Ethiopian Institute of Architecture Building Construction and City Development

Willingness to pay and perception for preferred natural light, view and space shape of condominiums: The case of Baldaras condominiums, Addis Ababa

By

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A Thesis Submitted to the graduate studies of Addis Ababa University for the partial fulfillment of masters of Arts in Urban land and Property Valuation.

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Declaration

Here with I declare that, this thesis prepared for the partial fulfilment of the requirements for the degree of **MASTERS OF ARTS IN URBAN LAND AND PROPERTY VALUATION** entitled **"Willingness to pay and perception for preferred natural light, view and space shape of condominiums, the case of Baldaras condominiums"** is my original research work. It is prepared independently by my own effort with the close advice and guidance of my advisor. I also declare that this thesis has not been presented in any university and all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Bethel Ayalew Zeleke

Signature

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Date

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Acknowledgement

I would like to express my eternal gratitude to the almighty God, for all the guidance and lessons throughout my life and specially for Maya.

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Abstract

Even though it is taken as common knowledge that natural light, view and the space shape are important attributes of any living space, how significant they are in the eye of the dweller, in what way they are preferred and how those demands can possibly be appreciated financially was the main interest of this paper. The task of satisfying the research intentions was carried out mainly by surveying condominium dwellers attitude towards the significance of natural light, view and space shape and in what way they preferred them, with how much they will be willing to pay to attain them. Another method used was a focus group discussion with professionals involved in the real estate business be it designing, valuing, selling and buying of condominiums to understand the financial influence of the attributes on condominium value. From the data analyzed it can be concluded that natural light, view and space shape are considered as a very significant part of the condominium life, view having a less gradation than the other two. The preferences for natural light were medium to very lit, for view to the green and common area and for space shape rectangular and square were popular choices. With willingness to pay that ranged from 1500 birr to 0. It was concluded that natural light, view and space shape are considered as very significant to the dweller, with a visible willingness to pay that can be processed to be the indicative financial value to the attributes.

Key Word: Natural light preference, view preference, space shape preference, willingness to pay

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Abbreviations

Ba - Bathroom
BR – Bedroom
FGD - focus group discussion
K - Kitchen
LR – Living room
SAD - seasonal affective disorder
Sf – Space form / space shape
WTP - willingness to pay

CHAPTER ONE
INTRODUCTION

1.1 Background

What is the real relationship between architecture and a building? It may be very hard to describe what exactly architecture is to a building but there are many trials of theories that shade light to what the relationship should be. Architecture doesn't simply imply to the hardware of a building only, it's not the visual product that's finally revealed or the materials and composition of the form but it is the personality of the building.

As the architect Louis Kahan put it, A great building must begin with the immeasurable, must go through measurable means when it is being designed, and in the end must be unmeasured (Kahn,1930). With the many dialogues and theories of what architecture is to a building, comes a more complicated dialogue of what kind of a building is considered to have a good architecture. The difficulty to pin down what good architecture is with a few sets of checklists, brings forth a complicated perspective and must bees it should address. For example, the Roman architect Vitruvius in his treatise De Architectura more than 2,000 years ago, described good architecture as a composition of three components, Durability (Firmatis) – It should stand up robustly and remain in good condition, Utility (Utilitas) – It should be useful and function well for the people using it and Beauty (Venustatis) – It should delight people and raise their spirits (Morgan, Warren, Robinson, 1914). In general, it could be said that architecture offers visual comfort for the onlookers while also providing physical and psychological comfort for the dwellers. So, when the home (condominiums to be particular) is being discussed on this paper, it will be mostly from the perspective of the dweller, but it is also very important to note that the dweller is also an on looker with a better acquaintance with what he is looking on to.

Architecture is a field of knowledge embedded with values. Quality represents something good, a well-designed object. But what does it mean? The theory is that architectural quality as a key concept is basically disputable; this shows up in the design and appraisal of architecture and urban design projects as well as when the built environment is evaluated (Rönn, 2018).

In the art tradition of the west, architecture is categorized as one of the fine arts like painting, sculpture, literature and like, which makes people understand architecture of buildings as appealing to feelings than reason. So, most of the evaluation is carried out in similar manner as to other forms of arts (Sun, 2017), this view of architecture forgets the facts that the functionality of architectural products namely buildings is the most vital concern of the whole concept and can be valuated objectively. But when treated as an art form it makes it very subjective.

Talking about the home life in Addis Ababa now a days is highly comprised of the life in condominiums. Since 2005 the city has been building condominiums. Condominium: means a building for residential or other purpose with five or more separately owned units and common elements, in a high-rise building or in a row house, and includes the land holding of the building (Condominium Proclamation No. 370/2003).

Many raise the issue of quality when it comes to these condominiums, some suggest part of the reason the quality of the condominium in many perspectives has been compromised is because of lack of renters' involvement in decision making (Adamu, 2012). Quality in terms of architectural space in condominium housing or in any residential housing is a gap seen both in research and value. There is also the question 'do the qualities the architect strives to fulfill have values (economical) when the property is being appraised? How much is a view to a lake or a green area?' How much is a morning sun through the window? Or what is the value of well composed form? The above questions are mainly answered with very subjective figures that are born out of a hunch gathered from the majority of the observed tendencies, rather than a well-studied figure that actually corresponds to the use that these features offer the owner.

In many cases especially in the case of our country we find that these attributes of good architectural space are not wholly represented as figures. The value gained or created through good quality architecture is not financially direct and can come in a form of social, environmental and psychological benefits which makes it difficult to quantify (Millhouse, 2002). There is of course an obvious difficulty in many intangible qualities to quantify. Appraisals may determine the value of any building in comparison to the cost of its production and its locational attributes, but the hard to quantify attributes have high contribution to a comfortable life inside the buildings. For example, a space

of a room may be determined by its area and calculated by the market price per meter square but this does not matter whether this room is a well-lit room or not (because the windows were designed to give enough and right directional light to the room), or the proportion of its height and length makes it inadequate to its function or not, or the choice of permanent fixtures are well composed in the room or not. Sometimes architectural space attributes are generalized into groups for understanding and handling purposes, in that perspective when we come to the way the architecture of a building is valuated, the issue that the generalization caused will be viewed vividly. So many qualities that are under the architecture of the building will be lost in translation.

Since these attributes of spaces are not all listed and limited for sake of time and resource management this paper will try to identify the significance of natural light, view and space shape to the dweller and what possible financial backing it can have.

1.2 Problem statement

The condominium has become a huge part of the Addis Ababa residents, it appears in many sites as blocks of buildings. It has also become the space that many inhibit, from a bachelor, newlyweds to a small or large family. This makes the condominium the most recognizable residence both as a home and a building block that is part of the city. Since the condominium was meant as a low-cost housing development, the focus was mainly in providing the main spaces with the minimum cost. This may have caused some quality compromises in design and physical appearances among other construction quality problems (Adamu, 2012).

As with many properties the appraisal process of the condominiums is mostly based on the hardware of the spaces that can easily be quantified like the area, the material it is built up with, what floor the unit is situated at but this may not be enough because most people also value the comfort the space that they live in gives them. For example, they do enjoy the amount of light that enters to the room, the thermal comfort, the spatial organization and even the space shape of the rooms, which are some of the elements that make up the architectural spaces.

In the appraisal process of condominiums and or any other residence the main components that are considered as values technically speaking are the walls, the windows, the area, the slab, the roof, the fixtures and installments that the building or

the residence is made of. But the quality of the view and the natural light that the window offers are not considered as critical value, the shape of the space that the walls, the slab and roof makes are not the main value generators. And even when being considered in the valuation process it does not have a proper and technical step into how they can be quantified into value.

It's a given fact that natural light, view and space form are essential parts of one's activity in his or her condominium house. But the preference of the general dweller on the brightness level of the rooms they live in, the view they would like to have and the space form that they will like to sit in is not known. Many raise the issue of quality when it comes to these condominiums, some suggest part of the reason the quality of the condominium in many perspectives has been compromised is because of lack of renters' involvement in decision making (Adamu, 2012).

1.3 Objective of the study

Main objective:

To assess the significance level and preference of natural light, view and space shape of condominium spaces to the dwellers and how it can be interpreted into financial value if the preference of the dwellers is met.

Specific objective:

1. To assess the understanding of dwellers as how significant natural light, view and space shape have to the living condition in condominiums.
2. To examine the effect natural light, view and space shape have on value through the current appraisal process of a condominium.
3. To investigate the preference and value dwellers have towards natural light, view and space shape of a condominium.
4. To formulate an indicative numerical value to natural light, view and space shape of condominiums.

1.4 Research question

Main Research question:

What is the significance and preference of natural light, view and space shape to the life of a dweller in a condominium and how can it turn into financial value if the preference of these attributes is met?

1. How well is the significance of natural light, view and space shape understood by the dwellers of condominium?
2. How does natural light, view and space shape affect the current value of a condominium, if it has an effect at all?
3. How do dwellers prefer natural light, view and space shape to be in their condominium?
4. What could be the financial value of natural light, view and space shape when it meets the preference of the dweller?

1.5 Significance of the study

The study mainly focuses on the natural light, view and space shape which are three of many architectural space attributes that make any built structure livable and comfortable. The particular focus point being the value and the preference type related with these attributes of architectural space.

Thus, the study can open doors to investigation how natural light, view and space shape can add financial value to a condominium unit if the particular preference of the dwellers is met. It will also shade light on the preference of condominium dwellers on the type of natural lighting they prefer in each room, the view that they would like to have a sight of and the type of shape they get the most function out of for each room.

The study will also help in reviewing the current appraisal process and valuing technique in the eyes of these three factors namely natural light, view and space shape as values worthy of financial consideration and how.

1.6 Scope of the study

The research is based on the intangible attributes of space of condominiums. The intangible attributes that are part of the architectural space created by the tangible elements which are the walls, floor, ceiling, windows and doors are not conclusively numbered but include, space shape, space organization, texture, color, thermal

atmosphere, view, light, noise. But this list grows more in time and in-depth study, for example recently green effect of spaces is an important topic as space attribute. So, to study all these elements with time and resources available for this study would not be possible therefor the study focuses on the main attributes that are the simple and direct relatives of the wall and windows. The windows bring view and natural light into the rooms and the walls give each room the shape that they retain. The two most important functions of windows are the provision of daylight access and a view to the outside (Boyce et al., 2003). Thus, the scope of the study is limited to the natural light, view and space shape of the condominium units.

Since condominium buildings are large in number, it makes it impossible to incorporate all of them with the amount of resource and time allocated for this research level. Thus, the Baldaras condominium was used as a case area to show case the objectives of the research.

The other perspective in which the study is guided by is the type of condominium units included in the study. Since the research looks through the preferences of natural light, view and space shape of each room in the unit the smaller number of rooms to be studied the clearer the study. For this reason, the study focuses on one bedroom and two-bedroom condominium units only.

In consideration to natural light the study focuses on the illumination level of natural light as the focus to research the preference and willingness to pay.

Since the windows of all the units of condominiums is similar and at times even of every room, the view perspective considered in this study focuses on what view is offered rather than how it is offered.

As with windows the room height and the shape of rooms offered by condominiums is limited and similar so the focus of space shape will be on the basic form that are available within the studied units, which happen to be rectangular, square and L-shaped.

CHAPTER TWO
LITERATURE REVIEW

2.1 Good architectural quality

Before getting into the particular architectural space attributes covered in this research which are natural light, view and space shape, it is better to first understand what good architecture in general means. Most describe good architecture in terms of what they want from it and not what these wants are composed of, they describe how architecture affects the different paths of life and yet not be able to describe the exact elements of the suggestions that they offer to us. For example, Aaron Betsky, a president of the School of Architecture at Taliesin and a critic and author of more than a dozen books on art, architecture, and design, describes architecture as an entity that could make the world better, he suggests that it can make it better in a social and an environmental sense. It can create spaces that are open, accessible, and sustainable. It can create the stages on which we can act out the roles we feel are ours to play with those we recognize as our fellow actors. He also states that architecture should be neither weird nor boring, neither alien nor alienating, neither wasteful nor wanting in the qualities that make us human. It should be good (Betsky, 2019). The above description does not quite help in figuring out the elements where good architecture emanates from but yet shows the general direction of where to look for these elements.

Quality according to (Arditi and Gunaydin 1997) is meeting the requirements of the stakeholders: designer, contractor and regulatory agencies as well as the owner. In another view quality of a construction project should address science and technology of construction and also manage to satisfy the physical and psychological aspects of the human need. (Griffith 1990).

Recent qualifications for good architecture concentrate on how the building uses energy and works on sustainability. If a new building is absolutely necessary, it should be good. It should work well and answer all codes, but that is only the beginning point. It should use minimal amounts of energy both in construction and in use. It should offer spaces that do not imprison and pigeonhole us. It should enhance its site. It should be beautiful (Betsky, 2019).

Some just simply formulate major criterion for what they think to be a checklist for a good design and it lists sustainability, accessibility, functionality, well made-ness, emotionally resonate, enduring, socially beneficial, beautiful, ergonomic, affordable (Metropolis,2009). And as need raises and time brings forth new challenges the characters of a good architecture will change.

2.2 Architectural space and architectural space attributes

Architecture and what good quality architecture means entails with it a very wide range of qualities and one of the major elements within it is architectural space. Architectural space has more to do with experience than just being some enclosed three-dimensional atmosphere. There is a debate on the priority architecture gives to the form or the space. Some argue that form follows function, (Sullivan ,1996) meaning that the space is first designed for that particular function it supposed to serve and the form will be the byproduct of the elements shaping that space. And others say that the form and function should be one and should be joined spiritually (Wright, 1939). The relationship between form and function or form and space to be exact is one of the major factors that shape architecture of any building. It is obvious that the form engulfs that space which is the functional part of the building and this space has shape, degree of enclosure, dimension, proportion, material, color and texture.

'We put thirty spokes together and call it a wheel; but it is on the space where there is nothing that the utility of the wheel depends. We turn clay to make a vessel; But it is on the space where there is nothing that the utility of the vessel depends. We pierce doors and windows to make a house and it is on these spaces where there is nothing that the house depends. Therefore, just as we take advantage of what is we should recognize the utility of what is not' (Lao-tzu, 6th BC) (Ching, 1995). It can be noted from this quote that the space that we utilize is the nothing and not exactly the elements that bound it.

Architectural space comes into existence by arranging geometric elements like point, line, plane and volumes which in architecture become linear columns, beams, planer, roofs, floors and walls (Ching, 1995). The way these elements are arranged along with windows and door openings give the defined space a certain spatial quality. These qualities are measured in perspective of form, color, pattern, texture, sound, proportion, scale, definition, degree of enclosure, view or outlook and light. (Al-Houssainy, 2014).

The phenomena of architecture is captured mainly by the space that it engulfs and the character of that space. As space begins to be captured, enclosed, molded and organized by the elements of mass, architecture comes into being (Ching, 1995), which makes space creating the beginning of architecture, therefore the more a building guarantees a functional and high-quality space the more the architecture of that building is to be appreciated.

Architectural space is majorly having to do with indoor environment and can be understood as, indoor air quality: an umbrella term comprising odor, indoor air pollution, fresh air supply, etc., Thermal comfort: dependent on moisture (humidity), air velocity, temperature, etc., Acoustical quality: noise from outside, indoors, vibrations, etc., Visual or lighting quality: view, illuminance, luminance ratios, reflection, et (Bluyssen, 2010).

Architectural space has many attributes within, some of them are natural light, view, form, organization, temperature, aesthetics and noise being some of the prominent constituents. These characters are of course are highly entangled with body of the building. The view and natural lighting of the space is controlled by the type, size and opening direction of the window, the form and organization of the space is controlled by the position of the walls, the ceiling and floor to each other, the temperature is controlled by the type of material it is built with and the direction of openings, aesthetics is controlled by the overall decision made on the walls, ceiling floor and their relationship.

2.3 Architectural space qualities of a home/ residence

Even though architecture matters in all types of building, the residence building is of special interest because one way or another everyone lives in a place where he calls home and with it will come a choice or an opinion on what it should have and what it shouldn’t. So, the architecture of the home can be discussed largely among the society and will not be buried among the professional only nor among capable builders or clients.

Architecture is composed of measurable and unmeasurable properties. What is unmeasurable is the psychic spirit, the psyche is expressed by feeling, and also by thought and that may always keep it unmeasurable (Kahn, 1930). The home as with

other types of building is composed of the measurable and the unmeasurable properties of architecture. The measurable include everything that we can physically delineate, measure, and quantify which have been well researched in most cases unlike the unmeasurable properties which are the qualitative aesthetical and symbolic properties that are a great part of our home perception. The measurable and the non-measurable properties of a residence are harmoniously balanced in a good quality architecture residential building (Nylander, 2002).

There were seven fields of non-measurable properties that were outlined in the Nylander paper to be important for a residence architecture. These include Material and detailing, Axiality (directional axes relate the spaces of the home and make it easy to survey), enclosure (the openness and closeness of spaces), movement (the transition from one space to another), spatial form (the form of a space in section and plan), light (the effect of the natural light in spaces) and spatial organization (schematic layout of spaces) (Nylander, 2002).

2.4. Natural light

i. Significance

The story of architecture is highly entangled with the history of window and letting daylight enter through a space along with of course air, heat and cold. Daylight has a lot with the wonder of the interior spaces of many medieval cathedral buildings and any other private buildings (Philips, 2004). Daylight entrance to buildings is manipulated through the orientation of the building, the nature of the aperture and the structure of the whole building (Philips, 2004). Natural light or daylight is a light source to which human vision adapts to the full spectrum. Taking into account the daylighting of a building can increases space productivity (Rizal, Robandi and Yuniarno, 2016).

Day light has a very positive effect on the physical and psychological health of human beings and this was acknowledged by ancient Egyptians and Greeks. It was also put to use as healing method in the early 1900s (Magazine by Velux, 2010). This proves that proper use of sunlight in designs is a very important part of indoor architecture.

According to University of Alberta a sunny hospital almost halved the death rate of patients that were recovering from heart attack and other scientists also confirmed that sunny atmospheres help patients battling depression (Pearce, 2010). Office spaces that

are brighter have more productivity rates and less absentees which compensates for any financial loss that is spent to make the spaces have more sunlight (Pearce, 2010).
Building design in particular can enhance overall light during daytime and ensure that people get sufficient morning exposure to the blue light that at this time-of-day bolsters circadian rhythms and may ward of SAD (seasonal affective disorder) and other health-threatening conditions. Much of this comes back to windows – the most important link between the indoor and outdoor environments, the source of natural light and natural ventilation (Pearce, 2010).

There are many situations in which the daylight interacts and affects spaces, aesthetically speaking it creates different textures when it lands on different materials casting shadows and along with-it different moods and appearance. And it also creates different moods in the same room as it moves throughout the day. Psychologically it is known that the sense of well-being is highly associated with daylight. Health wise it is believed that it improves resistance to infections, skin problems and cardiovascular impairments, energy wise it is the most efficient way of low-cost energy building (Evans, 1981).

ii. Measuring and categorizing methods

The amount and distribution of natural light in a room depends on three factors: the room geometry, the location and orientation of windows and other openings, and the characteristics of the interior surfaces (Rizal, Robandi and Yuniarno, 2016).
Illuminance is defined as the amount of light received on a surface and is measured in lux which is luminance per meter square. It is the most used measurement of light currently used to determine daylight intensity in the interior (Deru, Blair and Torcellini, 2005).

