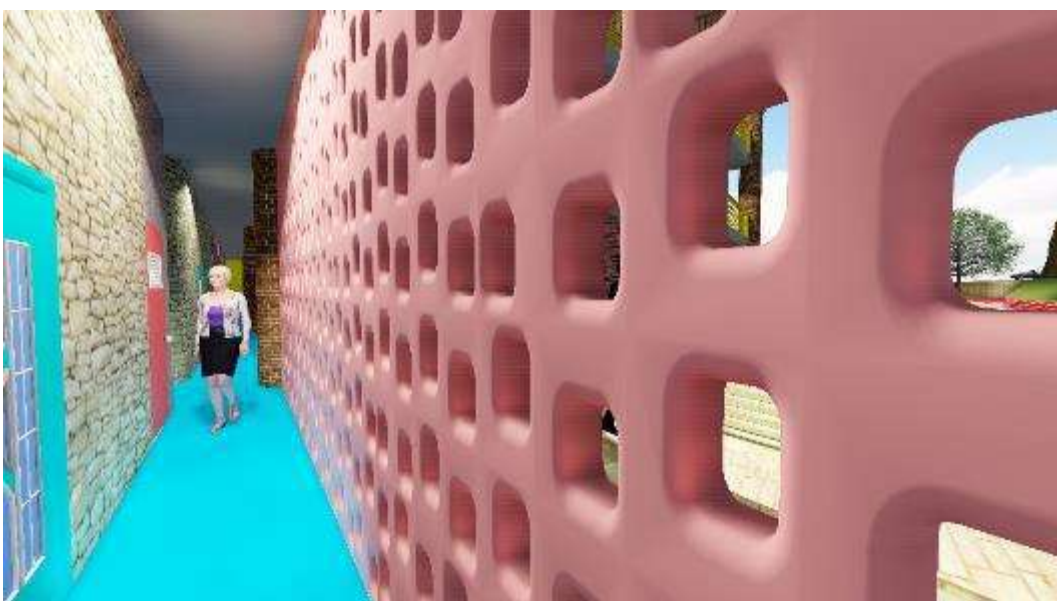


Figure 5.1.3 Porous Wall (Author's data, 2018)

For the corridor using porous wall as inlet to let air come inside the building.

Corridor with different function area has different texture to make elderly easier to recognize the building room.

b. Material

Building interior material using local material such as concrete, ulin wood, natural stone, red brick stone that give natural ambience inside the building.



Figure 5.1.4 Sauna Stone Material Combine with wood floor (Author's data, 2018)

#### 5.1.4 Open Courtyard



Figure 5.1.5 Open Courtyard at Housing Area (Author's data, 2018)



From Figure 5.1.5 open courtyard is used for natural ventilation and also as the focal point for elderly signage to make them easier for way finding.

For the roof using contrast colour (yellow) because elderly easier to remember contrast colour and to make the ambience under the acrylic glass that can change its colour depend on sun angle.



Figure 5.1.6 Place for Socializing (Author's data, 2018)

From Figure 5.1.6 We can see that elderly tend to socialize at the corridor because they can socialize with not only their close friends but also with everyone that pass the corridor.

## 5.2 Technical Exploration

### 5.2.1 Sanitation System

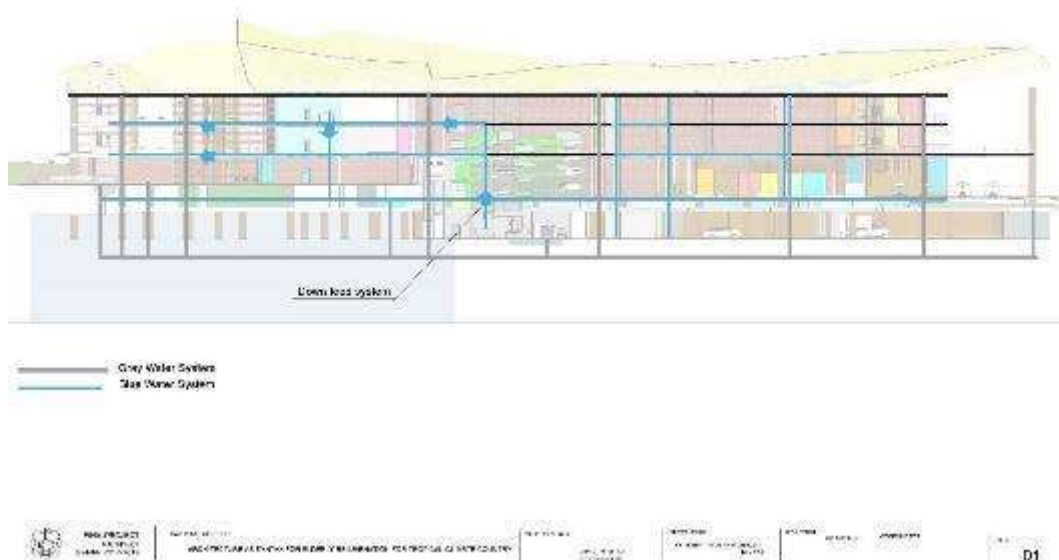


Figure 5.2.1 Water Sanitation System (Author's data, 2018)

