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The impact of building architecture and neighborhood aesthetics on the attraction of multinational corporation headquarters.

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The psychology of multinationals.

The impact of building architecture and neighborhood aesthetics on the attraction of multinational corporation headquarters

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Summary

Ever since the cross-national trading become popular and MNCs became the dominant backbone of an economy, foreign investments and investors have had taken a significant role in building the city's image. The majority of multinational corporations keep the headquarter office building in the global cities where all the fame, facility, infrastructure, good quality of urban and architectural aesthetics are in place. This study took the frontier to explain the relationship between architectural and urban neighbourhood aesthetic characteristics and MNC HQ's location, using primary and secondary quantitative data. Open street map, google map and google street view are used to generate the primary data and investment data for financial and business sector, from Financial Times Limited 2017 database used to collect the secondary data. Finally, it reveals that the aesthetics of a city, specifically some elements of architecture and neighbourhood characteristics, such as building's tower, entrance emphasis, logo, accessibility, distance to subway entrance and surrounding density, significantly influence the attraction of FDI, particularly MNC's HQ in London, New York and Tokyo focusing on financial, business and service sectors, when measured by the MNCs outdegree representing the power and image of the MNCs.

KEYWORDS

Multinational Corporations (MNC), MNC Headquarter buildings, Aesthetics, Architecture and neighbourhood characteristics, Foreign Direct Investment (FDI)

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Dedication

I would like to dedicate this paper to my loving family, as they have been there for me throughout my difficult times in life.

Abbreviations

FDI	Foreign direct investment
MNC	multinational corporations
IHS	Institute for Housing and Urban Development
WCN	World City Network neighborhood
TAL	Transport Accessibility Level
NBR	Negative Binomial Regression
OLS	Ordinary Least Squares
NY	New York
LO	London
TOK	Tokyo

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Chapter 1: INTRODUCTION

1.1 BACKGROUND

Since mankind started long distance trading and the use of barter trade as a means of exchange, the value of similar commodity and goods in the modern world, as a result of contextual and spatial character, demand and the uniqueness of each destination, has resulted in differential pricing systems (Bakshi, Kapadia, et al., 2003). This has led to many companies investing in other countries to take advantage of the benefits that are available in the new place, leading to multinational corporations relocating outside their national boundary. Through generations, a trend of investing across borders for increased benefits and the need for suitable investment environment has risen. (Kitson et al., 2004). In turn, investing to other places has created linkages within the global network. (Wall, 2011), thus, locational preference has become a relevant concern among multinational corporations as to where headquarters are to be located.

The hosting cities mostly relate the flow of Foreign Direct Investment (FDI) with an extensive diversity of benefits; the most widely accepted advantages are the transfer of modern technology, the creation of competitive markets, building city image and spatial development (Rosenthal and Strange, 2004). The complex causality of the host country to attract and host FDI mostly depends on how much it benefits from the investment, mostly seen from the perspective of economic visibility. The majority of multinational corporations keep their headquarters in the global cities where all the fame, facility, infrastructure, good quality of urban and architectural aesthetics are in place. This is one way of branding and keeping the statuesque of the corporate in the business and another way of building trust and good image in the eyes of the clients.

Most policies concerning the attraction of multinational corporations are made only on the basis of the social and economic features (Goerzen, Asmussen, et al., 2014), but the aesthetics and built environment part are mostly being kept aside. Nonetheless, the built environment is a root for the advanced investment which results in faster and reliable socio-economic growth. Global cities, indeed care about the general appearance of their cities and also world's major portion of investment flow towards and from them, but the development of policies for a beautiful city to attract investment has been practiced to the minimum (Markusen, 2001; Saggi, 1996, 1999; Ethier and Markusen, 1996). Meanwhile, the world is having differences on the cause and result of the globalized world, the network of capital value flow of resources in a cross-nation relationship, bearing global competition and facilitate mega city formulation (Sanderson and Kentor, 2008). Notwithstanding, the worries of economic dependencies and imperial culture, developing countries as well are looking for new ways of attracting investment by upgrading side by side the built environment and facilities, by using design and planning tools. In addition, spatial qualities such as zoning regulations, offshore economical havens, high-tech parks, duty-free districts have made it easy for investors to invest and improve the existing urban and architectural quality of cities which in return attracts further investment (Markusen, 2001).

When looking at the top investors in the world, they are mostly concentrated in global cities. The fast-economic growth opportunities and the economic networking capacity, over the last few decades, have helped emerging metropolis to grow into global cities. In and outward flow of investment is one of the key causes for the transformation of this metropolitan cities to grow into more complex global cities (Goerzen, Asmussen, et al., 2014). This huge transformation has

witnessed tremendous inflow of diverse investment, yet the need to develop a policy that enhances the city's aesthetics has been neglected. However, giving low attention to the aesthetical value of a place, as one way of attracting investment, actually interrupts the flow dynamics of foreign investment.

The different features of building architecture and urban planning like, form, height, enclosure and aesthetic assessment of spaces, have an effect on the general image of the city, with respect to a given sector. However, the interesting aspect about this from the view of the investor is that examining the effects of aesthetical characteristics provides an enclosure on the decision to invest or not. The experience of investors indicates that they agglomerate their offices in the economically delivered and popular cities (Wall, 2011) with high architectural building and urban beauty, cities with a high level of touristic attraction and places that are considered beautiful on a worldwide scale. Taking the example of Ritterfeld and Cupchik (1996), the beauty rating of given spatial characteristics assigned to beautiful buildings is the highest determinant for willingness to settle in that particular city. This idea has prolonged till to today's understanding, where investors are more likely to opt for areas that are accepted to be more beautiful, is an indication that investment follows beauty or vice-versa. Conversely, neuroscience studies confirm that there is a definite differentiation within our wiring in the human brain system accountable for linking judgment of beauty that could influence rational decision making like where to invest (Vartanian, Navarrete, et al., 2013). Therefore, past discoveries assure us that there is a direct link between beauty/aesthetics and judgment (Cupchik, Ritterfeld, et al., 2003).

Architectural design and urban design have contributed so much to cities' aesthetical value; as most scholars agree on top of social, environmental and historical aspects. The art of self-expression, the spirit of the timely design, structural ingenuity and creativity, functionality, material variety and vernacular design are the main aesthetical factors that contribute to the subject of beauty and man-made environment. Multinational headquarter buildings are major areas of expressing the art and science of design. The location of these buildings is mostly decided by the economic determinants where the urban and building architecture characteristics are influenced. Despite the growth in attention in investors' location-related preferences, the financial and economic aspects dominate the geographical advantages. In addition, the character of the building is affected by the locality aspects in economic terms in the eyes of the economist (Pirinsky and Wang 2006). Once multinational headquarters move to an area, building and neighborhood design aspiration flourish by attracting more innovative designs and more headquarters by giving a better image to the urban settings.

This study attempts to address the extent to which, building architecture and neighborhood aesthetic characteristics influence the location of multinational corporates(MNC's) Headquarter(HQ). In addition, it forwards some key policy guideline for local, national and global policy makers; on the major aesthetical characteristics to host MNC's HQ.

1.2 STATEMENT OF THE PROBLEM.

This study is initiated by professional observation and curiosity to comprehend the common aesthetical characteristics that top multinational corporations share despite disparity in aesthetic valve as a result of location and or sector.

Study conducted by Taylor and Derudder (2014) has indicated that Advanced Producer Services (APS) are oriented towards image making and building, which provide an enormous opportunity for the building and the surrounding aesthetes to play the role. Hence, searching for the right place to establish one's headquarter is a challenging and immense decision for investors. The extent to which the existing neighborhood and architectural aesthetic values contribute to multinational investors' attraction has not yet been studied thoroughly, which is the main area that will be explored in this research paper.

Multinational corporations in advanced producer service sectors choose to persist on their corporate branding and image making. Furthermore, this image is mostly showcased on the buildings they decide to erect as well as the neighborhoods they locate their headquarters; but the detailed requirement for their selection has not yet been known. Looking at top multinational corporate companies, they appear to be most powerful within the network and have the most outward investments (Fernando, P., 2015), good imaging and showing-off, are their way of dominating the market; yet, the relation between power within the network and aesthetics/image has not been addressed by scholars. Furthermore, the main interest of this research is to study the common characteristics of MNC's HQ buildings and the mystery behind the type of building image they choose to have. The architecture/neighborhood common characteristics in terms of aesthetic quality and the architectural formula that attracts these multinationals has not yet been explored.

This research wishes to disclose the psychology of multinational corporations regarding the neighborhood and building aesthetics and how they react and decide to invest. This study focusses only on the headquarters (HQ) of the top MNC's in New York, London and Tokyo by evaluating the architectural principles and characters of their MNC's HQ buildings and their neighborhood like proximity, connectivity, height of the buildings color and material as well as the quality of green space and closeness to basic facilities. The study aims to identify common aesthetics characteristics of MNC HQs in APS sector and explain how these are related to MNC's HQ attraction. In addition, it explains the relationship between what multinational corporations seek in terms of aesthetical assets and the image of MNC's HQ, and provides a platform for policy makers to consider aesthetical values for economic competitiveness and beautification of the city.

1.3 RESEARCH OBJECTIVE

- To explain the relationship between architectural and urban neighborhood aesthetic characteristics and MNC HQs location.
    - To identify the most common building architectural features and surrounding neighborhood characteristics of different sectors of top Advanced Producer Service (APS) multinationals sectors
    - To find out the extent to which top MNC HQ locations are influenced by building architecture and neighborhood aesthetics
    - To identify geographical similarities and differences of building architectural features and neighborhood aesthetics

1.4 RESEARCH QUESTIONS

- To what extent do architectural building and urban neighborhood aesthetics influence the location decisions of MNC Headquarters?
    a. What are the most common architectural features and urban neighborhood characteristics?
    b. To what extent do architectures and urban neighborhood aesthetics affect the selection of top MNCs HQ locations?
    c. Are there geographical similarities and/or differences in building architectural features and neighborhood aesthetics?

1.5 SIGNIFICANCE OF THE STUDY

Within this study, the hidden aesthetical desire for opting MNC's HQ location which is believed to increase inflow of investment and contribute to economic growth, is explored. This explanatory study contributes in two fundamental ways. Primarily, it introduces a supplementary method to the existing ways of attracting investment by providing a guidebook for policymakers to consider aesthetics as an additional parameter for attracting MNC's headquarter. City municipalities can take an aesthetics manual into consideration while planning for new MNC's headquarter cluster, which can also help them make their city attractive enough for an investor to setup the HQ. Further, the study will have a significant impact on the academic world by adding new knowledge by bridging the gap between the two distinct disciplines, aesthetics and attraction of MNC headquarter on top of the existing knowledge of economic value.

1.6 SCOPE AND LIMITATION

This study investigates the relationship between building architecture and neighborhood aesthetics and MNCs Head quarter locations. Hence, the scope of the study in terms of area is limited to MNC HQ buildings and the surrounding neighborhood not extending beyond 500M diameter. Three cities from three different continents are selected based on their power within the network through their investment out degree. Consequently, the study will only focus on three global cities, New York, London and Tokyo. In doing so, the study only focusses on the exterior/external features of the HQ buildings and will not cover the interior of the buildings. The research does not also separate between own-built and rented buildings, based on the argument that, as long as the MNCs chose the building to settle in, either way, is influenced by their aesthetical desire to present themselves. However, not all MNCs sectors wish to show off their image especially in terms of their buildings as explained in the literature review. For this reason, the study will select Advanced Producer Service (APS) sectors particularly, Insurance and banking, Legal firms, and business companies for better comparison and results. Accordingly, the study will select the world's top MNCs from each city ranked based on their outdegree value in the global network.

Chapter2: LITERATURE REVIEW

This chapter delves into the profound insight of literatures on concepts and variables related to neighborhood and building aesthetics, building architectural characteristics, Locational characteristics, top MNC in the world and MNC HQs location.

2.1. AESTHETICS

2.1.1 DEFINITION

Aesthetics is a Philosophical study that investigates the nature of beauty, taste, and art with a focus on the appreciation and creation of beauty. From the scientific point of view, it is defined as the study of sensory and emotional values of taste, sentiments, and judgments (Zangwill, 2003). Furthermore, most scholars and experts agree with Michael Kelly (1998) as he defines aesthetics as the critical image on culture, nature, and art. The appreciation or the sensory reflection of an object is defined as an aesthetic judgment.

Aesthetics, the root term is driven from a Greek word Aisthanomai ("I perceive"), which was first used by a German philosopher, Alexander Gottieb Baumgarten (Berleant, 1986). Afterwards, the terminology grew gradually throughout the philosophical disciplines of both art and beauty, with the oldest theory of aesthetics of any scale being introduced by Plato who further explained it as the reality containing archetypes or any forms that are invisible themselves to our senses but are visible to our soul. Even though Plato was more focused on the concept of an absolute beauty (Orrell, 2012) that existed in the system of ideas of self-existing forms, his indication of beauty is not clear yet. He tried to reject numerous definitions in his discourses of the Platonic Socrates, but his arguments ended up as being inefficient. Unity, proportion and harmony among different parts of shared elements within a beautiful object seem to be the basic notion that has been understood from his dialogues. In similar terms, order, definiteness, symmetry, and repetition were to be universal elements of beauty (Orrell, 2012) as per the discovery of Metaphysics philosopher Aristotle, who observed that Beautiful things do not attribute true beauty and general beauty or one cannot find beauty as is. Even though beautiful things share beauty, they are not "beauty itself" beauty by themselves. Plato also identified beauty with truth and goodness, adding to that, Eros or love results ambition to the prenatal experience of beauty, and Phaedo, the beauty by itself is a cause of remembrance of the reason for the existence of soul's knowledge (Hofstadter and Kuhns, 2009).

2.1.2 AESTHETICS JUDGEMENTS

According to Zangwill (2003), the appreciation for beauty is a key part of life. This can be traced back to ancient philosophers who observed and wrote about beauty and judgments of aesthetics, as they tried to understand the natural phenomena of this subjective matter and sought to find out whether these experiences are genuine. Kant (1987), the first man to study aesthetic judgments and mostly referred scholar, isolated the two-major requirement for judgment, into subjectivity and objectivity (universality), which is discussed in detail below.

SUBJECTIVE AESTHETICS: Subjectivity is first and foremost the basic condition for judgment, which is also conceptualized as the feeling of pleasure or lack of it. The judgement of a test of pleasure makes it be different from empirical judgment. The judgment of beauty or not is the main example of a judgmental test. Beyond a certain level, the pleasure in beauty becomes the symphonic play of understanding and imagination. The intentional content of pleasure in beauty does not

account more than the pleasure of drinking, eating or sensation. In contrast, it is interpreted as a personal representation of things as (Kant, 1790).

OBJECTIVE AESTHETICS/UNIVERSALITY: This OBJECTIVE AESTHETICS, Universality: is when, the judgment to be considered as universal beauty, taking into account the subjective judgment of an individual becomes similar to the majority, then the rule holds to be true. The general validity woks in the majority but not subjected to everyone (Kant, 1790, pp. 52–53).

> *"… when [a man] puts a thing on a pedestal and calls it beautiful, he demands the same delight from others. He judges not merely for himself, but for all men, and then speaks of beauty as if it were a property of things. Thus he says that the thing is beautiful; and it is not as if he counts on others agreeing with him in his judgment of liking owing to his having found them in such agreement on a number of occasions, but he demands this agreement of them. He blames them if they judge differently, and denies them taste, which he still requires of them as something they ought to have; and to this extent it is not open to men to say: Everyone has his own taste. This would be equivalent to saying that there is no such thing as taste, i.e. no aesthetic judgment capable of making a rightful claim upon the assent of all men" (Kant, 1790, p. 52).*

For contemporary philosophers, beauty is more subjective reality than being an objective phenomenon. Most researchers and theoreticians like Edmund Burke, Lord Kames, William Hogarth and Henry Home (Sitter, 2001) has conceptualized beauty to a list of measurable attributes like

- The wholeness of different parts
- Possible variations
- Symmetry/ regularity/ uniformity
- fitness Character
- distinctness /simplicity
- intricacy
- magnitude/ quantity

with the linking of beauty to complexity theory of biology and/or psychology, such as Herbert Spencer and James Mill respectively.

MATHEMATICAL AESTHETICS: Symmetry and complexity are the two most popular way of considering theoretical aesthetics as a mathematical consideration. This consideration is different from applied aesthetics consideration. Scientists like physicist Marcelo Gleiser (2010) and mathematician David Orrell (2012) agree that symmetry is the main criteria for emphasizing mathematical aesthetics. Studying the geometry of any form can express as reality or attractiveness, beauty, order, knowledge, and science (Orrell, 2012).

COMPUTATIONAL AESTHETICS: Since the development of computers, the aesthetic dimension of objects and the understanding of beauty took a leap forward. The quality of aesthetics and beauty has developed significantly with the help of digital and automated visualization (Leyton, 2001). Machine learning approach used a significant number of manually graded photographs to program a computer to recognize and extract visual aspiration of aesthetical quality and beauty. Penn State University followed computerized learning approach by introducing rated images to study pattern, repetition, harmony, and sequence and convert it to digital language to analyze and rediscover the hidden era of beauty and aesthetics. Distinguished findings by (Leyton, 2001) reveals the generative theory of shape by using group theory, he mathematically specified and digitally recorded shapes to study standard aesthetical geometry (Kobbert, M. 1986).

EXPERIMENTAL AESTHETICS: Gustav Theodor Fechner is the founder of experimental aesthetics in the 19th century which is an inductive subject-based approach. The main principle of experimental aesthetics is the in-depth analysis of own expectancy and behavioral response to beauty (Funch, 1997); Contemporary approaches originated from the study of most cognitive psychology and neuroscience.

The principles of minimum description length and algorithmic information theory, introduced by Jürgen Schmidhuber (2007) revealed an algorithmic theory of beauty by considering the subjectivity, and with numerous observation found out the principle for most pleasing aesthetics.

2.2 URBAN SETTING AND BUILDINGS ARCHITECTURAL AESTHETIC CHARACTERISTICS

Vitruvius, a prominent Roman classic architect, outlined the three main pillars that define good architecture: firmity, beauty and functionality, or firmitas, venustas and utilitas in Latin. Beauty, being one of the main components in architecture, plays a significant role in determining buildings' character (Berleant, 1986).

Nevertheless, without focusing in detail, looking at the general visual character of a building is nothing more than scanning physical aspects that distinguish it from others (Vartanian, Navarrete, et al., 2013). Irrespective of whether architecture is simple, plain or complicated, the understanding of the character of a building boils down to those elements that most distinguishes the general character than the detail architectural attributes like their profile and moldings (Berleant, 1986).

The characteristics of a building is embodied in its basic element, shape and settings, such as, wall, roof, openings/windows and doors, cupolas or chimneys, projections and protrusion, voids or recesses, arcades, balconies, open galleries contribute to the building's character. In addition to the materials, colors, textures, and patterns (Cupchik, Ritterfeld, et al., 2003). The overall character is also determined by the shape of the building, either basic form or complex; the height, either single story or skyscraper; the size, either small or big.

When a building is designed by an architect to be used by end users, there is an absolute certainty that the visual experience and perception of the building and the setting of the two parties will be different. There always exists a high level of risk that the professionals produce the design by their visual performance which might not be enjoyed by the users whose perception is different (Kelly, 1998). This conflict has existed through ages and it has not yet been solved however in some cases, there has been an attempt to reconcile the expectation of the two extreme pools, a structure that is well appreciated by the user and fulfilling the ambition of the professionals in designing an iconic figure.

If we take any building and its urban setting, it has a given form and specific purpose which depicts the function of the building. Its style is mostly the reflection of a particular time which the building has been built. However, most professionals disagree with the preceding argument. Most designers feel like each product should be unique, vibrant and new to avoid boredom (Kelly, 1998). Many styles have changed and/or grew with the development of technology. Technology brings about the opportunity to see new materials, new techniques and new construction systems. The principle of architecture has continuously been redefined, starting from the ancient period. Looking at Roman, Greek, Medieval, Modern, Industrial era, followed by the 20th century all having adopted different

historical approaches, which is dependent on the philosophy and the technological knowhow (Vartanian, Navarrete, et al., 2013).

2.2.1 CHARACTER OF A BUILDING

The ability to express a particular status or function is the sole purpose of building character. In history, no building has a neutral character or without a status or functional expression and without following at least one style. Just as an individual has a personality which has a unique characteristic, composed of upbringing, innate factors and environment which helps to single out an individual building from others. Likewise, various aspects of a building are comprised of an exclusive uniqueness (Vartanian, Navarrete, et al., 2013). The universally accepted motto by world class architect and urban planner Le Corbusier (1931) states that every building and surrounding setup should be unique and have a character. Since symbolism has become one of the leading principles in the age of architecture; every functionality is associated with a certain figure. The seven lamps of architecture, as per John Ruskin an English poet, a proper setting of a building can evoke abstract principles of humanity like life, grace, power, obedience, sacrifice, truth and beauty (Schmidhuber, 2007).

Regardless of the function of the building, whether it's a library, church, a bank or any kind, it owns certain appropriate characteristics hammered from the aesthetical characters, such as scale, contrast, composition and unity. A building and surrounding settings need to have these basic characters, functional, associated and personal characteristics. The external look of the building plays a great role in governing the usage and the purpose indicated as a fictional character. An important, influential role in location and culture are the determining factor for the associated character (Cupchik, 2003). An individual touch or test in designing express personal characteristics like vitality dignity and grace

2.2.1.1 OVERALL VISUAL CHARACTER: SHAPE:

Vitruvius' explanation of beauty has developed a distinctive aesthetic that characterizes architecture. Calm logic, rational order and symmetry are the most basic definition of beauty. The bold, but also simple and self-efficient contemplation, having high-end qualities appreciated by intellect were the inspiration for his prize of Classical civilizations.

Mathematical equations were used to make a logical building, which then after adopted in every part of building element and form. The parts exist in a direct mathematical correlation with the structural element and other parts. The "Golden Section ratio" is a ratio of 1.6818 is a complex mathematical relationship between the two sides, merely exist consistently in every naturally existing thing, even us human beings, most of our body parts proportioned to other parts by Golden Section ratio. In point of the basic unit, the golden section was driven from an ideal humans' anatomy, where later buildings during the classical architecture followed this same rule (Cupchik, 2003). The overall shape of a building is a significant aspect of its general visual characteristics. As an example, A building with unique vertical box-like forms with mid portion of the box protruding down to an extra floor. The example has many other aspects that use to characterize its general character, in addition to the windows pattern, vertical bands used as a decorative element which helps to detach the lower base to the upper stories (Kelly, 19998). The brick brown color applied to it with a grand arched entrance, and the large tower at the back of the building gave it a unique character (Hofstadter, 2009). Different elements of the building jointly with the overall shape of the building provides a distinct

character. Moreover, building the architectural form is very much dependent on the culture, geographical location and historical period and architectural style followed.

2.2.1.2 BUILDING SHAPE VS FORM:

Form: often associates with the experiencing of a volume or a mass in a three- dimensional standpoint shape and is a significant feature that gives and administers building appearance. The relative or configuration nature of lines demarcate a form or a figure. The composition and the pattern of an element governed by the relational property of forms. Shape, color, texture are the visual properties while position, orientation and visual inertia are the compositional property.