The amount of sunlight that enters a room is composed of three components which are the direct sunlight, skylight, and reflected light. Direct sunlight illuminance to earth may exceed 100, 100 lux, but its brightness is dependent on time of the day, location and sky conditions. Sky light is the soft diffused light that is scattered by the atmosphere and clouds and it lies between 10,000 lux and 30,000 lux depending on the season. (Winter, or summer). The reflected light is the light that is reflected form the surrounding environment, be it the natural environment (terrain, vegetation.) or man

maid (the surrounding buildings) generated first from the direct sunlight or sky light (Rasmussen, 2016).

There are standard recommendations about the amount of lighting condition in a different room in a residence living. For a bedroom the general lighting condition should be 100-300 lux and for a specific task 500 lux, for a kitchen the general recommendation is 300 lux and for a specific task (countertop) 750 lux, for a living room the general recommendation is 300 lux and for specific task 500 lux, and for a bathroom the general recommendation is 300 lux and for specific task (shaving and makeup) is 300-700 lux (Adams, 2021).

iii. Value of natural light in appraising process

Historically light valuation method is a closed subject that was dared questioned by a few (Thomson, 2005). In most cases sunlight is likely ignored as a variable in hedonic models (Fleming, Grimes, Lebreton, C. Maré and Nunns, 2017). There is a high scarcity in published research on the topic of the economic estimate that the sunlight has on the residential property market (Fleming, Grimes, Lebreton, C. Maré and Nunns, 2017). Sunlight highly influences the financial decision people make on real estate. A study in New Zealand proofed that there is a high willingness to pay for an extra daily hour of sun which was found to be associated with 2.4% in a house price (Fleming, Grimes, Lebreton, C. Maré and Nunns, 2017).

From the urban economics side of things, there is a proofed indication in the United States implies that a better climate which is the sum product of mean annual sunshine hours, average winter temperature is highly associated with higher property values and even high rate of city growth (Glaeser et al, 2001).

Indirectly access to sunlight helps reduce the amount of energy that is consumed than those with low quality natural light access and this difference could amount to 19% consumption difference (Strømann-Andersen and Sattrup (2011) In contrast those exposed to harsh sunlight pay more to create shading and cooling (Donovan and Butry,2009).

2.5 View

i. Significance

In the beginning of architecture views were important as a strategic point in which one can spot intruders but these days it has more to do with the aesthetical value of the view (Bourassa, Hoesli, Sun, 2004). Even though a view is considered to be an aesthetical part of architecture it is more than a luxury because it has a positive say on the psychological health of a person.

A study found that patients in hospital rooms that have a view to natural scenery recover more quickly than those viewing a wall (Pearce 2010). It is also noted that the sense of well-being is highly influenced by outside views of nature (Kaplan,1993).

Visual comfort can be described as being in a condition where one can perform his task with clear visibility, has a relaxed observation and or the person is satisfied with the visual condition (Hellinga,2013). But since we do different things in different parts of apartment like bedroom are for resting purposes, kitchen for preparing food and at times eating too, bathroom for cleaning purposes and living room is for general purposes from reading, watching tv and entertaining guests the amount of light we need and the view we want from it are also different.

Even though having a view from a living space is important the privacy of the people living in it should not be compromised. Research revealed that it's a biological nature of human beings to prefer a vantage point in which one can see a good deal without being seen himself which is referred to as the refuge theory (Bourassa, 1991).

ii. Measuring and categorizing methods

The complexity of the human perception brings forth differences in the preference. It is composed of that particular person's previous experiences, his values beliefs, expectations and attitude (Zube et al, 1975).

View is affected mainly by the size and geometry of the window, the character of the view in another perspective is highly influenced by the surrounding of the building and its characters (Hellinga, 2013).

View can be measured and understood in a different perspective, one is the perspective of what the view offers (natural setting, buildings, streets etc..) two is the view from the inside to the outside to be distant (like seeing the sky, distant city, etc,) or nearby

ground. The third is the window of view to be wide and spacious or small and informative (Hellinga, 2013).

iii. The value of view in appraising

There is a research gap in the impact of view on property value and a closer look on the subject shows that the effect that view has on a property is represented by a single dummy variable to a hedonic regression equation (Bourassa, Hoesli, and Sun, 2004). It is clear that a home with a great view should worth more than a home with less interesting view but there are no rules on how much value it adds to the property.

A study shows that the value of a home is affected by 5 to 8 percent of the market value based on the view that it offers (Rodriguez and Sirmans,1994). Even though this is a fact that is well recognized the method in which the exact number is captured and attributed to the view is not clearly put. Not only that the view affects the value of the property, the closeness and the fairness of the view is determinant in its effect. Close up view being worth more than faraway view but also in contradiction to that ability to see far away is much appreciated than a foreshortened sight (Brown and McCabe, 2000).

In one observation from a real estate agent says that the view being from the back has more value than a view from the front and the reason for this per the experience is because living takes place mostly in the rear side of the house or from rooms that are used most often (Siracusa, 2011).

In another perspective the view and what one is looking onto also has a huge effect on the value of a property. For example, a house with a view to a water body has more value than the one with none and the one with a view to a coastal ocean view has greater of them all (Benson and Hansen, 2013).

2.6 Space shape

i. Significance

The space shape of a room is the form the room has, coming together by structural system at first and then the walls, floor and ceiling of the room with windows and doors managing the space's relationship with other spaces. These elements have patterns and with an inherent geometry which will be passed on to the spaces that they create (Ching, 2018). The major forms of spaces that we are accustomed to are the rectangle, square, L-shaped, oval, circle but there are as many forms possible as there

are shapes but are not used as common as the above mentioned. Space form determines how the space is made functional, how the furniture is laid out and how the space feels.

ii. Measuring and categorizing methods

The shapes of rooms and spaces are determinant on how one furnishes and one feels in that space. It affects how one moves interacts and functions within the realm of that space. Forms in general can be of two types, organic – It refers to the form that is created or exists in nature in its natural living form such as a tree or a shrub; an outline created by the same and geometric or Inorganic – It pertains to the man-made, geometric shapes and forms which implies it includes non-living forms. The most common and highly delt with inorganic shapes that are used in residential spaces are the rectangular, l shaped square oval and circular or a combination of them.

The reason most commercial designs are rectangular, or square, is because they are easier, faster and more economical to build out of ordinary materials – stone, concrete, brick or wood. Square and rectangular shapes are also exponentially easier to reconcile, and there's usually less waste. Altered shapes not only utilize more materials and assets but are more expensive to construct and maintain (Whittaker, 2019).

90 degrees angles are very strong structurally, psychologically and spatially. Vertical stacks and vents align better. Roof planes become easier to design. Air circulation and temperature regulation are better controlled. Even electrical lines and water pipes are easier to incorporate (Whittaker, 2019). Square and rectangular designs also mean that there's little space that goes unused, plus it's easy to scale up and down with slight calculations. The challenge of rectangular shaped room is that it can easily feel narrow and claustrophobic and is usually difficult to create intimate gathering areas. Tall built in furnishing technique in balancing the elongated room.

The challenged faced in an L shaped room is the challenge of creating a visual and functional separation but is has the advantage of design freedom by supplying options as to what can be done with the functional areas also known as the two sides of the L, the short and the long.

2.7 Willingness to pay (WTP)

The process of finding the financial value of some intangible elements is complicated and hard to define and therefore the way they are appraised is different from other real properties. The total economic value that emanates from natural resources and heritage

is divided into three components which are the use value, the option value and the non-use value. The use value is the representation of the direct use of the environmental resource, the option value shows the willingness to pay in order to preserve the ability to use and the non-use value is the willingness to pay to preserve or improve a resource even if they may never use it themselves. All the three together bring about the notion of willingness to pay (Tietenberg and Lewis, 2010).

In other scenarios the willingness to pay can also be used as a market assessment for a new product development or in pricing decisions and some researchers agree that valid estimates of WTP is essential pricing strategy (Breidert, Hahsler, Reutterer, 2006).

One of the methods used to determine the willingness to pay of concerned parties is to directly ask them this could be done through a survey or through a focus group (Stobierski, 2020). This method is referred to as direct approach to measure WTP (Breidert, Hahsler, Reutterer, 2006). Through a survey a large amount of quantifiable data is used while from a focus group more of a qualitative data is collected (Stobierski, 2020). Another advantage of survey data is that they can be used to test concepts, new products and for the valuation of non-market goods (Cameron and James 1987).

CHAPTER THREE

METHODOLOGY AND DATA ANALYSIS

Introduction

As with many research the method to be used to achieve the objective of the paper is very important in the outcome of the result. The research is mainly exploratory research which is research undertaken in a situation in which insufficient research is made on the subject.

3.1 Case Area

The case area used for this study is a condominium site that is found in Ethiopia, Addis Ababa in Yeka Sub city and is named Baldaras condominium.

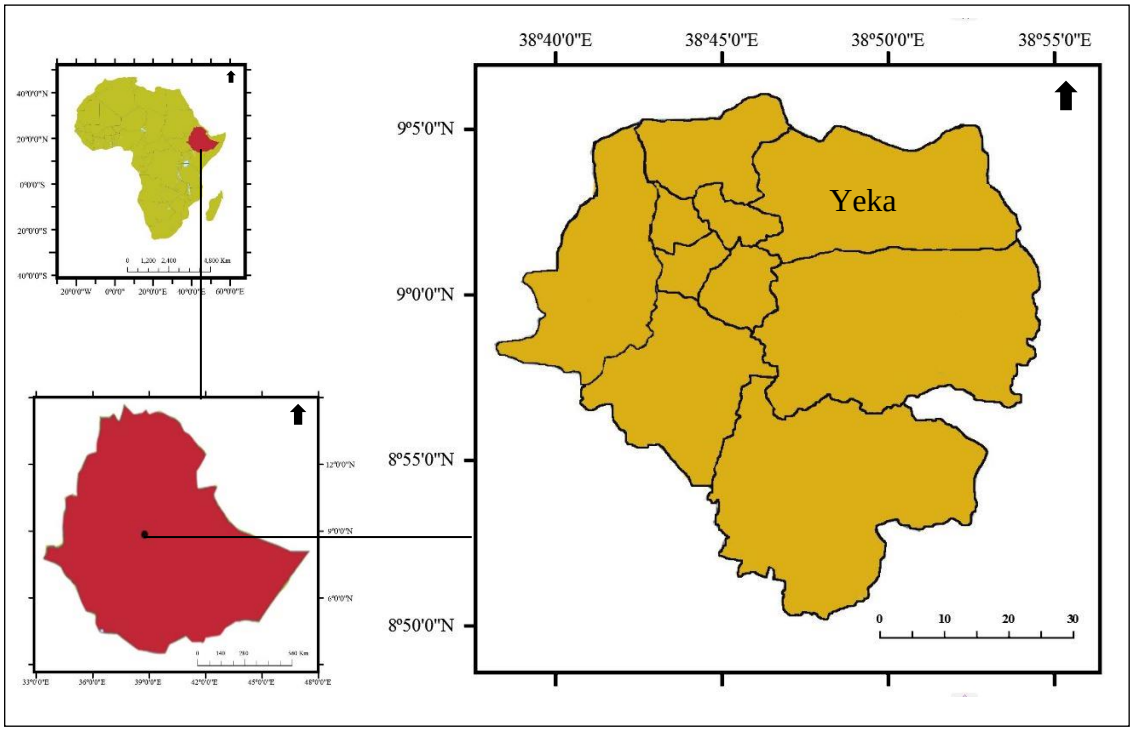

Figure 1: Case area location

The case area needed for this study is highly related to the fact that the dwellers opinion of natural light, view and space shape is affected by their current living condition and experience. So, the older the site the more it is understood and experienced. And Baldaras condominium was one of the sites that were developed in the first phase of the condominium developments.

Baldaras condominium site is located in a key central place that is connected to main centers of the city. It is one taxi fare away from Piassa, Aratkilo, Kazanchis, Haya hulet, Megenagna and has a straight highway road that is connected to atlas road. This

makes the site wanted by many residents which makes them stay committed to the site and giving the study an advantage of residents acquainted with the spaces for a long time.

The study focuses on one bedroom and two-bedroom apartment condominium housing, and Baldaras condominium is comprised of mainly only of the two types.

Baldaras condominium is found in the inner part of Addis Ababa, Yeka Sub-city at 9.026 Latitude and 38.78302 Longitude.

a

b

c

d

Figure 2: Baldaras condominium location map

i. Natural Light

The sun path in Addis Ababa or Ethiopia in general during the summer time is from east to west while tilting to the south, south west direction sun being the harshest, and in winter time the sun's path is from east to west tilting more to the north. Overhead is experienced on September.

The lowest angle the sun reaches in the summer time is 72 degree and the lowest it gets in the winter time it is 56 degrees to the north.

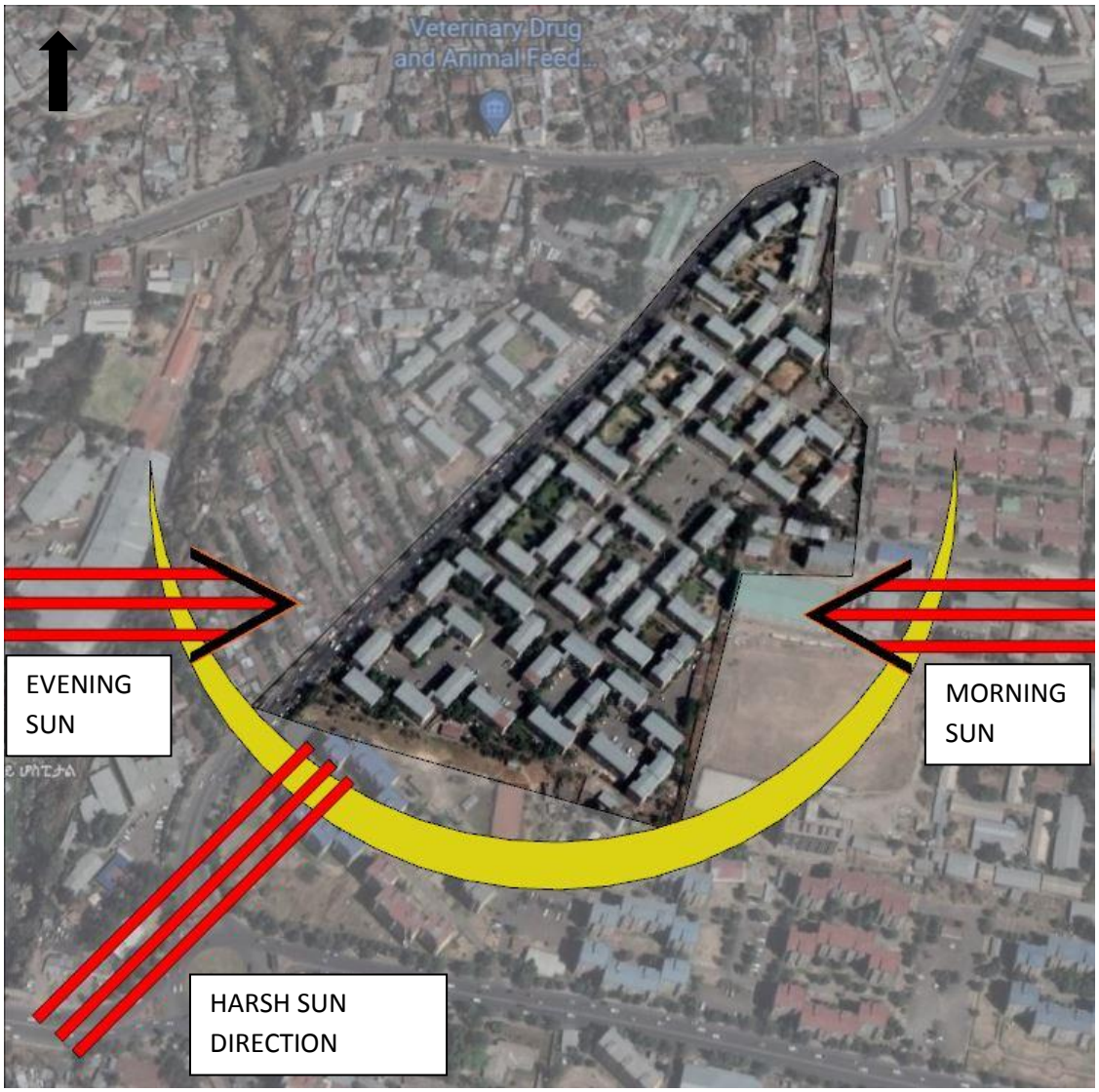

Figure 3: Sun path direction Vs Baldaras Condominium site

Block level

The main block orientations that are found in the site are horizontally and vertically aligned to the main road found in front of the site. And another four blocks are diagonally aligned to that main road.

The blocks aligned along the south west – north east direction, face the main road parallelly are 28 in number. The morning and evening sun reach to them in some degree and the harsh sun (south west) directly reaches their shorter side.

The blocks that are aligned the east south – west north line, perpendicular to the main road, are 25 in number. They also get the morning and evening sun reach to them in some degree while the harsh sun directly faces their longer side.

The other 4 blocks that are diagonal in alignment get the morning and evening sun directly while the harsh sun reaches to them in some degree.

Figure 4: Alignments of blocks Vs sun path

Apartment level

Both the one-bedroom and two-bedroom apartments get natural light majorly from two opposite directions. The direction of sunlight entering the rooms is dependent on the positioning of the blocks. Each room gets light from one window and some light also enter the rooms through some parts of the door which is made of frosted glass. The size of the windows for the living room, bedroom and kitchen is similar in size.

Figure 5: One bedroom apartment plan and section VS natural light

Figure 6: Two-bedroom apartment plan and section VS natural light

ii. View

The human eye visual field can horizontally see 62 degrees to the right and 62 degrees to the left with a total view span of 124 degrees. And vertically the eye can see 50 degrees up and 70 degrees down with a total span of 120 degrees.

The view that is available to the blocks of the Baldaras condominium is comprised of a relatively small green area, a common area floored with coble stone, a secondary road, and the main road with the traffic below.

