Evaluation of the Prayer Hall Proportions for Masjids in Erbil City

The Masjids Built Between “1980-1989” and “2000-2015” as Case Study

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ABSTRACT: The design of any building depends on the elements and principles of design which are the basic needs in architectural design. The masjid design started with a simple form which used for multiple functions as led it to become religious, social and political center in the cities. Therefore, the design of masjids as any other buildings has changed across the history and varies from region to region and from period to period. The masjid building is composed of many elements which have different classifications as some of them classified them as; (functional and symbolic elements), (constant and variable elements), (basic, complementary and extra elements) and so on. Thus, these elements should be taken into consideration in designing masjids as each of them has its own proportion.

From here this study started to seek to find the proportion of some elements in the masjid design in Erbil city in order to compare them with each other and with the standard proportions too.

Thus, the general problem of the study is determined as; “The implementation of a design which is not suitable for the site led to have many loosed spaces in the masjid design in Erbil city”, in order to specify the scope of the study, the research problem is; “There are many masjids in Erbil city which has taken only prayer hall into consideration without considering the proportion of other elements”.

The main aim of the study is to find a proper proportion for each element according to the prayer hall in order to have a suitable design by taking the site into consideration. The study takes some samples in Erbil’s masjids which their area is above 1000m² so that to compare them with the known proportions which have found in literature review.

Thus, the study concludes that neglecting the number of users and the proportion of each element led to lose the basic principles of design in masjid buildings. The study recommends the architects to take these points into consideration in the design of masjid buildings.

Keywords: Masjid, Proportion, Prayer Hall

I. INTRODUCTION:

The proportion is one of the basic principles in design so the design of any building should take some basic principles into consideration such as proportion of the elements to each other and to the whole as well. Thus, in some countries they have their own regulations on the proportion of the building elements such as in the masjid buildings like in Saudi Arabia, Abu Dhabi and so on. (Mosque Development Committee, 2008, p. 39).

As Islam spread in various regions led to appear various styles all over the world such the style which appeared in Arabic countries is the hypostyle that is present mostly in Erbil city too. Throughout the history of Erbil city many masjids have been built in it, besides that there are not any specific regulations in the Ministry of Endowments about the proportions in designing masjids. From here the research seeks to find the proper proportion of the masjid’s prayer hall with some of the basic elements in the masjid’s built in Erbil city from two periods “1980-1989” and “2000-2015”. In order to compare the proportions of Erbil’s prayer hall with the present proportions, thus, it tests the validity of hypotheses which are the followings:
1) Governmental parties’ unconsciousness on the importance of the masjid’s site orientation toward Qibla direction which led to having many waste areas.

2.) There is a significant proportional relationship between the prayer hall and other masjid elements which results in a qualified design.

So the aims of the research are:

1) Finding the relationship between the site limitation and prayer hall.

2) To find out the proportional relationship between the prayer hall and some other elements of the masjid.

3) Seeking for a proper proportion between some masjid elements in order to be applied in the future designs of masjids.

To test the research hypotheses, the research depends on analytical method which is surveying the masjids that have the area above 1000m² between the two periods which are “1980-1989” and “2000-2015”, therefore, 24 samples have been selected for the case study. As it analysis ten variables for these samples by comparing them with the proportions mentioned in the theoretical part which are; area of the prayer hall to the site, orientation of site toward Qibla, length to width proportion for prayer hall, no. of module in prayer hall, area of the prayer hall to the court area, area of the prayer hall to the services, prayer hall area to the number of ablution units, prayer hall area to the number of latrines, direction of latrines toward the Qibla and prayer hall height to the height of minaret.

Then it tests the validity of hypotheses through analyzing the proportion of the prayer hall by using statistical program SPSS.

