Socio-Physical and Environmental Evaluation of Courtyard Space and Courtyard-Lifestyle in the Context of Swahili Architecture and Culture-Case Study of Dar es Salaam, Tanzania

Ombeni Swai*

School of Architecture Construction Economics and Management, Department of Architecture, Ardhi University, Tanzania

Abstract: This study was meant to analyze courtyard space in Magomeni neighborhood, which comprises Swahili architectural buildings arranged in grid iron pattern built in 1940s as African settlement. Three field surveys were conducted in 2012, 2013 and 2014 where, 99, 100 and 99 households samples were consecutively picked up for spatial, social, environmental and cultural analysis. In each survey, courtyard spaces were studied based on previous functions in terms of physical, environmental and socio-spatial roles in the Swahili architecture and lifestyle of the people. The original intended role of courtyard spaces were analyzed and compared with the current situation where most of them have lost their functions (architectural, environmental, cultural and social) due extension of rooms in the courtyard spaces which is caused by urbanization and socio-economic needs for renting spaces in areas within a walking distance from the city center. The physical analysis was followed up by the socio-statistical investigation where the results from the two analytical methods were discussed with the results as follows: Pragmatically, the courtyard spaces in Swahili architecture had central role in the physical, environmental and social layout of buildings which in this study it is considered as a "center of life" or genius loci of the Swahili architecture. The alteration in most of the buildings by extending rooms into the courtyard space has caused a downfall of this very vital space which has resulted into change of lifestyle of the residents. Discomfort due to lack of cross ventilation was reported by most of the respondents. Consequently, there is an excessive demand for artificial cooling and ventilation appliances which has increased the cost of living in the neighbourhood. Although residents have shown some efforts to plant trees to improve the living condition, a holistic approach from both the government and the community is needed in the redevelopment of the neighbourhood.

Keywords: Architecture, urbanization, Swahili culture, environment, courtyard.

1. INTRODUCTION

1.1. Background

A courtyard is a yard wholly or partly surrounded by walls or buildings. Courtyard spaces have been used in many countries for centuries, and these serve as rich models for creating outdoor spaces [1]. Referring to the case of desert area in terms of the use of courtyard, the same author affirms that the basic plan of a courtyard is a rectangular enclosure walled against the dust of the desert. This affirmation gives the morphological understanding of the courtyard as a protection space in the house against fierce living environment in desert areas. Moreover, the explanation describes the physiological and morphological characteristics of the courtyards.

Courtyards exist in many society-dwelling places, and their origins and functions differ from one society to the other. For example, China's courtyard homes create a quiet, intimate space where the walls shelter the home from the noise and dust of the street, giving way for light, fresh air and rainwater. It is also in the courtyards where fragrant trees in garden are planted to perfume the air around the homes.

In Japanese society, it is known that the courtyard space is a place for gardening, which is meant to bring peace and meditation, where objects like a stone lantern, stepping stones, and a stone water basin are placed. In these two examples, the vitality of the courtyard can be appreciated as a special space in the dwelling where the life and the culture of the particular society is centered and nurtured. This is similar to the observation of the usage of the courtyard space in the Swahili architecture.

In the coastal climate, where cross ventilation is a prerequisite requirement in design, and also in accordance with the Islamic planning perspective, it has been advised that the courtyards be located next to the external walls that are perforated in order to permit wind entry [2]. The Islamic planning categorizes courtyard spaces in three main types; the visitors' garden; the internal courtyard for the family; and the backyard, which is used for services and storage. According to this classification, it is in the internal courtyard where women stay, while men stay in the visitors' garden. This same spatial seclusion based on sex and age is found in the Swahili architecture layout, which also originates from the Islamic influence along the coastal towns of East Africa.