### 5.2.2 Fire Protecting System

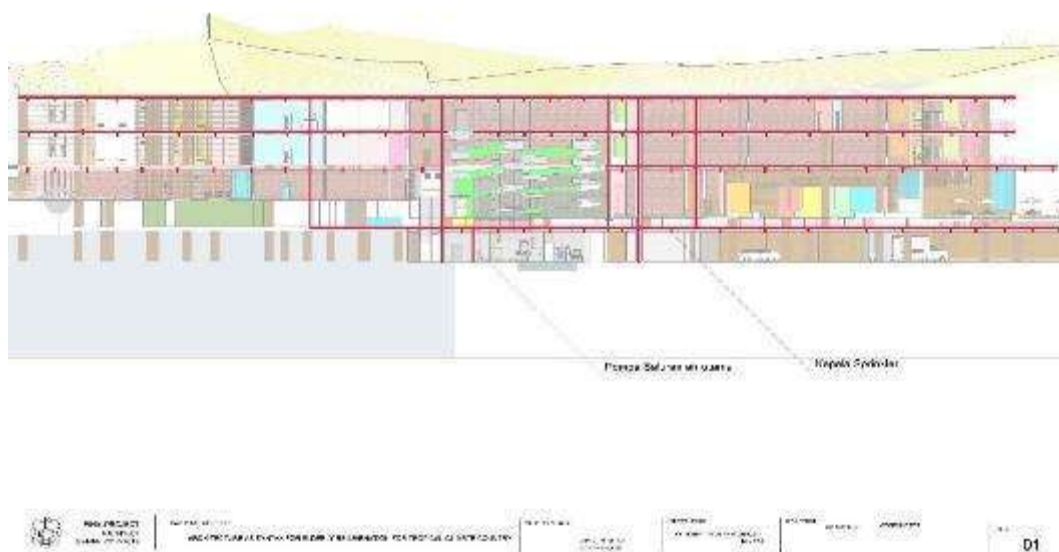


Figure 5.2.2 Fire Protecting System (Author's data, 2018)

### 5.2.3 Structural System

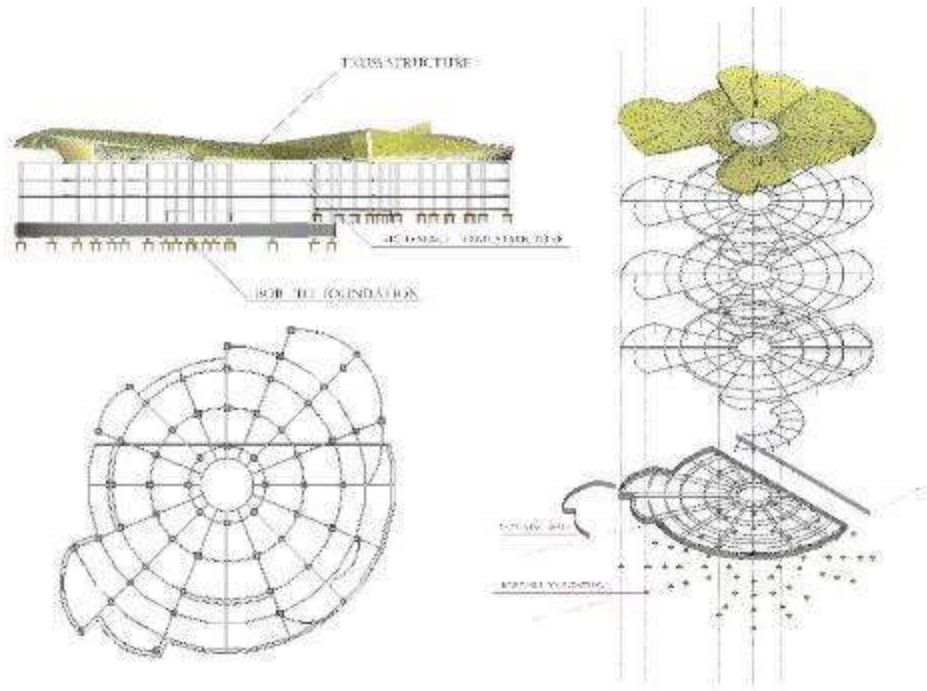


Figure 5.2.3 Structural Systems (Author's data, 2018)

From Figure 5.2.3 the building structural systems is rigid space frame structure that mimic from honeycomb that has rigid structure. The roof structural system is undulated roof with parabolic shape from swarming bee analogy, and also to collect wind to move inside it.