II. THE MASJID ARCHITECTURE:

Mosque is relevant to the Arabic word Masjid. While the meaning of masjid is the prostration’s place. Masjid derived from the Arabic word “sa-ja-da” which means to prostrate. When a Muslim’s forehead touches the ground, he or she is close to God (Ardhiati, 2013, p 076). The masjid architecture has two main criteria:

A. Masjids Planning Criteria:

It is considered to be an important part in the Islamic city and Muslim community as well (Yusof & Ibrahim, 2011, 1), as it is used for daily life in Islamic community so it should be taken into consideration in various planning projects as it should be distributed in a way that ensures convenient access to them and should maintain the proper proportion between the size of the masjid and worshippers density (أبراهيم، 1979، ص.4).

There are various classifications for the masjid type1 according to the planning criteria as Rafaat and others classified them to:

1) Daily Prayers Masjid: It is used to serve residential clusters for five daily prayers only with a walking distance not exceeding [200-250m].

2) Masjid (Jamii): It serves a neighborhood which used for five daily prayers and Friday prayers too with a walking distance not exceeding 500m.

3) Town Masjid (Eid Masjid): It is used for prayers in feast and other religious ceremonies which have large open spaces and the distance is not determined because it would be accessible by vehicles (رفة والآخرون، 2000، ص. 5).

While Ibrahim has classified them to the followings:

1) Small Mosque: It has small area for serving neighborhood that is why it serves the nucleus of residential clusters for daily prayers, the walking distance should not be more than [150-200m].

2) Gamah Mosque (Jamii): It serves the neighborhood and it is an emphasized feature in it which located in the center of it and the walking distance should be between (250-300m). It should occupy the whole worshippers of the neighborhood for Friday prays.

3) Eid Mosque: It is located on the countryside of the city in large open spaces that is used for feast prays and other religious ceremonies. If the population density of the town is more than 100,000 inhabitants, it needs more than one masjid that is why Gamah masjids may be used too (أبراهيم، 1979).

The masjid architecture are classified according to planning criteria into three types which are small masjid, masjid Jamii and Eid masjids, thus, this study will take the second type which is masjid (Jamii)2 that used for five daily prayers and Friday prays. As it is important to maintain the appropriate proportion between the masjid size and population density so these points would be achieved through design criteria of masjid.

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1 There are other classifications of masjid according to Hassan classified them to: 1- Small mosque (Mosalla) used for 40 worshippers which is located on an institution like factory or school. 2- Mosque: it occupies more than 200 worshippers with a walking distance of (150-200m). 3- Grand mosque (Jamii): It is used for five daily prayers and Friday prayer which is the largest one with a walking distance not more than (500m) (Hassan, 2002, p.15) as cited in (شحادة، 2010، ص.10).

2 This study takes masjid (Jamii) as studies used various terms for this type; thus, the word masjid in this study is relevant to masjid (Jamii).
B. Proportion in Masjid’s Design Criteria:

Proportion is one of the principles of design which are the vocabulary used to measure and define design (Hardwood & etal, 2002, p. xii). Proportion deals with the size of elements in a design to each other and to the whole (Pile, 2007, p.60). The apparent size of an object is affected by the size of other elements in its environment (Ching & Binggeli, 2012, p.123). The study of Abdulrahman prioritizes to utilize the term “Design Module” which the proportional relations system is based. The module, upon which the majority of proportional relations are based, is a dimension whereby different elements of the building are repeated (Abdulrahman, 1993, p.75) as cited in (Khalil and Wahid, 2013, p.3-4).

In Islamic architecture, proportioning is one of the significant aspects which it takes into consideration. Proper relations are combined through the system of favorite relations among the part, the parts and the whole levels of various forms and measurements of the architectural Islamic composition, regardless the classifications of the functional type and the architectural style of the construct (Khalil and Wahid, 2013, p.4). Islamic architecture depends on frequency, symmetry, balance, and gradation in proportional relations (Khalil and Wahid, 2013, p.4).