*Address correspondence to this author at the School of Architecture and Design, Department of Architecture, Ardhi University, Tanzania;
Tel: +255 715 400 491; E-mail: swaiarcht@gmail.com

E-ISSN: 2409-9821/16

In North Africa and the Middle East environment, courtyard spaces are deliberately designed to respond to the demands of a hot dry climate, notably the problems of solar radiation, and windy dusty environment, as well, they act as thermal regulators [3]. The same author has shown the role of courtyards in terms of air collection, filtering, cooling and supply into rooms through the openings facing the courtyard. The issue of cultural values, privacy, and different functions attached to the use of courtyard space is mentioned for the courtyards in Japanese and Chinese models.

Studies pertaining to courtyards have been conducted by many scholars; however, not all of them are direct related to the issues dealt with in this particular case. For example, Muhaisen [4] conducted some courtyard studies related to thermal performance, where the author focused on the effects of rectangular courtyard proportion on the shading and exposure conditions produced on the internal envelope. The author raised the notion of the courtyard being a climate modifier after analyzing various climates. The study shares some concept with the Swahili culture, living environment, and climatic modifications which are all centered in the courtyard space, specifically in the past before the emergency of much of the transformation which is taking place today.

Another study by Wang and Liu [5] was conducted to examine the interaction amongst the cave rooms, the courtyard, and the ambient in dwelling, which focused more on the aspects of thermal environment. In one of the findings, the two authors clarify the role played by the courtyard in terms of creating a microclimate, where in the experiment, the air temperature of the courtyard was found to be higher than that of the outdoor temperature in winter. The reverse is true for the hot and humid climate, where the temperature in the courtyard is always lower than that of the outside environment. Both of these studies show the environmental roles played by the courtyard space in dwelling places in different climatic conditions.

The study by Swai and Deguchi [6] has shown the attributes of Swahili architecture, notably the key role played by the courtyard space in socialization. The same authors have recited the courtyard space as genius loci for the Swahili dwelling space, when they considered “life” being centered in the courtyard.

Moreover, another study has also affirmed that in Bangladesh, a homestead is defined by the courtyard, which is formed by arranging the dwelling units and ancillary buildings around the open space [7]. The same author continues to recite that the courtyard has important physical and functional characteristics derived from the climatic requirements and living patterns. Nonetheless, particularly in the predominantly Muslim society, the cultural aspect of respecting women’s privacy is an important factor behind the development of this archetype. So, here, the author has linked the social, cultural and the environment aspects of the courtyard space in defining, protecting and identifying the society.

Other studies [8] have shown the environmental roles of the courtyards in dwellings, annotated that some courtyards contain fountains and trees to promote evaporative cooling and provide shade, while causing moderation of the climatic extremes in many ways such as: 1) The cool air of the summer night is kept undisturbed for many hours from hot and dusty wind provided that the surrounding walls are tall and the yard is wide; and 2) The rooms draw daylight and cool air from the courtyard. It is also affirmed that the courtyard with its gentle microclimate provides a comfortable outdoor space to enjoy [8].

It is the above reasons that have persuaded the author to evaluate the courtyard as a space, and also as the center of life in the Swahili architecture, where the author intends to understand the current condition by applying socio-physical and environmental aspects as tools to evaluate the actual living condition based on the feedback from the people. Among other things, the study will lead in understanding the remaining vitality of the courtyard in the Swahili dwellings, and its corresponding socio-cultural and environmental contributions to local culture and Swahili architecture.

The studied literature written above has significantly contributed in highlighting the vital roles of courtyard space in various societies, cultures and climatic conditions. By virtue of the functions of the courtyard space, this study is geared to respond to the following questions: What happens when the courtyard space downfall in the Swahili neighborhood? Life in Swahili neighborhood being centered in the courtyard, how do users respond when the courtyard dysfunctions? What are the alternative reactions by the residents?

1.2. The Study Area

Dar-es-Salaam is a multi-colonial rooted city from the Arab, the German, and the British occupations. All of the three have influenced the evolution process and

Figure 1: Dar es Salaam region-municipalities source: kinondoni municipality.