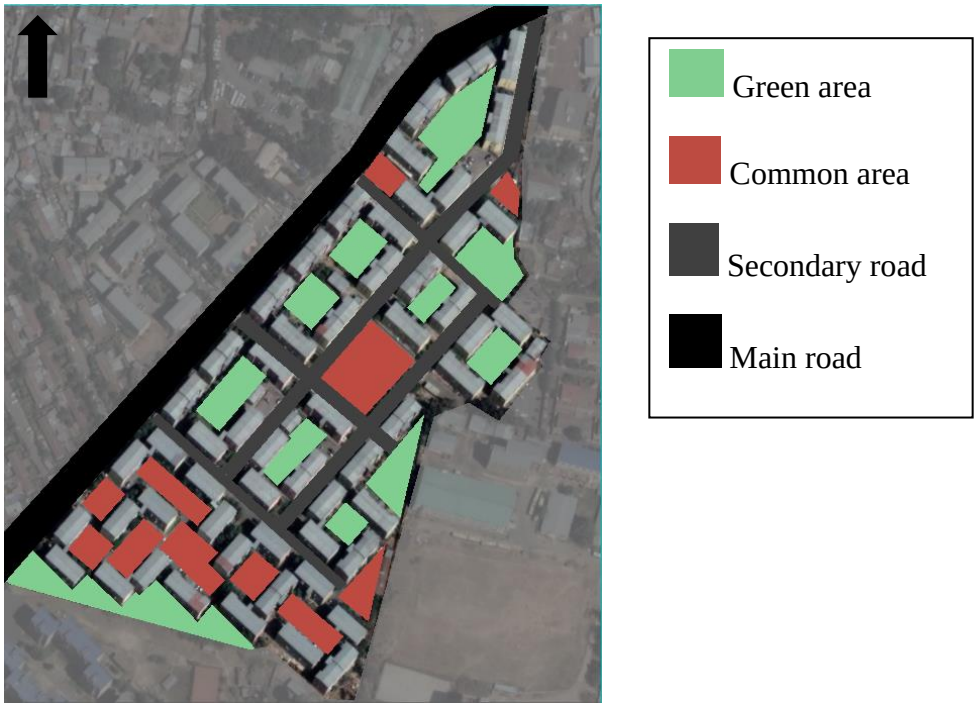

Figure 7: Possible views to condominium blocks

The views that are available are from the bedroom, living room and kitchen and the balcony. The balcony of the one bedroom is accessed from the bedroom while the balcony for the two bedroom is accessed from the living room.

The living room of both one bedroom and two-bedroom apartments are situated in front of the circulation corridor which is either facing the common area, the main road or the secondary road.

The bedroom and the kitchen give view to the same scenario because the windows are positioned towards the same viewpoints for the one bedroom, while for the two-bedroom apartment the kitchen and the two bedrooms give view to three different areas. And these options again are the common area, the main road, the secondary road or main road.

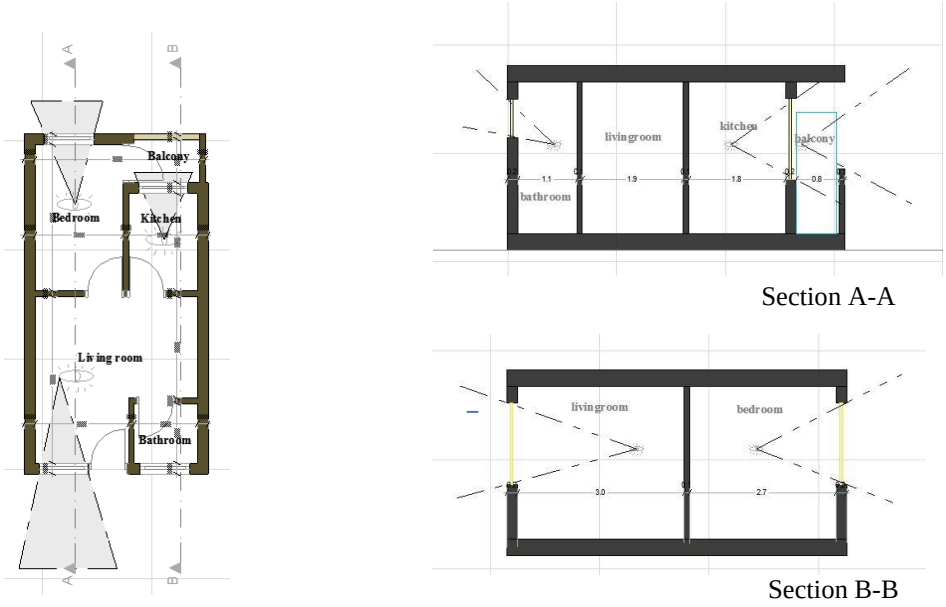

Figure 8: One bedroom apartment condominium Vs view

Figure 9: Two-bedroom apartment condominium Vs view

iii. Space shape

The space form of the existing one-bedroom condominium apartments at Baldaras site fall into a rectangular bedroom, kitchen and bathroom with an L shaped living room with a relatively low ceiling in all cases.

The two-bedroom apartment offers all the room in a rectangular shaped space form and an L-shaped living room with small corridor spaces connecting it to the front door.

Figure 10: One bedroom and two-bedroom apartment condominium Vs Space shape

3.2 Significance of natural light, view and space shape

This is the first objective of the paper and aims to see how significant natural light, view and space shape is to life in a condominium in the eye of the dwellers and the professionals.

i. Data type and collection method

The data collected for this is a primary data that is collected through a survey that is extended to dwellers of the Baldaras condominium. A total of 150 respondents (84 male and 64 female) residents participated for the survey.

A second method used to gather primary data for this objective is using focus group discussion with key informant professionals.

Survey

Sampling size and technique

The site is divided into two compounds, named Feres Bet and Yeka Site and the sites are separated by a wire fence.

Table 1 below describes the number of apartments and communal spaces that are available in Baldaras condominium.

Table 1: Number of apartments found in Baldaras condominium

compound	studio	one bedroom	two bedrooms	communal space
Feres Bet	60	460	70	3
Yeka Site	236	531	235	6
Total	**296**	**991**	**305**	**9**

The study focuses on the major four spaces of the condominium the living room, the bedroom, the kitchen and the bathroom.

The sampling technique used is stratified random sampling and this type of sampling is mostly used when all can't be included in the study but the probability of each to be part of the sample is needed to be guaranteed (Kothari, 2004). From the random sampling the particular method used was stratified random sampling one bedroom and two bedrooms being the two strata or categories.

Taking the 991 one-bedroom population in 10% population proportion and 305 two-bedroom population in 2% population proportion, a calculation with 95% confidence level and 5% margin of error the sample size is 150 in total. 122 for one bedroom and 28 for two-bedroom apartments.

Finite population: $$n' = \frac{n}{1+\frac{z^2 \times \hat{p}(1-\hat{p})}{\varepsilon^2 N}}$$

Unlimited population: $$n = \frac{z^2 \times \hat{p}(1-\hat{p})}{\varepsilon^2}$$

where
- **z** is the z score
- **ε** is the margin of error
- **N** is the population size
- **p̂** is the population proportion

Selection of apartments for survey

Table 2 below describes the selection process of condominium apartments for survey purposes. It shows the number of apartments selected from the one- and two-bedroom apartments in perspective to natural light, view and space shape.

Table 2: No of apartment units for survey

Natural light			**selected number of apartments form the blocks**	
Orientation		**no of blocks**	**Two-bedroom**	**One bedroom**
i	east south – west north alignment (V)	25	59	12
ii	south west – north east alignment (H)	28	59	12
iii	tilted / other alignments	4	4	4
View		**available blocks**	**selected number of apartments form the blocks**	
i	**east south – west north alignment (V)**		**Two-bedroom**	**One bedroom**
1	Both sides to common area	2	1	9
2	Common area and green area	8	3	11
3	Common area and secondary road	4	2	9
4	Both sides to green area	1	1	9
5	Main road and green area	1	1	9
6	Secondary road and green area	9	4	12
	total	**25**	**12**	**59**
		available blocks	**selected number of apartments form the blocks**	
ii. south west – north east alignment (H)			**Two-bedroom**	**One bedroom**
1	common area and another block	2	1	7
2	Both sides to common area	2	1	7
3	Common area and green area	3	1	7
4	common area and secondary road	1	1	7
5	both sides to green area	1	1	7
6	main road and common area	3	1	7
7	main road and green area	5	2	7
8	secondary road and green area	11	4	10
	total	**28**	**12**	**59**

		available blocks	selected number of apartments form the blocks	
iii	**tilted / other alignments**		**one bedroom**	**Two-bedrooms**
1	main road and green area	2	2	2
2	secondary road and green area	2	2	2
	total	**4**	**4**	**4**

Focus group discussion with key informants

A total of 18 (7 female) key informants/ professionals were selected who were all in their perspective fields for 10 years and above.

Informant selection criteria include the following:

The professionals involved in the focus group are those with careers involved in designing buildings (architects), designing the interior spaces of buildings (interior designers), simulating the effect of environmental factors into designed or to be designed spaces (Climate designer), determining the value of properties (appraisers), involved in the selling and buying of buildings (brokers)

i. Interior designers_ the profession deals with making created space useable and comfortable for dwellers
ii. Architects _ the profession deal with creating and designing spaces in general
iii. Climate related designers _ the profession deal with scientifically (with detail numerical data) designing spaces to create a balanced indoor environment in relation to the external environment
iv. Appraisers and brokers_ the profession deals with finding value of a property and knowledge what is marketable

Table 3 below describes the key informant professionals involved in the FGD.

Table 3: Expert professionals involved in the research

Profession	Expert	Gender	Level of education	Experience
Architect	1	male	BSc in architecture and urban design MSc in architecture	25 years
	2	male	BSc in architecture MSc in landscape	10 years
	3	male	BSc in architecture and urban design MSc in urban design	15 years
	4	female	BSc in architecture MSc in urban land and property valuation	18 years
	5	female	BSc in architecture and urban design MSc in urban design	14 years
	6	female	BSc in architecture	8 years
Interior Designer	7	male	BSc in architecture and urban design MSc in urban design	15 years
	8	female	BSc in architecture	10 years
	9	female	BSc in architecture and urban design	10 years
	10	female	BSc in architecture and urban design	10 years
	11	female	BSc in architecture and urban design MSc in construction management	11 years
Appraiser	12	male	BSc in civil engineering MSc in management	25 years
	13	male	BSc in civil engineering MSc in construction management	12 years
	14	female	BSc in civil engineering MSc in urban land and property valuation	12 years
Broker	15	male	Diploma in managements	20 years
	16	male	High school complete	12 years
	17	male	High school complete	10 years
Climate designer	18	male	BSc in architecture and urban design Certificate in climate design and assimilation	11 years

ii. Data analysis method

The data that is gathered from the survey process, which is a qualitative data, is analyzed using Likert- scale data analysis method. In which the significance level is measured using a four-level choice which were very significant, significant, little significance and no significance.

The data collected from the focus group discussion is processed using thematic analysis method in which the comments and answers given to the open question are put thematically in accordance to the stress and repetitiveness of the topics. In that perspective the thematic categories for this objective were level of significance, importance, and controlling mechanisms of the architectural space attributes under study (natural light, view, and space shape).

3.3 Effect of natural light, view and space shape on value

i. Data type and collection method

The data that is collected to achieve this objective is a primary data that is gathered from a focus group discussion with key informant professionals that were involved in the fulfillment of the first objective. A total of 18 (7 female) key informants/ professionals were selected who were all in their perspective fields for 10 years and above.

ii. Data analysis method

The data gathered from the focus group discussion which is a qualitative data is processed through thematic analysis technique. In this process the suggestions and comments that were raised in the focus group discussion are arranged in themes in categories that emanate from repetitive mentions which were effect on price, reason for effect and the appraising method used to determine the effect.

3.4 Preference and WTP for natural light, view and space shape

i. Data type and collection method

The data collected for this is a primary data that is collected through a survey that is extended to dwellers of the Baldaras condominium. A total of 150 respondents (84 male and 66 female) residents participated for the survey.

Questionnaire drafting

The questions were prepared in which the respondent can easily go through it, and this was particularly done by giving out clear choices for natural light, view and space shape.

The choices under the preferences were composite output of literature review and available preferences found in the case area.

Natural light

There is a standard lighting recommendation for each room based on the task to be carried out measured in lux. Based on this data the preference levels where set emanating from the standard illumination levels.

The standard illumination for living room is recommended to be 300-500 lux, for bedroom 100 – 300 lux for bedroom, kitchen 300 – 750 lux and bathroom 300 – 700 lux.

Table 4 below shows the link between what level of brightness is associated with each choice presented to the respondent for each room in question.

Table 4: Brightness Vs preference categories

	Living room	**Bedroom**	**Kitchen**	**Bathroom**
Very bright	>500 lux	>300 lux	>750 lux	>700 lux
Fairly bright	500 lux	300 lux	750 lux	700 lux
Medium	400 lux	200 lux	525 lux	550 lux
Fairly dark	300 lux	100 lux	300 lux	300 lux
Very dark	<300 lux	<100 lux	<300 lux	<300 lux

View

The choices for view were made based on the possible views that existed in condominium areas. Based on the scope of the study described the study focuses on view in respect to what can be seen and not how. The choices were view to the main road, to secondary road, to common area and to the green meadow.

Space Shape

The choices for space shape were made up of the possible space shapes that are common to condominiums. And those were rectangular, square or L-shaped.

For each choice of preference there is a tag along question about how much they will be willing to pay for their choice. Which will indicate if these choices are mere preferences or if they are needs that they consider as value.

Mock sample

At first the questionnaire was given to 15 residents of any condominium, to find if the line of questioning will give the answers to the objective sought after. And after fixing a few of the questions, to make sure that there is clarity in understanding the topic at hand, the questionnaires were given to respondents of Baldaras condominium residents.

ii. Data analysis method

The data gathered from the survey about the preference of natural light, view and space shape is analyzed using descriptive analysis method in which the frequency is represented in percentages for each level of choice.

3.5 Indicative value for natural light, view and space shape

i. Data type and collection method

The data collected for this is a primary qualitative data that is collected through a survey that is extended to dwellers of the Baldaras condominium. A total of 150 respondents (84 male and 66 female) residents participated for the survey.

The data gathered from the survey was about the willingness to pay for the preferences that were reserved by the respondents.

ii. Data analysis method

The data gathered from the survey about the willingness to pay for the type of natural light, view and space shape conditions of condominiums is analyzed using descriptive analysis method in which the mean, median, mode, maximum, minimum and range is calculated and understood as a level of demand.

Table 5 below shows the objectives that were sought after and the data source and analysis method associated with each to accomplish them.

Table 5: Summary of research design

Objective one Assess the understanding of how significant natural light, view and space shape is to life in condominiums	Data Source	Primary data - survey and focus group discussion
	Data analysis	Survey - Likert-scale data analysis FGD - Thematic analysis
Objective two Examine the effect natural light, view and space shape have on the current appraisal process of a condominium.	Data Type	Primary data - FGD
	Data analysis	Thematic analysis
Objective three Investigate the preference and WTP dwellers have towards natural light, view and space shape	Data Type	Primary data - Survey
	Data analysis	Descriptive analysis
Objective four Formulate an indicative numerical value to natural light, view and space shape of condominiums	Data Type	Primary data - Survey
	Data analysis	Descriptive analysis

3.6 Data Analysis

3.6.1 Significance of natural light, view and space shape

i. Dwellers' Perspective

Significance of natural light

Table 6 and Figure 11 below show the level of significance given to natural light by dwellers for life in condominiums.

Table 6: Significance of natural light to condominiums _dwellers' perspective

Level of significance	Frequency	Percent	Valid Percent	Mode / central tendency
significant	50	33.3	33.3	**Very significant**
little significance	10	6.7	6.7	
not significant	17	11.3	11.3	

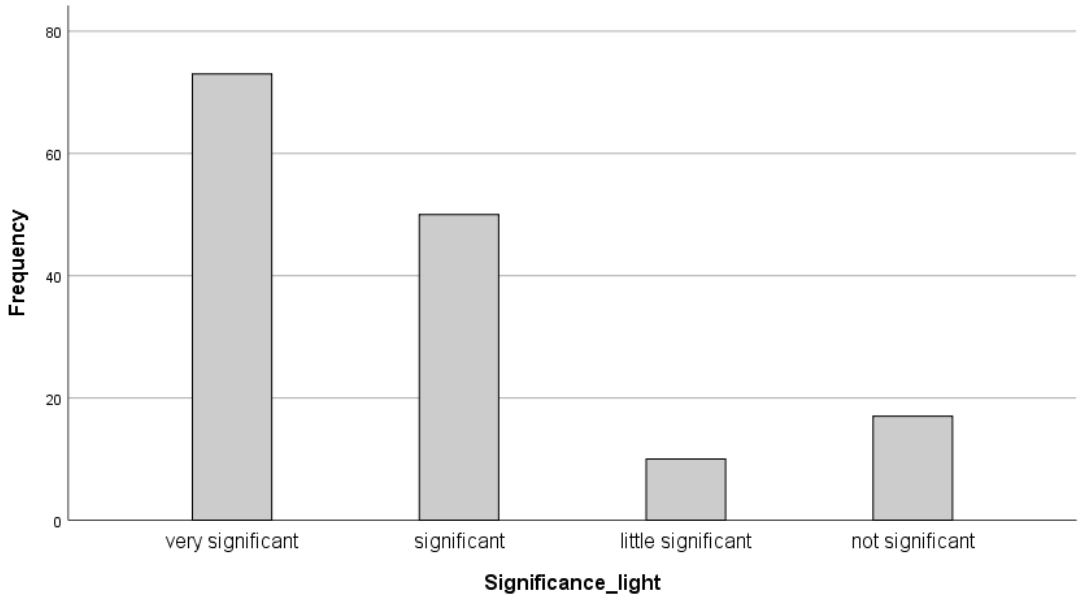

Figure 11: Significance of natural light to condominiums _dwellers' perspective

Significance of view

Table 7 and Figure 12 and graph below show the level of significance given to view by dwellers for life in condominiums.

Table 7: Significance of view to condominiums _dwellers' perspective

Level of significance	Frequency	Percent	Valid Percent	Mode / central tendency
very significant	52	34.7	34.7	
significant	42	28.0	28.0	**Very Significant**
little significance	23	15.3	15.3	
not significant	33	22.0	22.0	

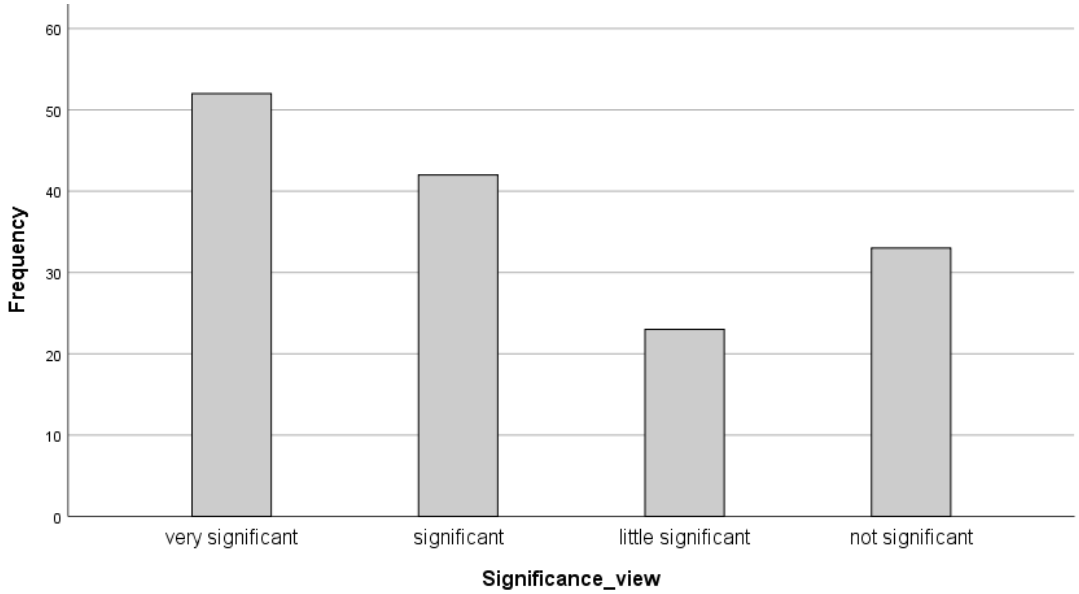

Figure 12: Significance of view to condominiums _dwellers' perspective

Significance of space shape in condominiums

Table 8 and Figure 13 and graph below show the level of significance given to space shape by dwellers for life in condominiums.