### 5.3 Design Simulation

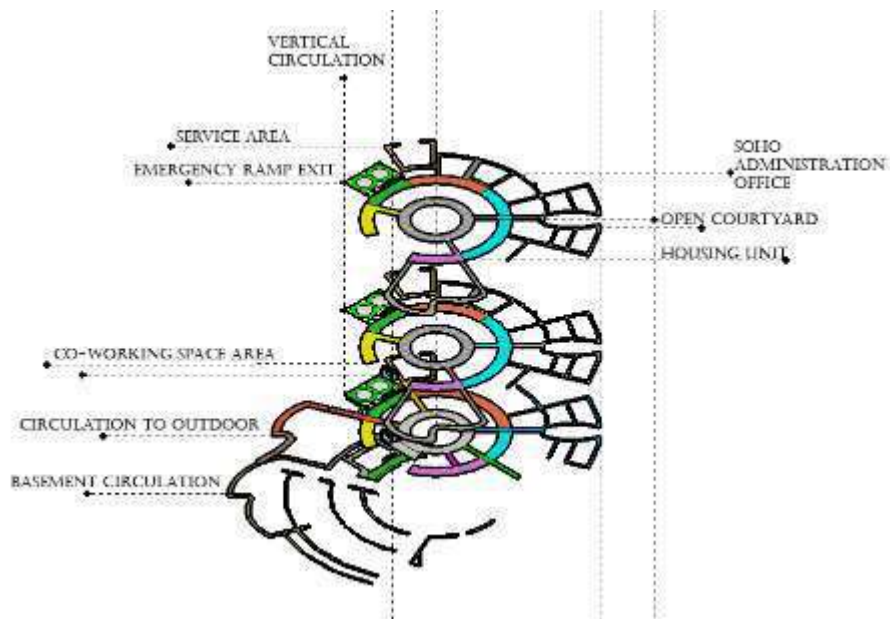


Figure 5.3.1 Building Circulation Axonometry (Author's data, 2018)



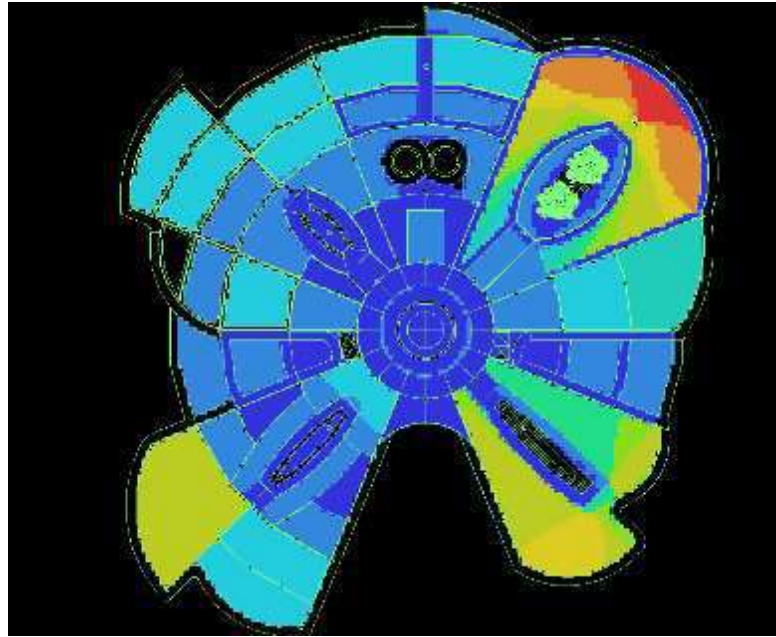


Figure 5.3.2 Building Mass Design Simulation Analysis(Depthmap, 2018)