Figure 2: The study Area. Source MLHHSD [10], edited by the author, 2012.

original infrastructural-layout of the city. Currently, it is the biggest commercial center of Tanzania (Figure **1**), with a population of about 4.5 million people within an Area of about 1,600 km^2 with the annual population growth rate of about 7-10% [9]. It is among the fastest growing cities in Africa. The main part of this study is conducted at the Magomeni area Figure **2**.

2. OBJECTIVES

The purposes of this study are:

1. To outline and clarify the current living condition in the Swahili architecture neighborhood regarding the characters of courtyard space and its role in the lives of the residents.

2. To present some of the findings of the socio-physical and environmental evaluation based on their feedback from the residents.

Physically and spatially, the study clarifies an outcry of the disappearance of the courtyard space, the vital architectural element which plays an important role in the traditional lifestyle of the Swahili people. Environmentally, the study clarifies from the macro and micro perspectives how the demise of the vital courtyard space has contributed to a deterioration of the urban living condition, and the need to revamp the prevailing situation.

The study is based on a field study conducted in Dar es Salaam city, Tanzania, specifically in the Magomeni neighborhood. The first data collection was conducted from January to February 2012, followed by a second data collection from July to August 2013, and the last study on January and February 2014. In each case, a sample of about 100 household is used as the first hand information for analysis, however the respondents were 90, 100 and 99 for the three studies respectively.

3. RESEARCH STRATEGY AND METHODS

A case rich research strategy refers to an empirical inquiry that seeks to understand a contemporary phenomenon in its real context [11]. Strategies could also be differentiated based on the phenomenon under study; whether it is contemporary or past observable fact, the choice of research strategy depends largely on the nature of the research problem. Research questions are amongst the yardsticks used in making a choice of the strategy. When the main research questions are “how and why”, case studies and experiments are likely to be the most appropriate

strategies. Surveys are the best when the main questions are 'who', 'what' and 'where', while archival and historical analyses are used for 'whom', 'what' and 'where' [12, 13].

Yin [14] continues to assert that case study is used in many situations to contribute to knowledge of individuals, group, and organizational, social, political and related phenomena. He also iterate that the case study has been a common research strategy in psychology, sociology, and political science social works, business, and community planning [15, 16]. It is further clarified that the central tendency among all types of case studies is that it tries to illuminate a decision or a set of decisions: why they were taken, how (process) they were implemented and with what results (impacts) [17]. It is from this understanding where the author tries to investigate the case of disappearance of the courtyard space and its associated lifestyle in the context of the Swahili people where environmental challenges have emanated in the neighborhood. The case study will be applied in which quantitative analysis is one of other several methods applied in the study, for that reason, data collection using questionnaires, supported by interviews and observation was inevitable. Structured questionnaire with a variety of closed and open ended questions was used to collect data. The variables included in the questionnaire were those of personal data such as age, sex, address, occupation, income, length of stay, daily activities, number of families, number of rooms in their unit, and the sketch of room division in their unit. Moreover, the interviewees were asked to express their opinions pertaining to the ongoing transformation and its outcome to the residents.

The field survey was conducted in three consecutive years longitudinally in order to compare reaction of the residents in terms of their climatic comfortability due to the changes which have taken place in the courtyard space (Table **1**). In this case data were taken during summer season (hot and humid) as well as rainy season for each year. In each data collections, a reasonable number of residents and houses were targeted in order to obtain profound information (Table **2**). In the first case (2012),

Table 1: Number of Respondents in the Three Field Surveys

Family Members	First Survey (2012) (N=90)	%	Second Survey (2013) (N=100)	%	Third Survey (2014) (N=99)	%
Men	21	23.0	48	48	42	42.4
Women	60	67.0	35	35	36	36.4
Children	9	10.0	17	17	21	21.2
TOTAL	90	100%	100	100%	99	100.0%