Table 8: Significance of space shape to condominiums _dwellers' perspective

Level of significance	Frequency	Percent	Valid Percent	Mode / central tendency
very significant	93	62.0	62.0	
significance	36	24.0	24.0	**Very Significant**
little significance	21	14.0	14.0	

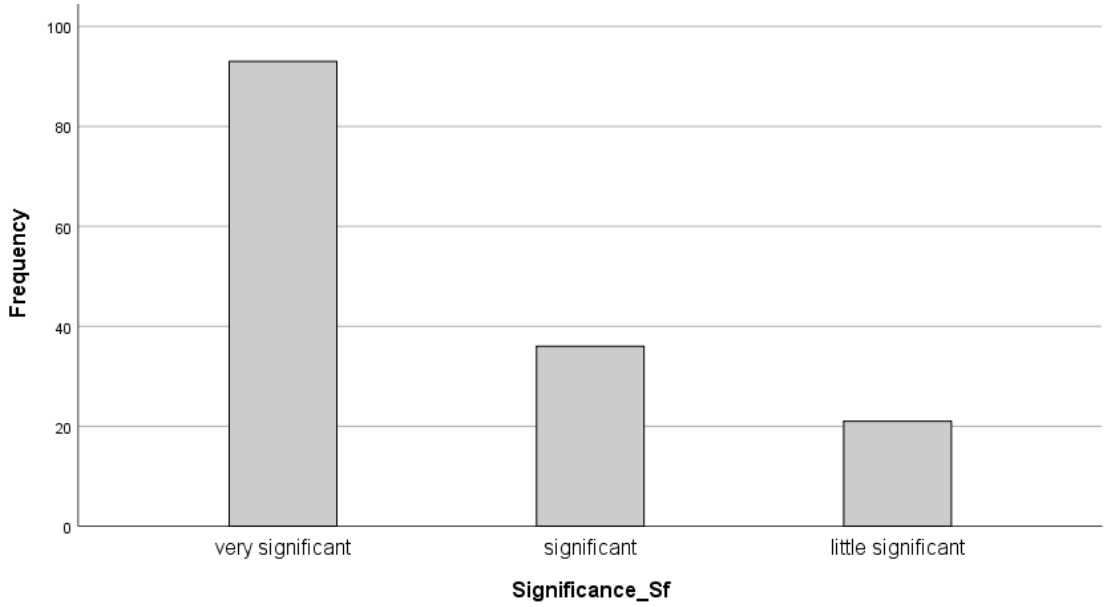

Figure 13: Significance of space shape to condominiums _dwellers' perspective

ii. Professionals' perspective

Table 9 below show the level of significance given to natural light, view and space shape in the perspective of professionals that are involved in the design, appraising, selling and buying of condominiums. It also describes why it's important and its controlling mechanism as discussed in FGD.

Table 9: Significance of natural light, view and space shape _ professionals' view

Architectural space elements	Significance	Importance/ Advantage	Controlling mechanism
NATURAL LIGHT	Very significant	- Psychological relief - Clear visibility of the space - Free of charge - More dependable than electricity - Source of vitamin D	- Window sizes (the larger the brighter) - Window glazing type, weather it is reflective dimming patterned, tinted, film or textured - Bright colored wall paints to exaggerate light that enters the spaces. - Orientation of buildings away from harsh sun direction. - Wall type, for example curtain walls could be used instead of solid walls.
VIEW	Very significant	- Informative on what is going on in the surrounding. - Psychologically it is refreshing to connect with surrounding	- Window sizes - Height of the room - Orientation of buildings to views that are useful or informative. - Floor level of the space
SPACE FORM	Very significant	- How space is furnished depends on space shape. - It determines the movement of functional activities carried out	- How the walls, floor and ceiling come together

The data shows that the professionals find the three space attributes very significant, which was the highest choice available to show significance. It also shows the reason why they are very significant along with on how to manipulate these attributes.

3.6.2 Effect natural light, view and space shape on condominium value

The following data was analyzed from the data collected through interviews and focus group discussions with appraisers, brokers along with architects, interior designers and climate designers. It summarizes the effect that natural light, view and space shape have on value and appraisal process of condominiums.

When it has an effect on the price, how it is integrated in the appraising method is indicated in the table. The effect was described on how occasional it affects the price (all the time, most of the time, sometimes, rarely, never), if it affects it directly (directly, indirectly), how significant the effect is on the price is (high effect, medium effect, small effect, no effect).

Table 10 below describes the effect natural light, view and space shape has on the total value of condominiums.

Table 10: Effect of natural light, view and space form on value of properties

Architectural space attribute	Effect on Price	Reason	Appraising method	NOTE:
Natural light	Mostly no effect	All condominiums have natural light	-	
	Rare, Direct Small effect	When scenarios arise with a situation of a very dark spaces, it affects the price of the property.	No research-based methodology, the price is set by sellers, brokers appraisers	On land purchase the orientation of the land being to sunrise or not has a huge impact on the price
View	NO effect	-	-	On land purchase the height or depression of the sight has a huge impact on the price -View maybe used as bargaining chip
Space shape	Mostly, Small, Direct effect	Clear rectangular or square room could make a difference amounting to 10,000 birrs just for the space form	No research-based methodology, the price is set by sellers, appraisers, brokers	

In summary it shows that natural light mostly has no effect on the value of a condominium, but rarely it has a small effect when there is a situation in which there isn't enough light coming into a room and is very dark. View generally have no effect on the value of condominiums.

Space shape in condominiums has an effect on the price because of the fact that condominiums are small in size generally and the way to furnish them is directly related to the shape or form of the space. It may not affect price as a major component but it affects it to some level.

3.6.3 Preference and willingness to pay

The following data is collected form the respondents to the questionnaire about their preference about the kind of natural light, view and space shape that dwellers prefer for a condominium apartment and how much they are willing to pay for it. There were 150 respondents involved in the survey with different backgrounds.

Table 11 below describes the demography of dwellers that were participant in the survey.

Table 11: Demographic characteristic of respondents

Category	Frequency	Percent
Age		
25-40	108	72.0
40-above	42	28.0
Total	150	100.0
Gender		
male	84	56.0
female	66	44.0
Total	150	100.0
Living condition		
alone	32	21.3
with spouse	44	29.3
with spouse and children	74	49.3
Total	150	100.0
Educational background		
high school	31	20.7
TVET graduate	5	3.3
University graduate	114	76.0
Total	150	100.0
Time spent home		
all day	59	39.3
half the day	19	12.7
in evenings	72	48.0
Total	150	100.0

Preference for natural light, view and space shape

i. Natural light preference of dwellers

After distributing and collecting a survey that investigates the preference of dwellers on the light intensity that they prefer in the different rooms of condominiums, the following data was collected.

Table 12 and Figure 14 below show the preference type for natural light intensity level for living room of condominiums as described by dwellers.

Table 12: Natural light preference for living room

Lighting condition	Frequency	Percent	Valid Percent	Mode / central tendency
Very lit	90	60.0	60.0	**Very lit**
Fairly lit	60	40.0	40.0	

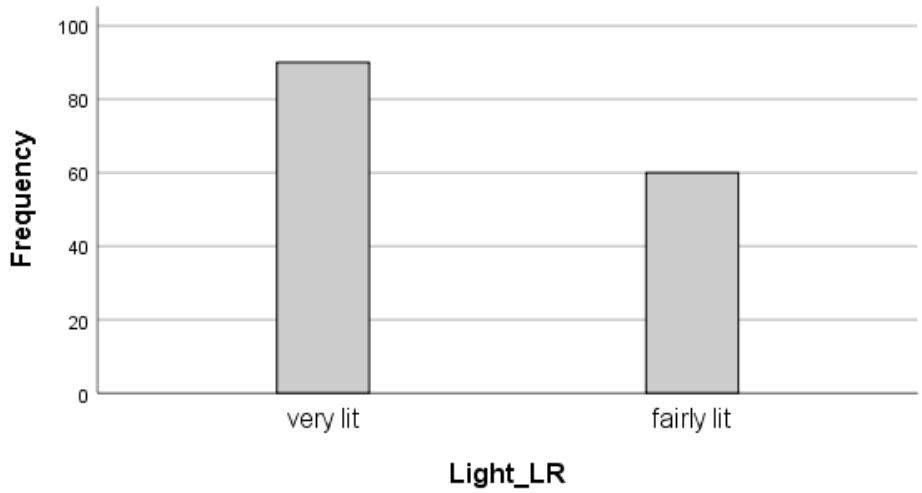

Figure 14: Natural light preference of dwellers

Table 13 and Figure 15 below show the preference type for natural light intensity level for bedroom of condominiums as described by dwellers.

Table 13: Natural light preference for a bedroom

Lighting condition	Frequency	Percent	Valid Percent	Mode / central tendency
Very lit	19	12.7	12.7	
Fairly lit	50	33.3	33.3	**Medium lit**
Medium	81	54.0	54.0	

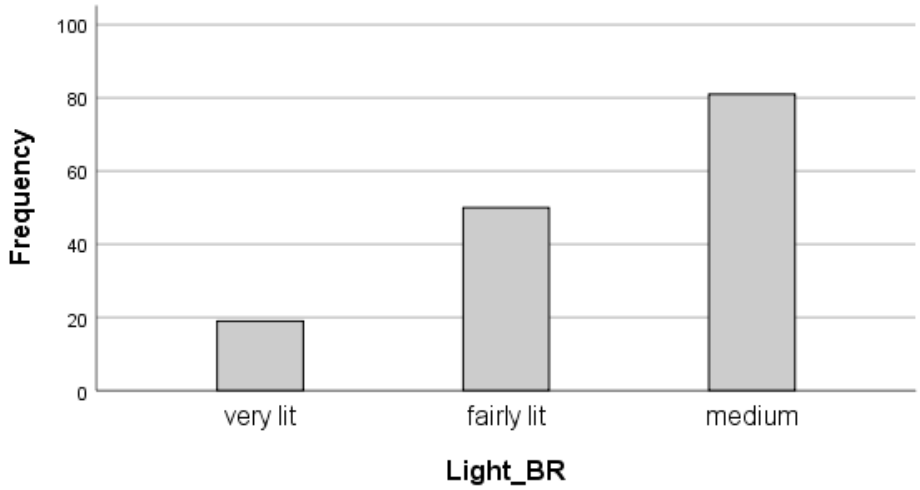

Figure 15: Natural preference for a bedroom

Table 14 and Figure 16 below show the preference type for natural light intensity level for kitchen of condominiums as described by dwellers.

Table 14: Natural light preference for a kitchen

Lighting condition	Frequency	Percent	Valid Percent	Mode / central tendency
Very lit	8	5.3	5.3	
Fairly lit	116	77.3	77.3	**Fairly lit**
Medium	26	17.3	17.3	

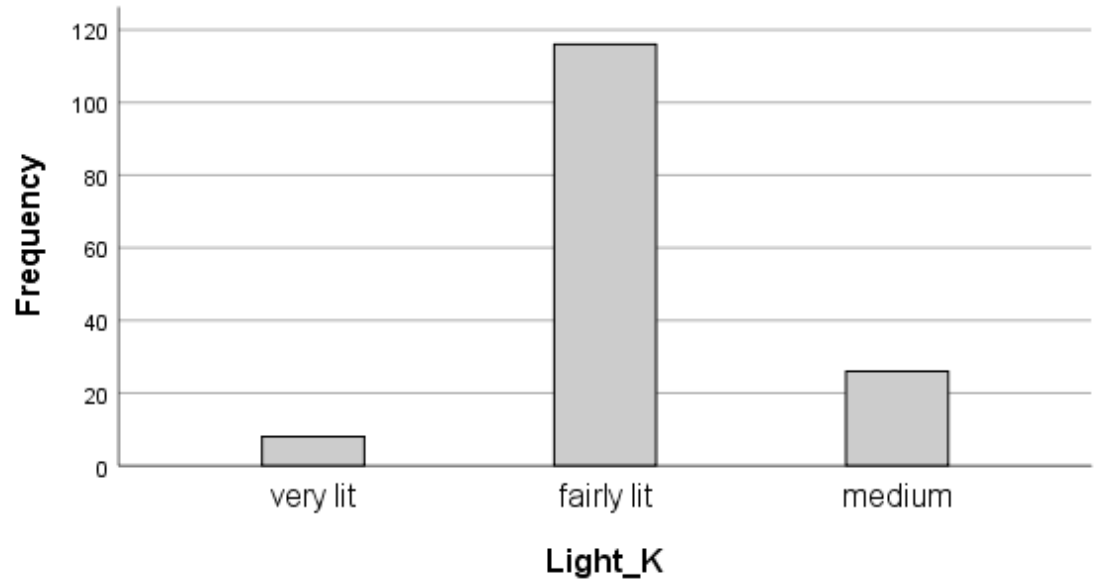

Figure 16: Natural light preference for a kitchen

Table 15 and Figure 17 below show the preference type for natural light intensity level for a bathroom of condominiums as described by dwellers.

Table 15: Natural light preference for bathroom

Lighting condition	Frequency	Percent	Valid Percent	Mode / central tendency
Very lit	1	0.7	0.7	
Fairly lit	18	12.0	12.0	**Medium**
Medium	104	69.3	69.3	
Fairly dark	27	18.0	18.0	

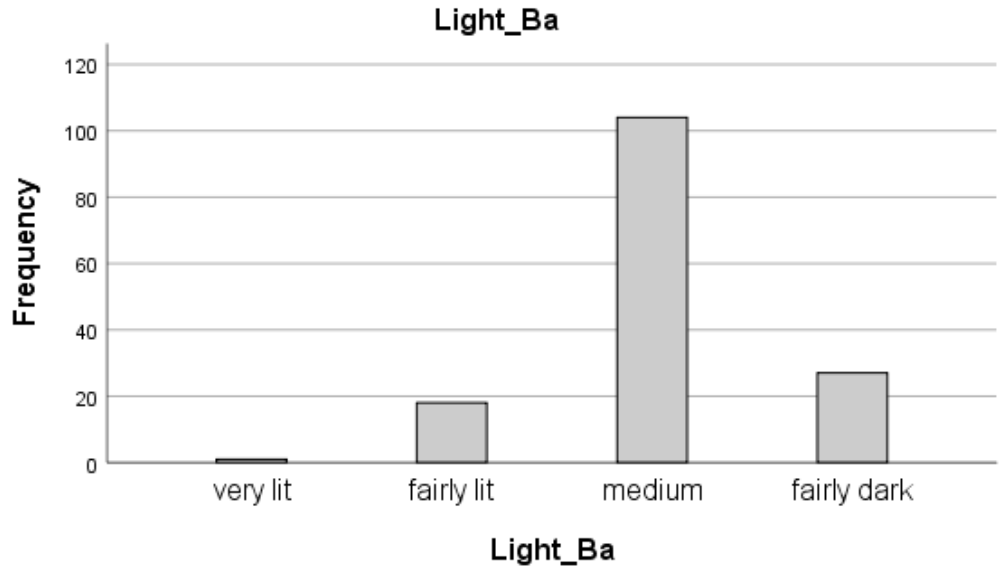

Figure 17: Natural light preference for bathroom

ii. View preference of dwellers

After distributing and collecting a survey that investigates the preference of dwellers on the view that they prefer from the different rooms of condominiums, the following data was collected.

Table 16 and Figure 18 below show the preference to what part of the site the view of the living room should be.

Table 16: View preference from a living room

View options	Frequency	Percent	Valid Percent	Mode / central tendency
Main road	15	10.0	10.0	
Secondary road	43	28.6	28.6	**Green area**
Common area	20	13.3	13.3	
Green area	72	48.0	48.0	

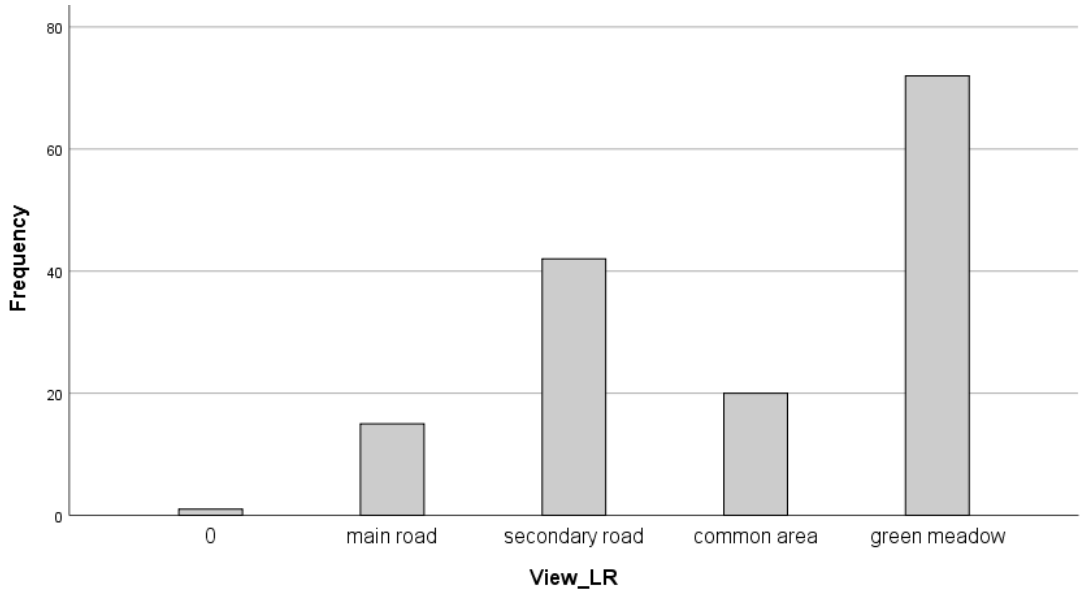

Figure 18: View preference from a living room

Table 17 and Figure 19 below show the preference to what part of the site the view of the bedroom should be.