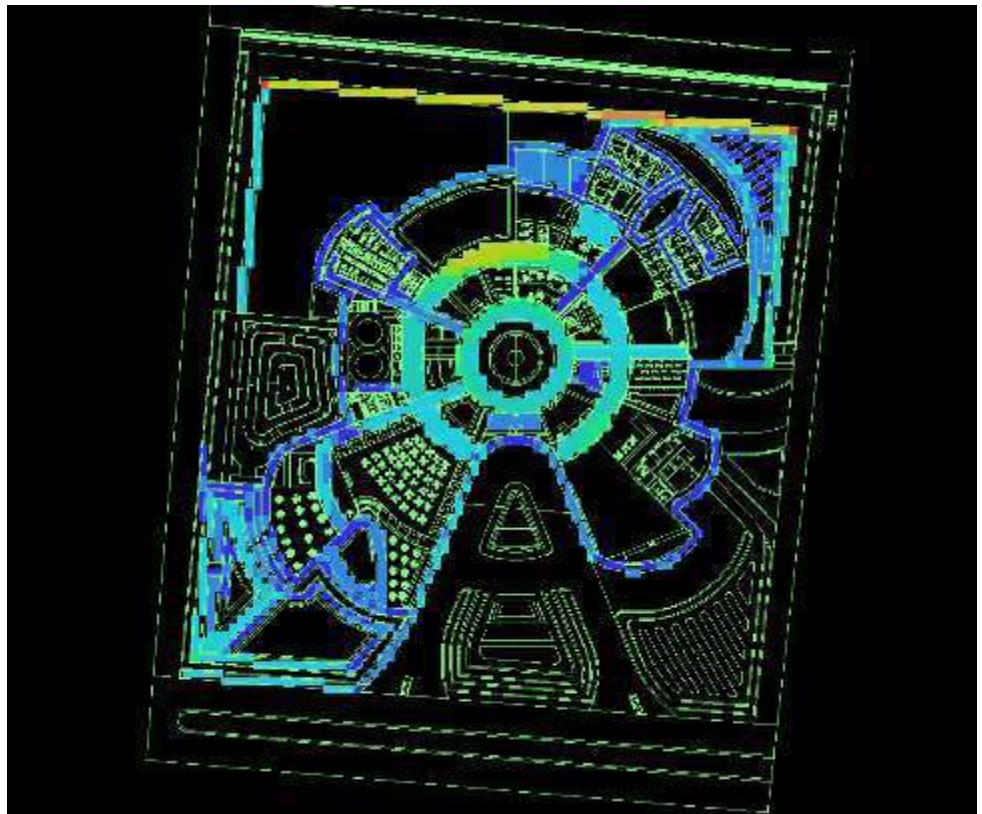


Figure 5.3.3Layout Plan Simulation (Depthmap, 2018)

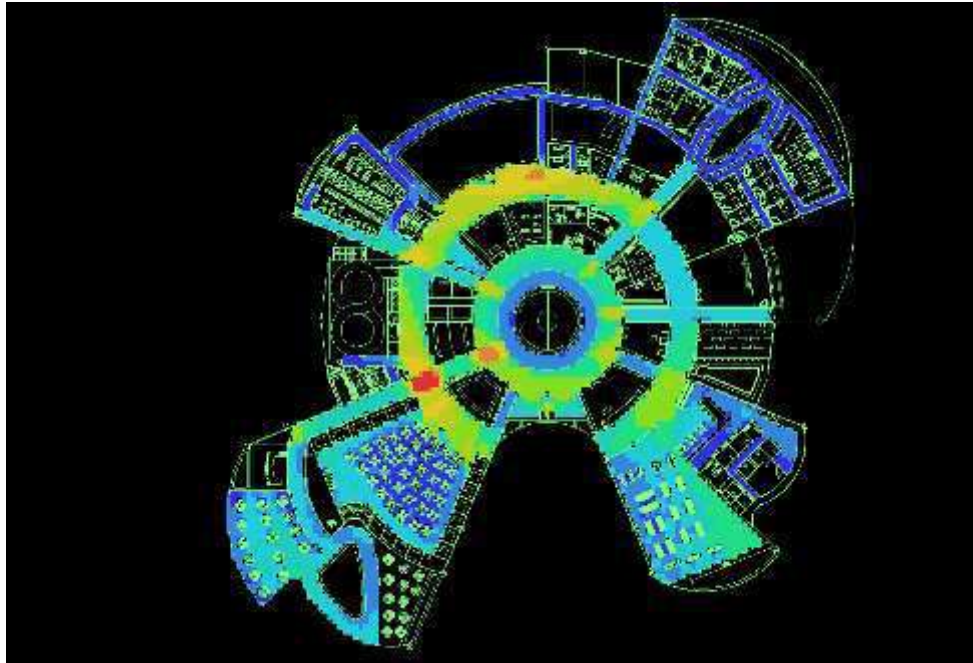


Figure 5.3.4 First Floor Design Simulation (Depthmap, 2018)