> *"Architectural form is the point of contact between mass and space Architectural forms, textures, materials, modulation of light and shade, color, all combine to inject a quality or spirit that articulates space. The quality of the architecture will be determined by the skill of the designer in using and relating these elements, both in the interior spaces and in the spaces around buildings"(Bacon, 1974, P. 22)*

REGULAR AND IRREGULAR FORMS: Regular forms are forms that are developed from basic shapes or combination of basic shapes and are kept in an orderly and consistent manner. They are more symmetrical in a single or multiple axis and they possess the property of stability. Even though the basic shapes form the base for form formulation, irregular shapes are also considered under the shape classification nowadays. This type of forms are forms that have no consistency and no formal structure. Nevertheless, with the adoption of the digital technology in the modern world, it promotes more irregular outputs, providing a better analytical solution on how to sustain irregular forms. Below is the detailed analogy of Gleiser (2010) of forms;

The shape is the outline of a given form which characterizes the surface. It is the principal feature which is used to categorize and identify forms. The most commonly used regular shapes are polygons and circles that can be circumscribed. From infinite sets of polygons, the most popular ones are the primary shapes, like triangle, square and circle. By the different rearrangement of this basic forms, one can come up with a whole new complex shape.

The size is the physical measurements of an object's, width, depth, and length. These measurements establish the form's property in addition to the scale, which is a relative measurement of an object in relation to another reference object in a given context.

The color is the occurrence of visual perception and light that in fact can be explained regarding person's perception of tonal value, saturation and hue. Color is one reason for a form to stand out from the environment. Color is also used to add to the visual weightiness of the form.

The texture is mostly a tactile quality of the view created by the surface's proportions, arrangement, shape and size of the parts, to disrupt the flatness or smoothness of the visual drama.

The material-The building's shape has continually dictated the material-the advancement of the usage and understanding of material. With the use of different materials, the shape possibility can vary by making advantage of the materials property. Materials are ranging from soft to hard, from transparent to opaque give designers room to experiment and become more creative and innovative.

Position is the visual filed which the object is to be seen or located. It is the relative location of forms to the observed environment.

Orientation is the directional arrangement about a reference point, other forms, viewing angle or compass direction.

Visual Inertia is the level of stability or the degree of concentration. It is also called the visual motion/ inertia of an object in a static position. The line of sight and the sense of gravitational pull combined with the relative orientation and geometry contribute to the visual inertia of a form.

2.2.1.3 BUILDING CHARACTERIZING ELEMENTS

Openings: Besides the functional requirements, openings play a great role on the characteristics of a building. The shape, size, position, location, orientation, craftsmanship and the type of material used for the opening area are some of the major distinguishing factors for the look. Openings are mostly the governing aspect for the reason that the contrast and proportion between void to solid in every building gives its unique characteristics.

Façade: It **i**s the vertical element of a building where the form can be very much characterized. It takes the signature look of the form as it has a unique and distinct property that can be both functional but at the same time aesthetical. Most designers give in-depth emphasis to what the building façade looks as it is the first impression that the viewer gets to experience. The angle, the voids, protrusion and suppression, material, color and texture are the major factors that characterize a façade.

Roof and Related Features: Even though the roof terminology has no rigid definition, it is the top most part of a building. The shape of a roof is mostly dependent on the climate and the locally available roofing materials, which are the main reason for a roof to differ from place to place greatly. The shape can range from flat to high pitched or pointed roofs; form domed or arched; from simple flat to a whole complex composition of different slopes hips, and gables. Flat, inclined, curved, dome and Irregular/ organic are the most commonly seen and general roof types/ shapes.

The roof and its related types are visually critical to the buildings overall visual character. The roof, not only is the top most part, but also the most visible part of the building, either very simple or decorative. It contributes to the first impression and experience of the building.

2.2.2 NEIGHBORHOOD SETTING (CHARACTERIZING ELEMENTS)

A character of a neighborhood is a collective contribution of urban setting, like accessibility (van't Hoff and Wall, 2014), density, surrounding facilities, sidewalks, setback, fence type or no fence, gates, size, location and features plaza, porch, curved or corner setting, type and design plantings, usage and location of parking. The surrounding buildings, sounds, sights, textures, tastes, and smells for under 120m urban settings; competition among buildings or sometimes, character conflict for every urban setting is an important aspect of characterization.

2.3 MNCs INVESTMENT FACTORS

According to Blonigen (2005), it is notable that FDI has developed at a speedier rate than most other global transactions, through the development of MNE action, especially trade flows between nations. From multiple points of view, MNEs are the control places for a huge part of worldwide exchanges other than investment. For instance, half of exchange flows are intrafirm; i.e., exchange inside an MNE.

In practical world, trends guided the attention of the economic community to explore factors that affect investment's performance scientifically. It is progressively perceived that the level and nature of infrastructure may have an important causal association with inflows of investment (Blonigen, 2005). In late studies, data framework has been singled out as a conceivably significant source of increased productivity and economic development, to some degree through its part in drawing in speculation and expanding the profits to that venture. Current economic geographers are trying to observe the depth of the relationship between investment flows and the level of networking

foundation show in host countries, and finds preliminary proof of a significant connection (Reynolds, Kenny, et al., 2004).

The economic strength of a country rose the classification of cities into three categories (GaWC, 2017), Alpha, Beta, Gamma cities. This classification was done based on the power, size, capacity, and quality of life, basing on monetary conditions, investment and per capita GDP. The attempt to point out why firms are appealed towards investing abroad has not been an easy task for many. Several studies argue that Suitable political climate and economic opportunity has been identified as the two major factors that determine the location of investment (Schneider and Frey, 1985, Nigh, 1985, Culem, 1988, Singh and Jun, 1995). However, contemporary investment studies indicate the networking and infrastructure play a key role (Hymer, 1970), specially the connection between firms to firm and firm to the government, coins the overall fundamental economic development. Architecture and neighborhood setting, in particular, plays a great role on shaping the quality of advanced infrastructure, which is the main determinant in attracting investment (Reynolds, Kenny, et al., 2004).

2.4 LOCATIONAL CHARACTERISTICS

Location is defined as an area where a building has its footprint plus the immediate surrounding. It is the contextual setup, the position or the site characteristics incorporating location identifiers. For example, elements, setting, geographic location and which form a recognizable address are the building identity or locational characteristics of an office building (Duntavs, 2006), while an office environment is an adaptable area for most companies. Depending on the vast diversity of service it gives and receives, the space required by the office is dependent and part of the investment criteria. The functionality of the building is influenced by the form and the location of the office building. Therefore, the form and function of the office building reveal the office location and the building characteristics. This concept is critical for understanding the context and ways to differentiate office buildings from the character of any other commercial buildings. However, each office building has its unique characteristics, which is dependent on, age, design, style, service, and technology adopted by the building. Looking at the locational characteristics of the office buildings and their surroundings, there is a common philosophy that influences to adopt local context, environment and culture.

2.5 WORLD'S TOP MNC HQS AND THEIR LOCATION

According to Alderson and Beckfield (2004), World class, highly-specialized global cities like London, Network, Tokyo, California, New Brunswick, Dusseldorf Zurich, Amsterdam, Munich, Palo Alto and New Jersey consistently dominate the world corporate system. Furthermore, they observed that MNC headquarter locations are necessarily not concentrated in global cities, rather they are mostly located within the city of the company's origin (Wall and Van der Knaap, 2011). Moreover, regardless of globalization, most MNCs determinedly keep their HQs within their national home bases. For example; Microsoft and General Electric are American companies based in the US same as Toyota and Honda which are Japanese and have their HQ in Japan. In contrary, as a result of global competition, status of buildings, branding and agglomeration for better information and knowledge sharing, MNC tend to shift their HQ as they become post continental. Forsgren and Holm (1995) phrased the reason for MNC's mobilizing out of the home city as "stationing away from home." MNCs have a holistic advantage over the local firms, with better information about the global economy, internationalization, suiting with world politics and law, taking advantage of other nation weak governance or differential policies. Initially, MNCs have

worldwide customers base that they have developed and which also is well acquainted with the brand. Globalization can easy overcome the loyalty to brand, and better product and services or locational value-adding in a systematized well-studied way that does not reduce national opposition (Forsgren, Holm, et al., 1995).

2.6 MNCs HQ RELOCATION

MNC's HQ has two major roles. The first role is to perform as an administrative center with a controlling and monitoring activities and the second, to create a good impression and build a positive image with in the network, mostly with an end goal of making additional revenue and increasing the number of clients. The decision to setup or relocate MNC HQ overseas form a place of origin may include:

- To respond to the fast development of the economy.
- To be close to more competitors (Looking for similar firms with same/better status to share/compete) and be part of the agglomeration (Ellison and Glaeser, 1999, Marshall, 1890),
- To scrape from unfavourable domestic legal and financial configuration to a better environment that can host them.
- The ease of modern mobility and fast globalization of the world.
- The global position and geographical location of the MNC which affects the firm's competitiveness capacity.

Studies by Birkinshaw and Braunerhjelm (Birkinshaw, Braunerhjelm, et al., 2006). tries to argues that the geographical location of corporate HQ has a slight relationship with firm's competitiveness, even though it is a very vital decision for the overall achievement of the firm.

2.7 MNCs ARCHITECTURAL STYLES/HISTORY PRACTICAL IMPLICATION.

Ever since the first MNC, Dutch East India Company, arose in the 17th century, economic liberalism and the free market economy started running the world (McCarthy, 1994, Amanda, R., 2016). Furthermore, globalization and business collaboration between countries started to grow. This unity opened a door for faster information flow, laying a firm ground for faster transmission of knowledge including architecture and architectural styles. As an example; the first company, Dutch East India Company, founded by the royal family of England, Queen Elizabeth I, has laid a fine ground for foreign investment HQ buildings, where the warehouses were stylish and elegantly designed that ended up to become the London's power and image over Asia during that period (Amanda, R., 2016). Such styles may contain different elements like regional character, unique building material, construction method, and building form. Most styles are chronologically ordered according to the change in time with the change in ideology, philosophy, fashion, new building material and techniques and technological advancement (Watkin, 1983).

Looking at the practical history of MNC's architecture, it is not different from the general building architecture, as it followed the universal building style at a time, also putting its contribution to the advancement and change of style. MNC HQ building's architectural styles show features that give a building a distinguishing character and historically recognizable. History indicates that the MNC has passed through five architectural styles, Neoclassical, Historicism, Early Modern, Postmodern and Contemporary Architecture (Brown and Gifford, 2001), listed chronologically. The culture of foreign investment grew dominantly during the late 18th century, corporations grew bigger and powerful on the global economy, centrally controlled by the HQ. The HQ architecture, it is only not

held as physical capital, but it also played a great role in showing the significance and the power of the firm over its investment branches and other companies as well.

The booming MNCs movement strongly aligned with the modernist movement, which gave architects the ideological and financial liberty, to show the art and the scientific advancement of the time. Key actors in this era ware, Peter Behren and his workers who later became legendary, such as, Walter Gropius, Le Corbusier and Ludwig Mies van der Rohe, very much known for the office and factories buildings designed with glass, steel and concrete (Ghirardo, 1996). The way of using the MNCs to express architectural style was founded by eleven architects gathered to find “the German Werkbund”(Rory, S., 2017) which has a modernist twist of Arts and Crafts movement style. Ever since this time the relationship between architecture and MNCs has been growing side by side, these two areas supporting each other, the corporation's desire to look big and strong and the ability of architecture to realize it made them stick together.

2.8 PLACE BRANDING AND IMAGE

Place image; according to Bose et al. (2016), is developing an image for some targeted specific customers in a particular area, by giving the area a unique brand and identity. Brand management system techniques were used by most Countries, regions, and cities to draw businesses, residents or visitors (Morgan, Pritchard, et al., 2011, Cardinale, Nguyen, et al., 2016). Place branding has become the new fashion of promoting one’s city with marketing terminologies like brand image (Sjödin and Törn, 2006), brand identity (Nandan, 2005) and brand positioning (Ries and Trout, 2004, Quelch and Jocz, 2005). Other scholars like Kotler and Gertner (2002) strongly argue that countries should empower themselves by adapting unique image branding strategy to attract customers and market. In addition, they highlighted that place branding is a strategic tool to uplift the image and competitiveness of a Country, region and city (Akotia, 2005). Place branding process is a complex task for the marketing and management of corporations to select the right image and the place to brand (Cai, 2002, Wagner and Peters, 2009, Fan, 2010). Country branding is more focused on creating the desired image within a target group (Foroudi, Foroudi, et al., 2016). Cities nowadays, have started putting an enormous amount of budget to market and improve the identity and overall image of the place (Moilanen and Rainisto, 2008).

2.9 MULTINATIONAL CORPORATE IMAGE

A corporate image is a way by which a firm, business organization or corporation present itself to the world. This is the principal mission by the corporations to build and maintain their identity to harmonize it to the objectives of the business. Trademarks and branding are a typical visual manifestation of identity, in addition to advertising, public relation, product designing and physical structure of corporate buildings (Knapp, 2001). Corporate Visual identity is important to corporations as it determines how corporations present themselves to both external and internal stakeholders which are very vital. In addition, it communicates the ambitions and values of the firm. Location is among one of the four distinguishing characteristics, three of which are targeted by external customers (Goerzen, Asmussen, et al., 2014).

First, a corporate visual identity is expected to offer the possibility of "recognizability" (Balmer and Gray, 1999). Secondly, it symbolizes the firm for all stakeholders, moreover, contributes to the reputation and corporate image (Schultz, Hatch, et al., 2000, Van den Bosch, Annette LM, De Jong, et al., 2005). Thirdly, about the geographical location, the identity of a corporate’s visual stamina is judged by the location and the physical structure, expressed by the financial status and liability of

the firm (Olins, 1990). Last but not least, the corporate visual identity classifies the status of the employees as it also plays an emblematic part in making such identification for the employees and business' sectoral characteristics (Balmer and Bromley, 2001, Dutton, Dukerich, et al., 1994, Kiriakidou and Millward, 2000). The current globalized market requires MNCs to setup and run effective branding strategy to be market competitive. Developing a company and product branding has been a key method to promote themselves and help them stay in the competition. Studies (Kotler and Keller, 2006) show that MNCs adapt evident characteristics to brand, promote and stand out. Furthermore, MNCs follow product branding strategy or corporate branding or occasionally both, even though, determinant factors to brand themselves within an international market has been puzzling. Corporations mostly use master branding strategy with characteristics like reputation, corporate image and stakeholder interests, branding as a projection of certain level of quality (Häggqvist and Lundkvist, 2008). Regarding the MNC, the customer's perception depending on the brand/ kind of product and countries' location, will be very different. Especially the country's image/reputation where the corporations located plays a significant role in the customer recognition (Han, 1989). In fact, some countries like China have improved global acceptance setback since 1989, by hosting world class MNCs which have changed the country's image (Fan, 2008). The more the corporate is connected to the world, or the more the outdegree a corporate has the more they care for the image, and the more it cares about locating in an attractive location/city.

2.10 MNCs SECTORAL IMAGE

Sectors such as Hotel and tourism (Hafeez, Foroudi, et al., 2016), hi-tech and ICT, food and franchise, retail, automotive, oil and gas and financial services are sectors that are more inclined to creating and retaining corporate brands. These sectors are areas that give due attention to beauty and image, to skim customer attraction. In general, according to Taylor and Peter (2014), advanced producer services (APS), also called service industries, such as, commercial laws/legal services, insurance, advertising, accountancy and financial services that are mostly located in the heart of a city. Hubs of modern services that regulate the financial and economic soul, with a wide range of the network. This makes them a key player among the stakeholders, which also gives them the luxury to invest an incredible amount of money for their image and also, how they look and pictured with in system (Hafeez, Foroudi, et al., 2016). This sectorial diffraction arose because of this sectors mobiles vast amount moony, having a strong power over the economy and desire to look elegant in front of their clients and indicate the superiority over other competing firms (Alderson and Beckfield, 2004).

2.11 NETWORKING AND OUTDEGREE

Countries are now drawing their attention towards how and to who connected. The strength of connection to the world amplifies the competitiveness and the power of a country, city and/or firm. The collective of strong multinational firms secures the economic resilience of a city, by creating a physical and virtual collective class to attract clients. This agglomeration in other edge ignites a competition among themselves to fight for a client, which forces them to build an image. Studies indicate that the more the firm is connected to a large number places the more it concerns about the image (Hafeez, Foroudi, et al., 2016) and how it is presenting itself through the all visual means, one of it is the building location. The connection of city and firm with the world is measured with the weighted outdegree, which is the total amount of investment and the total number of places connected and normal out degree, which is just measured by the number of places the firm is connected (Taylor, Catalano, et al., 2002).

2.12 LINKING AESTHETICS AND MNCs

Despite the fact that aesthetical theories have decreased after some time, there are as yet critical endeavors to give it more tissue. Aesthetics as a Philosophical study, investigates the nature of beauty, taste, and art, with a focus on the appreciation and creation of beauty, with the advancement of modern technology and computing skills, philosophers are trying to come up with a digital language to better understand the subject matter. In contrast to the subjectivity of beauty, most scholars argue that it is objective and measurable. Moreover, measuring indicators such as wholeness, variations, symmetry/ regularity/ uniformity, simplicity, intricacy, pattern, magnitude/ quantity, repetition, harmony, and sequence, have been used for over a century. The general form of architecture and urban set define the aesthetical characteristics which outline the overall visual perception. Moreover, these distinguishing characteristics contribute to the selection of the World MNC's HQ location, which puts a foundation for their corporate, place branding and image creation. This corporate image is different to different sectors; studies show that APS is highly inclined toward building corporate identity and branding as a result of being a powerful player in a large investment network or being connected to a large number of places/firms. In addition, this MNC APSs also has the luxury and the financial capacity to create or keep the corporate image. The collective image of this corporations also adds a value which promotes them to agglomerate, which results in attracting more MNC to locate in a certain area, as this has a positive pull on investment and enhance the competitiveness of the country.

2.13 CONCEPTUAL FRAMEWORK

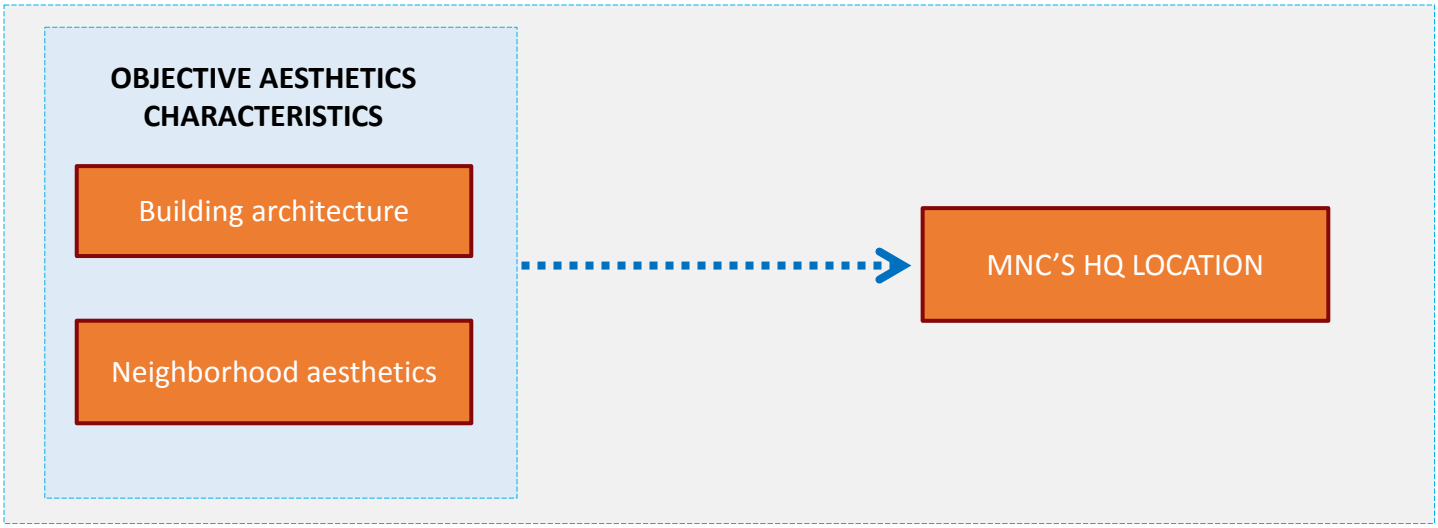

Figure 1: conceptual framework
Source: Author, May 2017

This conceptual framework tries to relate concepts such as, building architectural and surrounding neighborhood characteristics as independent variables and of MNC's HQ location as dependent variables. Some measuring indicators like position, orientation, urban setting, cluster, and surrounding are used for urban; building shape, size, color, material and texture are used for measuring buildings architectural characteristics and outdegree to measure the MNC's location characteristics.

Chapter 3: RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

This chapter discusses in-depth the step-by-step strategy trailed to empirically undertake the research, such as data collection and analysis methods and techniques. The approach followed tries to layout the way to find a significant dependency between building architectural and neighborhood aesthetics and MNC's HQ location. Furthermore, this chapter discusses the framework developed for logically structured data collection techniques and data analysis, on the base of reliable indicates extracted from previous chapters. The data was gathered from a secondary data source, a global market conveying a greenfield investment data with the worldwide MNC's information like ranking, number, and amount of investment, country of location, sector, distance parameters, year of establishment and investment.

This research adopted a desk research approach. The data for the dependent variable is generated from secondary database yielding a quantitative data while data for the independent variable is a primary data collected for the research. The type of data adopted in this research were both continuous and discrete data (Ordinal and Nominal/categorical data). Statistic analytical modeling techniques are used to simultaneously explain the relationship and level of significance between the factors affecting MNc's HQ location about the change in aesthetics.

3.1.1 REVISED RESEARCH QUESTIONS

The theories and concepts from the literature review have reinforced the significance of the research questions. The subjective knowledge about aesthetics has made the research questions to be more focused towards man-made aesthetic characteristics, neighborhood and building architectural characteristics than the natural characteristics for the selection of HQ location for the MNC's. The missing theory regarding the direct link between aesthetical characteristics and the choice of the HQ location, made the research question to be a valid question to be asked.

- To what extent do architectural building and urban neighborhood aesthetics influence the location decisions of MNC Headquarters?
    - What are the most common architectural features and urban neighborhood characteristics?
    - To what extent do architectures and urban neighborhood aesthetics affect the selection of top MNCs HQ locations?
    - Are there geographical similarities and/or differences in the top MNC HQ building architectural features and neighborhood aesthetics?

3.3 OPERATIONALIZATION OF VARIABLES

For the two concepts that are addressed in this research paper, the HQ location of MNC'S as the dependent variable, and the neighborhood and building architectural characteristics as two independent variables, are broken down to the preferred measurement and indicators extracted from the literature review.