Table 17: View preference from bedroom

View options	Frequency	Percent	Valid Percent	Mode / central tendency
Main road	3	2.0	2.0	**Green Area**
Green meadow	147	98.0	98.0	

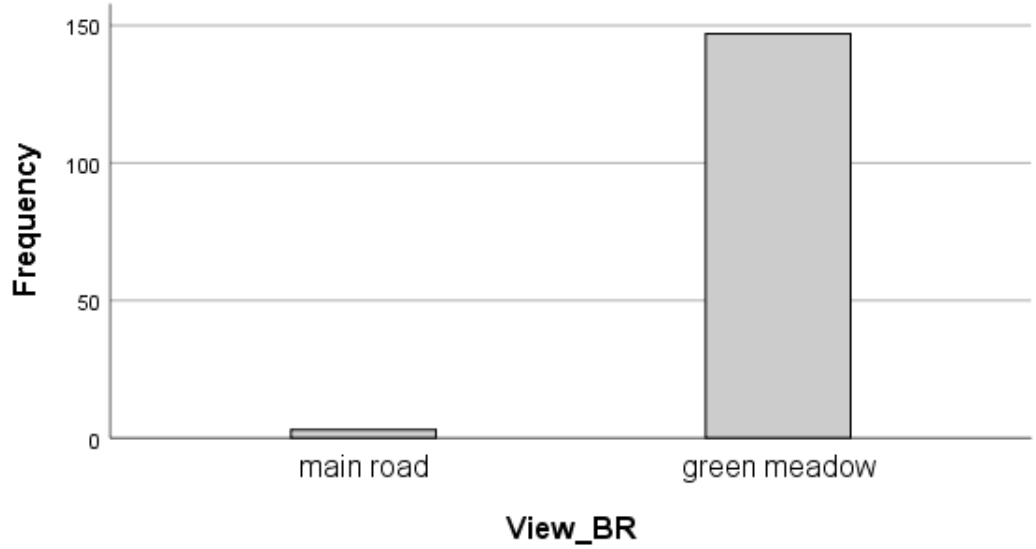

Figure 19: View preference from bedroom

Table 18 and Figure 20 below show the preference to what part of the site the view of the kitchen should be.

Table 18: View preference from kitchen

View options	Frequency	Percent	Valid Percent	Mode / central tendency
Main road	40	26.7	26.7	
Secondary road	18	12.0	12.0	
Common area	59	39.3	39.3	**Common Area**
Green meadow	33	22.0	22.0	

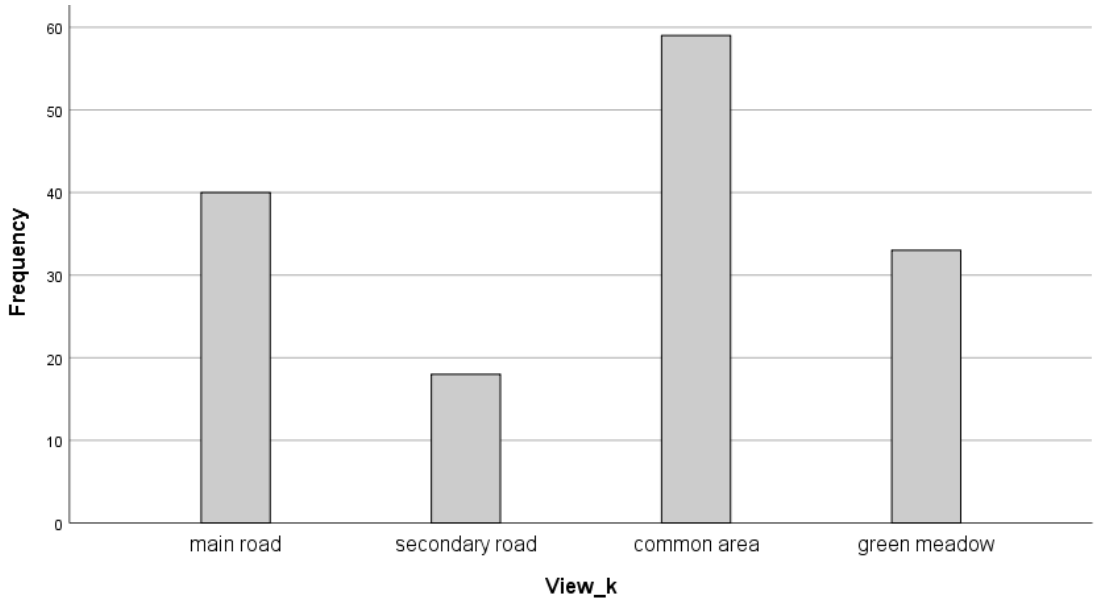

Figure 20: View preference of kitchen

iii. Space shape preference of dwellers

The data below is collected from the survey conducted as to what is referred as a shape of a room in condominium spaces.

Table 19 and Figure 21 below show the preference to what shape the living room is preferred as.

Table 19. Space shape preference for living room

Space shape preference	Frequency	Percent	Valid Percent	Mode / central tendency
Rectangular	85	56.7	56.7	
Square	30	20.0	20.0	**Rectangular**
L shaped	35	23.3	23.3	

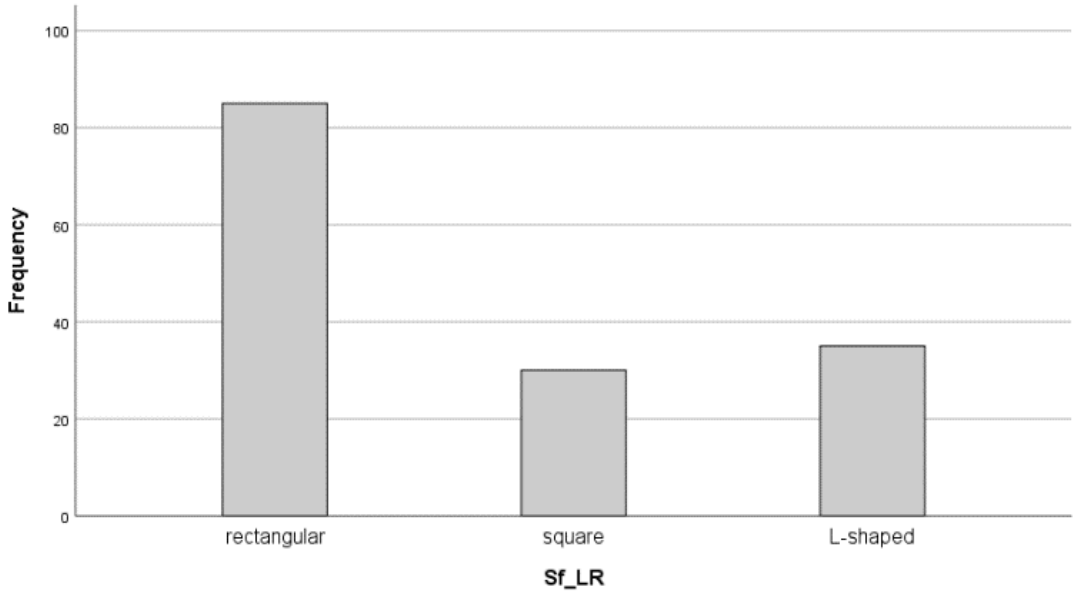

Figure 21: Space shape preference for living room

Table 20 and Figure 22 below show the preference to what shape the bedroom is preferred as.

Table 20: Space shape preference for bedroom

Space shape preference	Frequency	Percent	Valid Percent	Mode / central tendency
Rectangular	11	7.3	7.3	
Square	139	92.7	92.7	**Square**
Total	150	100.0	100.0	

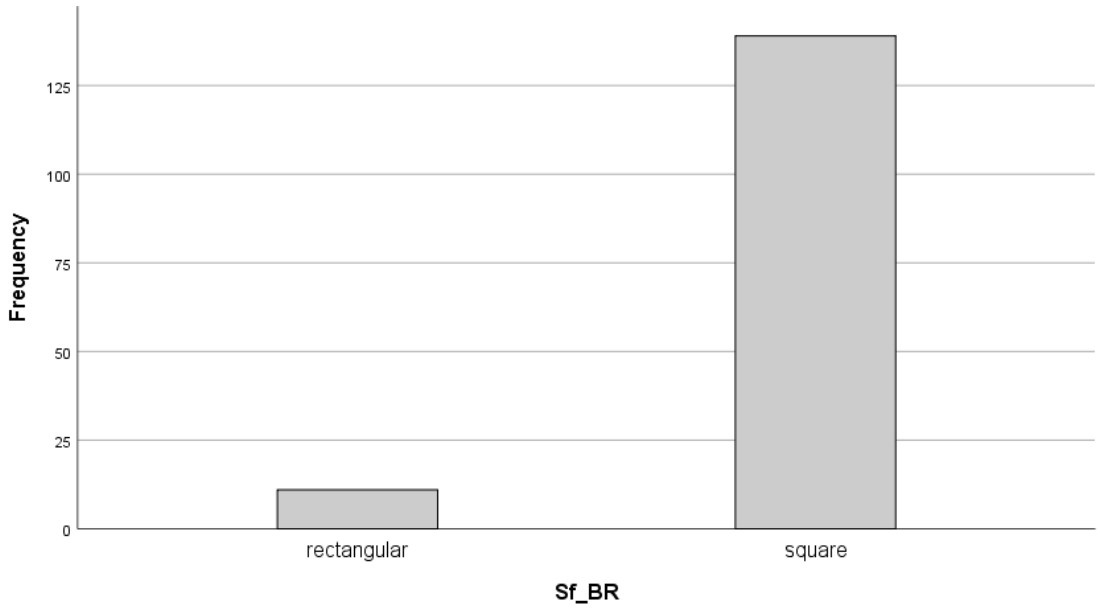

Figure 22: Space shape preference for bedroom

Table 21 and Figure 23 below show the preference to what shape the kitchen is preferred as.

Table 21: Space shape preference for kitchen

Space shape preference	Frequency	Percent	Valid Percent	Mode / central tendency
Rectangular	143	95.3	95.3	**Rectangular**
Square	7	4.7	4.7	
Total	150	100.0	100.0	

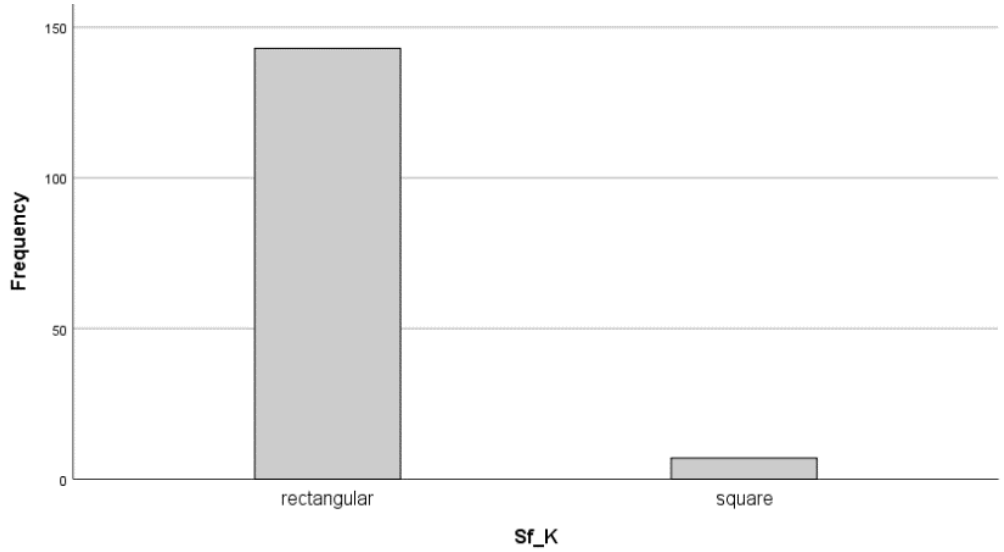

Figure 23: Space shape preference for kitchen

Table 22 and Figure 24 below show the preference to what shape the kitchen is preferred as.

Table 22: Space shape preference for bathroom

Space shape preference	Frequency	Percent	Valid Percent	Mode / central tendency
Rectangular	112	74.7	74.7	**Rectangular**
Square	38	25.3	25.3	

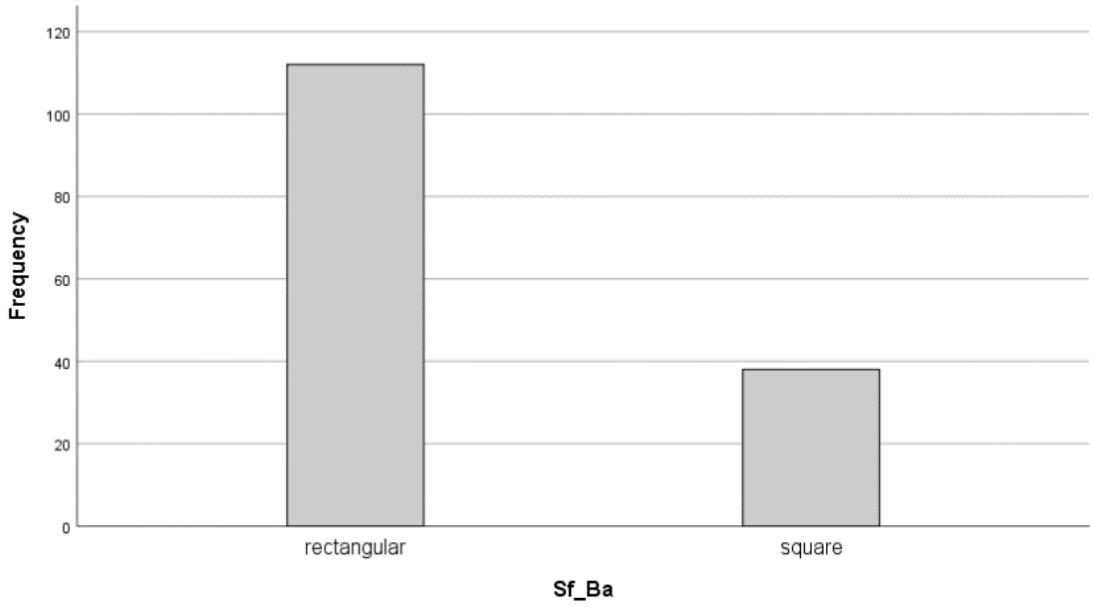

Figure 24: Space shape preference for bathroom

Willingness to pay for natural light, view and space shape

The data below was collected and analyzed from the survey conducted to see how much the dwellers of condominium will be willing to pay in order to have the preference that they have stated as their choice.

i. Willingness to pay for natural light in condominiums

Table 23 below summarizes the amount of money that dwellers are willing to pay for each room natural light choice as mean, median, mode, maximum, minimum and range.

Table 23: Willingness to pay Vs preferred natural light

Living room						
	Very lit	**Fairly lit**	**Medium**	**Fairly dark**	**Dark**	**TOTAL**
Mean	318.78	220.83	-	-	-	279.60
Median	200.00	200.00	-	-	-	200.00
Mode	500.00	200.00	-	-	-	500.00
Maximum	1000.00	500.00	-	-	-	1000.00
Minimum	0.00	0.00	-	-	-	0.00
Range	1000.00	500.00	-	-	-	1000.00
Bedroom						
Mean	381.58	269.00	100.62	-	-	192.33
Median	250.00	200.00	100.00	-	-	150.00
Mode	250.00	200.00	100.00	-	-	100.00

Maximum	1000.00	500.00	500.00	-	-	1000.00
Minimum	250.00	200.00	0.00	-	-	0.00
Range	750.00	300.00	500.00	-	-	1000.00
Kitchen						
Mean	150.00	184.05	200.00	-	-	200.00
Median	100.00	200.00	200.00	-	-	200.00
Mode	100.00	100.00	200.00	-	-	200.00
Maximum	500.00	400.00	300.00	-	-	300.00
Minimum	100.00	0.00	100.00	-	-	100.00
Range	400.00	400.00	200.00	-	-	200.00
Bathroom						
Mean	500.00	83.33	90.87	81.48	-	91.00
Median	500.00	100.00	0.00	100.00	-	50.00
Mode	500.00	100.00	0.00	100.00	-	0.00
Maximum	500.00	100.00	50.00	100.00	-	500.00
Minimum	500.00	0.00	0.00	0.00	-	0.00
Range	0.00	100.00	50.00	100.00	-	500.00

ii. Willingness to pay for view in condominiums

Table 24 below summarizes the amount of money that dwellers are willing to pay for each room's view choice as mean, median, mode, maximum, minimum and range.

Table 24: Willingness to pay Vs preferred view

Living room					
	Main road	**Secondary road**	**Common area**	**Green area**	**TOTAL**
Mean	400.00	296.43	440.00	328.77	341.67
Median	500.00	500.00	500.00	400.00	400.00
Mode	500.00	500.00	500.00	200.00	500.00
Maximum	500.00	500.00	500.00	1000.00	1000.00
Minimum	0.00	50.00	200.00	50.00	0.00
Range	500.00	450.00	300.00	950.00	1000.00

Bedroom					
Mean	0.00	-	-	227.21	222.67
Median	0.00	-	-	200.00	200.00
Mode	0.00	-	-	200.00	200.00
Maximum	0.00	-	-	500.00	500.00
Minimum	0.00	-	-	0.00	0.00
Range	0.00	-	-	500.00	500.00
Kitchen					
Mean	71.25	69.44	159.32	210.61	136.33
Median	50.00	0.00	100.00	200.00	150.00
Mode	0.00	0.00	300.00	200.00	0.00
Maximum	150.00	350.00	300.00	350.00	350.00
Minimum	0.00	0.00	0.00	0.00	0.00
Range	150.00	350.00	300.00	350.00	350.00

iii. Willingness to pay for space shape in condominiums

Table 25 below summarizes the amount of money that dwellers are willing to pay for each room space shape choice as mean, median, mode, maximum, minimum and range.

Table 25: Willingness to pay Vs preferred space form

Living room					
	Rectangular	**Square**	**L shaped**		**TOTAL**
Mean	575.29	356.67	262.86	-	458.67
Median	500.00	400.00	200.00	-	350.00
Mode	350.00	400.00	200.00	-	200.00
Maximum	1500.00	500.00	400.00	-	1500.00
Minimum	0.00	100.00	200.00	-	0.00
Range	1500.00	400.00	200.00	-	1500.00
Bedroom					
Mean	300.00	293.88	-	-	294.33
Median	300.00	300.00	-	-	300.00
Mode	300.00	100.00	-	-	100.00
Maximum	300.00	600.00	-	-	600.00
Minimum	300.00	0.00	-	-	0.00
Range	0.00	600.00	-	-	600.00

Kitchen					
Mean	264.69	200.00	-	-	261.67
Median	250.00	200.00	-	-	250.00
Mode	100.00	200.00	-	-	100.00
Maximum	600.00	200.00	-	-	600.00
Minimum	0.00	200.00	-	-	0.00
Range	600.00	0.00	-	-	600.00
Bathroom					
Mean	70.91	7.50	-	-	54.00
Median	100.00	0.00	-	-	0.00
Mode	0.00	0.00	-	-	0.00
Maximum	200.00	100.00	-	-	200.00
Minimum	0.00	0.00	-	-	0.00
Range	200.00	100.00	-	-	200.00

3.6.4 Indicative value of architectural space elements

The study is using the approach that the value of the architectural space attributes should emanate with the value that the dwellers have for that particular element. So by processing the willingness to pay for the preferences made by dwellers the following indicative value was computed.

i. The indicative value of natural light in condominiums

Table 26 below summarizes the willingness to pay gathered from the survey and calculated it as a mean value for each room.