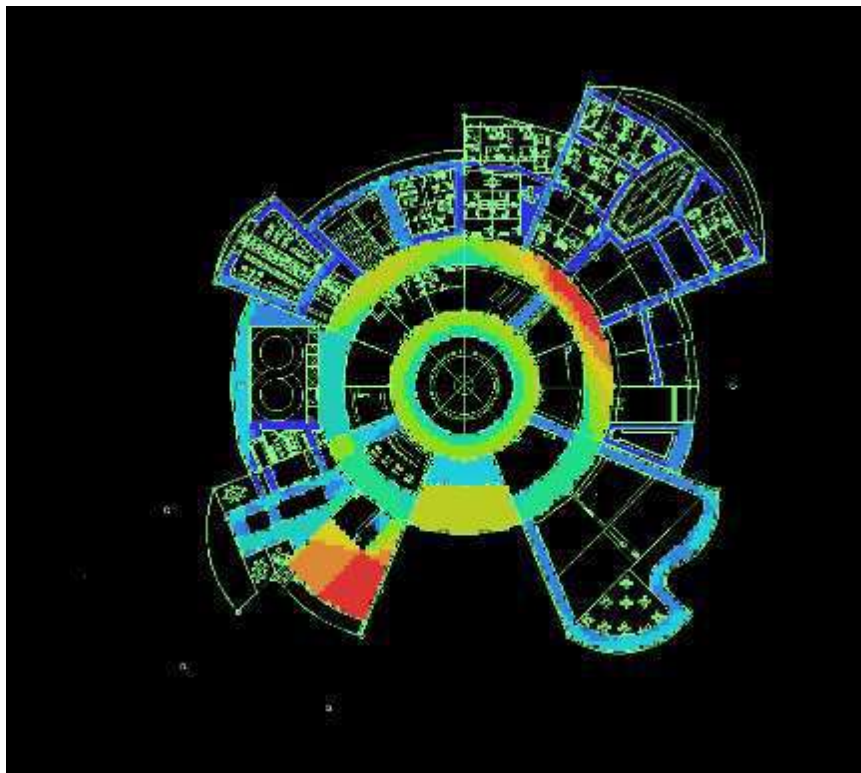


Figure 5.3.5 Design Simulation at Second Floor (Depthmap, 2018)

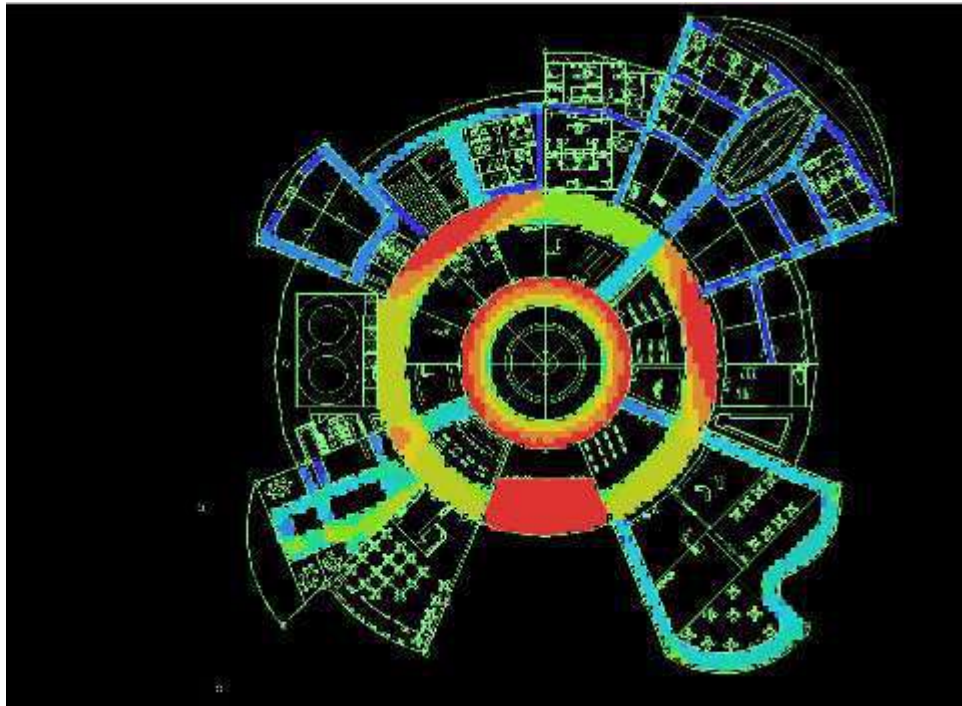


Figure 5.3.6 Design Simulation 3<sup>rd</sup> Floor (Depthmap, 2018)

From Figure 5.3.2 to 5.3.6 we can see that the integrity, intelligibility on radial room configuration is depend on the radial size. At the center radial (open courtyard) has function as shared room to gather people for socializing. At the Figure 5.3.2 and 5.3.4 there is different result because the change of radial size and furniture placing showing that corridor is used as social place.