Table 2: Building Conditions in Relation with Courtyard Space

Structure Content	First Survey (2012)	Second Survey (2013)	Third Survey (2014)
Courtyard	68	72	64
No Courtyard	7	9	3
With Extension	80	78	82
No Extension	10	12	17

Table 3: Data on Family Members Involved in each Field Study

Family Members	First Survey (2012) (N=90)	%	Second Survey (2013) (N=100)	%	Third Survey (2014) (N=99)	%
Men	21	23.0	48	48	42	42.4
Women	60	67.0	35	35	36	36.4
Children	9	10.0	17	17	21	21.2
TOTAL	90	100%	100	100%	99	100.0%

interviews and questionnaires from 90 households were collected. In the second case (2013), data from a 100 households was collected, and in the third one (2014), data from 99 households were collected. These data were collected longitudinally in order to compare different seasons of the year.

Questionnaires were used to obtain information about the family structure and the way it had been changing (Table **3**). A sample of 100 households was selected for the study. The target group consisted of people of all ages (old, middle and young). Elderly people who had been living in the neighborhood for a long time, and therefore, would be able to provide more accurate information about the historical background of the study area were given more attention. The data collection exercise which lasted for one month was carried out by the author and four undergraduate students from Ardhi University in Dar-es-Salaam.

Physical measurements for the spatial organization of the household and air circulation were accurately documented by using a laser meter. The objective was to obtain the dimensions of the current remaining spaces in particular the courtyard and the way these spaces are used to facilitate the daily lives of the residents.

3.1. Conceptual Framework

This study develops a conceptual framework (Figure **3**), which helps to explain the overview of the use of courtyard space in Swahili architecture as considered in the three major categories:

3.1.1. Courtyard as a Social Space

In this aspect a courtyard space is used for various social activities such as resting, dining/eating, playing, cooking, gossiping, and family gathering. These activities vary with age, time and gender. For example, during family festivals women and children may use courtyard space for dining, gossiping, cooking and playing. Likewise, children use the courtyard space for playing and resting after school. Again, in normal days, women use courtyard as a resting place and sometimes for gossiping as an act of socialization. Seldom, a courtyard space is used by men in the night as a resting place during hot and humid months of the year, while waiting for the indoor environment to cool. These social activities and use of courtyard space is typical for communities along the coast.

3.1.2. Courtyard as an Environmental Space

The study considers a courtyard space environmentally in terms of various functions, activities and practices which residents carry-out in the courtyard space. For example, due to the limited size of the plots (12 x 24m) in the study area, buildings covers most part of the plot living the courtyard space where the residents use landscape arrangement by planting and gardening to beautify their buildings. This has also