Table 26: Summary of preference of natural light Vs the willingness to pay

Natural Light		**living room**	**bedroom**	**kitchen**	**bathroom**
very bright	mean value (birr)	318.78	381.58	150.00	500.00
	preference level (%)	60.0	13.0	5.3	1.0
	value per month (birr)	**191.27**	**49.61**	**7.95**	**5.00**
fairly lighted	mean value (birr)	220.81	269.00	184.05	83.00
	preference level (%)	40.0	33.0	77.3	12.0
	value per month (birr)	**88.32**	**88.77**	**142.27**	**9.96**

medium	mean value (birr)	0.00	100.62	200.00	91.00
	preference level (%)	0.0	54.0	17.3	69.0
	value per month (birr)	**0.00**	**54.33**	**34.60**	**62.79**
fairly dark	mean value (birr)	0.00	0.00	0.00	81.00
	preference level (%)	0.0	0.0	0.0	18.0
	value per month (birr)	**0.00**	**0.00**	**0.00**	**14.58**
very dark	mean value (birr)	0.00	0.00	0.00	0.00
	preference level (%)	0.0	0.0	0.0	0.0
	value per month (birr)	**0.00**	**0.00**	**0.00**	**0.00**
	TOTAL	**279.59**	**192.71**	**184.82**	**92.33**
		749.45			

Indicative rent value of light = mean wtp of living room + mean wtp of bedroom + mean wtp of kitchen + mean wtp of light of bathroom

ii. The indicative value of view in condominium apartment

Table 27 below summarizes the willingness to pay for view gathered from the survey and calculated it as a mean value for each room.

Table 27: Summary of preference of view Vs the willingness to pay

View		**living room**	**bedroom**	**kitchen**
main road	average per month value (birr)	400	0	71.25
	preference level (%)	10	2	27
	value per month (birr)	**40.00**	**0.00**	**19.24**
secondary road	average per month value (birr)	296.43	0	69.44
	preference level (%)	28	0	12
	value per month (birr)	**83.00**	**0.00**	**8.33**
common area	average per month value (birr)	440	0	159.32
	preference level (%)	13	0	39
	value per month (birr)	**57.20**	**0.00**	**62.13**
green area	average per month value (birr)	328.77	227.21	210.61
	preference level (%)	49	98	22
	value per month (birr)	**161.10**	**222.67**	**46.33**
TOTAL		**341.30**	**222.67**	**136.04**
		700.00		

Indicative rent value of view = mean wtp of living room + mean wtp of bedroom + mean wtp of kitchen

iii. The indicative value of space shape of a condominium apartment

Table 28 below summarizes the willingness to pay for space shape gathered from the survey and calculated it as a mean value for each room.

Table 28: Preference of space shape Vs willingness to pay

Space shape		**living room**	**bedroom**	**kitchen**	**bathroom**
rectangle	average per month value (birr)	575.29	300	264.68	70.9
	preference level (%)	57	7	95	73
	value per month (birr)	**327.92**	**21.00**	**251.43**	**2.67**
square	average per month value (birr)	356.67	293.88	200	7.5
	preference level (%)	20	93	5	27
	value per month (birr)	**71.33**	**273.31**	**10.00**	**0.00**
L shaped	average per month value (birr)	262.86	0	0	0
	preference level (%)	23	0	0	0
	value per month (birr)	**60.46**	**0.00**	**0.00**	**0.00**
		459.71	**294.31**	**261.43**	**2.67**
TOTAL in birr		**1,018.12**			

Indicative rent value of light space form = mean wtp of living room + mean wtp of bedroom + mean wtp of kitchen + mean wtp of bathroom

CHAPTER FOUR
RESULT

4.1 Significance of natural light, view and space shape

I. Natural light

Dwellers

From the survey it can be seen that 82 percent of the dwellers that took part in the survey believe and understand the quality of natural light has a significant role in their living condition, 48.7 % designating it as very significant.

The other 18% believe that the quality of natural light has no or little significance to their living space 11.3% of those labeling it that it is not significant at all.

Professionals

From the focus group discussion carried out it can be concluded that all the professionals involved believe in the high significance of natural light quality in a living space with no opposing idea brought up. The importance of natural light to a living condition were pointed out in the discussions and were attributed to, psychological relief, clear visibility of the space, free of charge, more dependable than electricity, source of vitamin D.

The most strongly and repeatedly mentioned were its psychological use, the fact that its free of charge and its contribution to clear visual access it gives to carry out functions.

The controlling mechanisms that affect the quality of natural light was also discussed in the focus group discussions. Window sizes (the larger the brighter), window glazing type, weather it is reflective dimming patterned, tinted, filmed or textured, bright colored wall paints to exaggerate light that enters the spaces, orienting of buildings away from harsh sun direction curtain walls being used instead of solid walls. were the ones mentioned, window size and orientation of buildings being the most repeatedly pointed out and strongly discussed.

II. View

Dwellers

In case of view 62.7 % of the dwellers believe the view that they are offered matter in their living space. 34.7 % of them giving it the high significance level while 37% of the dwellers consider it a less significant item, with 22% slamming it as insignificant.

Professionals

In the case of view there was also a strong understanding on the significant role it plays in the quality of life in the condominiums, but there were some mentions on the fact that it cannot be talked about with the same significance level as natural light.

The significance of view was attributed in the discussions mainly to it being informative and letting us know what is going on in the surrounding and the other one being psychologically it is refreshing to connect with surrounding.

The controlling mechanisms that affect the quality of view was attributed to window sizes, height of the room and orientation of building to views that are useful or informative.

III. Space shape

Dwellers

When it comes to space shape 84.6% of the dwellers consider the shape of their spaces are significant to their living condition, 59.3% considering it as very significant, while 15.3% of them consider it as non-significant part of their living condition.

Professionals

Space shape was labeled unanimously as very significant in the discussions on the way it affects life in the living spaces of condominiums.

The importance was thought to be from the fact that it is the determinant factor on how one furnishes his or her house and how one moves about and carries out activities in the spaces.

The controlling mechanism or to be precise elements are the way the walls are positioned and come together to engulf the intended space. No other controlling mechanism was discussed or mentioned.

4.2 Effect of natural light, view and space shape on value

I. Natural light

In the discussions and the interviews carried out, it shows that natural light has mostly no effect on the value of condominium housings this mostly because that all of the condominiums have natural light and the quality is not usually mentioned in the buying and selling deals.

But rarely when there is a visible defect on the natural lighting condition of the space, when it is very dark, it makes a direct difference on the value of the condominium but that effect is considered small. This effect though is quantified without any scientific method and it is determined by experience-based hunch of brokers and appraisers.

II. View

In the discussions it was indicated that view has no clear effect on the value of condominiums that can be worthy of mention. It is used as bargaining chip to a buy or a sell at times but not a worth by itself. It was mentioned as a side note in the discussion that on a land buy or sell the depression or the height of the site matters and affect value, which is highly related to view.

III. Space shape

Space shape was discussed to mostly have effect on the value of condominiums. This effect may be small but is direct effect on value. This is attributed mainly because condominiums are relatively minimal in size, there for to get the most use out of the spaces, and to have flexibility in furnishing them having a clear geometric shape is highly recommended.

So rectangular and square like space forms has an advantageous effect on condominium values while L shaped and other unclear form shapes are considered a disadvantage. When it comes to the methodology that is used to quantify this effect like in the case of natural light is based on the experience hunch of the broker and appraiser.

4.3 Preference and WTP for natural light, view and space shape

I. Natural light

From the survey conducted to understand the preference of dwellers as to what kind of natural lighting they would like to have in the different rooms of their condominium housing.

It was made clear that a very bright living room was preferred by 60% of the dwellers with a willingness to pay mean value of 318.78 birr per month. The second popular preference was 40% for a fairly lit living room with a willingness to pay mean value of 220 birr per month.

For a bedroom the popular choice is 54% for a medium light amount with willingness amounting to 100 birr per month the second popular choice was 33% for a fairly light bedroom with a willingness to pay amounting to 269 birr per month.

In case of the kitchen 77.3% of the dwellers prefer a fairly lit kitchen with a willingness to pay amounting to 184 birr per month others settling for medium lit kitchen make up 17% with willingness to pay amounting to a mean value of 200 birr per month.

For a bathroom the 69% of the dwellers prefer a medium lit atmosphere with 91 birr per month mean value, the others prefer 12% for fairly lighted with 83 birr per month and 18% for fairly dark with 81 birr per month.

II. View

For a living room 49 % prefer a view to a green area with willingness to pay for it being a mean value of 328.77 birr per month, 28% prefer a view to secondary road with 269.43 birr per month, 10% prefer view to main road with 400 birr per month willingness to pay.

For a bedroom 98% prefer a view to a green area with 227.21 birr per month and 2% prefer a view to the main road with no willingness to pay.

For a kitchen 39% prefer a view to the common area with 159.32 birr per month willingness to pay 27% prefer a view to the main road with 71.25 birr per month, 12% prefer a view to a secondary road with 69.44 birr per month and 22% percent prefer a view to green area with 210 birr per month willingness to pay.

III. Space shape

The living room preference for a rectangular shape is 57% with willingness to pay 575.29 birr per month. 20% want a square shape with 356.67 birr per month willingness to pay and the other 23% prefer L shaped with willingness to pay 262.86 birr per month willingness to pay.

To a bedroom 93% prefer a square shape with 293.88 birr per month willingness to pay and the other 7% prefer a rectangular shape with 300 birr per month willingness to pay.

In a kitchen 95% prefer a rectangular shape with 264.68 birr per month willingness to pay and the other 5% prefer a square shape with 200 birr per month willingness to pay.

For a bathroom 73% prefer a rectangular shape 70.9 birr per month willingness to pay and the other 27% prefer a square shape with 7.5 birr per month willingness to pay.

4.4 The indicative value of natural light, view and space shape

The indicative value was the mean value of the collected willingness to pay for all the categories of preferences.

I. Natural light

The value attributed to natural light that meets the preference of dwellers will have a mean indicative value of 279.59 birr per month for the living room, 192.7 birr per month for the bedroom, 184.82 birr per month for kitchen and 92.33 birr per month for the bathroom.

II. View

The value attributed to view that meets the preference of dwellers will have a mean indicative value of 341.3 birr per month for the living room, 222.67 birr per month for the bedroom, 136.04 birr per month for kitchen.

III. Space shape

The value attributed to space form that meets the preference of dwellers will have a mean indicative value of 459.7 birr per month for the living room, 294.31 birr per month for the bedroom, 261.43 birr per month for kitchen and 2.67 birr per month for the bathroom.

CHAPTER FIVE
DISCUSSION

There is a general understanding that of course there is value in natural light, view and space shape, and of course they are significant. But this is not backed or compensated financially when presented in a better quality in spaces of condominiums. This loss in value when it is being translated from a significant part of space to none in the appraisal of the property it arises the question where that link is lost. Is it not found significant by the dwellers (rent payer) of the condominiums or is it mistreated by the process of the appraising?

From the survey conducted to assess if there is a proper understanding how significant natural light, view and space form difference has on the living space of condominiums it can be understood that for natural light and space shape there is a strong positive reaction while on view there was a mixed reaction with 37 % of the surveyed deeming it as low or no significance. And this attitude was also reaffirmed by professionals involved in designing, evaluating and selling or buying of real estate. This may be because natural light and space shape directly affect the proper functioning of the space while what view the space offers was a tip to the main purpose.

Even though the survey suggested that the significance of natural light, view and space shape is understood and appreciated by dwellers and professionals involved, its effect on the value of the condominium during the appraisal process is small to none. And that small attribution comes to realization only for natural light and space shape. Whatever view the condominium offers it has so far been recollected by professionals to be none. But this is not true in studies carried out in developed countries which attribute view to affect 5-8 % of the total value of the property (Rodriguez and Sirmans,1994). And even mentioned in the focus group discussion was that in selling and buying of land those found on higher level are worth more which is an indirect factor to the view that it will offer.

Understanding the preference of condominium dwellers on how lit their space should be, what view they would like to have a look to, and the space shape that they want dwell in along with how much they will be willing to offer to have access to their preference is used as a key to unlock the value that these attributes add to the condominium financially.

It was observed in the study when it comes to natural light the dwellers prefer a medium – fairly lit rooms while for the living room there is a high demand for a very lit- fairly lit conditions. The preference observed in what view the dwellers want to see from their living space it was observed that for a living room and bedroom the most common answer was green area and for kitchen it was the common area. Space shape wise the popular choices where rectangular for a living room, kitchen and living room while there is a balanced demand for a square and rectangular shapes for bedrooms. And the willingness to pay for these preferences range from 1500 birr to 0 depending which attribute was in question and for what room.

In order of the mean value offered for preferences it shows that dwellers are willing to pay for space form than for natural light with a lower interest for view. And these preferences are then again graded with the room in question.

For space shape it shows that people are willing to pay more for living room shapes that for bedroom and lower for the kitchen and a very low amount for the bathroom. For natural light it shows the willingness to pay is highest for the living room than the other rooms and again the bathroom has the lowest offer. In consideration to view, the pricing lowers form living room to bedroom to kitchen with no interest for the bathroom.

Overall, there is a high indication that shows that there is a potential to use natural light, view and space shape as financial values in property appraisal of condominiums and that there is an appetite for a better spatial condition in terms of these attributes than there is being considered.

To better manage the time and resources allocated the paper focused on natural light in relation to how much light it offers, view in relation to what can be seen and not how wide, near or far it is seen and space form in relation to the basic shape that it is packaged as in condominiums and not as how it makes one feel. This focus on certain aspects of each attribute may not show the full impact that they have on the value of condominiums but the study opens door to further investigation of these and other attributes of spaces as value generating entities because it was targeted and proven that they have a financial potential that emanates from the residents and rent payers of the condominiums.

CHAPTER SIX
CONCLUSION AND RECOMMENDATION

6.1. Conclusion

Even though natural light, view and space form are considered significant and essential in the professional realm and in a generalized default understanding, there is a huge gap both in research and attention on how it affects the value (financial) of a living space be it condominiums or other residential types.

So, understanding and investigating the significance level, preference and financial willingness of dwellers of condominiums to pay for natural light, view and space shape, is essential in order to derive its potential as a major contributor to the economic value of condominiums.

In the study it was observed that

Natural light was well considered as a significant part of condominiums and there is a wide range of preference on its quality, a visible potential as a financial value and a clear appreciation on its contribution to a living space. And all these vary on the different rooms of the condominiums.

View, even though considered significant the majority of the dwellers seem to consider it as less important for their life's activity in the condominiums. Like natural light the preference and willingness to pay for view differs from room to room but has the potential to be a contributor to the economic value of the condominiums.

Space shape was found to be strongly considered as significant for it plays a major role on how the dweller inhibit the different rooms of the condominiums. And space shape also has a great potential to have a great influence on the value of condominiums as seen by the willingness to pay numbers contracted from the study.

Even if natural light, view and space shape are considered to be important in different aspects by default, that significance or importance is not reflected on the economic value of condominiums. Thus, this research may help in re focusing on the taken for granted but significant part of the living space. There also should be a focus on finding a scientific way to appreciate it financially, which will in return inspire better spatial designs that strive to fulfil the preference of the dwellers.

6.2 Recommendation

The recommendation of this paper majorly extends to appraisers, designers, developers and researchers.

1. Bring to consideration all factors that impact the living condition of any living space as values to the appraisal process.
The fact that there is no financial backing for a good spatial attributes like natural light, view and space form makes the significance and role of these life enhancing attributes to be neglected and unnoticed. Therefore, bringing these intangible attributes in the appraisal process is essential in solving bad spatial designs.

2. Create a clear and feasible formula that responds to the different gradation of space attributes, including natural light, view and space shape as financial value of the property.
At times when natural light, view and space shape are used as values in the appraising process the way they are integrated is not scientific or rational. Which calls for a subjective value that is not consistent and open for abuse. So, creating a feasible formula for valuation of attributes of spaces in accordance to their contribution level is a necessity.

3. Do more research on the preference of dwellers as to understand on how much demand there is to different qualities of living conditions rather deciding on assumptions formulated by brokers and other secondary resources.
More research is required as to understand the demand side of the dweller in depth rather than letting the market be run by trends of brokers. This will help in better understanding how what is preferred and how that can be interpreted in spaces in the design process and as value in the appraisal process.

4. Design spaces with better natural light, view and space shape because there is a demand and appreciation for it from the dweller side.
Spaces should be designed not with the least effort in bringing natural light, view and space form into existence just enough to make it function. Instead, it should be done with the most care for at the end of the day it is offered to dwellers that actually have preferences and understanding of what is they are being offered to live in.

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Appendices

I. Questionnaire for survey

This questionnaire is prepared as part of a research for a master's program graduating thesis project. The main subject of the questionnaire is to find out if some selected space qualities of a condominium have value to the dwellers of that space. These categorizations affect the persons understanding on space quality and also the willingness to pay for the preference.

AGE	1☐ 18-25 2☐ 25-40 3☐ 40 and above	EDUCATIONAL STATUS	1☐ ILLITRATE 2☐ ELEMENTARY 3☐ HIGH SCHOOL 4☐ TVET GRADUATE 5☐ UNIVERSITY GRADUATE
GENDER	1☐ M 2☐ F	TIME SPENT HOME	1☐ ALL DAY MOST OF THE TIME 2☐ HALF THE DAY 3☐ IN THE EVENING
LIVING CONDITION	1☐ ALONE 2☐ WITH A SPOUSE 3☐ WITH A ROOMATE 4☐ WITH A SPOUSE AND CHILDREN		

LIGHT_ in case of condominium buildings

1. How significant do you think is natural light to a residence
    1. High significance
    2. Significant
    3. Little significance
    4. Not significant

2. From scale to 1- 5 how lit do you think a living room should be

    1.very bright ☐ 2.fairly lighted ☐ 3.medium ☐ 4. fairly dark ☐ 5.very dark ☐

    i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

3. From scale 1-5 how lit do you think a bedroom should be

    1.very bright ☐ 2.fairly lighted ☐ 3.medium ☐ 4. fairly dark ☐ 5.very dark ☐

    i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

4. From scale 1-5 how lit do you think a kitchen should be

1.very bright ☐	2.fairly lighted ☐	3.medium ☐	4. fairly dark ☐	5.very dark ☐

   i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

5. From scale 1-5 how lit do you think a bathroom should be

1.very bright ☐	2.fairly lighted ☐	3.medium ☐	4. fairly dark ☐	5.very dark ☐

   i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

View_ in case of condominium buildings

The most common views in Baldaras site condominium buildings are the view to main road, view to secondary roads, view to common areas and green meadow (in case of condominiums found in the outskirt of Addis)

6. How significant do you think is view to a residence?
   1. High significance
   2. Significant
   3. Little significance
   4. Not significant

7. What view do you consider most appropriate to a living room?
   ☐ 1. Main Road
   ☐ 2. Secondary roads
   ☐ 3. Common area
   ☐ 4. Green meadow
   If other please specify_____
   i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

8. What view do you consider most appropriate to a bedroom?
   ☐ 1. Main Road
   ☐ 2. Secondary roads
   ☐ 3. Common area
   ☐ 4. Green meadow
   If other please specify_____
   i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium
9. What view do you consider most appropriate to a kitchen? (put in order of preference)
   ☐ 1. Main Road
   ☐ 2. Secondary roads
   ☐ 3. Common area
   ☐ 4. Green meadow
   If other please specify_____

i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

Space shape _ in case of condominium buildings

10. How significance do you think is space form to a residence?
    1. High significance
    2. Significant
    3. Little significance
    4. Not significant

11. What form do you think a space for living / dining should have
    ☐1. rectangular shape
    ☐2.square shape
    ☐3.L- shaped
    _____other
    i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

12. What form do you thing a space for a bedroom should have
    ☐1. rectangular shape
    ☐2.square shape
    ☐3.L- shaped
    _____other
    i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

13. What form do you thing a space for a kitchen should have
    ☐1. rectangular shape
    ☐2. square shape
    ☐3. L- shaped
    _____other
    i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

14. What form do you thing a space for a bathroom should have
    ☐1. rectangular shape
    ☐2. square shape
    ☐3. L- shaped
    _____other
    i. How much more will you be willing to pay to get your first choice if you rented an apartment/ condominium

II. Open Ended Interview Questions for key professional informants

These interview questions are prepared for professional architect, interior designers, appraisers, brokers who will be used as a key informant to help determine what value natural light, view and space shape play in the process of designing a residence in general and condominiums in specific and how it affects the value of the property.