## **CHAPTER 6**

### **CONCLUSION**

Elderly need to be in community while in their aging phase in order to stay productive. Elderly has desire to socialize whether with their friends and youth. Social interaction between elderly and youth can bring positive impact where they can learn together.

In order to trigger elderly movement architecture should provide natural ambience which can create elderly interaction and nature. Because in built environment elderly tend to move in natural environment. Biomimetic from beehive ecosystem level is being used to create natural environment that can trigger elderly movement. In line with Yung et al (2016) elderly tend to walk in natural environment. In addition this research try to bring natural environment into built environment to trigger elderly movement.

The proposed design concept for elderly SOHO (small office, home office) must be integrated to get the design goal. The integration output affects elderly behaviour setting from building circulation, aperture, furniture placement, and outdoor natural environment. Depthmap is being used to analyze building space integrity and connectivity to achieve the performance requirement goal for this research. By using Depthmap for elderly SOHO space syntax from elderly SOHO floor plan the result is elderly tend to gather at circulation area. From Figure 7 space/area with high integrity is located at the centre of building (open courtyard), space with radial shape has a role as collecting space/ assembly point where elderly tend to socialize. Then space integrity and connectivity can be split into different sections according to its collecting radial size.

## REFERENCE

- Aguiar, Bruno and Rosario Macario, (2017), “The Need for an Elderly centred mobility policy”, *Transportation Research Procedia*, Vol. 25, Page. 4355 - 4369
- Chindapol, John and Paul, Deo, (2017), “A suitable thermal stress index for the elderly in summer tropical climates”, *Procedia Engineering*, Vol.180, Page. 932-943
- Diaz, Claudio Aurelio and Paul Osmond, (2017), “A suitable thermal stress index for the elderly in summer tropical climates”, *Procedia Engineering*, Vol.180, Page. 393-402
- Jiao, Yu and Hang Yu, Zi Wang, Qi Wei, and Yifan Yu l, (2017), “Influence of individual factors on thermal satisfaction of the elderly in free running environment”, *Building and Environment*, Vol.116, Page. 218 – 227
- Jiao, Yu and Hang Yu, Tian Wang, Yusong An, and Yifan Yu l, (2017), “The relationship between thermal environments and clothing insulation for elderly individuals in Shanghai, China”, *Journal of Thermal Biology*, Vol.70(a), Page. 28-36
- Sattayakorn, Sutida and Masyuki Ichinose and Rumiko Sasaki, (2017), “Clarifying thermal comfort of healthcare occupants in tropical region: A case of indoor environment in Thai hospitals”, *Energy and Buildings*, Vol.149, Page. 45-57
- Song, Yan and Jie – Ge Jiao and Ze - Jun Chen, (2017), “Exploring on the elderly health management model in tropical area”, *Asian Pacific Journal of Tropical Medicine*, Vol.10(6), Page. 614-618
- Abbasi, Ayah and Chaham Alalouch and Glen Bramley, (2016), “Open space quality in deprived urban areas: user perspective and use pattern”, *Social and Behavioral Science*, Vol.216, Page. 194-205
- Ghobashy, Shaimaa El and Gihan Mosaad, (2016), “Nature Influences on Architecture Interior Designs”, *Environmental Research*, Vol. 146, Page 27 – 34