Variable	Indicators		Description	Method of data collection	Data type	source
MNC's HQ location	• Outdegree value	count	The total number of investment a MNC has	Secondary data	Quantitative	financial and business services
		Outdegree Weighted	The total number with the value of investment a MNC has			

Variable	Indicators		Description	Method of data collection	Data type	source
Urban setting characteristics (under 500m radius)	• Accessibility	distance	How far is the building from a major transportation hub	Secondary data	Quantitative	Google Earth
	• Building Density	%	The built-up to open area ratio			
	• Sidewalks	distance	How close is the building to the nearest sidewalk			
	• Located in Urban center /Outskirts	distance	How far is the building from the city center			
	• in between or corner setting	Categorical	Whether the building is located in between buildings or located at the corner			
	• surrounding o total number of buildings	Count	Count the number of building with in 500 m radius			
	o Number of similar height buildings	distance	Count similar buildings with ± 3 floors			
	o Nearby park	distance	Distance to the nearest park			
	o Nearby water body	distance	distance to the nearest water body			
	o amusement facility	distance	distance to the nearest amusement facility			
	• setback	Distance	distance from the main street			
	• plaza	area	How wide is the plaza in terms of Square meters			

	• parking area	area	How wide is the parking area in terms of Square meters			
Architecture characteristics	a. Number of floors	Count	Number of floors to determine the height of the building	Secondary data	Quantitative	Google Earth
	b. Opening Types *(open to solid)*	ratio	The proportion of opening to solid ratio in percent.			
	c. Façade Material	Categorical	The material the building façade is constructed with, glass, steel, concrete, other or composite …			
	d. floor area(Footprint)	area	Total footprint of the building in Square meters			
	e. Color *(variation)*	count	Number of different colors used on the building.			
	f. Visual Texture (*Protrusion to Recesses)*	Categorical	Visual drama created by the ratio of Protrusion to Recesses			
	g. Tower Position *(front/center/ back)*	Categorical	Tower position in relation to the podium			
	h. Entrance emphasis	Categorical	If the entrance is emphasized or not.(entrance canopy, raised platform, directional guide)			
	i. architectural style	Categorical	To which category of stile which the building belongs to. (Neoclassical, Historicism, Early Modern, Postmodern and Contemporary Architecture)			
	j. Podium + tower	%	The ratio of Podium to tower in terms of vertical measure			
	k. Regular/ irregular	Categorical	Regular polygon or shapeless/organic			
	l. Voids	%	Level of void trough the building			
	m. Symmetrical	Binomial	Either symmetrical or asymmetrical			
	n. Intricacy/ Complexity *(is or not)*	Categorical	Complexity *(is or not) basic form (rectangular, cylinder, spherical, pyramidal) or combination to basic forms*			
Contr	o. Urban population,	Count	Total population of the country/ city	Secondary	Quantitative	World bank

	p. Political stability,	%	The direct effect MNC location with the political stability			data
	q. GDP	%	To control for the direct financial effect of			
	r. Originated city	distance	The place of origin of the MNC			
	s. Employment in the city	%	Control for the employment gap effect			
	t. City technological advancement, *(patent registration)*	%	Control for the effect of technology innovation with the image of the MNC			
	u. year of service MNCs	Count	to avoid the effect of longer service with the image			

Table 1: Operationalization
Source: Author, May 2017

3.3 RESEARCH METHODS AND TECHNIQUES

3.3.1 RESEARCH STRATEGY

Desk research refers to the data set that is not collected by the researcher or for the research, which in this case is described as a secondary data, an information set collected without conducting a field survey. In this research, secondary data sets are gathered from a global investment data source. The strategy adopted attempts to lay out the way to study the significant relationship between neighborhood and building architectural characteristics and MNC's HQ location. Furthermore, it introduces the constructed framework, by cultivating reliable and measurable indicators that are reinforced by theory. The research seeks to cover a large geographical area, i.e. the global scale, with large sample size, which forces the research to rely on secondary data The research tries to make a new connection between two different theories; it tries to study the existing phenomena, link, and relationship between variables that have not been tested before in many cases (Van Thiel, 2014). The existence of high-quality open data makes the research more dependable as it is required by the statistical model for a better result. Moreover, high reliability of the result is required for generalization and for policy makers to incorporate the result as a policy guide, which desk research has a better advantage of generalization and higher reliability (Van Thiel, 2014).

3.4 DATA COLLECTION TECHNIQUES

Data collection techniques, type, source, sampling method, tools and analysis techniques are discussed in detail in this section.

3.4.1 DATA TYPE AND SOURCE

For this research, both primary and secondary quantitative data are used. Open street map, google map and google street view are used to generate the primary data. Investment data for financial and business sectors is obtained from FDI Market and Financial Times Limited 2017 database. Both nominal and ordinal data type are extracted from the set of check list developed by the researcher. Additionally, the data was standardized to be used as a cross-sectional Data.

3.4.2 DATA COLLECTION TECHNIQUES

Data on the different building architectural features and neighborhood aesthetic characteristics were collected with both nominal and ordinal values. This was done by virtually visiting the building site using real-time online programs and checklists. The nature of the data collected was numerical and was used as an input for further statistical analysis. Hence, Google map and street view will be used as a main data collection tool for this purpose. OSM data from the open street map with the help of GIS was also used as an additional source of data.

3.4.3 SAMPLING METHOD AND TECHNIQUES

This research adopts a non-probability and purposive quota sampling techniques. The detail criteria for selection is discussed below.

From the total population of MNC, the literature indicates that sectors such as, insurance and banking, legal firms, and business companies care more about the corporate image, which is reflected on how they chose the location of their buildings. As a result, 30 top MNC HQ buildings from three most powerful cities were selected based on their outdegree ranking, New York, London and Tokyo taking the APS sector into consideration. Hence, a total of 90 top MNCs with in APS sector are selected based on their global connectedness, measured by their outdegree investment as theoretical foundation indicates, the more connected they are, the more they give attention to their image and branding.

3.4 DATA ANALYSIS TECHNIQUES

This section deals with two parts, descriptive and inferential analysis. Descriptive analysis is used to explain the overall property of the data, then afterward, an inferential analysis is conducted to analyze the interdependencies between variables, which is investigated using multivariate liner regression. The last part explains the common characteristics and sectoral differentiation of MNC's HQ location about the building architecture and neighborhood aesthetical characteristics. Empirical data was used from a particular attribute data like MNC's outdegree and primary empirical data from maps and image. The descriptive and inferential analysis are computed with the help of the contemporary spatial and statistical computer programs.

3.4.1 DESCRIPTIVE

The descriptive part follows three data analytical techniques, i.e., network analysis, spatial analysis, and statistical descriptive analysis techniques listed in chronological order. Firstly, the network analysis attempts to analyze and select the MNC's outdegree values, which tries to study the firms' network strength and level of connectedness. It aims to explain the relationship between the concentration of resource and power within the MNC network and their aesthetical characteristics. For this part, global investment values from financial and business services data were used, containing detail information of the companies, city destination, firm's sector and year of investment. The second part tries to explain the spatial characteristics and relationship by plotting firms on GIS map to examine the geographical distribution of top MNCs. With this method, the moving trend of MNC's HQ and the developing pattern of location choice is observed. Lastly, spatial analysis using both open street map data and ArcGIS are conducted. In this section, the data property was described, such as the number of observation, missing values, mean, median, standard deviation, errors, data types, and univariates.

Using the "describe" and "Codebook" tool on STATA, the data type can easily be observed. "summarize" tool helps to study the number of observation, the mean, standard deviation (Spread/dispersion), minimum and maximum observation values per every indicator. The "Correlation" tool is used to describe the relationship and interdependency of variables.

With regards to indicators with continuous (non-categorical) data, Pearson correlation is run. It is used to show how those variables are related and interdependent. It tries to find the magnitude of correlation by finding the coefficient of correlation with the given formula below.

Below are the list and a brief description of software used for descriptive analysis: -

GEPHI: is used to conduct the network analysis among the MNC's. The graphical output for reporting and a statistical outdegree values was used for the selection of the sample to 90 HQ and statistical analysis.

GIS: is used to plot out the geographical distribution of the MNC's HQ, and to calculate the spatial/ distance and area characteristics of the buildings. The graphical output was used for reporting and the calculated results are used for statistical analysis.

GOOGLE MAP/ GOOGLE STREET VIEW: is used to observe the buildings virtually. The structured observation with the help of the check list developed results in on empirical data.

OPEN STREET MAP: OSM data and XAPI are used to study the nearby facilities and export the data to GIS. The locational facilities were exported to GIS for calculating the number, distance, and area depending on the indicator's requirement.

STATA: is used to describe the statistical data and model used. Scatterplot tool is used to study the graphical strength relationship the variables then after the correlation coefficient, which is the value between -1 and +1 indicating the strength of the relationship between the variables is observed.

The output is cared for all the possible flaws by testing all the several assumptions that could deviate the result such as, the existence of the nonlinear relationship, outliers, multicollinearity, homoscedasticity, non-normality and omitted variables. Only then, regression analysis is conducted.

3.4.2 INFERENTIAL

An inferential statistical analysis is used to study the systematic relationship between aesthetics and MNC's HQ location. This analysis works under the probability theory of regression analysis and scale construction of the collected data (Van Thiel, 2014). The inferential statistical analysis is used to generalize, inference and/or explain predictions about the variables relationship by indicating the magnitude and the significance. A linear regression model is the most suited model for the research because the data are cross-sectional and the dependent variable is contusions. In Linear regression, the relationship between outdegree value as a dependent variable and the aesthetical characteristic indicator for an independent variable is modeled.

The results are reported both in words and table/figures, which were used collectively to explain the outcome. Numeric results from the tables/figures indicate the score generated from the analysis and the word is the logical interpretation of the numeric results.

The final stage is the explanatory analysis with four levels of multiple regressions. The first component of this stage is the regression between the location of MNC's HQ and building's architectural characteristics. The second is the regression between the location of MNC's HQ and urban characteristics. The third is the regressions per sector, and the final regression is all together. So, this study will explain whether aesthetics has a direct or indirect impact on the selection criteria of MNC's HQ location.

For the regression analysis, STATA software was used to do statistical analysis, study the empirical property of the data and OLS and negative binomial regression analysis of the data.

Having known the suitable regression, following is the structure for the regression,

$$P(y \mid X) = \frac{\left(y+\alpha^{-1}\right)}{y!\left(\alpha^{-1}\right)}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}}\left(\frac{\mu}{\alpha^{-1}+\mu}\right)^{y}$$

P(y|X) = the probability of MNC's HQ location
X= the aesthetic characteristics
μ □ variance
α =over-dispersion

STATA model: breg y x1 xn i.a, irr
note: y=dependent var, x1-xn=continuous independent var, i.a=categorical var, irr= incidence-rate ratios

Note: In this model, only variables that have significant relations with the dependent variable will be used and those with less significant relations are omitted from the model at the initial stage.

3.5 VALIDITY AND RELIABILITY

In this research, the data, the indicators and the methods implemented have been proven to be reliable and have been tested in prior scientific works. The statistical data is gathered from reliable official sources, like Financial Times 2017, FDI Market Financial and Business Service database, which ensures the reliability of the data. Unambiguous, and software reinforced straightforward calculation are used to remove all practical errors that could occur during calculation. The data is well tested for different possible faults and corrected according to the necessary standards. Linearity, outlier, multicollinearity and the missing variable test had been conducted before the regression, which made the result more dependable. The external validity was secured as this research is using secondary data, which permits it to generalize based on the result acquired and the possibility of using large data set. In contrary, Open street map and Google map are developed for the different purpose, which makes the result less dependable. This limitation is addressed through cross referencing the two tools used to generate the data. The other limitation observed is that the two data sets for dependent and independent variables were collected differently and at a time, which makes the result relatively less reliable, but this has been resolved by standardizing the data and controlling for firm establishment period accordingly.

Chapter 4: RESEARCH FINDINGS

In this section, the outcome of the collected data is interpreted and discussed in detail. It is divided in to three sub sections. The first section (4.1) discusses general descriptive analysis of the nature of the data while the second section (4.2) covers the inferential analysis. Lastly, the third section (4.3) presents specific descriptive analysis results. It should be noted that only few selected maps, charts, graphs and tables are shown in this section while the majority of the outputs are saved in the annex.

4.1. DESCRIPTIVE ANALYSIS:

In this sub section, the data is described, associated, contrasted, evaluated, and compared using graphs, charts and maps. Furthermore, the general behavior of the data followed by comparison between different regions on different variables are discussed in detail.

4.1.1 GENERAL DESCRIPTIVE ANALYSIS:

The MNC's outdegree and weighted outdegree are taken as primary indicators to measure the selection of MNC Headquarter locations. On top of that, the data was limited to the top three cites ranked with their investment outdegree, which was used to analyze the common and different regional characteristics of MNC's HQ. Whereas the relationship between architectural and neighborhood aesthetics and MNC Headquarter locations is limited to the top 90 MNCs from the selected cities ranked based on the MNCs outdegree.

4.1.1.1 MNC'S OUTDEGREE COUNT AND WEIGHTED OUTDEGREE

The study analyzes MNC's outdegree count and weighted outdegree value in three geographically distinct cities taken form FDI markets. To measure the geographical similarity/differentiation on aesthetics and investment within those influential global cities where the cities are coded as a dummy variable. Moreover, multilevel regression is run to study the correlation and extent of relationship between aesthetics and MNCs outdegree by controlling for population, geographical size, age of the MNC, total floor area and the age of the building they choose to locate.

The first part adopted a linier multivariate OLS regression to analyze the relationship between the outdegree value (in US Dollars) and aesthetics. Nonetheless, the figure below shows that the generated histogram is skewed to the left, which indicates that the mode is greater than the mean, but rather it was supposed to be concentrated in the center.

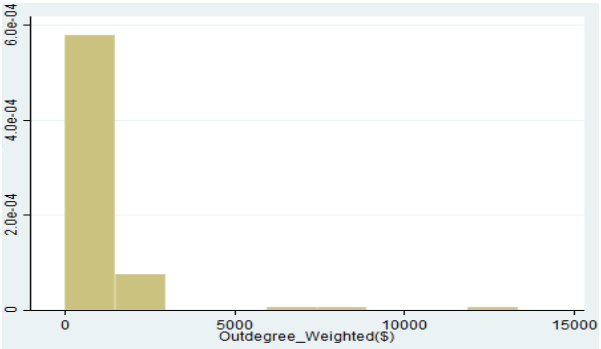

Figure 2: MNC's Weighted Outdegree Histogram
Source: Author, 2017: based on Financial times, 2017.

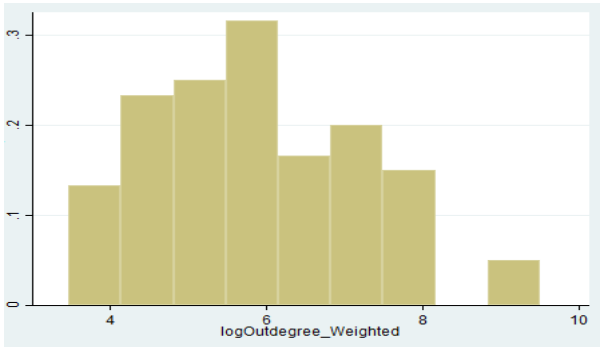

Figure 3: MNC's LOG-Weighted Outdegree Histogram

Therefore, the appropriate correction has been applied for this model by generating a log. A normal OLS regression is accepted to be appropriate as one of the dependent variable, weighted outdegree is a continuous data. From this point onward a step by step assumption test was conducted to have a reliable result taking care and correcting for all the faults in the data.

The second part uses MNC's Outdegree count as dependent variable, which is a categorical (discrete) and randomly distributed (Poisson distribution) data, which also makes OLS regression inappropriate for this model. Consequently, it requires a different analysis method that considers the mode and mean as equal, so either Poisson or negative binomial could fit the requirement but the difference between variance and mean (over-dispersion) is the determining factor to choose between the two.

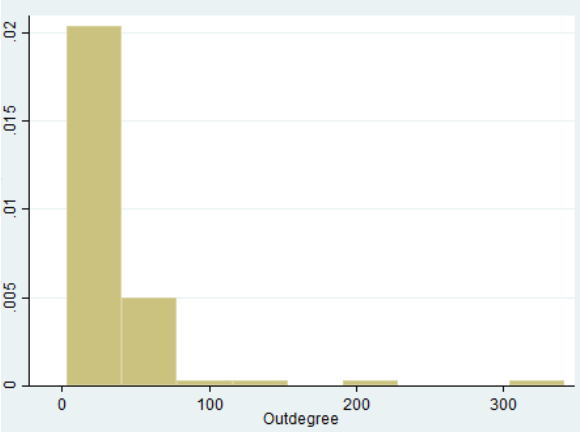

Figure 4: MNC's Outdegree Histogram
Source: Author, 2017: based on Financial times, 2017.

```
. sum Outdegree, detail

                        Outdegree
-------------------------------------------------------------
      Percentiles      Smallest
 1%            3              3
 5%            4              3
10%            6              3       Obs                  90
25%           10              4       Sum of Wgt.          90

50%           16                      Mean            30.57778
                      Largest         Std. Dev.       44.89162
75%           36            104
90%         57.5            153       Variance        2015.258
95%           71            204       Skewness        4.68401
99%          342            342       Kurtosis        29.61295
```

Table 2: Poisson regression, Variance and Mean of Outdegree

Table (2) above shows that the mean for the dependent variable outdegree is 30.58, which is not equal to the variance (the square of std. dev) 2015.25. Therefore, this demonstrates that Poisson distribution regression is not the suitable model for the analysis. An alternative suitable Poisson-like analytical model for categorical and randomly distributed data set is Negative Binomial Regression(NBR). Table (3) below shows the zero-ratio alpha test, where the alpha vale is positive, non-zero and the probability chi2 test is significant. Which means, the mean and the variance are assumed to be the same with an over-dispersion, putting NBR as the most fitting model.

/lnalpha	-1.481206	.1729746	-1.82023	-1.142182
alpha	.2273634	.0393281	.1619886	.319122

Likelihood-ratio test of alpha=0: chibar2(01) = 481.73 Prob>=chibar2 = 0.000

Table 3:Alpha test and chi2 test for Negative Binomial regression
Source: Author, 2017: based on Financial times, 2017.

The data for dependent variable is collected from MNC's FDI markets taking the number of investment in three cities, London, New York and Tokyo within financial, business and service sectors and own generated aesthetical characteristics for independent variables. Each city has an observation of 30 MNCs. The mean and standard deviation of the dependent variable's, MNC's outdegree, is classified according to the individual cities is tabulated below.

VARIABLE	OBS	MEAN	STD. DEV.	MIN	MAX
NY_Outdegree	30	31.83333	37.19852	10	204
NY_ logOutdegree_Weighted	30	6.140554	1.239387	3.966511	8.963685
LO_Outdegree	30	45.13333	63.36742	15	342
LO logOutdegree_Weighted	30	6.047955	1.318868	4.416428	9.498831
TOK_Outdegree	30	14.76667	17.49814	3	58
TOK_ logOutdegree_Weighted	30	5.498883	1.308312	3.48124	7.918439
Total Outdegree	90	30.57778	44.89162	3	342
Total logOutdegree_Weighted	90	5.895797	1.306191	3.48124	9.498831

Table 4:mean and Std. Dev. Dependent Variable
Source: Author, 2017: based on Financial times, 2017.

Form table 4 above, we can observe that the std. dev. for the outdegrees is high, which is an indicator for high variation between the observed points. While the outdegree Weighted has a low std. dev., because the variation and distribution is recovered through logging.

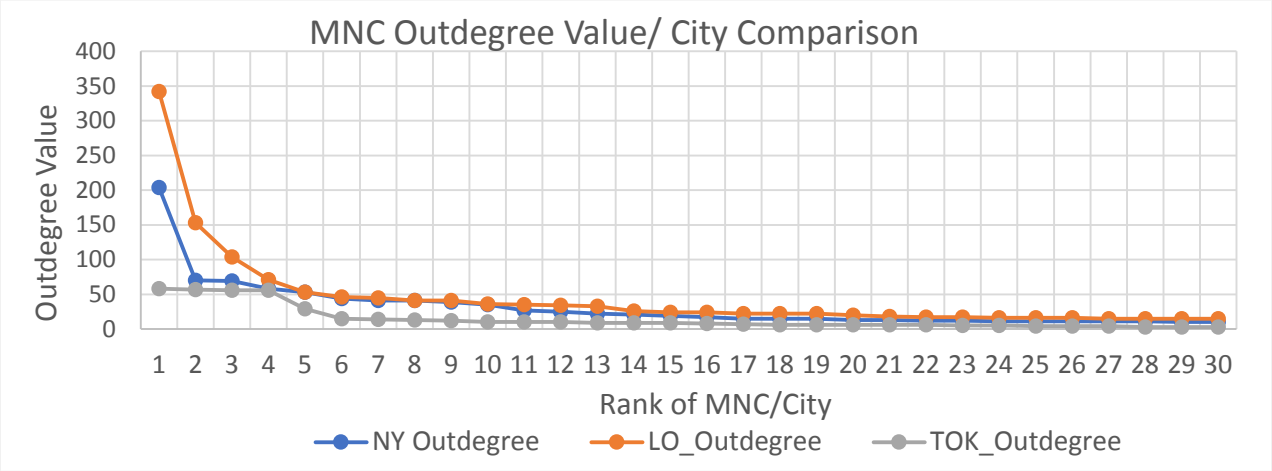

Figure 5: MNC Outdegree Value/City comparison
Source: Author, 2017: based on Financial times, 2017.

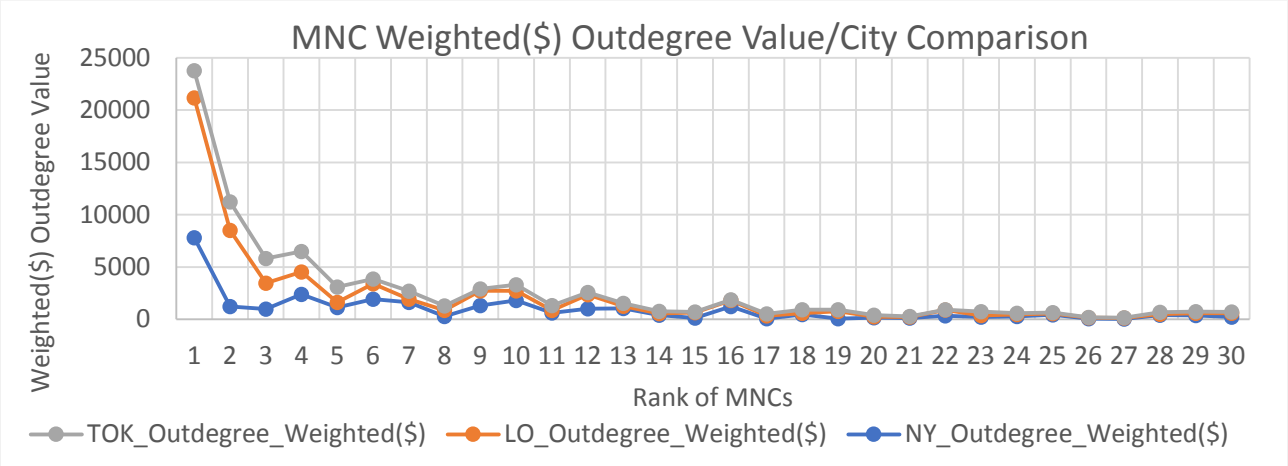

Figure 6: MNC Weighted ($) Outdegree Value/City comparison
Source: Author, 2017: based on Financial times, 2017.

When comparing the graphs in Fig 5 and 6, we can evidently see that London scores the highest outdegree while Tokyo grades the highest Weighted ($) outdegree. Nevertheless, in both cases, we can witness that, the very first four companies have extreme network values but the majority are closely ranged under 15 outward investment counts and 20,000$ outward investment values.

Based on this, the first result to be generated is the Pearson Correlation Relation, which listed out the significant relationship between outdegree and architectural and neighborhood indicators. From this, the city where the MNC is located, the sector, visual texture, tower position, logo's position on the building, the intricacy of the building, symmetry, regularity, architectural style, building entrance emphasis, podium to tower ratio, .the number of color applied on the building, solid to window(glass) proportion as architectural indicator and MNC service year, total building floor area, city geographical area, city population as a controlling variable were found to be significantly correlated. Except for architectural style, which has to be dropped because of multicollinearity test, all the other indicators were used in the model.

Similarly, the neighborhood indicators of MNC HQ within 500m radius were the city where the MNC located, accessibility, located within the city center or not, the sector, the number of road that the building is facing, the total number of surrounding buildings, average distance between neighboring buildings, the distance to subway entrance, stations, park and to the next MNC HQ as an independent variable and MNC service year, city geographical area and city population as a controlling variable are found to be significantly correlated with no dropped variable (van't Hoff and Wall, 2014).