As the masjid architecture is the most important building in Islamic architecture which composed of various elements has different classifications:

According to Noufe (1999) is as follow: Main elements (prayer hall and minaret), complementary elements (courtyard, ablation places and women prayer hall), additional elements (Imam home and library) and detailed elements (Qibla wall and Minbar). While Abdul-Fatah (1980) has classified to: Constant elements (courtyard, portico, Qiblah wall and Minbar) and variable elements (minaret and ablution places) as cited in (Khalil and Wahid, 2004, p.25).

There are various elements in the masjid architecture but in most of the classifications the main basic element is considered to be the prayer hall, so this study will focus on the proportion of this element with some other elements and with the whole.

- Proportion in the Elements of Masjid:

There are various studies upon the proportion of masjid’s elements:

a). Prayer Hall:

The most important characteristic of a masjid is that it should be oriented toward Mecca (Sanie, 2012, P.139).

According to Zainhurn study: It is recommended that the shape of masjid should be rectangular and its length directed toward Qibla, in order to have a prayer hall that occupies the most worshippers in the rows as each one takes 1m² which is 0.8*1.2m and the proportion of its width to length could be: 1:2 (زائنهم, 2006, ص 7).

According to (Sanie, 2012, p.139) there will be 0.75*1.2m as the long edge is along Qibla, which is the most worshippers in the rows and the proportion of width to length is 1:2.5 (Mosque Development Committee, 2008, p. 35), and minimum prayer area for each worshipper is 0.75*1.2m (Mosque Development Committee, 2008, p. 15).

According to all studies the best shape for masjid and prayer hall is rectangular with the long side on the Qibla direction as the proportion of width to length in prayer hall should be more than 1:2 in order to occupy more

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3 Al-Bukhari, Hadith no.686.
4 Al-Bukhari, Hadith no.624; Muslim, Hadith no. 437 661;
worshippers in the rows especially first row and the modular unit required to be an odd number like [3, 5…].

b). Courtyard (Sahan):

It acts as an intermediary between the public space of urban life and the spiritual space of the prayer hall for the preparation of praying as it also serves to occupy more worshippers during Friday prayers (Longhurst, 2012, P.10).

According to Ibrahim study: It is recommended that all masjids should have a courtyard in order to use for prayer when they need it. Thus, the proportion of the courtyard to the prayer hall in masjids shouldn’t be less than [1/2] for small masjids and [1/3] for masjids (Jamii) (ابراهیم، 1979 ، ص.36).

The study of (Mosque Development Committee) explained that: There should be a proportion between the courtyard and the prayer hall as it may be used for prayer as an extended part for the prayer hall, therefore, the proportion is determined according to the design and size of the masjid (Mosque Development Committee, 2008, p. 39).

According to Shehada’s study: The courtyard is also used for praying and to collect worshippers when the climate is suitable which is considered to be the source of light and fresh air, as the study of (alam, 1999، ص.6) mentioned that the courtyard could minimize 1/3 energy used in the masjids so the courtyard is an important element which its area must be at least 1/2 of small masjids and 1/3 of masjids (Jamii) (شحادة، 2010، ص.35).

The courtyard is a significant element in the masjid which used for natural lighting and ventilation as most of the studied agreed on the proportion to be not less than 1/3 for the masjid (Jamii).

c). Service Elements:

The service area changes according to the masjid type which is for ablution places, storage, library, Imam’s room and so on, as service area for the small masjid is [20%], for the masjid (Jamii) is between [30%-40%], as, the area for each worshipper is 1m² in the prayer hall, so if a small masjid occupies 200 worshippers will need (200m²+40m² for service but without the courtyard area), on the other hand if a masjid (Jamii) occupies 500 worshippers needs (500m²+ 200m² for service without courtyard area) (ابراهیم، 1979، ص.8).

Also Rafaat and others mentioned that services area depends on masjid type, the time masjid will need [1.2] m² for each worshipper, while the masjid (Jamii) needs 1.3-1.4 m² for each worshipper (رفاعت والاخرون، 2000، ص.9).