- Loenhout, J.A.F van and A. le Grand, F. Duijm, F. Greven, N.M Vink, G. Hoek, and M. Zuurbier, (2016), “The Effect of high indoor temperature on self-perceived health of elderly persons”, *Environmental Research*, Vol. 146, Page 27 - 34
- Mohammad, Sitinur Athirah and Mazuiyah Mohd and Sabarinah Sh, (2016), “Inclusion of Social Realm within Elderly Facilities to Promote Their Wellbeing”, *Social and Behavioral Sciences*, Vol. 234, Page 114 – 124
- Monokrousou, Klio and Giannopoulou, (2016), “Interpreting and Predicting Pedestrian Movement in Public Space through Space Syntax Analysis”, *Social and Behavioral Science*, Vol.216, Page. 194-205
- Wardhana, Mahendra (2016), “Spatial Analysis of Users Movement Pattern and Its Socialization on Public Facilities and Environment through the ESVA”, Surabaya. CITIES 2015 International Conference
- Othman, Ahmad Ridzwan and Fikri Fadzil, (2015), “Influence of Outdoor Space to the Elderly Wellbeing in a Typical Care Centre”, *Procedia Social and Behavioral Sciences*, Vol. 170, Page. 320 – 329
- Jiang, Shan, (2014), “Therapeutic Landscapes and healing gardens: A review of Chinese literature in Relation to the Studies in western countries”, *Fronties of Architecture Research*, Vol. 3, Page. 141 – 153
- Pandelaki, Edward Endrianto and Wijayanti and Septana Bagus Pribadi, (2016), “The Elderly Friendly High-Rise Housing: A Comparison Study between Indonesia & Japan”, *Procedia Environmental Sciences*, Vol. 20, Page 146 – 153
- Mohammad, Nik Mastura Nik and Abbas, Mohaed Yusoff, (2012), *Elderly Environment in Malaysia: Impact of Multiple Built Environment Characteristics*, *Social and Behavioral Sciences*, Vol. 45, Page 120-126
- Syamwil, Indra Budiman, (2012), “Social Construction View in Environment Behaviour Studies: The Potential for Asian Context in Environment Behaviour Knowledge in Architecture and Urban Design”, *Proceedings of ASEAN Conference on Environment-Behaviour Studies*, Riverside Majestic Hotel, Kuching, Page. 27-33

- Wijayanti, Eko Budihardjo and Edward Endrianto Pandelaki, (2012), “Places where the Elderly Meet Friends at Banyumanik Public Housing, Semarang, Indonesia”, *Procedia Social and Behavioral Sciences*, Vol. 50, Page 405 – 417
- Nisbet, Elizabeth K, John M. Zelenski, and Stephen A. Murphy, (2009), “The Nature Relatedness Scale Linking Individuals’ Connection With Nature to Environmental Concern and Behavior”, *Environment and Behavior*, Vol. 44, No. 5, Page 715-740
- De Groot, Judith. I. M, and Linda Steg, (2007), “Value Orientations to Explain Beliefs Related to Environmental Significant Behavior”, *Environment and Behavior*, Vol. 40, No. 3, Page 330-354
- Brawley, Elizabeth C, (2006), *Design Innovations for Aging and Alzheimer’s : Creating Caring Environment*, John Wiley & Sons, Inc., Canada
- Kellert, Stephen B et all, (2008), *Biophilic Design*, John Wiley & Sons, Inc., USA
- Lang, John and Moleski, Walter, (2010), *Functionalism Revisited Architectural Theory and Practice and The Behavioral Sciences*, Ashgate Publishing Company, United Kingdom
- Latifah, Nur Laela, (2015), *Fisika Bangunan 2*, Griya Kreasi, Jakarta Timur
- Lauer, David A and Stephen Pentak, (2005), *Design Basics*, 6<sup>th</sup> Edition, Thomson Learning Inc., United States of America
- Pena, William M and Steven A Parshall, (2001), *Problem Seeking : Edition An Architectural Programming Primer*, 4<sup>th</sup> Edition, John Wiley & Sons Inc., New York
- Pallasmaa, (2012), *The Eyes of the Skin, Architecture and the Senses*, 3<sup>rd</sup> Edition, John Wiley and Sons Ltd., United Kingdom
- Zumthor, Peter, (1988), *Thinking Architecture*, Second Expanded Edition, Birkhauser, Berlin
- Rasmussen, Steen Eiler, (1959), *Experiencing Architecture*, MIT Press, USA
- Plowright, Philip D, (2014), *Revealing Architectural Design Methods, Frameworks, and Tools*, Routledge, New York