4.2 INFERENTIAL FINDINGS

In this study, the influence of aesthetics on the location of MNCs HQ was measured by network values. The network counts and values used as a dependent variable were run in a separate model. The result from OLS regression (Weighted-Outdegree value) and negative binomial (Outdegree count) for both architectural and neighborhood characteristics are presented, interpreted and discussed below. It should be noted that the results of both regional and sectoral differentiation were generated. Nonetheless, the sectors are not addressed because of limited observation, but as for the output results, the annexes should be referred.

PART 1: ARCHITECTURE AND WEIGHTED OUTDEGREE-OLS RESULTS

From Table 5 below, we can see that a 70.2 % of variation in MNCs Weighted outdegree is explained by the variation in the independent variables. It is also clear that having the tower to the front of the building with an emphasized entrance and the logo on the top of the building significantly increases the MNCs weighted outdegree by 79%, 38%, and 11.5% respectively. In contrary, buildings having the tower to the center or no tower will significantly decrease the MNCs weighted outdegree.

VARIABLES	MNCs Outdegree_Weighted
Tower Position (located Up front)	0.789*
	(0.47)
Tower Position (located on the center)	-1.117***
	(0.41)
Entrance Emphasis	0.381*
	(0.23)
Logo (logo @ top of BLGD)	1.148**
	(0.56)
Sector (Banking Firms)	0.449*
	(0.26)
Sector (law Firms)	-0.854*
	(0.48)
Sector (business Firms)	-0.489**
	(0.24)
MNC_Service_year	0.00436***
	(0.00)
Building Footprint	0.037*
	(0.00)
City Population	-1.778**
	(0.00)
Constant	6.688***
	(0.74)
Observations	81
R-squared	0.702

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: OLS regression for weighted outdegree and Architecture characteristics
source: Author, 2017:

Note, the insignificant values has been removed from the table for the convince of presentation. To see the complete table please refer to ANNEX 1.

The controlling variables like the building footprint and MNCs service year are found to increase MNCs weighted outdegree while city population inversely affect it. We can deduce that as the building foot print increases the MNC is growing in business and network and also as the MNC's service year increase the network and business in most cases will increase. Since the city population has a negative influence, we can deduce that, as the population increase the city becomes more and more crowded which results in reducing the MNC's image.

PART 2: ARCHITECTURE AND OUTDEGREE-NEGATIVE BINOMIAL RESULTS

Table 6, we can see that a 16% of variation in MNCs outdegree is explained by the variation in the independent variables for the overall model while 28%, 34% and 39% for New York, London and Tokyo respectively is explained. Visual texture is crucial only for London which can also mean that one-unit increase in visual texture will positively influence the outdegree by 76%. We can see that the tower position complies with the OLS results where the tower at the center will negatively affect the outdegree while bringing it to the front will increase the MNC outdegree. In addition, one-unit shift to the center will decrease the outdegree by 66% in all the three cities and the effect is amplified in Tokyo by 13.4%, apparently bringing out the geographical differentiation. The logo in Tokyo is only significant when it is positioned at the ground level, but for the rest, placing it on the top of the building is the most appropriate position. This means that when the logo position increase by one unit towards the upper part of the building, the outdegree will increase the by 68%, 150% and 160% for Tokyo, New York, and London respectively. One other interesting thing observed is that the MNCs prefer buildings that are regular and symmetrically (balanced, beautiful, proportioned, and harmonious) oriented. The result indicates that one unit increase to being more symmetrical will increase the outdegree by 61% and the one-unit increase in being irregular will decrease the outdegree by 260% and 72% for New York and London respectively. In general, we can say that an increase in the number of colors used on a building will inversely affect the outdegree. Furthermore, one-unit increase in opening/glazing to solid proportion will positively affect the outdegree complementing the architectural style results where contemporary buildings adapt higher open to solid ratio.

MNC_ARCH_CITY_MODEL				
	MNC Outdegree ALL	MNC Outdegree NY	MNC Outdegree LO	MNC Outdegree TOK
Outdegree				
1.Visual_Texture	-0.22	0.441	0.757**	0.119
	(-1.39)	-1.63	-2.73	-0.31
2.Tower_Position (center)	-0.664***	0.0918	-0.19	-1.344**
	(-3.79)	-0.18	(-0.90)	(-3.13)
3.Tower_Position (back)	0.203	5.520**	1.148**	-1.262
	-0.65	-2.63	-3.05	(-1.92)
2.Logo (ground level)	-0.0799	0.124	0.158	1.208*
	(-0.48)	-0.21	-1.03	-2.49
4.Logo (top of the building)	0.680***	1.531***	1.619***	0.106
	-3.86	-5.26	-3.77	-0.17
1.Symmetry	0.611***	-0.0738	0.237*	0.145

	-3.41	(-0.10)	-2.13	-0.36
2.Regularity (irregular)	-0.411	-2.607*	-0.728***	0.0608
	(-1.88)	(-2.09)	(-4.67)	-0.1
Architectural Style (Neoclassical)	-0.355**	-1.168***	-0.345***	-0.661
	(-3.23)	(-3.66)	(-5.85)	(-1.81)
3.Color_Count (three colors)	-0.296	-5.935**	-0.474**	-0.138
	(-1.18)	(-3.27)	(-2.98)	(-0.35)
4.Color_Count (four colors)	-0.275		-0.696**	-0.335
	(-0.96)		(-3.26)	(-0.33)
5.Color_Count (five colors)	-0.712		-0.850**	-0.109
	(-1.73)		(-2.64)	(-0.11)
Open_to_Solid	0.0104***	0.0237**	-0.00428*	0.0204***
	-3.37	-2.63	(-2.02)	-3.54
Total_floor_area	0. 147*	0. 374***	0. 148	0. 101
	-2.06	-3.4	-1.9	-0.23
_cons	4.353***	9.827***	5.405***	3.866
	-6.91	-4.4	-14.85	-1.92
lnalpha				
_cons	-1.481***	-2.893***	-24.27	-19.03
	(-8.56)	(-5.76)	.	(-0.03)
N	89	29	30	30
Pseudo R2	0.16	0.28	0.34	0.39
t statistics in parentheses ="* p<0.05** p<0.01***p<0.001"				

Table 6: MNCs outdegree and architectural characteristics, Negative Binomial results
source: Author, 2017:

Note, the insignificant values has been removed out from the table for the convince of presentation. To see the complete table please refer to ANNEX 3.

PART 3: NEIGHBORHOOD AND WEIGHTED OUTDEGREE-OLS RESULTS

Table 7 below shows the neighborhood proximity measure. A 59.4% of variation in MNCs Weighted outdegree is explained by the variation in the independent variables. It explicitly reveals that the distance to station and subway entrance are very significant, which indicates that the MNC's desire to be located close to these services. As the distance to station and subway entrance increases, the outdegree and the weighted outdegree will decrease by 12% and 24% respectively. Relating the proximity measures with the geographical distribution of MNCs discussed in the descriptive section of this study, we can see that MNCs prefer to settle close to transportation services, which became one of the reasons for them to cluster within a given area. The MNC's proximity to one another is critical as it becomes better for them to share the services mentioned above. Moreover, the fascinating part is to see that, it is a common phenomenon across all case cites. The total number of surrounding building under 500m plays a significant role in attracting or repelling the MNCs. The result shows that as the density of the neighborhood increase, the MNCs Weighted outdegree will decrease by 0.2%. This indicates that the more compact the area, the less attractive it becomes, as it gets more crowded, the outdegree and the image of the MNCs reduces.

VARIABLES	MNCs Outdegree Weighted
Building Count	-0.00178**
	(0.00)
Distance to Subway Entrance	-0.235*
	(0.12)
Distance to Station	-0.118*
	(0.07)
MNC Service Year	0.00505***
	(0.00)
Sector_ 6 (law firms)	-1.647***
	(0.21)
Sector_7 (business Firms)	-2.173***
	(0.76)
Constant	7.362***
	(0.65)
Observations	83
R-squared	0.594
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Table 7:Neighborhood and Weighted Outdegree-OLS results
source: Author, 2017:

Note, the insignificant values has been removed out from the table for the convince of presentation. To see the complete table please refer to ANNEX 2.

PART 4: NEIGHBORHOOD AND OUTDEGREE-NEGATIVE BINOMIAL RESULTS

Table below presents the regression result for three case cities and all joined.

MNC_NHD_CITY_MODEL				
	MNC Outdegree ALL	MNC Outdegree NY	MNC Outdegree LO	MNC Outdegree TOK
Outdegree				
3.Road_Facing (three sides)	0.22	0.937**	-0.642*	0.22
	-0.4	-2.92	(-2.13)	-0.4
Distance to Subway Entrance	-0.0339**	0.00065	-0.0267*	-0.0339**
	(-2.78)	-0.1	(-2.46)	(-2.78)
Accessibility	0. 285*	-0. 00982	-0.0147	0.285*
	-2.19	(-0.12)	(-0.32)	-2.19
1.Urban_Center_Located	-0.749	0.96	-0.606*	-0.749
	(-1.08)	-1.58	(-2.54)	(-1.08)
Distance to the Park	-0.000288	0.000171	0.000147**	-0.000288

	(-0.85)	-0.48	-2.69	(-0.85)
DST_MNCMNC	0.0908*	0.342***	-0.0341	0.0908*
	-2.55	-5.3	-1.12	-2.55
MNC Service Year	0.00921**	0.0035	0.0015	0.00921**
	-3.05	-1.27	-1.76	-3.05
3.Sector_ID (bank)	1.310**	-0.116	-0.301	1.310**
	-2.63	(-0.22)	(-0.62)	-2.63
4.Sector_ID (Financial)	-1.005	-0.57	-1.336**	-1.005
	(-1.60)	(-1.11)	(-3.23)	(-1.60)
5.Sector_ID (Insurance)	-0.174	-0.263	-0.914*	-0.174
	(-0.25)	(-0.58)	(-2.39)	(-0.25)
6.Sector_ID (law firms)	-0.417	-1.286*	-0.686*	-0.417
	(-0.66)	(-2.41)	(-2.13)	(-0.66)
7.Sector_ID (business Firms)	-0.731	-0.573	-0.818*	-0.731
	(-1.13)	(-1.14)	(-2.04)	(-1.13)
_cons	2.299	1.071	5.398***	2.299
	-1.84	-1.04	-11.75	-1.84
lnalpha				
_cons	-2.521***	-2.043***	-2.750***	-2.521***
	(-4.78)	(-6.19)	(-6.83)	(-4.78)
N	30	30	29	30
Pseudo R2	0.08	0.17	0.17	0.24
t statistics in parentheses				
="* p<0.05** p<0.01*** p<0.001"				

Table 8: Neighborhood and Outdegree-Negative Binomial results
source: Author, 2017:

Note, the insignificant values has been removed out from the table for the convince of presentation. To see the complete table please refer to ANNEX 4.

Table 8 we can see that only 8% of variation in MNCs outdegree is explained by the variation in the independent variables for the overall model while 24% for Tokyo and 17% for New York and London is explained. The surrounding neighborhood aesthetics has been characterized and measured with several variables. Table 8 shows significant results of the regression between MNCs outdegree and neighborhood characteristics. In the same table, the city differentiation is also being presented. It should be noted that results for both regional and sectoral differentiation were generated. Nonetheless, the sectors are not explained because of limited observation, but as for the output results, the annexes should be referred.

The number of roads that a building is adjacent to, accessibility, the distance between MNCs and distance to the park do have a positive influence on MNC's outdegree while the relative distance to the city center and the distance to sub way entrance are negatively correlated. From these results, we can understand that the building facing three sides street will increase the network outdegree for New York by 93% and decrease by 64% for London, which means that a building set in a corner will increase the accessibility where the planning history of New York and London played a great role. New York has a grid layout which furnished prior advantage for building to be adjacent to three street. On the contrary, London has an irregular layout limiting the flexibility on the number of roads a building is facing.

The accessibility is as well found to increase the outdegree by 28% for both Tokyo and all the cities together. The distance to subway is a good proximity measure on how the MNC is connected. A 10-meter decrease between the MNC's HQ and the subway entrance, increases the MNCs outdegree by 26% for London and 34% for Tokyo and all the cities joined. Being located in the city center will present several benefits; proximity to other MNCs is one of it. Another result that has been found is that, the proximity to the park is significant for London and also one kilometer decreases in distance between MNC's HQ and the park will increase the outdegree by 5% (van't Hoff and Wall, 2014).

The distance between MNCs signifying the physical proximity form one MNC to the other, following the agglomeration theory is found to be very important as they are located within a reasonable walking distance, as MNCs agglomerate for the benefit and comparative advantage. MNCs are positioned comparatively close to each other for sharing, learning and effecting information and clients. We can see that the effect is stronger in New York than the other cities and all cities together. In New York, as the distance between MNCs decreases by 10 meters, the outdegree increases by 34% while the overall joined and Tokyo increase by 9%. Consequently, this shows that clustering in a close area is appropriate for the HQ.

4.3 SPECIFIC DESCRIPTIVE ANALYSIS

4.3.1 COMMON/DIFFERENT CHARACTERISTICS

In this section, the common and different architectural and neighborhood characteristics of MNCs HQ will be discussed by plotting the results on GIS map to see the geographical distribution, relationship and growth pattern of the MNCS.

COMMON/DIFFERENT CHARACTERISTICS

Based on fig 7, we can see that the MNCs are agglomerated in United States to the north of New York business district area, Manhattan Island. It is the oldest and the origin of the city, which grew to become the most populated administrative and economic center. The most top investments HQs are concentrated at center (Midtown Manhattan or Time Square) and very few are located near the financial center and stock exchange which is located to the south of Manhattan (Lower Manhattan). Even though the higher outdegree investment count of 204 and Weighted outdegree value of 7814.1$ by a company named “Citigroup" is located to the south, the average MNCs with an outdegree count between 15 to 45 are located in the Midtown area. Ever since the Time Square HQ building for New York Times publisher were built in 1904, the place has had developed popularity among the corporate world, especially the entertainment, media and financial sectors. This historic HQ building was then surrounded by many other corporate firms following its lead on digital advertisement. The map below is a demonstration of how financial, business and service corporate HQ buildings chose to locate themselves close to each other. The shift towards an alternative location was idealized in the 1970s where the Twin-Towers ware constructed in Lower Manhattan to balance the congestion and extreme price escalation of the Midtown area, only then after the financial district slowly moved south.

Figure 7:New York, MNCs Outdegree distribution plot.
Source: Author, 2017.

Taking advantage of its relative geographical position in United Kingdom, New London is a resilient seaport city and a strategic access point of US in the northeast coast. Looking at fig 8 below, we can see that the New London is a privileged deepwater port, the wealth pumped in and out of the city through the MNCs made the most prosperous city in the world. In addition, we can see that all the top MNCs chose to locate in the New London area with in the Greater London to share the popularity and the wealth accumulated within the city. New London is home to several top MNCs with its key theme and smart use its supreme legacy as a world economic capital.

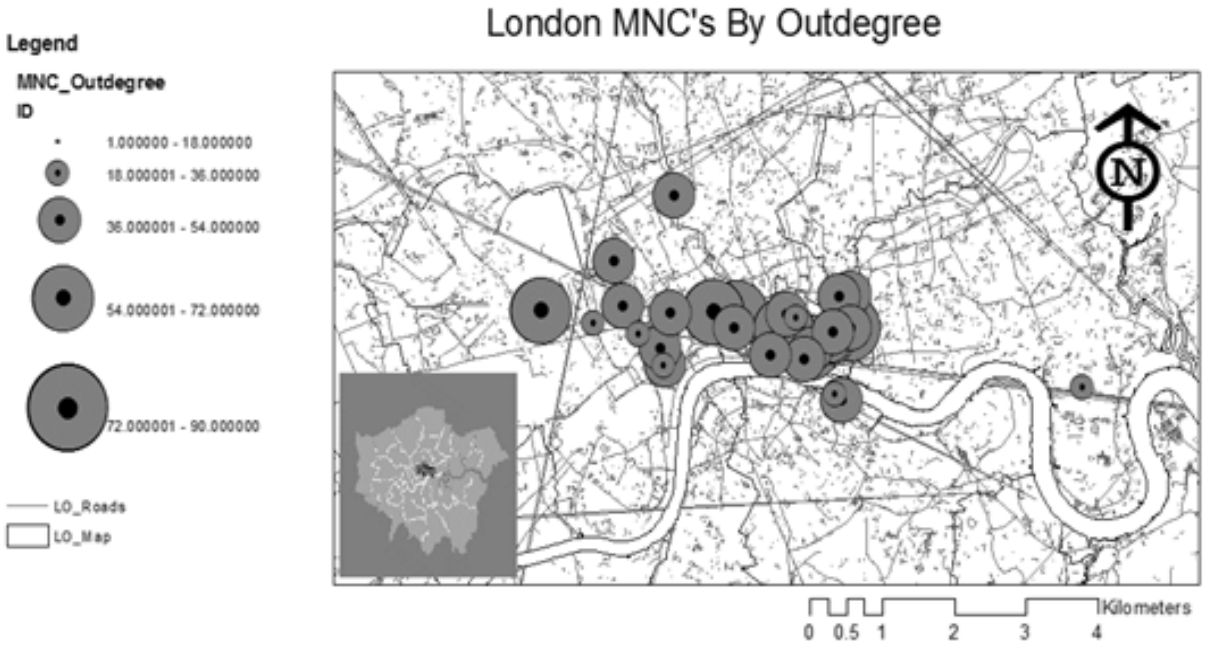

Figure 8: London, MNCs Outdegree distribution plot.
Source: Author, 2017.

Looking back to the last many decades, Tokyo has been honored as one of the foremost cities in Asia. Being the world's largest city and having the largest GDP, Tokyo has tremendous agglomeration of national companies with its high reginal values, which made it one of the top attractive cities for MNCs. From the fig 9 below, we can see that Tokyo has two third of the MNCs clustering in an area specially designated for HQ development. This area as seen is near the seaport and kept as the financial and business district named Marunouchi.

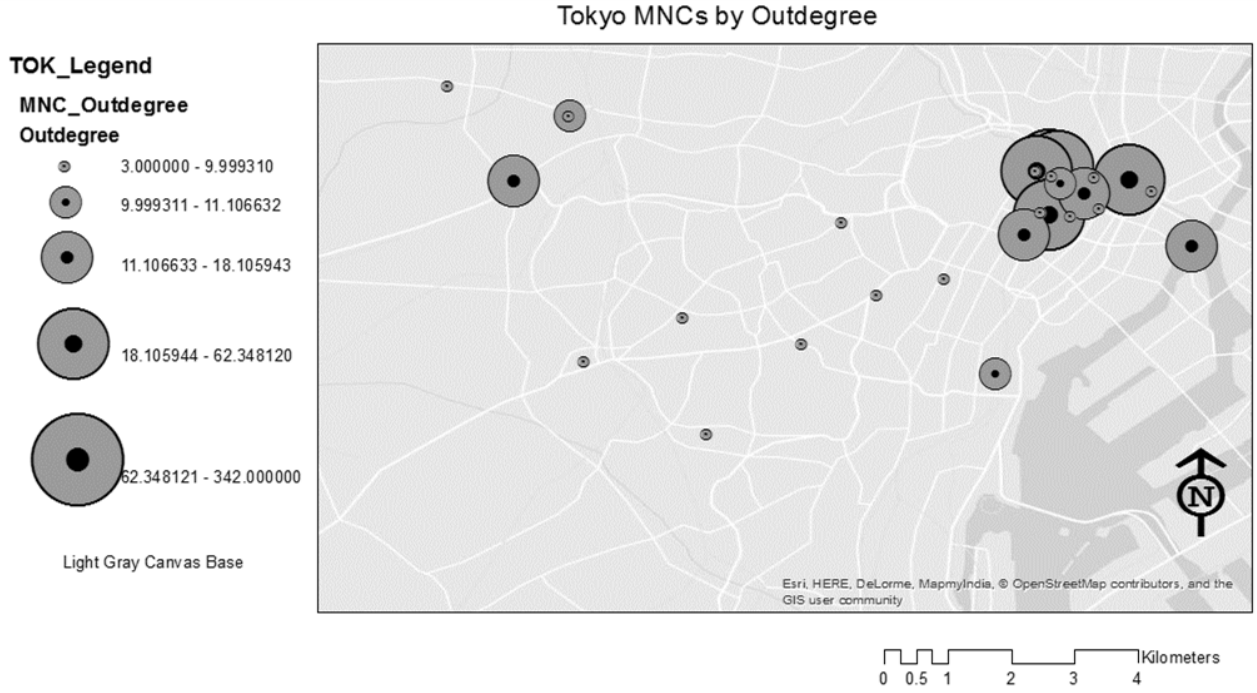

Figure 9: Tokyo, MNCs Outdegree distribution plot.
Source: Author, 2017.

4.3.2 SIGNIFICANT COMMON AND DIFFERENT ARCHITECTURAL CHARACTERISTICS

4.3.2.1 MNC'S HQ BUILDING'S ARCHITECTURAL STYLE: is a characteristic that makes a building look historically identifiable. The top 90 MNCs HQ observed in this research have an architectural style mean value of 4.2. It ranges from neoclassical to contemporary divided in to five years. From the maps below, we can see the geographical distribution and development of styles together with the common characteristics. The first thing to see is that most of the buildings are rated as postmodern or contemporary, which shows the MNCs are more inclined towards recent styled buildings. It also demonstrates that the wonder of multinationals became popular during the same period as those styles. Fig 10 presents Midtown Manhattan. New York is more into contemporary style where it gives the freedom to build strong, high-rise, light weight with a tremendous freedom of form and design expression.

Figure 10: NY_Architectural style
source: Author, 2017:

On the other hand, in the east of New London, Fig 11 below, contemporary architecture is more dominating in the periphery than the center where there exists the old town with old buildings. We can also see that transformation and growth of the city by the architecture at place.