1. How significant do you think is natural light to a residence
    1. High significance
    2. Significant
    3. Little significance
    4. Not significant
    - How important is natural light in a residence and why?
    - How do you control natural light in the process of designing a residence?
    - What is the effect of natural light on the value of a condominium?
2. How significant do you think is view to a residence?
    1. High significance
    2. Significant
    3. Little significance
    4. Not significant
    - How important is view in a residence why?
    - How do you control view in the process of designing a residence?
    - What is the effect of view on the value of a condominium?

3. How significant do you think is space shape to a residence
    1. High significance
    2. Significant
    3. Little significance
    4. Not significant
    - How important is space form in designing a residence why?
    - How do you control space form in the process of designing a residence?
    - What is the effect of space form on the value of a condominium?

III. PUBLISHABLE MANUSCRIPT

Preference and willingness to pay for natural light, view and space shape in condominiums: the case of Baldaras condominiums

Bethel Ayalew, 2022

Abstract: Even though it is taken as common knowledge that the natural light, view and the space shape are important attributes of any living space, in what way they are preferred and how those demands can possibly be appreciated financially was the main interest of for this paper. The task of satisfying the research intentions was carried out mainly by surveying condominium dwellers to understand in what way they preferred natural light, view and space shape in their homes and how much they will be willing to pay to attain them. From the data analyzed it can be concluded that natural light, view and space shape are considered as a very significant part of the condominium life, view having a less gradation than the other two. The preferences for natural light were medium to very lit, for view to the green and common area and for space shape rectangular and square were popular choices. With willingness to pay that ranged from 1500 birr to 0. It was concluded that natural light, view and space shape are considered as very significant to the dweller with a specific preference and a visible willingness to pay that can be processed to be the indicative financial value to the attributes.

Key words:

1. Introduction

1.1. Architectural space and architectural space attributes

Architecture and what good quality architecture means entails with it a very wide range of qualities and one of the major elements within it is architectural space. Architectural space has more to do with experience than just being some enclosed three-dimensional atmosphere. There is a debate on the priority architecture gives to the form or the space. Some argue that form follows function, (Sullivan ,1996) meaning that the space is first designed for that particular function it supposed to serve and the form will be the byproduct of the elements shaping that space. And others say that the form and function should be one and should be joined spiritually (Wright, 1939). The relationship between form and function or form and space to be exact is one of the major factors that shape architecture of any building. It is obvious that the form engulfs that space which is the functional part of the building and this space has shape, degree of enclosure, dimension, proportion, material, color and texture.

'We put thirty spokes together and call it a wheel; but it is on the space where there is nothing that the utility of the wheel depends. We turn clay to make a vessel; But it is on the space where there is nothing that the utility of the vessel depends. We pierce doors and windows to make a house and it is on these spaces where there is nothing that the house depends. Therefore, just as we take advantage of what is we should recognize the utility of what is not' (Lao-tzu, 6th BC) (Ching, 1995). It can be noted from this quote that the space that we utilize is the nothing and not exactly the elements that bound it.

Architectural space comes into existence by arranging geometric elements like point, line, plane and volumes which in architecture become linear columns, beams, planer, roofs, floors and walls (Ching, 1995). The way these elements are arranged along with windows and door openings give the defined space a certain spatial quality. These qualities are measured in perspective of form, color, pattern, texture, sound, proportion, scale, definition, degree of enclosure, view or outlook and light. (Al-Houssainy, 2014).

The phenomena of architecture is captured mainly by the space that it engulfs and the character of that space. As space begins to be captured, enclosed,

molded and organized by the elements of mass, architecture comes into being (Ching, 1995), which makes space creating the beginning of architecture, therefore the more a building guarantees a functional and high-quality space the more the architecture of that building is to be appreciated.

Architectural space is majorly having to do with indoor environment and can be understood as, indoor air quality: an umbrella term comprising odor, indoor air pollution, fresh air supply, etc., Thermal comfort: dependent on moisture (humidity), air velocity, temperature, etc., Acoustical quality: noise from outside, indoors, vibrations, etc., Visual or lighting quality: view, illuminance, luminance ratios, reflection, et (Bluyssen, 2010).

Architectural space has many attributes within, some of them are natural light, view, form, organization, temperature, aesthetics and noise being some of the prominent constituents. These characters are of course are highly entangled with body of the building. The view and natural lighting of the space is controlled by the type, size and opening direction of the window, the form and organization of the space is controlled by the position of the walls, the ceiling and floor to each other, the temperature is controlled by the type of material it is built with and the direction of openings, aesthetics is controlled by the overall decision made on the walls, ceiling floor and their relationship.

Architecture is composed of measurable and unmeasurable properties. What is unmeasurable is the psychic spirit, the psyche is expressed by feeling, and also by thought and that may always keep it unmeasurable (Kahn, 1930). The home as with other types of building is composed of the measurable and the unmeasurable properties of architecture. The measurable include everything that we can physically delineate, measure, and quantify which have been well researched in most cases unlike the unmeasurable properties which are the qualitative aesthetical and symbolic properties that are a great part of our home perception. The measurable and the non-measurable properties of a residence are harmoniously balanced in a good quality architecture residential building (Nylander, 2002).

There were seven fields of non-measurable properties that were outlined in the Nylander paper to be important for a residence architecture. These include Material and detailing, Axiality (directional axes relate the spaces of the home and make it easy to survey), enclosure (the openness and closeness of spaces), movement (the transition from one space to another), spatial form (the form of a space in section and plan), light (the effect of the natural light in spaces) and spatial organization (schematic layout of spaces) (Nylander, 2002).

Natural light

i. Significance of natural light

The story of architecture is highly entangled with the history of window and letting daylight enter through a space along with of course air, heat and cold. Daylight has a lot with the wonder of the interior spaces of many medieval cathedral buildings and any other private buildings (Philips, 2004). Daylight entrance to buildings is manipulated through the orientation of the building, the nature of the aperture and the structure of the whole building (Philips, 2004). Natural light or daylight is a light source to which human vision adapts to the full spectrum. Taking into account the daylighting of a building can increases space productivity (Rizal, Robandi and Yuniarno, 2016).

Day light has a very positive effect on the physical and psychological health of human beings and this was acknowledged by ancient Egyptians and Greeks. It was also put to use as healing method in the early 1900s (Magazine by Velux, 2010). This proves that proper use of sunlight in designs is a very important part of indoor architecture.

According to University of Alberta a sunny hospital almost halved the death rate of patients that were recovering from heart attack and other scientists also confirmed that sunny atmospheres help patients battling depression (Pearce, 2010). Office spaces that are brighter have more productivity rates and less absentees which compensates for any financial loss that is spent to make the spaces have more sunlight (Pearce, 2010).

Building design in particular can enhance overall light during daytime and ensure that people get sufficient morning exposure to the blue light that at this time-of-day bolsters circadian rhythms and may ward of SAD (seasonal affective disorder) and other health-threatening conditions. Much of this comes back to windows – the most important link between the indoor and outdoor environments, the source of natural light and natural ventilation (Pearce, 2010).

There are many situations in which the daylight interacts and affects spaces, aesthetically speaking it creates different textures when it lands on different

materials casting shadows and along with-it different moods and appearance. And it also creates different moods in the same room as it moves throughout the day. Psychologically it is known that the sense of well-being is highly associated with daylight. Health wise it is believed that it improves resistance to infections, skin problems and cardiovascular impairments, energy wise it is the most efficient way of low-cost energy building (Evans, 1981).

ii. Measuring methods of natural light

The amount and distribution of natural light in a room depends on three factors: the room geometry, the location and orientation of windows and other openings, and the characteristics of the interior surfaces (Rizal, Robandi and Yuniarno, 2016).

Illuminance is defined as the amount of light received on a surface and is measured in lux which is luminance per meter square. It is the most used measurement of light currently used to determine daylight intensity in the interior (Deru, Blair and Torcellini, 2005).

The amount of sunlight that enters a room is composed of three components which are the direct sunlight, skylight, and reflected light. Direct sunlight illuminance to earth may exceed 100, 100 lux, but its brightness is dependent on time of the day, location and sky conditions. Sky light is the soft diffused light that is scattered by the atmosphere and clouds and it lies between 10,000 lux and 30,000 lux depending on the season. (Winter, or summer). The reflected light is the light that is reflected form the surrounding environment, be it the natural environment (terrain, vegetation.) or man maid (the surrounding buildings) generated first from the direct sunlight or sky light (Rasmussen, 2016).

There are standard recommendations about the amount of lighting condition in a different room in a residence living. For a bedroom the general lighting condition should be 100-300 lux and for a specific task 500 lux, for a kitchen the general recommendation is 300 lux and for a specific task (countertop) 750 lux, for a living room the general recommendation is 300 lux and for specific task 500 lux, and for a bathroom the general recommendation is 300 lux and for specific task (shaving and makeup) is 300-700 lux (Adams, 2021).

iii. Value of natural light in appraising process

Historically light valuation method is a closed subject that was dared questioned by a few (Thomson, 2005). In most cases sunlight is likely ignored as a variable in hedonic models (Fleming, Grimes, Lebreton, C. Maré and Nunns, 2017). There is a high scarcity in published research on the topic of the economic estimate that the sunlight has on the residential property market (Fleming, Grimes, Lebreton, C. Maré and Nunns, 2017). Sunlight highly influences the financial decision people make on real estate. A study in New Zealand proofed that there is a high willingness to pay for an extra daily hour of sun which was found to be associated with 2.4% in a house price (Fleming, Grimes, Lebreton, C. Maré and Nunns, 2017).

From the urban economics side of things, there is a proofed indication in the United States implies that a better climate which is the sum product of mean annual sunshine hours, average winter temperature is highly associated with higher property values and even high rate of city growth (Glaeser et al, 2001).

Indirectly access to sunlight helps reduce the amount of energy that is consumed than those with low quality natural light access and this difference could amount to 19% consumption difference (Strømann-Andersen and Sattrup (2011) In contrast those exposed to harsh sunlight pay more to create shading and cooling (Donovan and Butry,2009).

View

i. Significance of view

In the beginning of architecture views were important as a strategic point in which one can spot intruders but these days it has more to do with the aesthetical value of the view (Bourassa, Hoesli, Sun, 2004). Even though a view is considered to be an aesthetical part of architecture it is more than a luxury because it has a positive say on the psychological health of a person.

A study found that patients in hospital rooms that have a view to natural scenery recover more quickly than those viewing a wall (Pearce 2010). It is also noted that the sense of well-being is highly influenced by outside views of nature (Kaplan,1993).

Visual comfort can be described as being in a condition where one can perform his task with clear visibility, has a relaxed observation and or the person is satisfied with the visual condition (Hellinga,2013). But since we do different things in different parts of apartment like bedroom are for resting purposes, kitchen for preparing food and at times eating too, bathroom for cleaning purposes and living room is for

general purposes from reading, watching tv and entertaining guests the amount of light we need and the view we want from it are also different.
Even though having a view from a living space is important the privacy of the people living in it should not be compromised. Research revealed that it's a biological nature of human beings to prefer a vantage point in which one can see a good deal without being seen himself which is referred to as the refuge theory (Bourassa, 1991).

ii. Measuring methods of view

The complexity of the human perception brings forth differences in the preference. It is composed of that particular person's previous experiences, his values beliefs, expectations and attitude (Zube et al, 1975).
View is affected mainly by the size and geometry of the window, the character of the view in another perspective is highly influenced by the surrounding of the building and its characters (Hellinga, 2013).
View can be measured and understood in a different perspective, one is the perspective of what the view offers (natural setting, buildings, streets etc..) two is the view from the inside to the outside to be distant (like seeing the sky, distant city, etc,) or nearby ground. The third is the window of view to be wide and spacious or small and informative (Hellinga, 2013).

iii. The value of view in appraising

There is a research gap in the impact of view on property value and a closer look on the subject shows that the effect that view has on a property is represented by a single dummy variable to a hedonic regression equation (Bourassa, Hoesli, and Sun, 2004). It is clear that a home with a great view should worth more than a home with less interesting view but there are no rules on how much value it adds to the property.
A study shows that the value of a home is affected by 5 to 8 percent of the market value based on the view that it offers (Rodriguez and Sirmans,1994). Even though this is a fact that is well recognized the method in which the exact number is captured and attributed to the view is not clearly put. Not only that the view affects the value of the property, the closeness and the fairness of the view is determinant in its effect. Close up view being worth more than faraway view but also in contradiction to that ability to see far away is much appreciated than a foreshortened sight (Brown and McCabe, 2000).
In one observation from a real estate agent says that the view being from the back has more value than a view from the front and the reason for this per the experience is because living takes place mostly in the rear side of the house or from rooms that are used most often (Siracusa, 2011).
In another perspective the view and what one is looking onto also has a huge effect on the value of a property. For example, a house with a view to a water body has more value than the one with none and the one with a view to a coastal ocean view has greater of them all (Benson and Hansen, 2013).

Space shape

i. Significance of space shape

The space shape of a room is the form the room has, coming together by structural system at first and then the walls, floor and ceiling of the room with windows and doors managing the space's relationship with other spaces. These elements have patterns and with an inherent geometry which will be passed on to the spaces that they create (Ching, 2018). The major forms of spaces that we are accustomed to are the rectangle, square, L-shaped, oval, circle but there are as many forms possible as there are shapes but are not used as common as the above mentioned. Space form determines how the space is made functional, how the furniture is laid out and how the space feels.

ii. Categorizing method of space shape

The shapes of rooms and spaces are determinant on how one furnishes and one feels in that space. It affects how one moves interacts and functions within the realm of that space. Forms in general can be of two types, organic – It refers to the form that is created or exists in nature in its natural living form such as a tree or a shrub; an outline created by the same and geometric or Inorganic – It pertains to the man-made, geometric shapes and forms which implies it includes non-living forms. The most common and highly delt with inorganic shapes that are used in residential spaces are the rectangular, l shaped square oval and circular or a combination of them.
The reason most commercial designs are rectangular, or square, is because they are easier, faster and more economical to build out of ordinary materials – stone, concrete, brick or wood. Square and rectangular shapes are also exponentially easier to reconcile, and there's usually less waste. Altered shapes not only

utilize more materials and assets but are more expensive to construct and maintain (Whittaker, 2019).
90 degrees angles are very strong structurally, psychologically and spatially. Vertical stacks and vents align better. Roof planes become easier to design. Air circulation and temperature regulation are better controlled. Even electrical lines and water pipes are easier to incorporate (Whittaker, 2019). Square and rectangular designs also mean that there's little space that goes unused, plus it's easy to scale up and down with slight calculations. The challenge of rectangular shaped room is that it can easily feel narrow and claustrophobic and is usually difficult to create intimate gathering areas. Tall built in furnishing technique in balancing the elongated room. The challenged faced in an L shaped room is the challenge of creating a visual and functional separation but is has the advantage of design freedom by supplying options as to what can be done with the functional areas also known as the two sides of the L, the short and the long.

Willingness to pay (WTP)

The process of finding the financial value of some intangible elements is complicated and hard to define and therefore the way they are appraised is different from other real properties. The total economic value that emanates from natural resources and heritage is divided into three components which are the use value, the option value and the non-use value. The use value is the representation of the direct use of the environmental resource, the option value shows the willingness to pay in order to preserve the ability to use and the non-use value is the willingness to pay to preserve or improve a resource even if they may never use it themselves. All the three together bring about the notion of willingness to pay (Tietenberg and Lewis, 2010).

In other scenarios the willingness to pay can also be used as a market assessment for a new product development or in pricing decisions and some researchers agree that valid estimates of WTP is essential pricing strategy (Breidert, Hahsler, Reutterer, 2006).

One of the methods used to determine the willingness to pay of concerned parties is to directly ask them this could be done through a survey or through a focus group (Stobierski, 2020). This method is referred to as direct approach to measure WTP (Breidert, Hahsler, Reutterer, 2006). Through a survey a large amount of quantifiable data is used while from a focus group more of a qualitative data is collected (Stobierski, 2020). Another advantage of survey data is that they can be used to test concepts, new products and for the valuation of non-market goods (Cameron and James 1987).

1.2. Contextual review

The condominium has become a huge part of the Addis Ababa residents, it appears in many sites as blocks of buildings. It has also become the space that many inhibit, from a bachelor, newlyweds to a small or large family. This makes the condominium the most recognizable residence both as a home and a building block that is part of the city.
Since the condominium was meant as a low-cost housing development, the focus was mainly in providing the main spaces with the minimum cost. This may have caused some quality compromises in design and physical appearances among other construction quality problems (Adamu, 2012).
As with many properties the appraisal process of the condominiums is mostly based on the hardware of the spaces that can easily be quantified like the area, the material it is built up with, what floor the unit is situated at but this may not be enough because most people also value the comfort the space that they live in gives them. For example, they do enjoy the amount of light that enters to the room, the thermal comfort, the spatial organization and even the space shape of the rooms, which are some of the elements that make up the architectural spaces.
In the appraisal process of condominiums and or any other residence the main components that are considered as values technically speaking are the walls, the windows, the area, the slab, the roof,

the fixtures and installments that the building or the residence is made of. But the quality of the view and the natural light that the window offers are not considered as critical value, the shape of the space that the walls, the slab and roof makes are not the main value generators. And even when being considered in the valuation process it does not have a proper and technical step into how they can be quantified into value.