- Chiara, Joseph De, (1983), *Time Saver Standards for Building Types*, 2<sup>nd</sup> Edition, Mc-Graw-Hill, Singapore
- Neufert, Ernest, (2002), *Data Arsitek Jilid 2*, 33<sup>rd</sup> Edition, Erlangga, Jakarta
- Ernest, Neufert, *Architect's Data*, 3<sup>rd</sup> Edition, Blackwell Science
- Steudje, Bjorn, (2007), *Architecture and Human Senses Pre-School in Alexandria Old Town, Virginia* "Thesis submitted to the Faculty of Virginia Polytechnic Institute and University in Partial Fulfilment of the requirement for the degree of Master of Architecture, Virginia
- Hashemnezhad, Hashem, et all, (2012), *Sense of Place and Place Attachment*, Doctoral Programme, Iran University of Science and Technology, Iran
- World Health Organization, (2011), *Global Health and Aging*
- Wright, Courtney J et all. 2017. *What housing features should inform the development of housing solutions for adults with neurological disability?: A systematic review of the literature*. Australia. Science Direct
- Rohaedi, Slamet. 2016. *Tingkat Kemandirian Lansia dalam Aktivitas Daily Living di Panti Sosial Tresna Werdha Senja Rawi*. Bandung. Universitas Pendidikan Indonesia
2008. *Age and Productivity Capacity*.
- Tulisan dalam artikel berjudul "Rumah Jompo Belum Populer", topik berita Kompas(<http://print.kompas.com/baca/2016/03/08/Rumah-Jompo-Belum-Populer>)
- Paiva, Marie Monique et all. 2015. *The Elderly and Environmental Perception in Collective Housing*. Brazil : Procedia Manufacturing 3
- Manurung, Parmonangan. 2016. *Considering the Elderly needs in developing nursing home design*. Yogyakarta. Universitas Kristen Duta Wacana

Pali, Cicilia. 2016. *Gambaran Kebahagiaan pada Lansia yang memilih tinggal di Panti Werdha*. Manado. Bagian Psikologi Fakultas Kedokteran Universitas Sam Ratulangi

FUTURARC. Edisi Jul-Aug 2015 Volume 43 The Biophilic Space

## APPENDIXES

### APPENDIX 1: INTERVIEW FORMS

#### A. Time of Observation

Date :

Time :

Temperature :

Humidity :

Wind Velocity :

Light Intensity :

Noise level :

#### B. Respondent Data

❖ Name :

❖ Age :

❖ Gender:

❖ What are you wearing at the moment

##### a) Top

- Topless
- T-Shirt
- Sweater
- Sleeveless Shirt
- Long Sleeve
- Daster
- Jacket

##### b) Bottom

- Shorts
- Trousers
- Long Skirts
- $\frac{3}{4}$  Skirts
- Sarung

##### c) Socks

❖ Hometown:

❖ Status:

- Unmarried
- Married
- Widower

❖ Amount of Children/Family:

❖ Reason Why move to Elderly Housing:

❖ Having house before: YES/NO

❖ Before enter this housing you are:



- Employee (official)
  - Business
  - House wife
- ❖ Why do you enter this retirement housing? And who take you here?
  - ❖ Where your income to pay your daily needs?
  - ❖ Have you felt comfortable here, Why?
  - ❖ Have you suitable with another elderly, Why?
  - ❖ What your problem by living here?
  - ❖ Do you have any sick track record? Do you have that diseases since you enter here or before?
  - ❖ Do you still have a contact with your children/family?
  - ❖ What kind of activity do you like the most from this housing?
  - ❖ What kind of activity that you don't like from this housing?
  - ❖ What kind of activity that you want beside activity from this retire housing?
  - ❖ Do you still have a desire to work again? Why? And what kind of work?
  - ❖ What kind of partner you like to work together?
  - ❖ What do you think about this elderly housing? Does it suitable for you for aging productively?
  - ❖ Do you prefer living here or with family?
  - ❖ What kind of facility that you need?

1. Building Data

a. Bedroom

Temperature	Humidity	Radiance	Lighting	Noise

b. Bathroom

Temperature	Humidity	Radiance	Lighting	Noise

c. Aula

Temperature	Humidity	Radiance	Lighting	Noise

d. Eating room

Temperature	Humidity	Radiance	Lighting	Noise

e. Corridor

Temperature	Humidity	Radiance	Lighting	Noise

2. Public Facility
  - a. Road Condition (Asphalt/ Soil/ Paving)
  - b. Vegetation (Yes/No)
  - c. Cafeteria (Yes/No)
  - d. Healthcare (Yes / No)
  - e. Praying Room (Yes/No)
  - f. Entertaining Room (Yes/No)

## APPENDIX 2: Atmosphere of Griya Usiawan Santo Yosef



**APPENDIX 3: SITE CONDITION**

Time	Temperature( <sup>0</sup> C)	Radiation (W/m2)	Lighting (lux)	Humidity (%)	Noises (dB)	Wind (m/s)
9 am	34.4	447	1792	57.7	56.8	1.2
12 pm	36	607.4	350 x 100	50.3	82.1	1