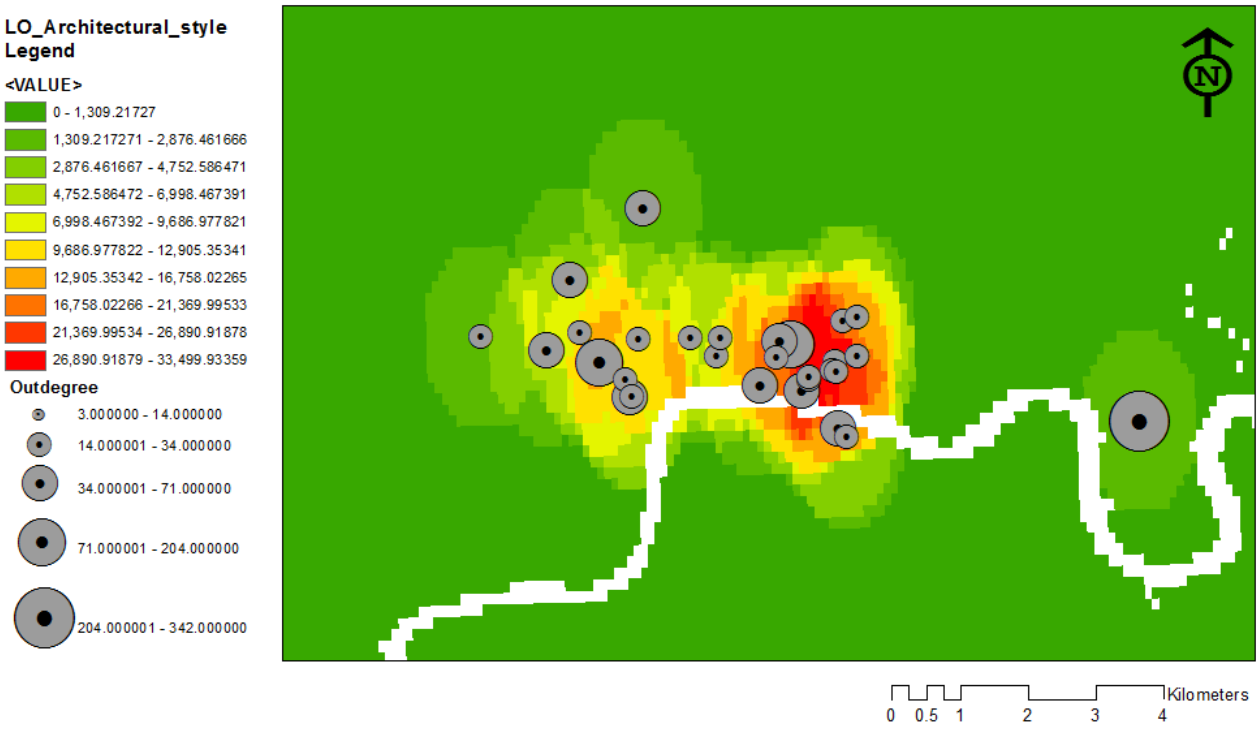

Figure 11: LO_Architectural style
source: Author, 2017:

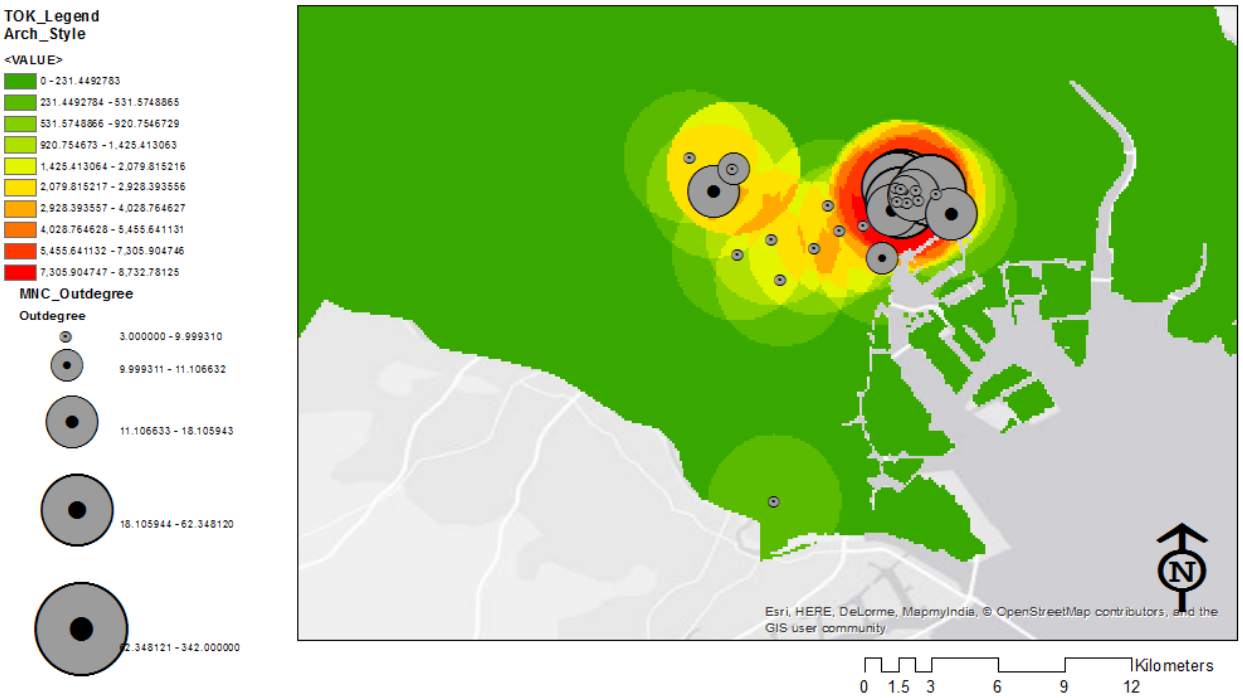

Figure 12:TOK_Architectural style
source: Author, 2017:

Fig 12 shows that Tokyo all in all is flooded with contemporary buildings with 21st century computer-aided design dominated contemporary architectural style. Another fascinating thing found was that this MNCs do not prefer to locate in a building older than early modernist style. Except in London, where only the very top MNCs which counts about 3% are located in neoclassical styled building.

4.3.2.2 MNC'S HQ BUILDING'S ENTRANCE EMPHASIS: basing its 15% correlation with outdegree, the building entrance emphasis has a mean value of 0.65. It is an indicator to evaluate the first impression about the building's functionality and appearance. It is an official welcoming principal point mostly articulated by signifying the building access. This is a universal building language which reflects the ethos of the MNC. Emphasizing on the entrance has both practical and visual aesthetic importance.

Fig 13 shows that New York has a clear entrance emphasis priority. 86.6% of the MNCs HQ buildings have emphasized on their entrance. It is most likely to have a good impression on clients and building users. The entrance is made with a due attention as it triggers the first imprint.

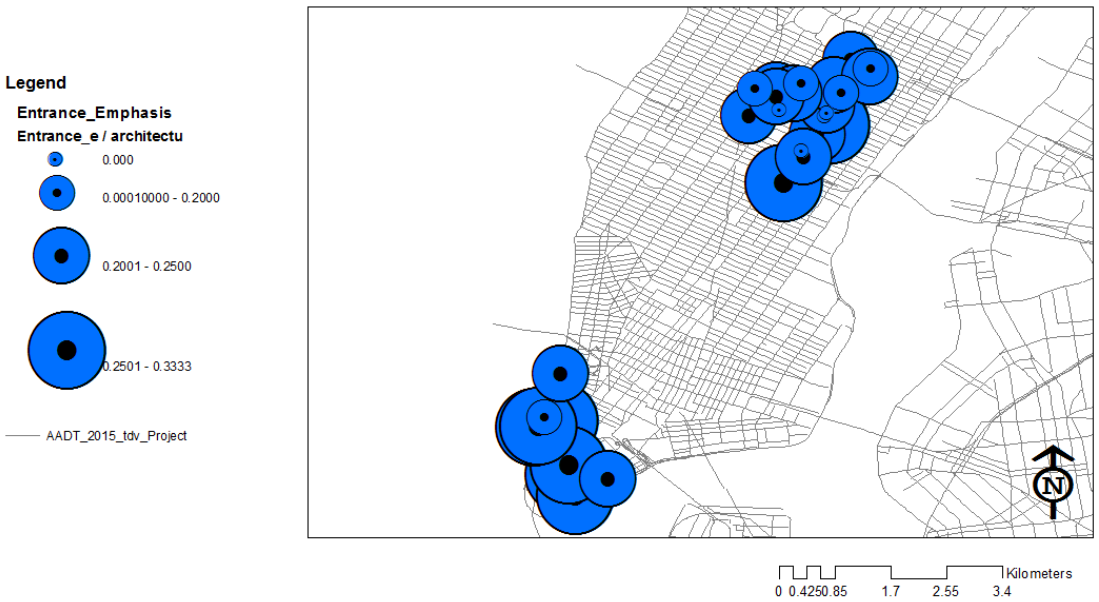

Figure 13: NY_ Building's Entrance Emphasis
source: Author, 2017:

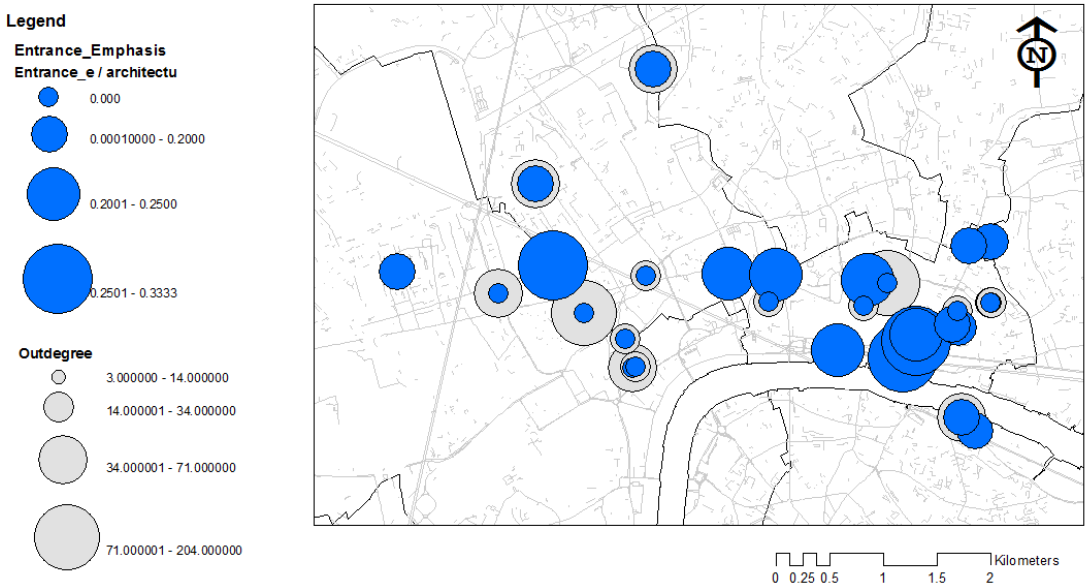

Figure 14: LO_ Building's Entrance Emphasis
Note: source: Author, 2017:

In London, where the buildings are old and built during pre and postmodernist era, the HQ buildings are more functionally oriented which leaves out the aesthetic pleasure. Consequently, we can see that only 56% of the HQ buildings have an entrance emphasis.

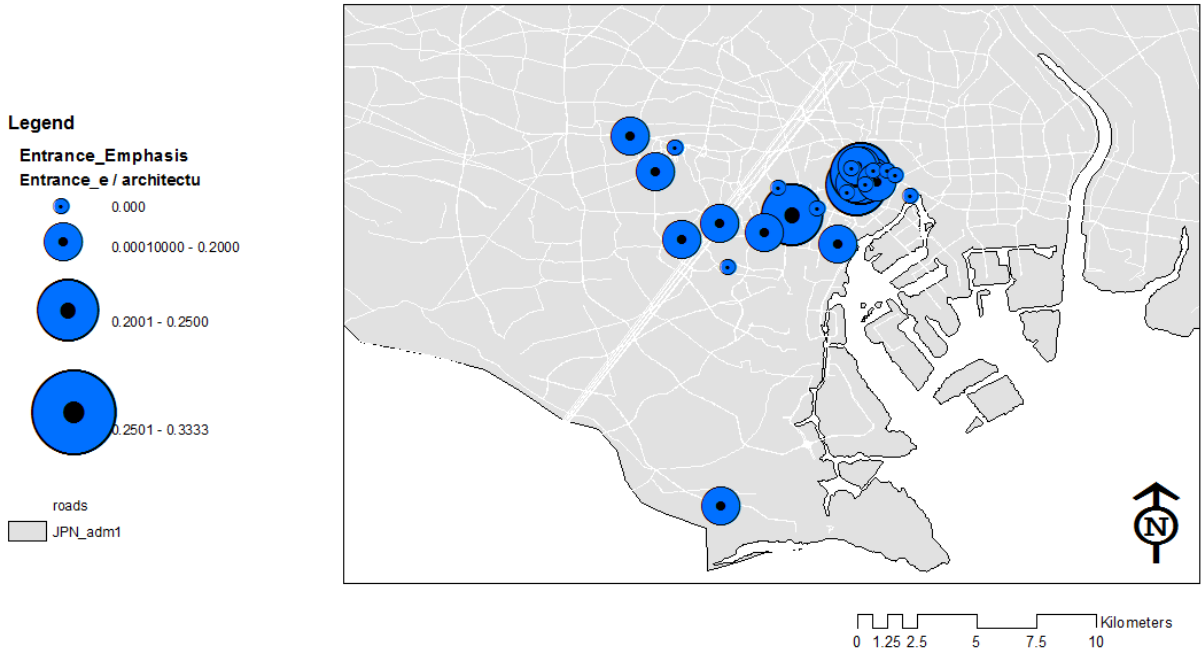

Figure 15: TOK_ Building's Entrance Emphasis
source: Author, 2017:

The entrance emphasis gives an idea of what to find inside the building and projects excitement and feeling of comfort and extra luxury. Fig 15 shows that the new buildings located near the port have made the entrance to be emphasized. In Tokyo, from the overall sample buildings observed, only 53% emphasized their entrance. All the buildings located on the east and the contemporary styled new development, possess the entrance emphasis concept.

4.3.2.3 MNC'S HQ BUILDING'S TOWER POSITION: With its mean value of 1.17, it measures the building tower location as in front, center (or no tower) and back of the building. The visibility of the building in general and the dominant height effect are the universal purposes of the tower, mostly used to manifest the power the MNCs, by so called the tower effect. Interestingly enough, this concept is most dominantly seen in all the three cities. The maps below reveal that the majority of the buildings have the tower located in the center.

Fig 16 shows that the New York lower Manhattan has a relatively similar number of buildings with front and center tower location, but looking at the Midtown Manhattan, we can see that building with central tower are more dominant.

Figure 16 NY_MNC's HQ building's tower position
source: Author, 2017:

Fig 17, Similarly, London, all the building towers are located in the center. 83% of the MNCs HQ buildings are either centrally positioned or buildings without a tower. Taking the building age and height (an average of ten floors high) into account, the London buildings are less suitable for a tower. We can see that the buildings are short compared to the other cities, but we can see the whole building is used to create visual tallness effect via its adjacency to the street.

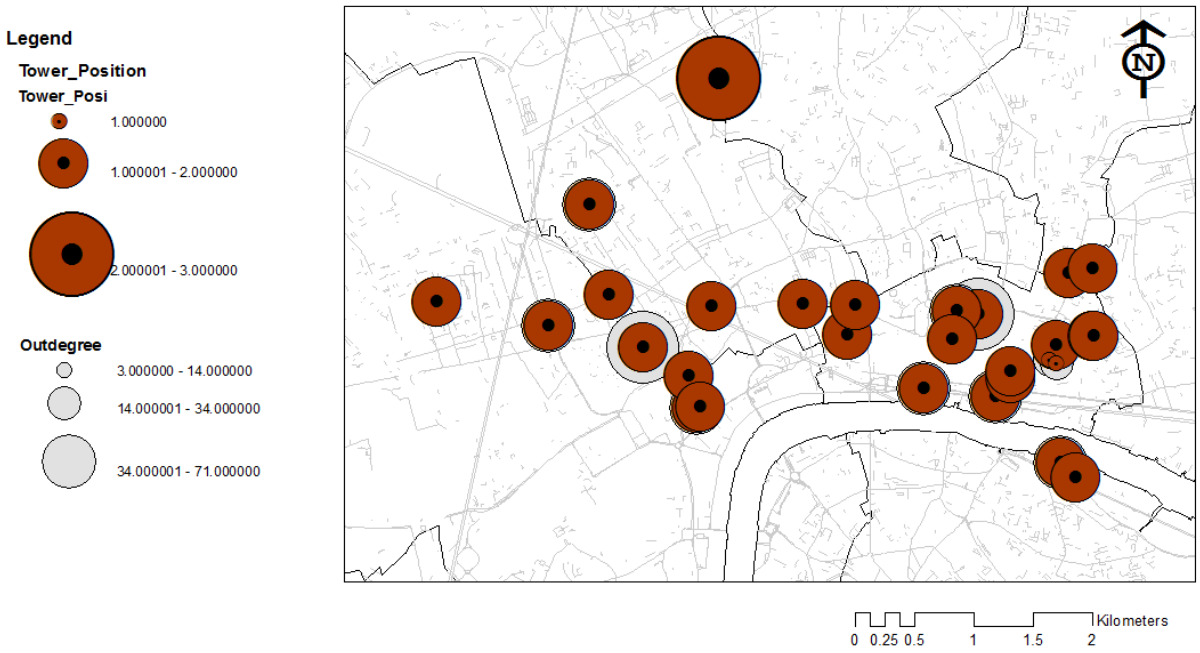

Figure 17: LO_MNCs HQ building's tower position
source: Author, 2017:

Fig 18 shows that majority MNC HQ building towers in Tokyo are centrally positioned as well with a mean value of 1.8. In Tokyo, from the overall sample buildings observed as much of 60% of the HQ building towers are located in the center of the building. In general, we can see that the overall tower position is centrally poisoned regardless of the city. But as the outdegree decrease, the desire to come to the front or back decrease.

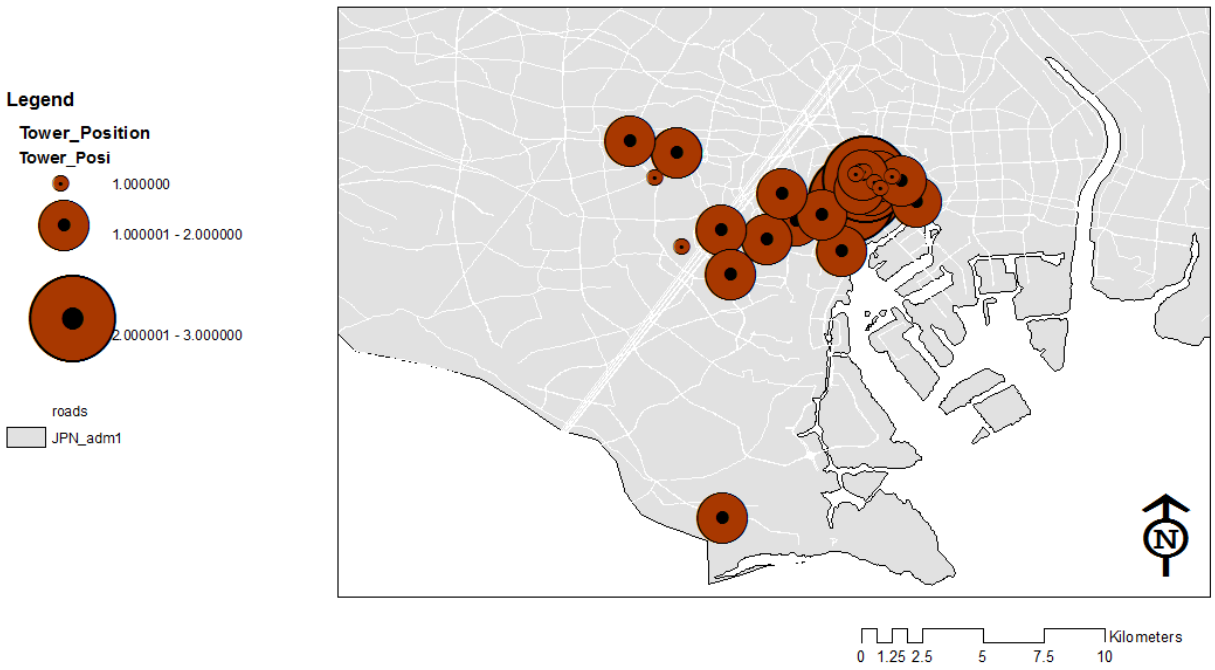

Figure 18: NY_ MNCs HQ building's tower position
source: Author, 2017:

4.3.2.4 MNC'S HQ BUILDING'S LOGO: we see that 56 out of 90 (62%) MNCs do not have their logo on the building where they are located in, but those MNCs with higher outdegree value are the ones which have displayed their logo on top of the HQ building. Looking at the maps below of the document, we can recall that logo in New York is very popular to have in a building, 53% of the buildings have the MNCs logo either on top or lower part of the building. We see that the Citigroup, located in the lower Manhattan, and MetLife from midtown Manhattan are examples of MNCs with a top outdegree and displayed the logo on the upper part of the building. New York MNC HQ logo has a positive 35% correlation with total floor area and 20% correlation with the architectural style, which means the logos are more convenient to apply on a tall contemporary building.

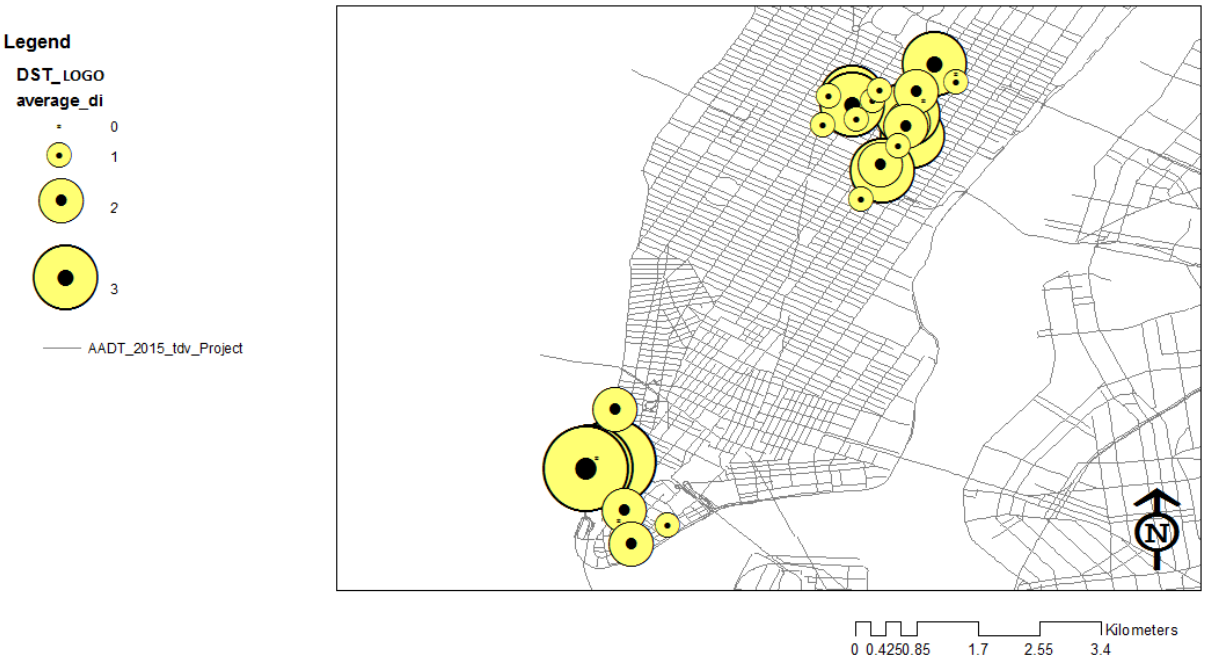

Figure 19: NY_MNC's HQ Building's logo
source: Author, 2017:

In contrary, London has a broad range of buildings without a logo on the MNCs HQ buildings with a mean value of 1.5. We can relate this to the age and the size of the buildings in London. We only see that 6% of the buildings have logo on top of their building, but also in London, the top MNCs HQ buildings apply logo on their building.