Therefore, the estimated area for the grand masjid (Jamii) for 500 worshippers could be 700m² for the prayer hall and services, while the courtyard area should be more than 1/3 area of prayer hall if it’s the half of prayer hall then the whole area of the masjid would be 950m² as there are areas specified for green area and some other facilities which this clarifies that the proportion of prayer hall to the site area is less than ½.

d). Ablution Place:

The ablution facilities should be located in a suitable place in order to prevent the undesirable northern breeze from penetrating into the masjid (Buhlifa, 2006، P. 40).

The study of Ibrahim mentioned that: Ablution facilities is one of the important elements in the masjid, on the other hand it is the most sensitive space in the masjid especially when it is neglected and not cleaned continuously, that is why it should be located in a suitable place which is not on the wind direction and shall be perpendicular to the Qibla direction. There should be 1 latrine per 4 ablution units for 100 worshippers in the masjid (ابراهیم، 1979 ، ص.21–23).

The study of Rafaat and others explained that the masjid should be kept clean that is why the ablution facilities should be located on a place that doesn’t interrupt worshippers and there might be 1 latrine per [2] ablution units for [40] worshippers (رفاعت والاخرون، 2000، ص.9).

While the study of (Mosque Development Committee) explained that the latrine facilities should not be located above or below prayer hall, thus, it should be perpendicular to Qibla direction 1 (Mosque Development Committee, 2008، p. 43).

While the number of ablution units changes according to the masjid location, if it is located in non-industrial area 1 ablution unit would be for 40 worshippers but if it’s located in industrial area 1 ablution unit would be per 10 worshippers, while 1 latrine is per 3 ablution units for both1 (Mosque Development Committee, 2008، p. 15).

Therefore, all the studies agreed that latrine facilities should be perpendicular on the Qibla direction and anything which results in bad odor and disturbs worshippers is unacceptable as the ablution facilities have malodorous smell so it should be located in a place that does not influence on the prayer hall’s environment. While the number of ablution facilities changes according to the needs such this study depended on 1 latrine per 4 ablution units for 100 worshippers.

e). Minaret:

At first masjids were built without minarets and the call to prayer was carried from the roof of the Prophet’s
house (Urey, 2010, P.60). After that they used minaret for the call to prayer (adhan) as in the old times. The minarets have striking figure being either freed standing or taller than any connected support structure; minaret provides a visual focal point and acts as a landmark in the city (Urey, 2010, P.59).

The study of (Mosque Development Committee) explained that: The minaret shall be a significant landmark within its built environment (Mosque Development Committee, 2008, p. 20), as the height of the main prayer hall should be taller than any other elements except minaret as it’s a landmark so the proportion of the minaret height to the prayer hall height shall be 2.5:1 (Mosque Development Committee, 2008, p. 29).

The study of Rafaat and others mentioned that: The minaret is an important element in the masjid as its dominant height goes back to its historical function however nowadays it is not used as a functional element but it became a symbolic element for the masjid and a landmark in the urban view so its proportional height should be taken into consideration (Rafaat and the others, 2000, ص. 10).

While Ibrahim in his study ensured that the height of surrounding buildings should not exceed masjid’s minaret height (Ibrahim, 1979, ص.36).

The minaret is added to the masjid architecture as a functional element in the past but after that it became a symbolic element for the masjid and a landmark in the Islamic cities, so the proportion of its height to the prayer hall should be taken into consideration which should be more than 2:1 in order to be emphasized.

III. PRACTICAL PART:

This part discusses the procedures and stages that the research has followed in the case study aiming to test the hypothesis of the research and to achieve the research goals.

A. General Overview for the Case Study:

This stage analyzes the selected samples by surveying all the dimensions in the masjids which related to the proportional relationship between the elements and the masjid itself, thus, it depends on the indications that were found in the theoretical part. It deals with the proportion of prayer hall with some other elements and within the masjid too and its relation with the direction of Qibla, then it compares each proportion with the proportion found in theoretical part in order to investigate however the masjids in Erbil city applied a unified proportion between the elements and the whole or not.