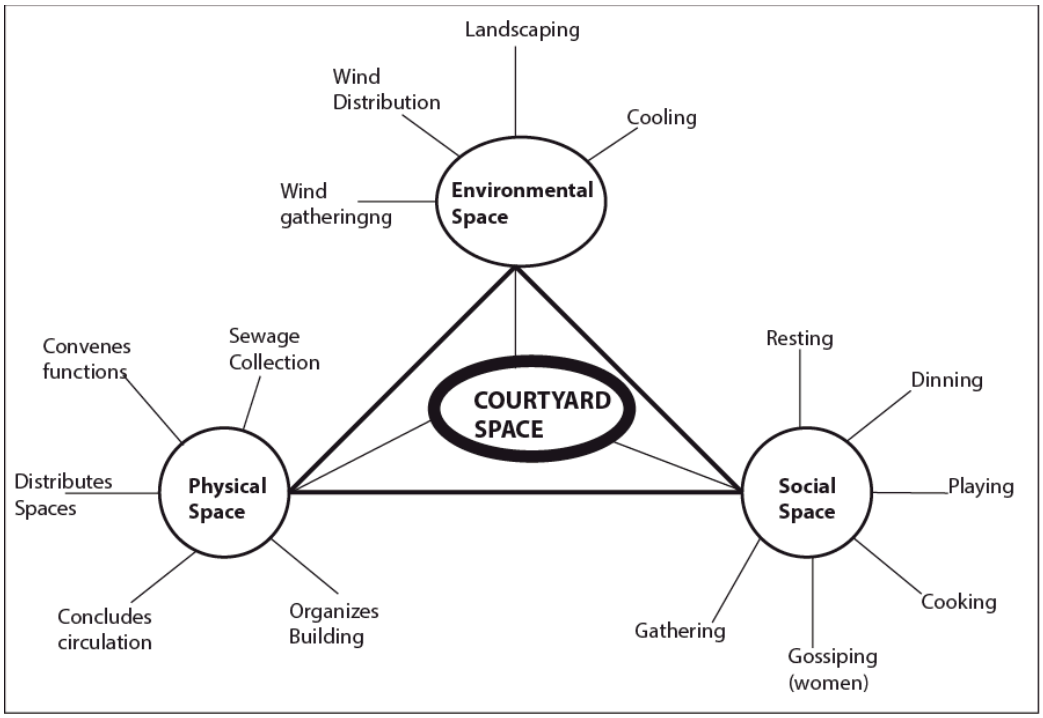

Figure 3: Conceptual framework for studying courtyard space in swahili architecture-author, 2014.

been mentioned by other authors in other countries in the literature review.

Naturally, since most of courtyard spaces are void, they collect wind which later goes through openings facing the courtyard to create ventilation in rooms. In coastal climate, room ventilation is one of the most important aspects to create a comfortable indoor micro climate.

3.1.3. Courtyard as a Physical Space

Normally, a courtyard space is bordered by physical structures such as fencing walls and buildings creating a void space in between. By virtue of its nature, it is perceived as a physical space demarcated by other structures thus giving it value to accommodate other household activities such as washing clothes, utensils, drying clothes and storing some equipment. Likewise, a courtyard in Swahili house helps to organize buildings and spaces by linking the outdoor (public) and the indoor (private) spaces. Main circulation routes normally terminate in the courtyard while also distributing spaces. For example, in normal use, a courtyard is a private space however, in the case of family festival where guests and visitors are invited, the courtyard space turns into a public space by accommodating outsiders. In some other cases, particularly where there is no provision of public sewer, soak away pit to collect sewage is built in the courtyard space, where on top it is covered by concrete slab for other activities to take place. The courtyard space normally connects the main house and other auxiliary structures such as toilet and kitchen which are usually located outside the main house. The author applies this framework to study the downfall of the courtyard space and lifestyle in the Swahili neighborhood in order to find out the responses from residents, impacts and alternative reactions.

4. RESULTS AND DISCUSSION

4.1. Socio-spatial Qualities of the Swahili Architecture-Analytical Approach

This section introduces the Swahili architecture in its basic spatial function, where it categorizes the architecture in terms of space, function and its private-public relationship. Magomeni settlement (the study area) is laid in grid iron pattern where blocks are structured by grid-street network where in these blocks, plots are arranged facing the streets. Looking at the spatial configuration of the building plot in relation to the streets, three main closely interconnected spaces (front space-street; intermediate space-Swahili building; and the rear space- courtyard) can be realized. The interweaving of these three spaces form social inclusion and seclusion in the process of interaction between occupants and space in the Swahili architecture and culture. The same configuration sets limitations and depth of interaction considering age, gender and closeness of the people. These spaces are categorically disconnected in terms of their physical locations, however, they are connected in terms of their social relationship (Figure **4**).

A further breakdown of these three spaces reveal that each of the space consist of “public and private

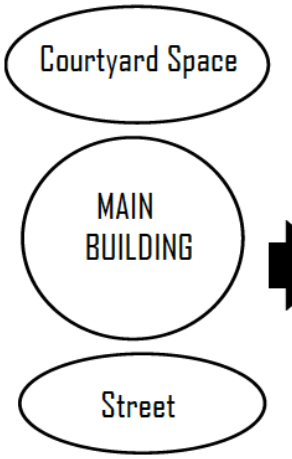

Figure 4: Spatial Categorization- author 2013.