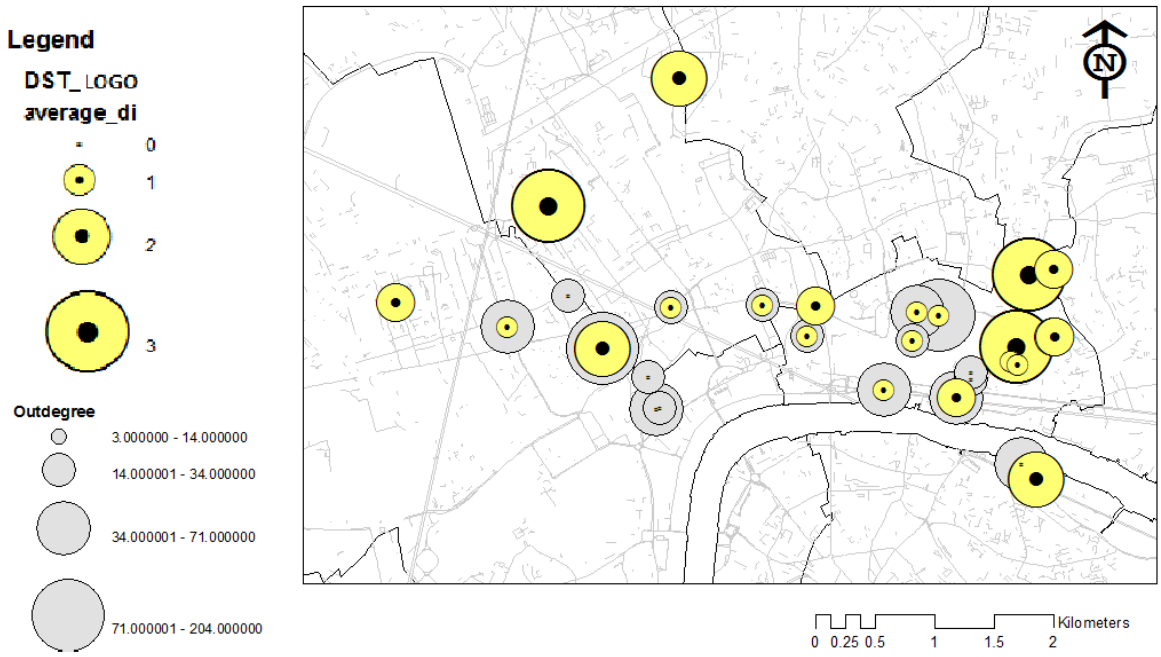

Figure 20: LO_MNCs HQ Building's Logo
source: Author, 2017:

Fig 21 shows that only few buildings have the logo on top of their building same as the other cities top MNCs are more appealed towards putting their logo or brand on their HQ building. But even in Tokyo, 75% of the HQ observed do not care to put the brand logo with a mean value of 1.7.

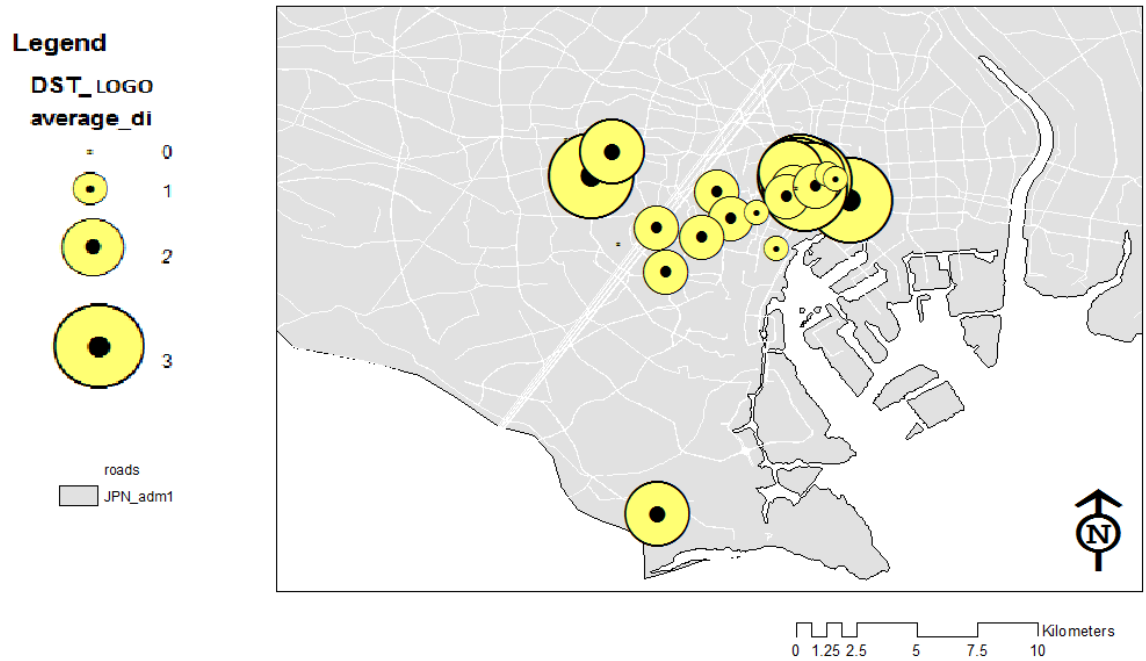

Figure 21: NY_ MNCs HQ Building's Logo
source: Author, 2017:

4.3.3 SIGNIFICANT COMMON AND DIFFERENT NEIGHBORHOOD CHARACTERISTICS

4.3.3.1 **DISTANCE BETWEEN MNCS HQ BUILDING:** is to measure the shortest distance from one MNC to another. It is fascinating to witness that the location of MNCs is in short proximity to other MNCs. As can be seen from the map below, the MNCs are clustered together implying the agglomeration density theory. The data acquired strengthens the agglomeration dynamics of MNCs and the travel mean distance is 375.31m. This indicates that the MNCs proximity to one another is very important as they are located within a reasonable walking distance, which can be seen as a common neighborhood characteristic.

Figure 22: NY_ Distance Between MNCs HQ Buildings
source: Author, 2017:

In Fig 22, we can see that the overall MNCs in Manhattan are located very close to each other. Both midtown and lower Manhattan share the same property regarding the clustering of MNCs. New York's MNCs agglomerate to benefit from comparative advantage as the MNCs are located relatively near to each other for sharing, learning, and competitiveness. It has a mean value of 180.63m, which is three times shorter when compared to the three cities together.

Fig 23, London in contrast, with its mean value of 315m, the old town shows that the MNCs are relatively located apparat when compared to the eastern part of the city. It has a positive 83.4% correlation with distance to the subway entrance.

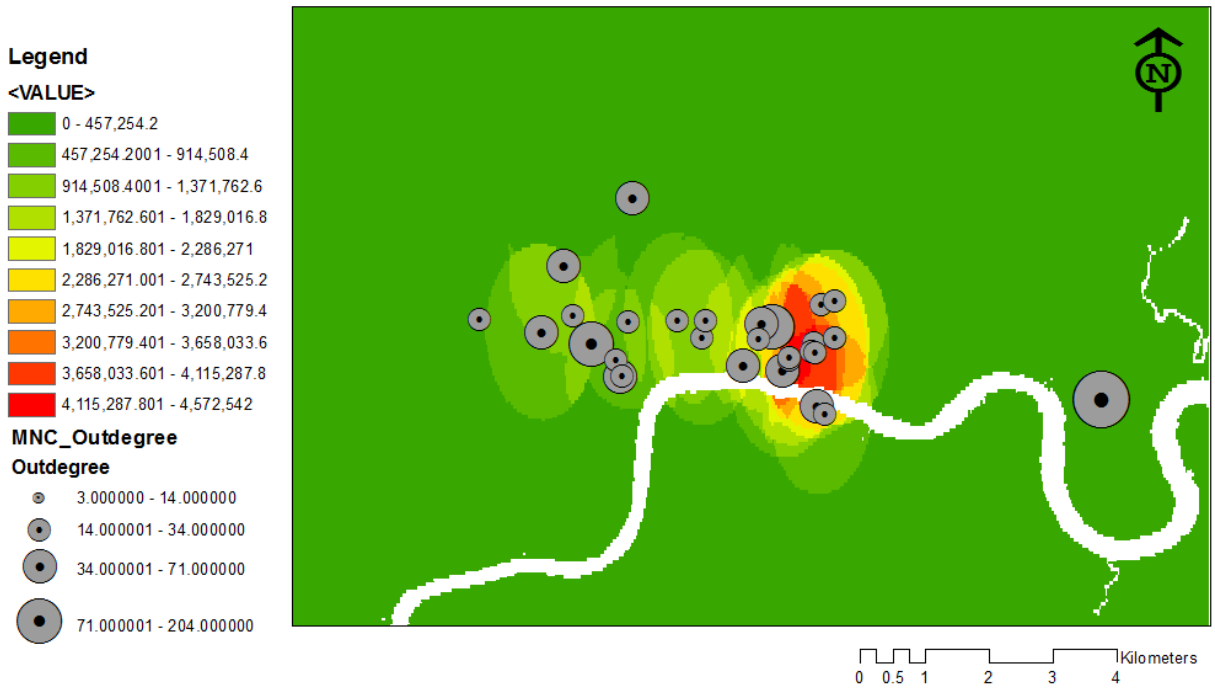

Figure 23: LO_ Distance Between MNCs HQ Buildings
source: Author, 2017:

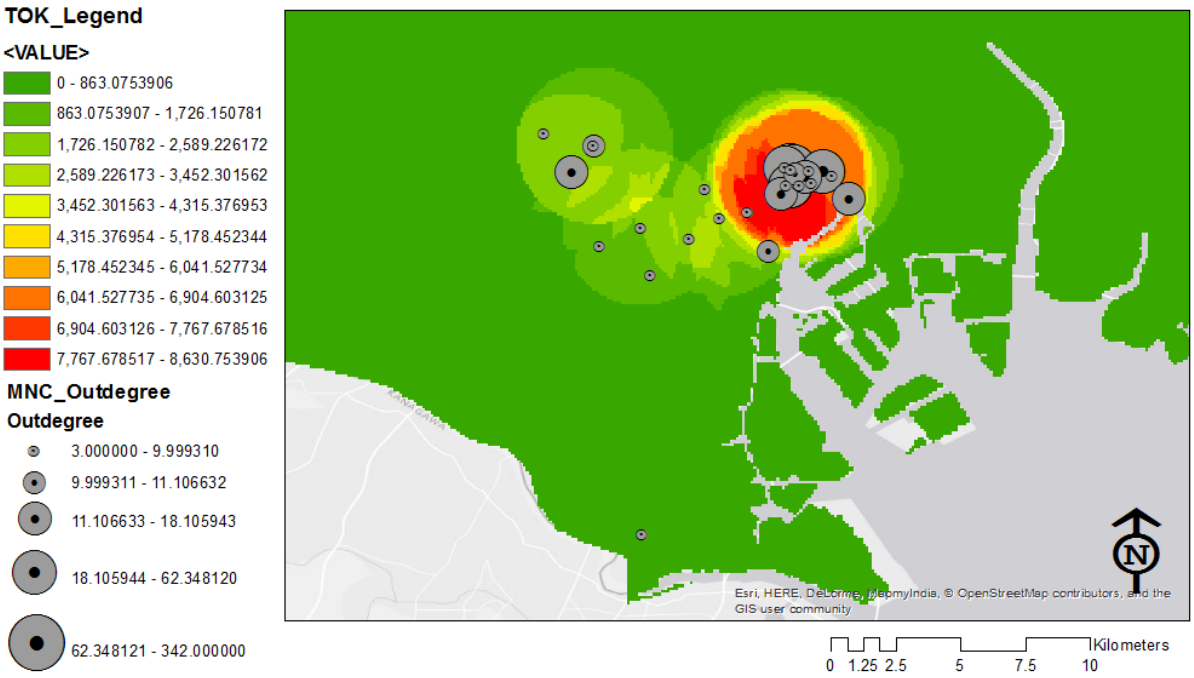

Figure 24: NY_ Distance Between MNCs HQ Buildings
source: Author, 2017:

Fig 24 shows Tokyo's MNCs HQ. Those closer to the port are more agglomerated in an area where it is reserved for HQ cluster. But as we move further away from the harbor, we see that the distance increases regardless of the outdegree. In Tokyo, the mean distance is 515.4m, which is double the length when compared to the three cities together.

4.3.3.2 **MNC'S HQ BUILDING'S ACCESSIBILITY**: it is so called Transport Accessibility Level (TAL) which is a calculative approach to find the shortest distance to the nearest public transport. It measures the distance from the center of the MNCs HQ building with a mean distance of 342.99m. The shortest distance measured is in New York with a value of 40m and followed by London 50m. We can explicitly see from the heat maps below that the MNCs agglomerate in the area where the transportation access is closely located. But we can see that those MNCs with higher outdegree value are located further from public transportation hub.

Figure 25: NY_MNC's HQ Accessibility
source: Author, 2017:

Fig 25 New York shows interesting contrast where the midtown Manhattan part is nearer to transportation access than the lower part. New York, having the mean value of 283.77, the overall distribution of access, is well provided when compared to the other cities. New York MNC HQ distance to public transport access points has a positively 14% correlation with the out degree of MNCs meaning as the further the distance the bigger the outdegree.

In converse, the MNCs HQ buildings in London have concentrated away from the old center and close to the new development of the city. It has a mean value of 380.5m which is very similar to the grand mean of the three cities. We can relate this with the old planning and the street layout in London.

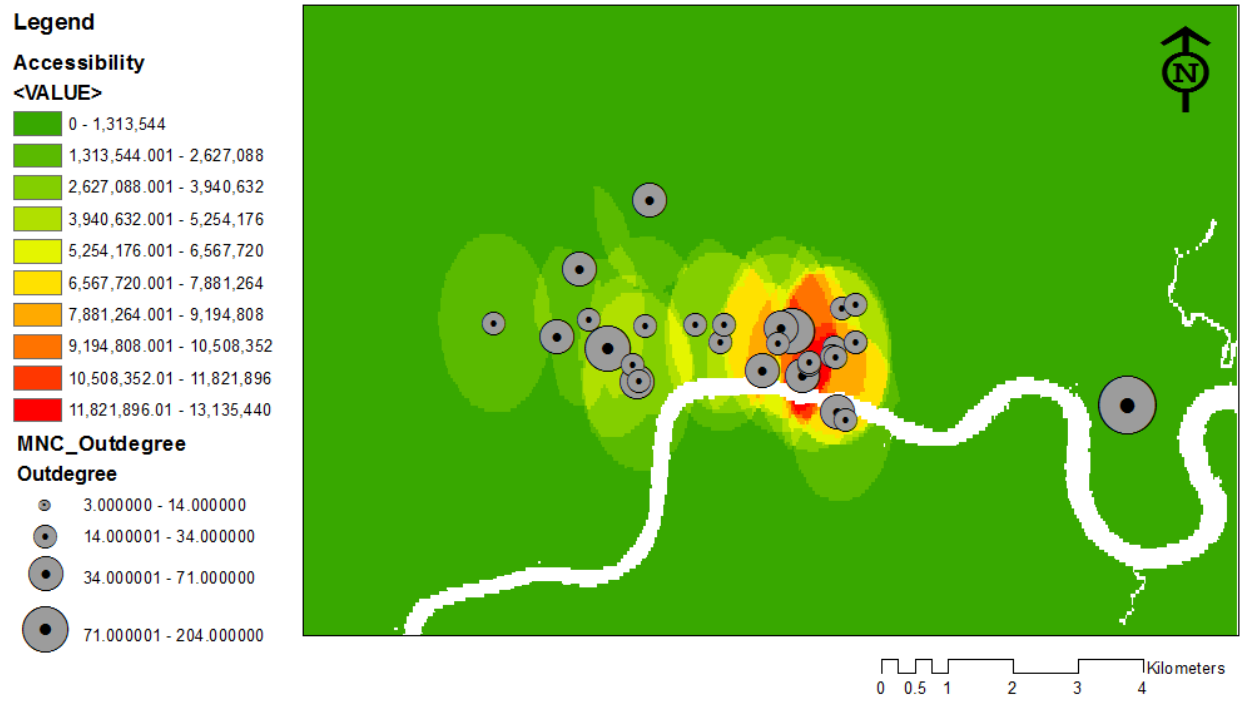

Figure 26: LO_MNCs HQ Accessibility
source: Author, 2017:

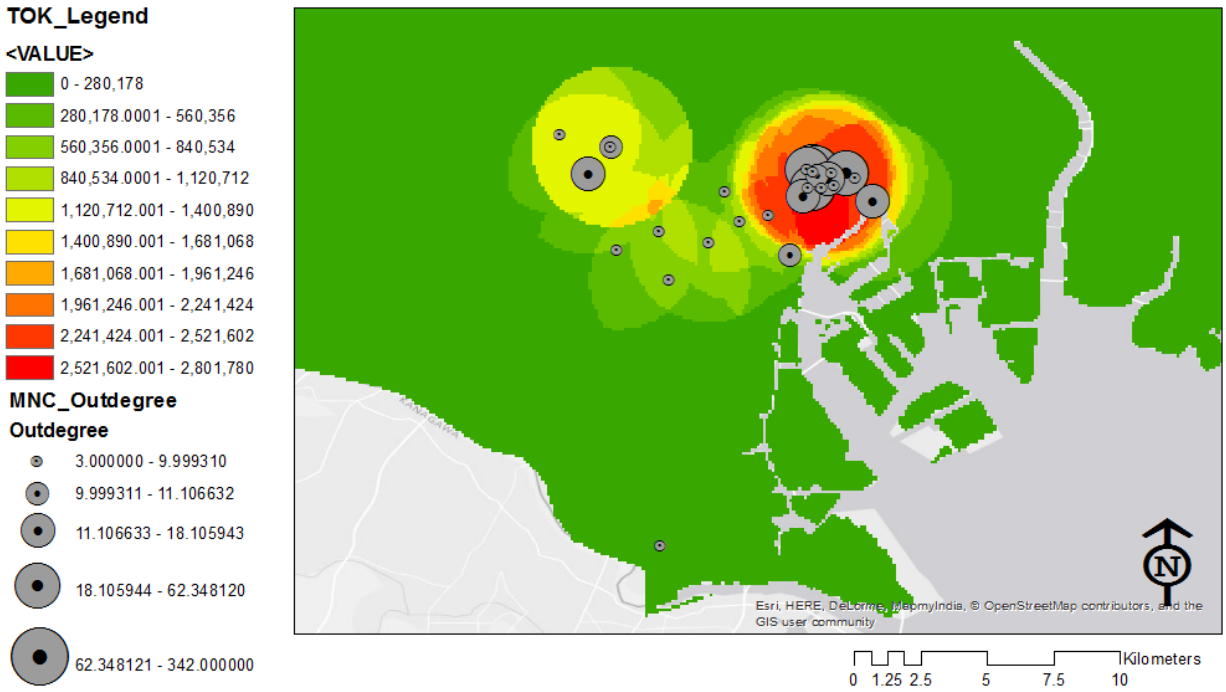

Figure 27: NY_ MNCs HQ Accessibility
source: Author, 2017:

Fig 27 shows Tokyo's MNCs HQ buildings that close to the port are more connected and located close to transportation hub. As we move away from the port, we see that the accessibility decrease even for those top MNCs. In Tokyo, the access is 21% negatively correlated with MNCs outdegree and has a mean value of 364.7m.

4.3.3.3 MNC'S HQ BUILDING'S BUILDING COUNT: is the measure of the density of the neighborhood. The number of buildings with in 500m radius are counted to indicate how compact the MNCs surrounding is. From the gathered data, we can see that the mean density is 104 buildings, with a minimum number of 14 and maximum of 465 buildings under the specified radius. This tells us that, the compactness value for these three global cities is found to be fair, as the majority of the MNCs locates in an area where the building count is 200. We can also observe that the areas that are older are more crowded than those areas with new buildings.

Figure 28: NY_MNC's HQ Building Count
source: Author, 2017:

Fig 28 shows New York's MNCs surrounding density. It has a mean value of 90 buildings, with a minimum of 4 and maximum of 179 buildings. We can witness from the heat maps that, the Midtown Manhattan MNCs are very densified and crowded as compared to lower Manhattan where there exists MNCs with highest outdegree value and a minimum count of surrounding buildings.

Fig 29, Looking at the compactness of London, the central and old part is more jammed and compact when compared to the part with the new buildings to the east. The main different thing about London is that the majorities of MNCs locate in the area where the density is relatively lower.

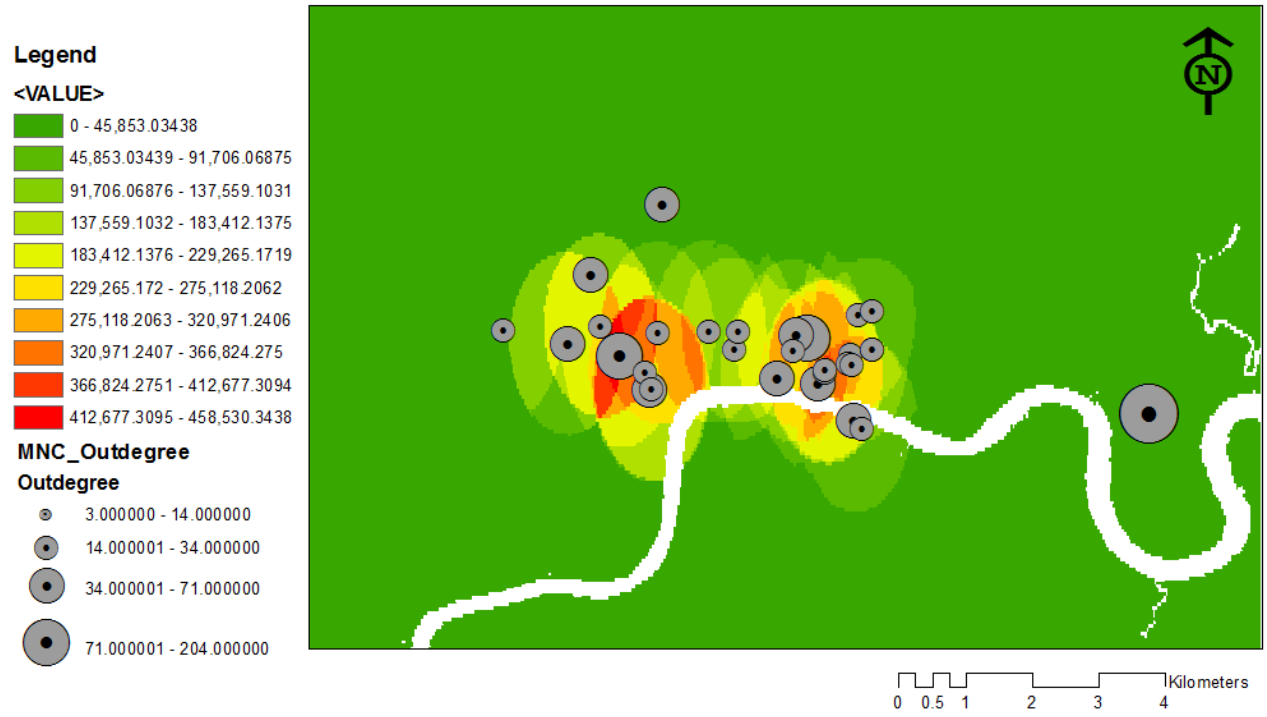

Figure 29: LO_MNCs HQ Building Count
source: Author, 2017:

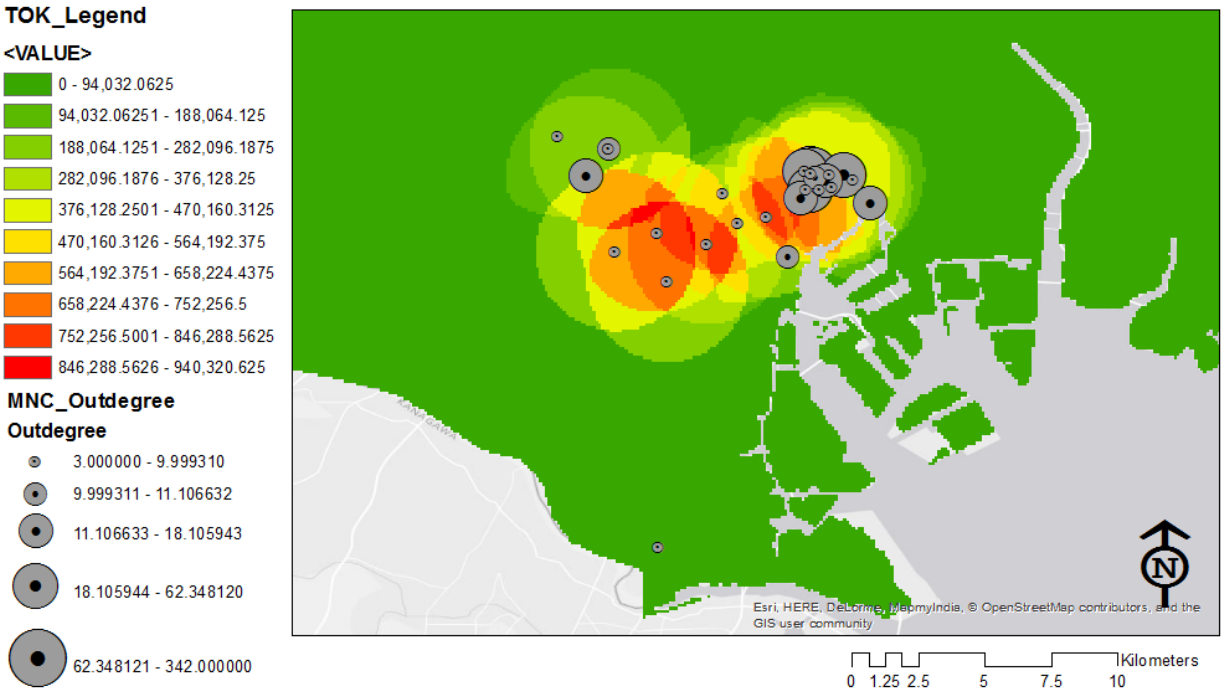

Figure 30: NY_ MNCs HQ Building Count
source: Author, 2017:

Fig 30 shows that Tokyo's MNCs HQ buildings are compact in the east and the old and unplanned town. It has a mean value of 136; it can be seen that low ranking MNCs are located in areas where the number of surrounding buildings is high.