B. Measuring Tools:

The research used different types of measuring tools in order to test the hypothesis. The research analyzed the proportional relationship of the prayer hall with some other elements for the selected samples by using (Percentage Proportion and Frequency), (Spearman Correlation5) and (Pearson Correlation) in the statistical program (SPSS Version.22).

C. The Research Limitation:

The case study of the research takes two different periods of the masjids built in Erbil city as the first period is masjids built in (1980-1989), while the second period built in (2000-2015) due to the followings:

• To control the size of the case study in number; (if the mosques in all periods are taken, a large number of mosque buildings have to be analyzed which would make the case study so big).
• To compare the new masjids with some older masjids in Erbil city in order to investigate if there is any variety between their proportional relationship. Thus, there are a large number of masjids which had been built in Erbil city in the first period.

D. Masjids in Erbil City:

There are about two hundred seventy four [274] masjids (small masjids and masjids “Jamii”) in Erbil city. From these masjids ninety of them are built before 1980 and seventy six masjids between “1980-1989”, while there are thirty three masjids built between “1990-1999” and there are about seventy three masjids which are built after 2000.

Thus, this study focused on two main periods which are the new masjids built in Erbil city and masjids built in 1980th which has a huge number of masjids while masjids which built in 1990th have been neglected because there is not too much masjids in this period which dates back to the economic effect on the society at that period, so it took twelve masjids6 from the first period and twelve masjids from the second period such these points have been taken into consideration in choosing the samples:

a) The built date of the masjids; in order to take samples in each year as far as possible.

b) The plot area of the masjids; so that masjid buildings should be more than 1000m² which chose only masjid “Jamii” type.

5 In the (Pearson and Spearman Correlation), it would be significant if the P-value is less than or equal to 0.05 while if it is bigger than 0.05 it would be not significant.

6 The masjids which have taken for the case study are from the [Masjid “Jamii”] type only, thus, every masjid term means masjid “Jamii".
E. Analyzing Selected Masjid Buildings:

This part includes graphical analyses of the selected samples from two different periods, where these masjids will be analyzed according to plan, photographs and site visits to determine the relative proportion of the prayer hall with the masjid site and some other elements in order to compare with the present proportions and even comparing both periods with each other too, so that to determine the differences between them.

Thus, the masjids were surveyed and analyzed according to the indicators:

- The area of the masjid sites and their prayer hall were determined and compared with the proportion if they used less than 1/2 or not, so eleven masjids in the first period [91.7%] and all the masjids in the second period [100%] used less than 1/2 of the site area. On the other hand the orientation of the site with the Qibla direction were analyzed too, as three masjids [25%] from the first period and two masjid [16.7%] from the second period orientated toward Qibla direction, which indicates that using less than 1/2 of the site area was not because of the proportional relationship while they could not utilize the site area as the prayer hall must be directed toward Qibla, thus, it led to have many waste areas in the site, see figure [2] and table [1].
- The prayer hall is the one of basic elements in the masjid building which the religious rituals are taking place in it especially praying as the worshippers must face toward Qibla and stand in straight rows such the first row is the best one according to the religious regulations “Shariaa”, therefore, the best shape for the prayer hall is the rectangular form with the longitudinal side on the Qibla in order to have straight rows and occupy the most worshippers in the first rows. Thus, the proportion of length to width in prayer hall should be 2:1 or more as only one masjid [8.3 %] from the first period achieved this rate, while none of the second period achieved it. As in Islamic architecture proportion is based on balance, symmetry and frequency, such the odd no of modules unit in the prayer hall is important which led to keep the symmetry and balance of Minbar (Pulpit) and Mihrab (Niche) in the center of Qibla wall within the prayer hall. So all of the masjids in the first period and eleven [91.7%] masjids in the second period have an odd modular unit, see table [1].
- The masjid’s courtyard area is a significant aspect as it used for natural lighting and ventilation besides that it also might be used for the prayer when it needed especially for Friday prays as Imam delivers ceremony so it is proportion with the prayer hall preferred to be more than 1/3, such nine masjids [75%] in both periods achieved this rate, however their shapes are irregular because of the sites’ orientation which are not toward Qibla direction which led to rotate the prayer halls in them and create irregular spaces around prayer hall, see figure [1] and table [1].
- Every building has the service facilities according to their needs likewise the masjid building also has a required area for the services per each worshipper such there is a proportion between the service area and the prayer hall as each 100m² in the prayer hall needs 30 to 40m². Therefore, one masjid [8.3%] from the first period and three masjids [25%] in the second period have this rate, while twenty masjids got more than the required service areas as this clarifies that the masjid builders did not take care about the proportion, see table [1].
- The ablution facility consists of ablution units and latrines such these two activities may sometimes be separated from each other, while in most of the masjids they are built within the same place. As ablution is a religious ritual which should be taken before pray without it the pray is not accepted that is why ablution facility became an important element in the masjids. Therefore, each 100 worshippers need 4 ablution units as only three masjids [25%] from the first period and none from the second period have got this proportion. On the other hand one latrine is required for 100 worshippers as eight masjids [66.7%] from the first period and eleven masjids [91.7%] from the second period achieved more than the required proportion. The direction of latrines preferred to be perpendicular to the Qibla direction, eleven masjids [91.7%] from the first period and ten masjids [83.3%] from the second period orientated latrines 90° from the Qibla direction, see table [1].
- Minaret is a symbol for the masjid buildings and the Islamic cities, so neglecting this element in the masjid buildings led to weaken its identity, which is why it should be emphasized over other elements in the masjid, therefore, its height proportion to the prayer hall height shall be 2:1 and more. However there are five masjids [41.7%] from the first period and five others from the second period are without minarets; such there are ten masjids [41.7%] from both periods that have minarets with the preferred height proportion, see figure [1] and table [1].
The study investigated that the proportional relationship of the prayer hall with the masjid and other elements has not a significant difference between the two various periods.

IV. FINDINGS:

- There is no a signified relationship between the prayer hall area and the site area which means by increasing the site area the prayer hall area is not increased, see table [3], because there are only five masjids [20.8%] from twenty four masjids which orientated toward Qibla direction that led to have many waste areas in the site, see table [1].
- There is not a signified relationship between the prayer hall area and the courtyard area, see table [3], while eighteen masjids [75%] achieved the required proportion which is more than 1/3 of the prayer hall this clarifies that the samples got the proper proportion without taking it into consideration, see table [1].
- There is no a signified relationship between the prayer hall area and the service area, see table [3], as twenty masjids had more than the required proportion which represents that the masjid builders did not go on a proper proportions, see table [1].
- There is no a signified relationship between the prayer hall proportion and no of ablution units and no of latrines, see table [3], however the masjids had more than required toilets but less than required ablution units so this represents that they are put randomly.
- There is no a signified relationship between the orientation of site and prayer hall, see table [4].

V. CONCLUSIONS:

- The orientation of the masjid site toward Qibla direction is very important, as most of the masjids used less than 1/2 area of the site for the prayer hall not in order to achieve proportional relationship, while they couldn’t utilize the site area as far as possible because of the orientation as a result it led to have many waste areas.
- The courtyard proportion to the prayer hall is taken into consideration but they have neglected the shape of the courtyard which most of them are irregular as this clarifies that they have created randomly without any calculations.
- However the proportion of the prayer hall shape is a significant aspect in the masjid but most of the masjid builders have neglected it.
- The area of services is determined according to the masjid type but most of the masjids used more than the required area because they have waste area and they just wanted to fill the site.
- The masjids have more latrines than ablution units while it’s vice versa, which this clarifies that they built ablution facilities without any proportional relationship.
- The proportion of the minaret height to the prayer hall height is very significant because minaret is the symbolic element in the masjids and used as landmarks in the city, while most of the masjids are without minarets.