It's a given fact that natural light, view and space form are essential parts of one's activity in his or her condominium house. But the preference of the general dweller on the brightness level of the rooms they live in, the view they would like to have and the space form that they will like to sit in is not known. Many raise the issue of quality when it comes to these condominiums, some suggest part of the reason the quality of the condominium in many perspectives has been compromised is because of lack of renters' involvement in decision making (Adamu, 2012).

So assessing the significance level and preference of natural light, view and space shape of condominium spaces to the dwellers and how it can be interpreted into financial value if the preference of the dwellers is met is the essence of the study.

The study mainly focuses on the natural light, view and space shape which are three of many architectural space attributes that make any built structure livable and comfortable. The particular focus point being the value and the preference type related with these attributes of architectural space.

Thus, the study can open doors to investigation how natural light, view and space shape can add financial value to a condominium unit if the particular preference of the dwellers is met. It will also shade light on the preference of condominium dwellers on the type of natural lighting they prefer in each room, the view that they would like to have a sight of and the type of shape they get the most function out of for each room.

The study will also help in reviewing the current appraisal process and valuing technique in the eyes of these three factors namely natural light, view and space shape as values worthy of financial consideration and how.

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The research is based on the intangible attributes of space of condominiums. The intangible attributes that are part of the architectural space created by the tangible elements which are the walls, floor, ceiling, windows and doors are not conclusively numbered but include, space shape, space organization, texture, color, thermal atmosphere, view, light, noise. But this list grows more in time and in-depth study, for example recently green effect of spaces is an important topic as space attribute. So, to study all these elements with time and resources available for this study would not be possible therefor the study focuses on the main attributes that are the simple and direct relatives of the wall and windows. The windows bring view and natural light into the rooms and the walls give each room the shape that they retain. The two most important functions of windows are the provision

of daylight access and a view to the outside (Boyce et al., 2003). Thus, the scope of the study is limited to the natural light, view and space shape of the condominium units.
Since condominium buildings are large in number, it makes it impossible to incorporate all of them with the amount of resource and time allocated for this research level. Thus, the Baldaras condominium was used as a case area to show case the objectives of the research.
The other perspective in which the study is guided by is the type of condominium units included in the study. Since the research looks through the preferences of natural light, view and space shape of each room in the unit the smaller number of rooms to be studied the clearer the study. For this reason, the study focuses on one bedroom and two-bedroom condominium units only.

In consideration to natural light the study focuses on the illumination level of natural light as the focus to research the preference and willingness to pay.
Since the windows of all the units of condominiums is similar and at times even of every room, the view perspective considered in this study focuses on what view is offered rather than how it is offered.
As with windows the room height and the shape of rooms offered by condominiums is limited and similar so the focus of space shape will be on the basic form that are available within the studied units, which happen to be rectangular, square and L-shaped.

2. Method

2.1 Case area

The case area used for this study is a condominium site that is found in Ethiopia, Addis Ababa in Yeka Sub city and is named Baldaras condominium.

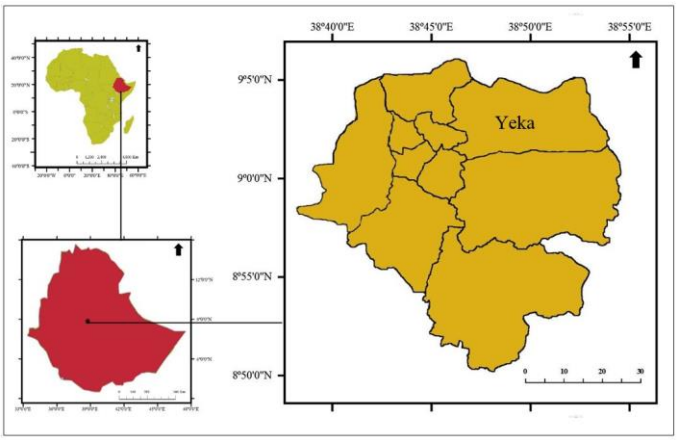

Figure 25: Case area location

The case area needed for this study is highly related to the fact that the dwellers opinion of natural light, view and space shape is affected by their current living condition and experience. So, the older the site the more it is understood and experienced. And Baldaras condominium was one of the sites that were developed in the first phase of the condominium developments.
Baldaras condominium site is located in a key central place that is connected to main centers of the city. It is one taxi fare away from Piassa, Aratkilo, Kazanchis, Haya hulet, Megenagna and has a straight highway road that is connected to atlas road. This makes the site wanted by many residents which makes them stay committed to the site and giving the study an advantage of residents acquainted with the spaces for a long time.
The study focuses on one bedroom and two-bedroom apartment condominium housing, and Baldaras condominium is comprised of mainly only of the two types.
Baldaras condominium is found in the inner part of Addis Ababa, Yeka Sub-city at 9.026 Latitude and 38.78302 Longitude.

Figure 26: Baldaras condominium location map

i. Natural Light

The sun path in Addis Ababa or Ethiopia in general during the summer time is from east to west while tilting to the south, south west direction sun being the harshest, and in winter time the sun's path is from east to west tilting more to the north. Overhead is experienced on September.
The lowest angle the sun reaches in the summer time is 72 degree and the lowest it gets in the winter time it is 56 degrees to the north.

Block level
The main block orientations that are found in the site are horizontally and vertically aligned to the main road found in front of the site. And another four blocks are diagonally aligned to that main road.
The blocks aligned along the south west – north east direction, face the main road parallelly are 28 in number. The morning and evening sun reach to them in some degree and the harsh sun (south west) directly reaches their shorter side.
The blocks that are aligned the east south – west north line, perpendicular to the main road, are 25 in number. They also get the morning and evening sun reach to them in some degree while the harsh sun directly faces their longer side.
The other 4 blocks that are diagonal in alignment get the morning and evening sun directly while the harsh sun reaches to them in some degree.

Apartment level
Both the one-bedroom and two-bedroom apartments get natural light majorly from two opposite directions. The direction of sunlight entering the rooms is dependent on the positioning of the blocks. Each room gets light from one window and some light also enter the rooms through some parts of the door which is made of frosted glass. The size of the windows for the living room, bedroom and kitchen is similar in size.

ii. View

The human eye visual field can horizontally see 62 degrees to the right and 62 degrees to the left with a total view span of 124 degrees. And vertically the eye can see 50 degrees up and 70 degrees down with a total span of 120 degrees.
The view that is available to the blocks of the Baldaras condominium is comprised of a relatively small green area, a common area floored with coble stone, a secondary road, and the main road with the traffic below.
The views that are available are from the bedroom, living room and kitchen and the balcony. The balcony of the one bedroom is accessed from the bedroom while the balcony for the two bedroom is accessed from the living room.
The living room of both one bedroom and two-bedroom apartments are situated in front of the circulation corridor which is either facing the common area, the main road or the secondary road.
The bedroom and the kitchen give view to the same scenario because the windows are positioned towards the same viewpoints for the one bedroom, while for the two-bedroom apartment the kitchen and the two bedrooms give view to three different areas. And these options again are the common area, the main road, the secondary road or main road.

iii. Space shape

The space form of the existing one-bedroom condominium apartments at Baldaras site fall into a rectangular bedroom, kitchen and bathroom with an L shaped living room with a relatively low ceiling in all cases.
The two-bedroom apartment offers all the room in a rectangular shaped space form and an L-

shaped living room with small corridor spaces connecting it to the front door.

2.2 Preference and WTP for natural light, view and space shape

i. Data type and collection method

The data collected for this is a primary data that is collected through a survey that is extended to dwellers of the Baldaras condominium. A total of 150 respondents (84 male and 66 female) residents participated for the survey.

Survey

Sampling size and technique

The site is divided into two compounds, named Feres Bet and Yeka Site and the sites are separated by a wire fence.

Table 1 below describes the number of apartments and communal spaces that are available in Baldaras condominium.

Table 1: Number of apartments found in Baldaras condominium

compound	studio	one bedroom	two bedrooms
Feres Bet	60	460	70
Yeka Site	236	531	235
Total	**296**	**991**	**305**

The study focuses on the major four spaces of the condominium the living room, the bedroom, the kitchen and the bathroom.

The sampling technique used is stratified random sampling and this type of sampling is mostly used when all can't be included in the study but the probability of each to be part of the sample is needed to be guaranteed (Kothari, 2004). From the random sampling the particular method used was stratified random sampling one bedroom and two bedrooms being the two strata or categories.
Taking the 991 one-bedroom population in 10% population proportion and 305 two-bedroom population in 2% population proportion, a calculation with 95% confidence level and 5% margin of error the sample size is 150 in total. 122 for one bedroom and 28 for two-bedroom apartments.

Questionnaire drafting
The questions were prepared in which the respondent can easily go through it, and this was particularly done by giving out clear choices for natural light, view and space shape.
The choices under the preferences were composite output of literature review and available preferences found in the case area.

Natural light
There is a standard lighting recommendation for each room based on the task to be carried out measured in lux. Based on this data the preference levels where set emanating from the standard illumination levels.
The standard illumination for living room is recommended to be 300-500 lux, for bedroom 100 – 300 lux for bedroom, kitchen 300 – 750 lux and bathroom 300 – 700 lux.
Table 1 below shows the link between what level of brightness is associated with each choice presented to the respondent for each room in question.

Table 1: Brightness Vs preference categories

	Living room	Bedroom	Kitchen	Bathroom
Very bright	>500 lux	>300 lux	>750 lux	>700 lux
Fairly bright	500 lux	300 lux	750 lux	700 lux
Medium	400 lux	200 lux	525 lux	550 lux
Fairly dark	300 lux	100 lux	300 lux	300 lux
Very dark	<300 lux	<100 lux	<300 lux	<300 lux

View
The choices for view were made based on the possible views that existed in condominium areas. Based on the scope of the study described the study focuses on view in respect to what can be seen and not how. The choices were view to the main road, to secondary road, to common area and to the green meadow.

Space Shape
The choices for space shape were made up of the possible space shapes that are common to condominiums. And those were rectangular, square or L-shaped.
For each choice of preference there is a tag along question about how much they will be willing to pay for their choice. Which will indicate if these choices are mere preferences or if they are needs that they consider as value.

Mock sample
At first the questionnaire was given to 15 residents of any condominium, to find if the line of questioning will give the answers to the objective sought after. And after fixing a few of the questions, to make sure that there is clarity in understanding the topic at hand, the questionnaires were given to respondents of Baldaras condominium residents.

ii. Data analysis method
The data gathered from the survey about the preference of natural light, view and space shape is analyzed using descriptive analysis method in which the frequency is represented in percentages for each level of choice.

3. Result and Discussion

3.1. Result

Preference and willingness to pay for natural light, view and space shape

I. Natural light
From the survey conducted to understand the preference of dwellers as to what kind of natural lighting they would like to have in the different rooms of their condominium housing.
It was made clear that a very bright living room was preferred by 60% of the dwellers with a willingness to pay mean value of 318.78 birr per month. The second popular preference was 40% for a fairly lit living room with a willingness to pay mean value of 220 birr per month.
For a bedroom the popular choice is 54% for a medium light amount with willingness amounting to 100 birr per month the second popular choice was 33% for a fairly light bedroom with a willingness to pay amounting to 269 birr per month.
In case of the kitchen 77.3% of the dwellers prefer a fairly lit kitchen with a willingness to pay amounting to 184 birr per month others settling for medium lit kitchen make up 17% with willingness to pay amounting to a mean value of 200 birr per month.
For a bathroom the 69% of the dwellers prefer a medium lit atmosphere with 91 birr per month mean value, the others prefer 12% for fairly lighted with 83 birr per month and 18% for fairly dark with 81 birr per month.

II. View
For a living room 49 % prefer a view to a green area with willingness to pay for it being a mean value of 328.77 birr per month, 28% prefer a view to secondary road with 269.43 birr per month, 10% prefer view to main road with 400 birr per month willingness to pay.
For a bedroom 98% prefer a view to a green area with 227.21 birr per month and 2% prefer a view to the main road with no willingness to pay.
For a kitchen 39% prefer a view to the common area with 159.32 birr per month willingness to pay 27% prefer a view to the main road with 71.25 birr per month, 12% prefer a view to a secondary road with 69.44 birr per month and 22% percent prefer a view to green area with 210 birr per month willingness to pay.

III. Space shape

The living room preference for a rectangular shape is 57% with willingness to pay 575.29 birr per month. 20% want a square shape with 356.67 birr per month willingness to pay and the other 23% prefer L shaped with willingness to pay 262.86 birr per month willingness to pay.
To a bedroom 93% prefer a square shape with 293.88 birr per month willingness to pay and the other 7% prefer a rectangular shape with 300 birr per month willingness to pay. In a kitchen 95% prefer a rectangular shape with 264.68 birr per month willingness to pay and the other 5% prefer a square shape with 200 birr per month willingness to pay.
For a bathroom 73% prefer a rectangular shape 70.9 birr per month willingness to pay and the other 27% prefer a square shape with 7.5 birr per month willingness to pay.

3.2. Discussion

There is a general understanding that of course there is value in natural light, view and space shape, and of course they are significant. But this is not backed or compensated financially when presented in a better quality in spaces of condominiums. This loss in value when it is being translated from a significant part of space to none in the appraisal of the property it arises the question where that link is lost. Is it not found significant by the dwellers (rent payer) of the condominiums or is it mistreated by the process of the appraising?

From the survey conducted to assess if there is a proper understanding how significant natural light, view and space form difference has on the living space of condominiums it can be understood that for natural light and space shape there is a strong positive reaction while on view there was a mixed reaction with 37 % of the surveyed deeming it as low or no significance. And this attitude was also reaffirmed by professionals involved in designing, evaluating and selling or buying of real estate. This may be because natural light and space shape directly affect the proper functioning of the space while what view the space offers was a tip to the main purpose.

Even though the survey suggested that the significance of natural light, view and space shape is understood and appreciated by dwellers and professionals involved, its effect on the value of the condominium during the appraisal process is small to none. And that small attribution comes to realization only for natural light and space shape. Whatever view the condominium offers it has so far been recollected by professionals to be none. But this is not true in studies carried out in developed countries which attribute view to affect 5-8 % of the total value of the property (Rodriguez and Sirmans,1994). And even mentioned in the focus group discussion was that in selling and buying of land those found on higher level are worth more which is an indirect factor to the view that it will offer.

Understanding the preference of condominium dwellers on how lit their space should be, what view they would like to have a look to, and the space shape that they want dwell in along with how much they will be willing to offer to have access to their preference is used as a key to unlock the value that these attributes add to the condominium financially.

It was observed in the study when it comes to natural light the dwellers prefer a medium – fairly lit rooms while for the living room there is a high demand for a very lit- fairly lit conditions. The preference observed in what view the dwellers want to see from their living space it was observed that for a living room and bedroom the most common answer was green area and for kitchen it was the common area. Space shape wise the popular choices where rectangular for a living room, kitchen and living room while there is a balanced demand for a square and rectangular shapes for bedrooms. And the willingness to pay for these preferences range from 1500 birr to 0 depending which attribute was in question and for what room.

In order of the mean value offered for preferences it shows that dwellers are willing to pay for space form than for natural light with a lower interest for view. And these preferences are then again graded with the room in question.

For space shape it shows that people are willing to pay more for living room shapes that for bedroom and lower for the kitchen and a very low amount for the bathroom. For natural light it shows the willingness to pay is highest for the living room than the other rooms and again the bathroom has the lowest offer. In consideration to view, the pricing lowers form living room to bedroom to kitchen with no interest for the bathroom.

Overall, there is a high indication that shows that there is a potential to use natural light, view and space shape as financial values in property appraisal of condominiums and that there is an appetite for a better spatial condition in terms of these attributes than there is being considered.

To better manage the time and resources allocated the paper focused on natural light in relation to how much light it offers, view in relation to what can be seen and not how wide, near or far it is seen and space form in relation to the basic shape that it is packaged as in condominiums and not as how it makes one feel. This focus on certain aspects of each attribute may not show the full impact that they have on the value of condominiums but the study opens door to further investigation of these and other attributes of spaces as value generating entities because it was targeted and proven that they have a financial potential that emanates from the residents and rent payers of the condominiums

4.Conclusion and Recommendation

4.1. Conclusion

Even though natural light, view and space form are considered significant and essential in the professional realm and in a generalized default understanding, there is a huge gap both in research and attention on how it affects the value (financial) of a living space be it condominiums or other residential types.
So, understanding and investigating the significance level, preference and financial willingness of dwellers of condominiums to pay for natural light, view and space shape, is essential in order to derive its potential as a major contributor to the economic value of condominiums.

In the study it was observed that

Natural light was well considered as a significant part of condominiums and there is a wide range of preference on its quality, a visible potential as a financial value and a clear appreciation on its contribution to a living space. And all these vary on the different rooms of the condominiums.

View, even though considered significant the majority of the dwellers seem to consider it as less important for their life's activity in the condominiums. Like natural light the preference and willingness to pay for view differs from room to room but has the potential to be a contributor to the economic value of the condominiums.

Space shape was found to be strongly considered as significant for it plays a major role on how the dweller inhibit the different rooms of the condominiums. And space shape also has a great potential to have a great influence on the value of condominiums as seen by the willingness to pay numbers contracted from the study.

Even if natural light, view and space shape are considered to be important in different aspects by default, that significance or importance is not reflected on the economic value of condominiums. Thus, this research may help in re focusing on the taken for granted but significant part of the living space. There also should be a focus on finding a scientific way to appreciate it financially, which will in return inspire better spatial designs that strive to fulfil the preference of the dwellers.

4.2. Recommendations

The recommendation of this paper majorly extends to the appraisers, designers, developers and researchers.

1. Bring to consideration all contributors of a living space either tangible or intangible be it natural light, view or space shape as values to the appraisal process.
The fact that there is no financial backing for a good spatial attributes like natural light, view and space form makes the significance and role of these life enhancing attributes to be neglected and unnoticed. Therefore, bringing these intangible attributes in the appraisal process is essential in solving bad spatial designs.

2. Create a clear and feasible formula that responds to the different gradation of space attributes, including natural light, view and space shape as financial value of the property.
At times when natural light, view and space shape are used as values in the appraising process the way they are integrated is not scientific or rational. Which calls for a subjective value that is not consistent and open for abuse. So, creating a feasible formula for valuation of attributes of spaces in accordance to their contribution level is a necessity.

3. Do more research on the preference of dwellers as to understand on how much demand there is to different qualities of living conditions rather deciding on assumptions formulated by brokers and other secondary resources.
More research is required as to understand the demand side of the dweller in depth rather than letting the market be run by trends of brokers. This will help in better understanding how what is preferred and how that can be interpreted in spaces in the design process and as value in the appraisal process.

4. Design spaces with better natural light, view and space shape because there is a demand and appreciation for it from the dweller side.
Spaces should be designed not with the least effort in bringing natural light, view and space form into

existence just enough to make it function. Instead, it should be done with the most care for at the end of the day it is offered to dwellers that actually have preferences and understanding of what is they are being offered to live in.

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