Chapter 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 INTRODUCTION

Ever since the cross-national trading become popular and MNCs became the dominant backbone of an economy (Balmer and Gray, 1999, Forsgren, Holm, et al., 1995), foreign investments and investors have taken a significant role in building the city's image (Akotia, 2005). With this study, the aesthetics of a city, specifically architectural and neighborhood image, which in turn can significantly influence the attraction of FDI (Reynolds, Kenny, et al., 2004) particularly MNCs HQ, has been revealed. Consequently, the MNCs aesthetical urge focuses on particular/part of building elements and selected surrounding proximity measures than the whole building (Schmidhuber, 2007). The concept argued by Vartanian and Navarrete (2013) in the theory review that the psychological judgment of MNCs considers aesthetics as one of the criteria to decide the HQ building and location. Accordingly, in addition to the economic value of MNCs as discussed by Blonigen (2005), a new perspective of understanding city development is revealed in this research by adding aesthetical attractiveness dimension. Even though the history, geographical location, and contextual advantage play a great role in the aggregated image of a place (Foroudi, Foroudi, et al., 2016), there is a bright chance for developing and newly growing cities to fast track their economic journey and perform better in the competitive world (Balmer and Gray, 1999). Indeed, it is a known fact that no city can be modest in every aspect, but the study reveals that financial, business and service sectors are the most aesthetically oriented sectors regarding building architecture and neighborhood features. Growing MNCs can take this feature as an advantage to grow, and cities can adopt it as one building block to build their competitiveness within the network.

From the findings, it can be concluded that, designated architectural and neighborhood characteristics for the top MNCs in London, New York and Tokyo focusing on financial, business and service sectors (Wall and Van der Knaap, 2011) significantly affects the MNC's HQ location, when measured by the MNCs outdegree representing the power and image of the MNCs. Moreover, the common and different aesthetical characteristics, the geographical distribution together with the pattern of development, gives a clear perspective on the relationship which will be discussed below.

5.1.2 COMMON CHARACTERISTICS:

In general, this study reveals that investment and aesthetics have direct relationship. Specifically, we can conclude that only few MNCs have extreme network values but MNCs that dominate the system have an average investment count of 15 and value of 20,000$. Moreover, the findings can directly be related to the theory of large contemporary buildings by Brown and Gifford (2001) and can be generalize as latest buildings with postmodern or contemporary architectural styles are most preferred by the MNCs. A clearly designated and a special focused development for MNCs HQ cluster (Wang, Madhok, et al., 2014) will provide a flexible room for MNCs to experiment their up to date ideal building style. The contemporary building styles (Brown and Gifford, 2001) together with the technological advancement allows buildings to be more open and glazed, which is also mostly desired by the MNCs. In addition, the first impression about the building's functionality and appearance is conveyed through buildings entrance emphasis (Domeshek and Kolodner, 1992). Furthermore, it exploits the practical and visual aesthetic experience of a user to uplift the image of MNCs. Consequently, top MNCs use their buildings to advertise and sell out themselves (Van den Bosch, Annette LM, De Jong, et al., 2005). A concept that is most seen dominantly in all the three

cities is the concepts of regularity and the symmetry (Bertman, 1965, Leyton, 2001) of a building. It projects safe, balanced, axial proportion and harmonious reflection of the building, which is employed to represent the MNC's power and right image. These days MNCs prefer the tower to be located to the front of the podium. Furthermore, top MNC's prefer to locate the company logo on top of the tower (Fan, 2010),which is found to be one of the powerful ways to brand and promote their image. In general, the building elements discussed above are reasoned to be the most common architectural characteristics of MNCs HQ buildings.

In compliance to the theory by van't Hoff and Wall (2014) it can be concluded that common neighborhood characteristics of MNCs HQ, the relative proximity of MNCs is found to be very significant, therefore, the shorter the distance, the better the MNC performance. This agglomeration economies allow MNCs to share common services like transportation, café, and restaurants giving a better-quality neighborhood. We can deduce that it is somewhat possible to increase the MNC's competitiveness in the network by increasing the number of streets buildings face to at list three. Adding the number of adjacent roads can also mean that the accessibility of the building will be enhanced. The surrounding environment like the green areas, open and plazas areas, play a great role in the attraction of MNCs HQ. Also, similar to Ries's and Trout's (2004) argument, we can conclude that the density of the surrounding will negatively affect the MNC's desire to locate in a particular area. As the number of buildings with in 5oom decreases the MNC shows an interest since it gives more space to relax and fosters its image, then this attracts the MNC to locate to the particular area.

5.1.3 REGIONAL DIFFERENTIATION:

New York is more inclined to the contemporary building style (Frampton and Futagawa, 1983), which gives it the advantage to attract more MNCs HQ. The custom of incorporating the entrance emphasis and the logo on the building is also another high point to attract MNCs together with the symmetrical and regular buildings promoted by the gridiron street layout (Bacon, 1974). This made the city to be one of the most attractive places for MNC HQ to settle in. New York is blessed with the great Central Park where the midtown Manhattan MNCs takes advantage.

London on the other hand, though it possesses the highest out degree in the world (Allen, 2010), the contemporary architecture is more dominant in the periphery than the center where the old town with the old buildings are (Kynaston, 2015). It has a disadvantage when it comes to the heart because it limits the flexibility and the planting of new HQ buildings. London is an old city where buildings are very compactly spaced, short, built during pre and postmodernist era (Tavernor, 2007) with no tower which does not furnish a way to put the logo on the top of the building.

Tokyo is very comparable with New York except that in Tokyo, all in all, are flooded with contemporary HQ buildings (Brown and Gifford, 2001), even though the buildings are relatively further apart. The buildings are half regular while the other half are irregular and only few buildings position the logo on top of the tower (Fan, 2010). Consequently, the agglomeration and clustering have received due attention. The area close to the port has been reserved for MNCs to cluster which made the MNCs settle there (Ashie, Komatsu, et al., 2005).

5.2 RECOMMENDATIONS

It is very imperative for cities to improve their architectural and neighborhood aesthetics features to attract big investors. Most top MNCs give due attention for how they present themselves in front of their clients and the general public. Consequently, to be attractive for investors, strategies have to be developed in a way to create a beautiful environment and adopt building design policies and guidelines that would fit the proper setup and meet the essential purpose and desire of the MNCs. As we have discovered, most changes that a city needs to brand to be more attractive for MNCs are things requires minimum cost like adopting the right kind of policies, design and building guidelines and decision makers that could solve with minimum cost as the desired changes are policy based.

Investing money for a city to look more attractive both in the architectural and urban spectrum, will promote more investments to come and set up their HQs. Cities shall take priority in controlling the population for attracting as the MNCs look for less crowd and less densified areas.

Designers and policy makers should collaborate in designating areas that provide adequate roads, transportation facilities for faster access and promoting a cluster layout so that they agglomerate together, share, learn and profit from comparative and proximity advantages.

Further studies can be incorporated on other sectors and adding more regions to understand how sectors and cities would perform to build their image. In addition, it can furtherly be investigated to see the effects of different regional, contextual and cultural aesthetics on FDI and MNCs, by comparing the MNCs in 1st, 2nd and 3rd world countries. With more money and time, it would be fascinating to incorporate space syntax results and/or interview with the MNCs (qualitative) to triangulate the result and to understand the psychology of multinationals better. In addition, the combined effect and the relationship between architecture and urban area as a whole on attracting FDI can be studied. Finally, the influence of star-architects on MNCs HQ architecture can be considered as an interesting area to be studied using different research strategy than the one used in this study.

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ANNEXES

ANNEX 1:

STATA OLS regression result between MNCs Outdegree Weighted and architecture characteristics

VARIABLES	(1) logOutdegree_Weighted
No_of_Floors	0.00643
	(0.01)
Total_floor_area	-1.64e-08
	(0.00)
c.No_of_Floors#c.Total_floor_area	-1.11e-08
	(0.00)
MNC_Service_year	0.00436***
	(0.00)
Open_to_Solid (ratio)	0.000729
	(0.01)
Tower_Position_DUMMY1 (located Up front)	0.789*
	(0.47)
Tower_Position_DUMMY2 (located on the center)	-1.117***
	(0.41)
Visual_Texture	-0.214
	(0.23)
Entr_Emphasis	0.381*
	(0.23)
Podium_Tower (ratio)	0.386
	(0.88)
CITY_Ppln	-1.77e-08**
	(0.00)
Bgd_Footprint	3.72e-05*
	(0.00)
Symmetry	-0.117
	(0.26)
Intricacy_DUMMY1 (simle building forms/shape)	0.469
	(0.40)
c.Symmetry#c.Intricacy_DUMMY1	-0.301
	(0.39)
Logo_DUMMY1 (no logo on the Blgd)	-0.211
	(0.24)
Regularity_DUMMY1 (regular shape)	0.158
	(0.26)
Sector_ID_DUMMY3 (Banking Firms)	0.449*
	(0.26)
Sector_ID_DUMMY6 (law Firms)	-0.854*

	(0.48)
c.MNC_Service_year#c.Sector_ID_DUMMY6	-0.00880
	(0.01)
Logo_DUMMY4 (logo @ top of Blgd)	1.148**
	(0.56)
c.MNC_Service_year#c.Logo_DUMMY4	-0.00738
	(0.00)
c.Sector_ID_DUMMY6#c.Logo_DUMMY4	-0.728
	(1.09)
co.MNC_Service_year#co.Sector_ID_DUMMY6#co.Logo_DUMMY4	0
	(0.00)
Sector_ID_DUMMY7 (business Firms)	-0.489**
	(0.24)
FaC'adeMaterial_DUMMY1 (glass materials)	0.212
	(0.30)
Color_Count_DUMMY4 (4 colors used on the blgd)	-0.0920
	(0.34)
Constant	6.688***
	(0.74)
Observations	81
R-squared	0.702

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ANNEX 2:

STATA OLS regression result between MNCs Outdegree Weighted and neighborhood characteristics

VARIABLES	(1) logOutdegree_Weighted
Bdg_count	-0.00178**
	(0.00)
Sector_ID_DUMMY6 (law firms)	-1.647***
	(0.21)
Sector_ID_DUMMY7 (business Firms)	-2.173***
	(0.76)
logDST_Subway_entrance	-0.235*
	(0.12)
c.Sector_ID_DUMMY7#c.logDST_Subway_entrance	0.575**
	(0.26)
Sector_ID_DUMMY3	0.240
	(1.10)
co.Sector_ID_DUMMY7#co.Sector_ID_DUMMY3	0
	(0.00)
c.logDST_Subway_entrance#c.Sector_ID_DUMMY3	0.0492
	(0.36)
co.Sector_ID_DUMMY7#co.logDST_Subway_entrance#co.Sector_ID_DUMMY3	0
	(0.00)
logDST_Station	-0.118*
	(0.07)
MNC_Service_year	0.00505***
	(0.00)
Constant	7.362***
	(0.65)
Observations	83
R-squared	0.594

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ANNEX 3:

STATA negative binomial regression result between MNCs Outdegree Weighted and architecture characteristics.

MNC_ARCH_MODEL									
	ALL	**PER CITY**			**PER SECTOR**				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	MNC Outdegree ALL	MNC Outdegree NY	MNC Outdegree LO	MNC Outdegree TOK	MNC Outdegree Bank	MNC Outdegree Fin	MNC Outdegree Ins	MNC Outdegree Law	MNC Outdegree Bus
Outdegree									
Total_floor_area	0.213**	0.187*	0.0513	-0.0209	0.118	2.27**	0.191	-0.0264	0.0190
	(2.86)	(2.04)	(0.57)	(-0.05)	(1.62)	(2.71)	(1.96)	(-0.09)	(1.14)
1.Visual_Texture	-0.146	0.195	0.531	0.0941	4.379	1.816*	-8.187*	0.917	-0.158
	(-0.92)	(1.09)	(1.77)	(0.24)	(1.47)	(2.07)	(-2.40)	(0.80)	(-0.46)
2.Tower_Position	-0.788***	-0.501	0.113	-1.290**	-4.058***	-4.100**	0.864	-0.554	-0.428
	(-4.37)	(-1.28)	(0.44)	(-3.00)	(-8.01)	(-2.62)	(0.51)	(-0.49)	(-0.87)
3.Tower_Position	0.125	1.303	1.604***	-1.315*	1.761***	0.371	12.86*		-0.924
	(0.41)	(0.75)	(3.71)	(-1.98)	(3.31)	(0.22)	(2.36)		(-1.40)

2.Logo	-0.113	-0.0436	0.230	1.618*	-0.788**	-1.428	3.309***	-0.466	0.297
	(-0.69)	(-0.10)	(1.45)	(2.43)	(-2.65)	(-0.96)	(5.74)	(-0.51)	(0.53)
3.Logo	0.380			-2.358					0.999
	(0.60)			(-1.12)					(1.22)
4.Logo	0.637***	1.109***	1.647***	0.406	0.416	0.568	8.024**	.	-0.760
	(3.68)	(5.08)	(3.81)	(0.58)	(0.95)	(0.78)	(2.78)	.	(-1.62)
MNC_Service_year	0.000360	-0.00174	0.00114*	0.00147	0.00120	-0.00467*	0.00479	-0.0129	-0.000994
	(0.39)	(-1.06)	(2.04)	(0.34)	(0.23)	(-2.09)	(1.03)	(-0.94)	(-0.16)
2.Intricacy	0.445	0.426	-0.0349	-0.217	-2.225	-4.095***	8.076*	-0.196	0.628*
	(1.88)	(0.88)	(-0.16)	(-0.25)	(-1.17)	(-4.41)	(1.99)	(-0.45)	(2.00)
1.Symmetry	0.656***	1.520*	0.122	0.0404	1.817***	1.981***	12.59**	-0.306	0.0765
	(3.74)	(2.29)	(0.98)	(0.10)	(5.07)	(4.23)	(2.93)	(-0.53)	(0.21)
2.Regularity	-0.461*	0.0432	-0.563**	-0.112	-1.397**	-1.710	2.141***	0.180	-0.483
	(-2.15)	(0.04)	(-3.23)	(-0.17)	(-3.29)	(-1.01)	(3.94)	(0.18)	(-1.12)
Arch_Style	-0.351***	-0.867***	-0.338***	-0.364	-0.753**	-2.166	4.362**	.	0.488
	(-3.30)	(-3.47)	(-5.68)	(-0.74)	(-3.06)	(-1.83)	(2.63)	.	(1.14)

1.Entr_Emphasis	-0.180	-1.069**	-0.0734	-0.0593	0.943	-1.843*	.	.	-0.495*
	(-1.18)	(-2.89)	(-0.59)	(-0.14)	(0.98)	(-2.17)	.	.	(-2.13)
Podium_Tower	-1.069*	-3.379***	1.295*	1.874					
	(-2.25)	(-5.30)	(2.19)	(0.92)					
2.Color_Count	0.0884	0.501	-0.265	0.951	-6.158*	-3.531*	1.822	.	-0.728
	(0.42)	(0.79)	(-1.31)	(1.03)	(-2.07)	(-1.97)	(1.87)	.	(-1.66)
3.Color_Count	-0.295	-1.281	-0.582***	-0.131	.	-3.944		.	-1.264**
	(-1.21)	(-0.78)	(-3.46)	(-0.32)	.	(-1.67)		.	(-2.64)
4.Color_Count	-0.216		-0.822***	-0.456		.	.	.	-1.277***
	(-0.77)		(-3.70)	(-0.44)		.	.	.	(-3.67)
5.Color_Count	-0.508		-1.055**	-0.898	.		.		-2.443***
	(-1.22)		(-3.10)	(-0.69)	.		.		(-3.83)
Open_to_Solid	0.0101***	0.0285***	-0.00536*	0.0220***	.	.	.	.	-0.0287**
	(3.33)	(4.29)	(-2.44)	(3.64)	.	.	.	.	(-2.64)
_cons	4.454***	6.870***	5.159***	2.674	7.361***	15.29*	-34.60*	4.608	4.160**
	(7.31)	(3.64)	(13.50)	(1.11)	(7.17)	(2.17)	(-2.29)	(1.56)	(2.81)
lnalpha									
_cons	-1.547***	-17.28	-19.62	-17.98	-19.59	-18.92	-18.99	-21.19	-18.58
	(-8.80)	(-0.03)	(-0.04)	(-0.03)	(-0.04)	(-0.04)	(-0.03)	.	(-0.03)

N	89	29	30	30	16	17	16	11	23
Pseudo R2	0.16	0.28	0.34	0.39	0.48	0.47	0.41	0.36	0.35
t statistics in parentheses									
="* p<0.05	** p<0.01	*** p<0.001"							

ANNEX 4:

STATA negative binomial regression result between MNCs Outdegree Weighted and neighborhood characteristics.

MNC_NHD_ALL_MODEL	ALL	CITY			SECTOR			
	MNC Outdegree ALL	MNC Outdegree NY	MNC Outdegree LO	MNC Outdegree TOK	MNC Outdegree Fin	MNC Outdegree Ins	MNC Outdegree Law	MNC Outdegree Bus
Outdegree								
1bn.Sector_ID	.	.	.					
2.Sector_ID	-1.162*	-0.585		.				
	(-1.98)	(-0.96)		.				
3.Sector_ID	-0.252	-0.116	-0.301	1.310**				
	(-0.62)	(-0.22)	(-0.62)	(2.63)				
4.Sector_ID	-0.703	-0.570	-1.336**	-1.005				
	(-1.78)	(-1.11)	(-3.23)	(-1.60)				
5.Sector_ID	-0.586	-0.263	-0.914*	-0.174				
	(-1.49)	(-0.58)	(-2.39)	(-0.25)				
6.Sector_ID	-1.250**	-1.286*	-0.686*	-0.417				
	(-2.92)	(-2.41)	(-2.13)	(-0.66)				
7.Sector_ID	-0.772	-0.573	-0.818*	-0.731				
	(-1.92)	(-1.14)	(-2.04)	(-1.13)				
2.Road_Facing	0.125	.	0.210	0.450	-7.348**	2.504	0.601	-0.139
	(0.42)	.	(0.69)	(1.00)	(-2.95)	(1.15)	(0.45)	(-0.25)
3.Road_Facing	-0.143	0.937**	-0.642*	0.220	-8.534**	1.806	0.0992	-0.889
	(-0.43)	(2.92)	(-2.13)	(0.40)	(-2.80)	(0.64)	(0.09)	(-1.47)
4.Road_Facing	0.134	0.617	-0.400	0.613	-8.497*	1.335	0.242	-1.439*
	(0.38)	(1.73)	(-1.29)	(0.68)	(-2.36)	(0.53)	(0.24)	(-2.43)
Bdg_count	-0.00199	-0.00452	-0.00164	0.000250	0.00306	-0.0144*	-0.00253	-0.00252
	(-1.56)	(-1.50)	(-1.11)	(0.15)	(0.61)	(-2.19)	(-0.36)	(-1.70)
DST_Subway_entrance	-0.00299	0.000650	-0.0267*	-0.0339**	-0.0328**	-0.0237	0.00163	-0.0243*
	(-0.49)	(0.10)	(-2.46)	(-2.78)	(-2.82)	(-1.40)	(0.06)	(-2.10)
DST_Station	-0.000130	0.000261	-0.0000995	-0.000364	-0.0000800	-0.0000690	0.000259	0.000116

	(-1.25)	(1.05)	(-0.18)	(-1.78)	(-0.20)	(-0.08)	(0.78)	(0.95)
MNC_Service_year	0.000593	0.00350	0.00150	0.00921**	-0.00796*	0.00479	-0.00131	-0.0000638
	(0.54)	(1.27)	(1.76)	(3.05)	(-1.96)	(1.03)	(-0.36)	(-0.03)
Accessibility	-0.000224	-0.0000982	-0.000147	0.00285*	0.0111**	-0.00418	-0.000680	-0.000236
	(-0.46)	(-0.12)	(-0.32)	(2.19)	(2.87)	(-1.29)	(-0.82)	(-0.29)
1.Urban_Center_Located	-0.0850	0.960	-0.606*	-0.749	-0.104	-2.043	.	0.419
	(-0.27)	(1.58)	(-2.54)	(-1.08)	(-0.19)	(-0.67)	.	(0.85)
DST_btn_Bdg	-0.00208	0.00273	-0.00388	0.0104	-0.0208*	0.0245	.	0.0109
	(-0.60)	(0.54)	(-1.15)	(1.85)	(-2.14)	(0.87)	.	(1.61)
Nearby_Park	0.0000633	0.000171	0.000147**	-0.000288	-0.0000776	0.000540	.	0.000774*
	(0.93)	(0.48)	(2.69)	(-0.85)	(-0.33)	(0.91)	.	(2.11)
DST_MNCMNC	0.0000617	0.00342***	0.000341	0.000908*	0.00186**	0.00349	.	0.000684
	(0.32)	(5.30)	(1.12)	(2.55)	(2.71)	(1.86)	.	(1.95)
2.Cty_ID					-5.477*	-1.247*	0.501	-0.0938
					(-2.53)	(-2.06)	(1.32)	(-0.34)
3.Cty_ID					-4.631**	-2.265	-1.753*	-2.028***
					(-3.27)	(-0.88)	(-2.05)	(-4.71)
_cons	4.568***	1.071	5.398***	2.299	9.931***	5.018***	2.653*	3.356**
	(8.08)	(1.04)	(11.75)	(1.84)	(4.10)	(3.39)	(2.06)	(2.99)
lnalpha								
_cons	-0.997***	-2.043***	-2.750***	-2.521***	-2.700***	-30.87	-21.19	-2.710***
	(-6.31)	(-6.19)	(-6.83)	(-4.78)	(-3.48)	.	.	(-5.20)
N	89	30	29	30	17	16	11	23
Pseudo R2	0.08	0.17	0.17	0.24	0.25	0.41	0.35	0.18
t statistics in parentheses								
="* p<0.05	** p<0.01	*** p<0.001"						