VI. RECOMMENDATIONS:

- Governmental parties should take the orientation of the masjid site toward Qibla direction as the most important factor in order to utilize most of the site area and not to have waste areas any more.
- There should be a regulation on the proportional relationship between the masjid elements in order to be applied for the future masjid designs in Erbil city.
- The study recommends designers that they should design mosques according to the required proportions.
- Ministry of Endowments should form an academic staff to put some basic regulations for the masjid designs and follow up the projects.

REFERENCES:


### Table [1]: Statistical Analyses of the Selected Samples by Percentage Proportion and Frequency

<table>
<thead>
<tr>
<th>Variables</th>
<th>symbol</th>
<th>Both period (24Masjid)</th>
<th>1st period (12Masjid)</th>
<th>2nd period (12Masjid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(prayer hall area to site area) less than 1/2</td>
<td>V1</td>
<td>23</td>
<td>95.8</td>
<td>11</td>
</tr>
<tr>
<td>(Direction of site land to Qibla wall) toward Qibla</td>
<td>V2</td>
<td>5</td>
<td>20.8</td>
<td>3</td>
</tr>
<tr>
<td>(length to width) 2:1 and more</td>
<td>V3</td>
<td>1</td>
<td>4.2</td>
<td>1</td>
</tr>
<tr>
<td>(No.of module) should be odd number</td>
<td>V4</td>
<td>23</td>
<td>95.8</td>
<td>12</td>
</tr>
<tr>
<td>(area of court to area of prayer hall) 1/3 and more</td>
<td>V5</td>
<td>18</td>
<td>75</td>
<td>9</td>
</tr>
<tr>
<td>(area of services are 30%-40% of prayer hall area) each 100m2 need (30-40m2)</td>
<td>V6</td>
<td>4</td>
<td>16.7</td>
<td>1</td>
</tr>
<tr>
<td>(No.of ablutions to area of prayer hall) 4 ablutions for each 100m2 area</td>
<td>V7</td>
<td>3</td>
<td>12.5</td>
<td>3</td>
</tr>
<tr>
<td>(No.of latrines to area of prayer hall) 1 latrine for each 100m2 area</td>
<td>V8</td>
<td>19</td>
<td>79.2</td>
<td>8</td>
</tr>
<tr>
<td>(Direction of latrines to Qibla wall) 90 degree with qibla wall</td>
<td>V9</td>
<td>21</td>
<td>87.5</td>
<td>11</td>
</tr>
<tr>
<td>(Minaret height to prayer hall height) 2:1 and more</td>
<td>V10</td>
<td>10</td>
<td>41.7</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table [2]: Analyses for the Selected Samples

<table>
<thead>
<tr>
<th>Geometric plan of Masjid</th>
<th>Case Study</th>
<th>Period</th>
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<th>4th Variable (No. of module) should be odd number</th>
<th>5th Variable (area of court to area of prayer hall) 1/3 and more</th>
<th>6th Variable (No. of ablutions to area of prayer hall) 4 ablutions for each 100m2 area</th>
<th>7th Variable (No.of latrines to area of prayer hall) 1 latrine for each 100m2 area</th>
<th>8th Variable (Direction of latrines to Qibla wall) 90 degree with qibla wall</th>
<th>9th Variable (Minaret height to prayer hall height) 2:1 and more</th>
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Table [3] Statistical analyses of the selected samples by Pearson correlation

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<td>Positive relation</td>
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Table [4] Statistical analyses of the selected samples by spearman correlation

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Figure [1] Proportion of the Minaret to the Prayer Hall

Figure [2] Site Plans for the Selected Samples