ANNEX 5:

DATA COLLECTION CHECK LIST

ID	Arithmetic number
Name	Name of the Firm
Google source	google image
Cty ID	1=New York 2=London 3=Tokyo
Designer	name of the designer (if Possible)
Latitude	x coordinate
Longitude	Y-coordinate
Sector_ID	1= Accounting 2= Advertisement 3= bank 4= Financial 5= Insurance 6= law 7= business
Outdegree	Count value
Outdegree_Weighted($)	value in USD
Year Established	The year the MNC is stablished
City_Origin	The origin of the MNCs
Accessibility	The shortest distance from MNC to the nearest transportation in general
DST_Sidewalks	The shortest distance from MNC to the nearest sidewalk
Urban_Center_Located	In City center=1 out of city center=0
Road_Facing	Count the number of
DST_btn_Bdg	The shortest distance from MNC to the neighboring Buildings
Bdg_count	Total number of building with in 500m radios
Similar_Bdg_Height	Total number of similar height (± 3 floors) building with in 500m radios
Nearby_Park	The shortest distance from MNC to the park
Nearby_water	The shortest distance from MNC to the water body
DST_Amusement	The shortest distance from MNC to the Amusement facility
DST_Setback	Set back distance
Plaza_Area	Plaza area in front/side/back of a building
Road_Parking_Area	Street parking =1 no street parking=0
DST_ parking	The shortest distance from MNC to the nearest parking
DST_MNC-MNC	The shortest distance from MNC to the MNC
DST_Cafe	The shortest distance from MNC to the Cafe
DST_Bus-stop	The shortest distance from MNC to the bus stop
DST_Subway_entrance	The shortest distance from MNC to the Subway entrance
DST_Stream	The shortest distance from MNC to the Stream
DST_River	The shortest distance from MNC to the River

DST_Recreation_groun	The shortest distance from MNC to the Recreation ground
DST_Commercial	The shortest distance from MNC to the Commercial
DST_Public_building	The shortest distance from MNC to the Public building
DST_Service	The shortest distance from MNC to the Service
DST_restaurant	The shortest distance from MNC to the restaurant
DST_University	The shortest distance from MNC to the University
DST_Train_ station	The shortest distance from MNC to the Train station
DST_Supermarket	The shortest distance from MNC to the Supermarket
DST_Station	The shortest distance from MNC to the Station
DST_Social_Facility	The shortest distance from MNC to the Social Facility
Year_Constructed	The year the building is constructed
No_of_Floors	Total number of floor count
Open_to_Solid_ratio	The ratio of Open/glazing to solid proportion
Façade Material	Glass=1 steel=2 concrete=3 other=4 composite=5
Total_floor_area	Added total area
Bgd_Footprint_area	Building footprint area
Color_Count	Count the different major colors used on the building
Visual_Texture	Yes Textured =1 not Textured =0
Tower_Position	front=1 center (or no tower)=2 back=3
Entr_Emphasis	noemphasis=0 emphasis=1
Arch_Style	Neoclassical=1 Historicism=2 Early Modern=3 Postmodern=4 Contemporary=5
Podium_Tower %	Ratio of podium to tower in height
Regularity Categorical	Regular =1 irregular=0
Voids Categorical	void=1 no-void=0
Symmetry (Binomial)	Symmetrical=1 asymmetrical=0
Logo position	no-logo=1 low=2 mid=3 top=4
Intricacy (Binomial)	basic form=1 (rectangular, cylinder, spherical, pyramidal) or combination to basic forms = 2
MNC_Service_year	Control Variable, how many years the MNC served
Building_Age	Control Variable, the age of the building since construction
CITY_Geo Area	Control Variable, City geographical area
CITY_Ppln	Control Variable, City population

MNC's HQ building's symmetry: With its mean value of 0.61, building symmetry was employed to study the axial balance, proportion and harmonious reflection of the building or part of it. The mirroring visual effect across an axis is the oldest ordering philosophies in architecture. This concept is seen most dominantly in all the three cities. The maps below show that the majority of the MNCs HQ buildings possess symmetrical ordering.

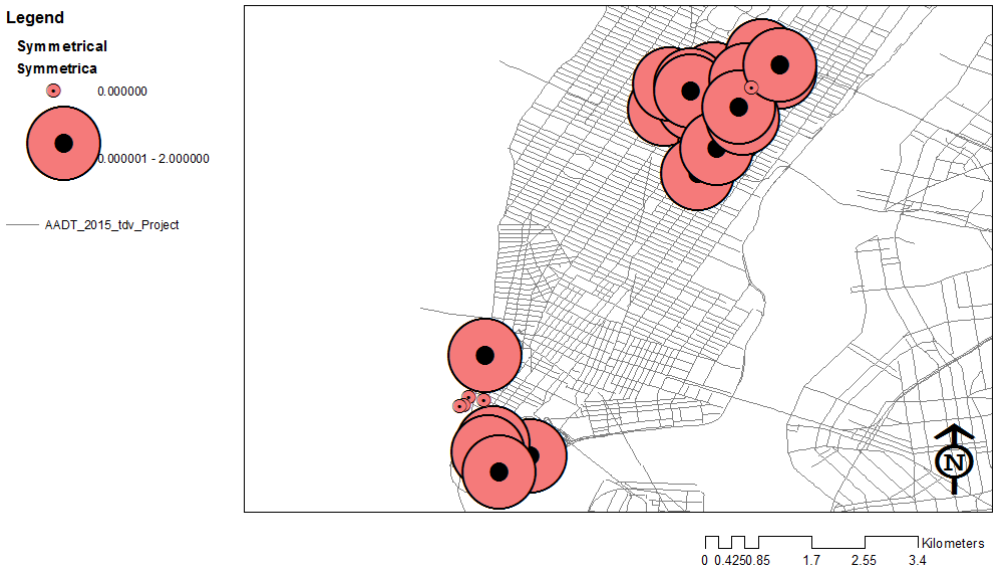

Figure 31: NY_MNC's HQ building's symmetry

Fig 31 indicates that MNCs in New York grants priority for a building with a symmetrical layout. 76% of the MNCs HQ buildings are designed symmetrically, which also goes hand in hand with the gridiron plan of the city, which is the defining element of Manhattan. We also see that majority of the asymmetrical buildings are located in the lower Manhattan.

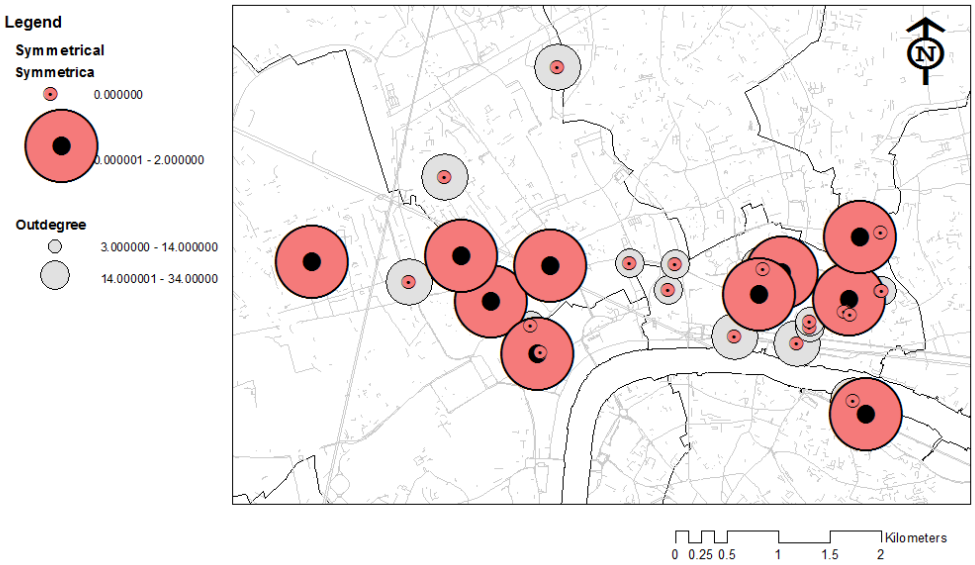

Figure 32: LO_MNCs HQ building's symmetry

In contrary London, Fig 32, where the streets are laid irregularly, and the buildings are old, only 66 % of the MNCs HQ buildings remain asymmetrically constructed.

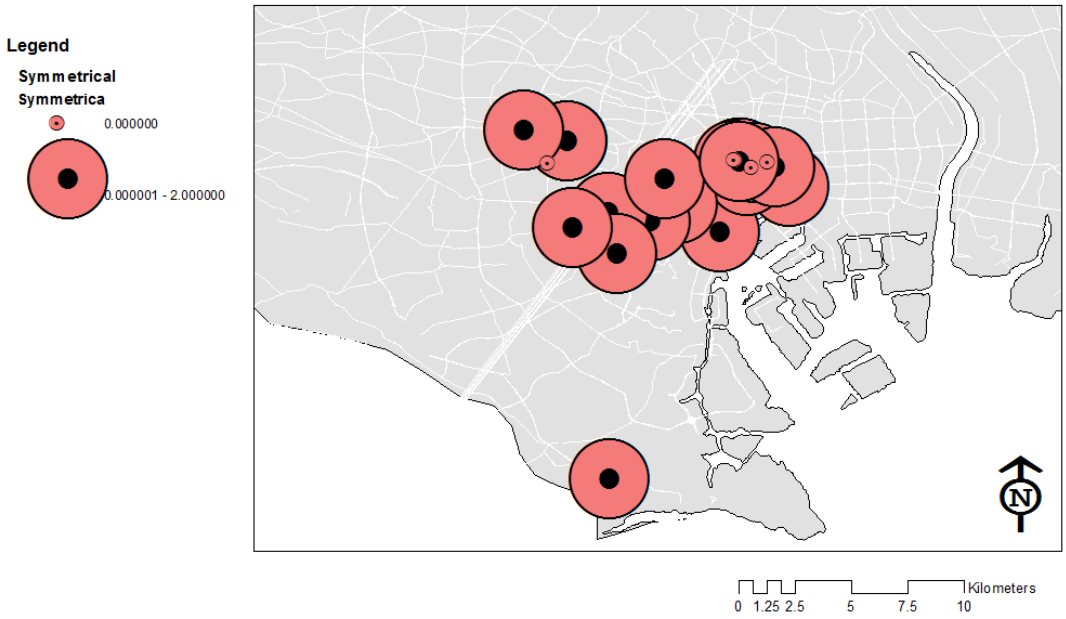

Figure 33: NY_ MNCs HQ building's symmetry

Fig 33 shows that majority MNC HQ buildings in Tokyo are symmetrical. It is understood that in Tokyo, the layout, the area / the streets where the MNC buildings remain located, are relatively grid. It can be seen that, form the total observed buildings in Tokyo, 73% of the HQ buildings are symmetrical, contemporary styled and newly developed, especially those buildings located to the east and near to the port.

MNCs HQ Building Glazing to Solid Ratio: having a mean value of 62.4 %, it is used to indicate and measure the level of openness. It is used to allow maximum lighting and yet protects the interior environment from severe/harsh external climate. Most of the time architects decide the size and the shape based on their design preference and the functional requirement. These days the glazing technology has allowed designers to have as much open/glazing as they desire. The maps in the below show that most buildings have a high degree of opened/glazed to solid proportion.

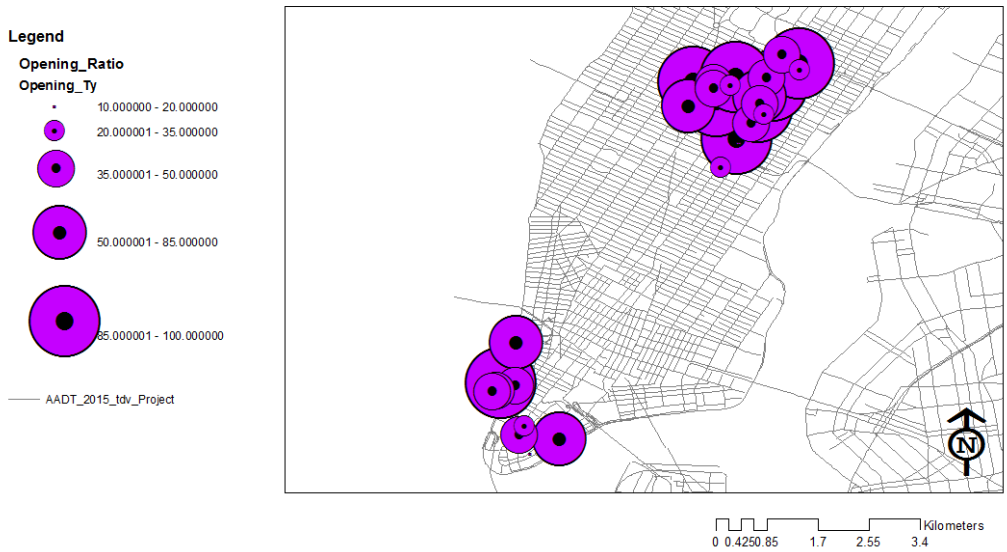

Figure 34: NY_MNC's HQ Open/Glazing to solid Ratio

Fig 34 shows, New York's big culture to apply glazing on their buildings. 58.8% of the MNCs HQ buildings are more open than sold. The architectural style has a 60% positive correlation with openness. This result indicates that most contemporary and modern styles use open designs.

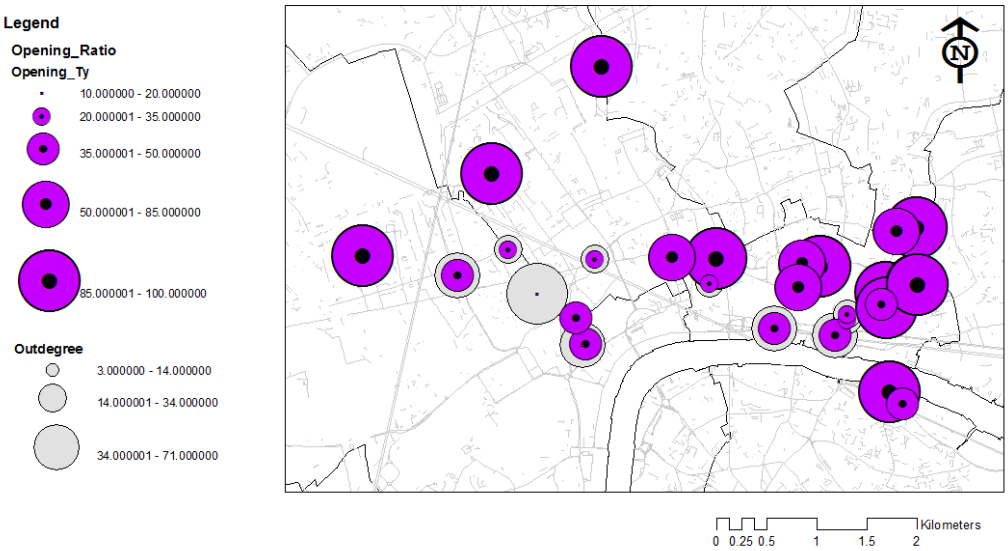

Figure 35: LO_MNCs HQ Open/Glazing to solid Ratio

Similarly, London has more openly rated buildings, 66 % of the MNCs HQ buildings have more openness ratio. Linking fig 35 of London's MNC HQ buildings open/glazing to solid Ratio with fig 15 the age of the building, we can see that as the building become newer as it gets more open. And as we move out from the city center the buildings become more open.

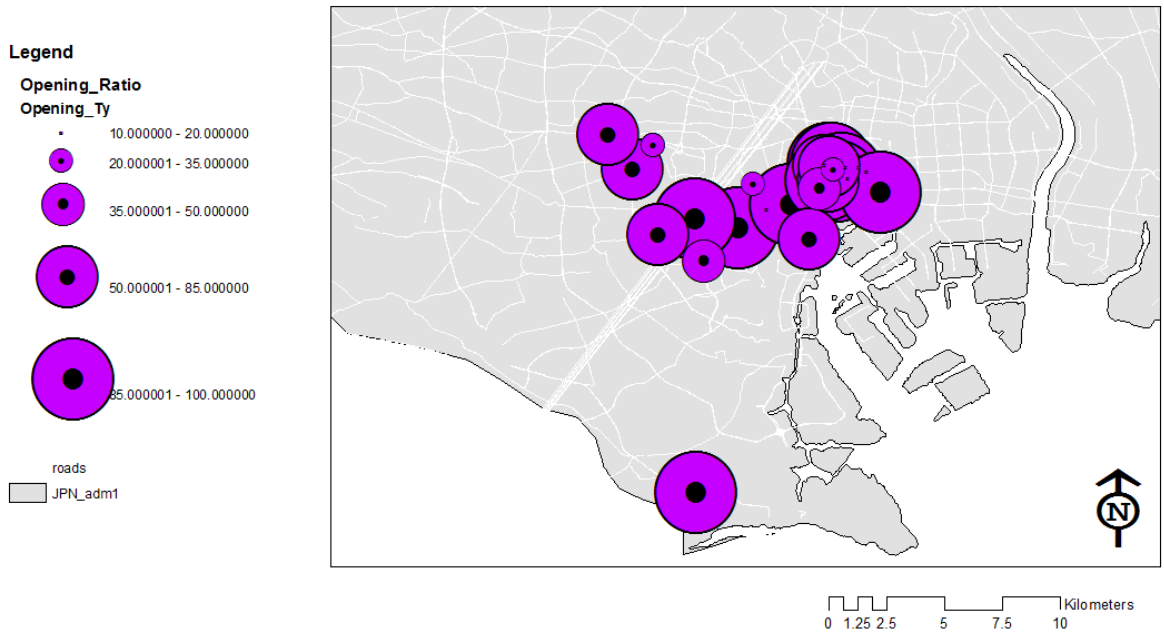

Figure 36: NY_ MNCs HQ Open/Glazing to solid Ratio

Fig 36 shows that majority MNC HQ buildings in Tokyo have more open/glaze to solid ratio. From the overall sample of buildings observed in Tokyo as much as 62.1 % of the HQ buildings have more openness ratio, especially those buildings that are young and located adjacent to the port.

MNC's HQ building's age: taking its 47.9% correlation with the style of the building, it is an indicator that shows the distribution and the general development in the building desire of MNCs. It has a mean value of 32 years, with a youngest of 3 years and the oldest 113.

The map on the below shows that the building age varies soundly. In all the three cities, the age of the building does not show any clear development or growth pattern. But, one common thing that can be seen here is that the random scattering, regardless of the value of outdegree, has spread all-around the city, which indicates that MNCs do not give attention to the age of the building but rather the look of it.

Figure 37: NY_Building's Age

Fig 37 shows that both lower and midtown Manhattan, New York follow a similar random growth of MNCs HQ. comparing the tow, lower Manhattan possess older buildings, whereas the midtown Manhattan has new and contemporary buildings especially after Harlem Renaissance, so called Great Migration, when the city transformed into an art and economy hub from 1900 to 1940.

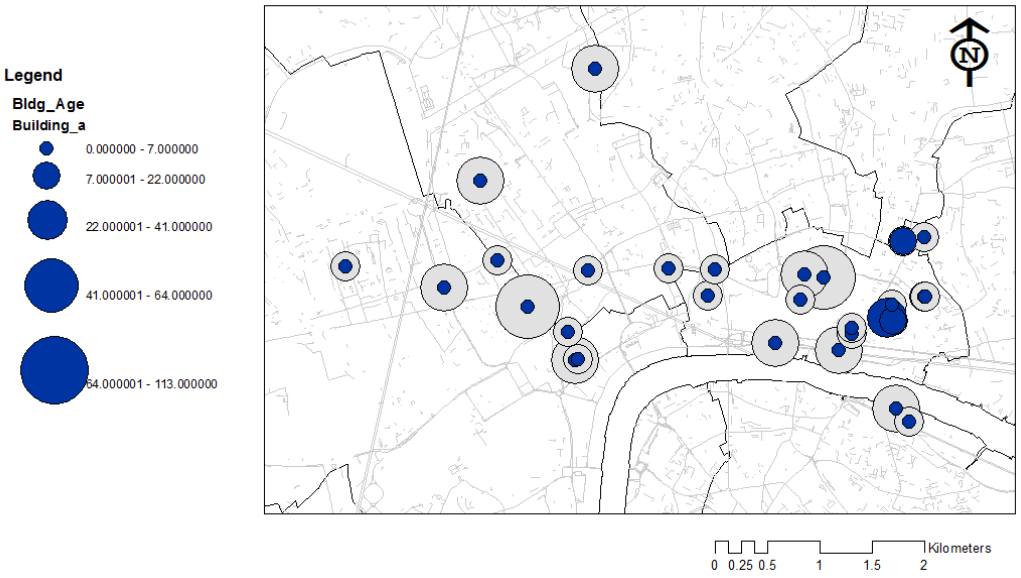

Figure 38: LO_Building's Age

New London on the other hand, though it missed some data observation, the majority of the building are pre and post-modern styles, with an average built after the First World War.

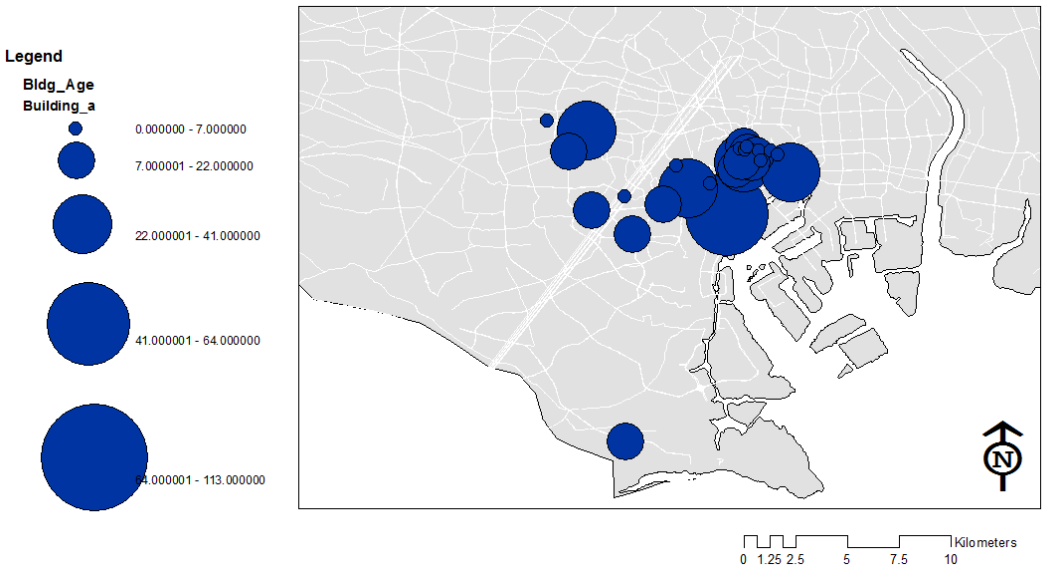

Figure 39: TOK_Building's Age

Fig 39, shows that Tokyo is exceptional, where we see the age of the building decrease as we move from the port area. Additionally, we can see that contemporary buildings are built aside the old ones. Beside the interruption and the missing data in graph, in general it shows that the aged buildings are located in New York. The majority of the MNCs are located in a building aged between 20 to 60 years.