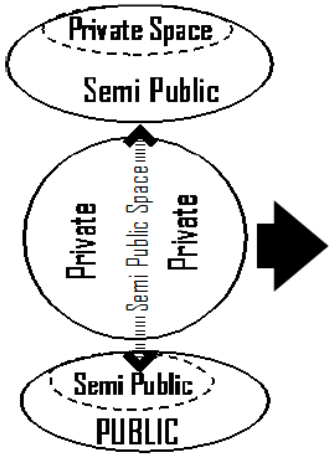

Figure 5: Spatial Transitions- author 2013.

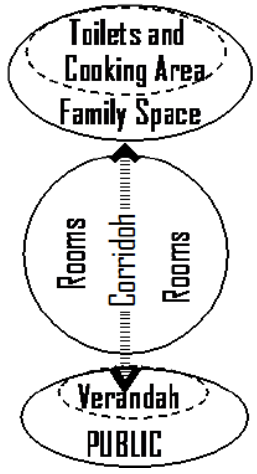

Figure 6: Functional Organization- author 2013.

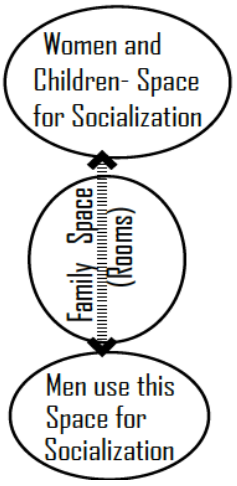

Figure 7: Social Values of Space Use (seclusion).

realms" in terms of their spatial use. For example, in the Swahili architecture, streets are part of the building frontage and the plots normally do not have frontage fence which could physically separate a building from the street. In this case, the frontage part of the building "verandah" is both physically and socially related to the immediate street and the alignment of several buildings along a street form a streetscape. In the study area, the street consist of an immediate space very close to the building which is used (cleaned, maintained, and occupied) by the owners and hardly used by passers-by "semi-public" while the part of the street which is publicly used (driving, waling, playing and other uses) is categorized as a "public realm". At the building scale, the Swahili architecture consists of a (passage) "corridor" dividing room on both sides of the building, which is again the main spatial connecting media. Again, this space consists of a public and private realms in terms of its uses and the relationship between the use and the user. For example, the very middle part of this corridor is purposely left open for passage by the members of the family, occupants or visitors (semi-public) while there is a small space which is occupied by the room users for storage, cooking, and short time socialization among family members. Rooms on both sides of the corridor remain as private space where only occupants can enter "private realm" (Figure **5**). This transition of space-use depends on the attachment of a user to the space. Likewise, users (men and women) who are normally the Swahili people, know the cultural limitations of the use of the three spaces, respecting both the connection and isolation of the spaces. The three spaces of the Swahili architecture layout can be functionally organized or categorized as verandah, corridor and rooms, and the courtyard which work together harmoniously fulfilling their social, spatial, cultural and environmental functions (Figure **6**).

According to the narration from one occupant in the Swahili building, he described how the three spaces are used throughout a day by saying "each *part of this area is useful for us as a family. In the past wazee (elder men) used to stay at the front verandah to greet others who pass-by our house. This was a sense of neighbourhood, by doing so, we were able to know each other and to extend our relationship. While men sitting here, women and children were either in the corridor talking or in the courtyard playing and chatting. He continue to narrate. We don't want our children to play in the front part of the building, they will be knocked off by cars. There are many cars in the streets. In the evening the old men would gather in the verandah playing* ***bao*** *"a chess-like traditional game" famously played by men along the coast. When a woman is sick or visited by her friends they go there…"pointing in the courtyard" they talk until they finish their matters. These days, the economy is not good, women prepare bites in the corridor and stay at verandah selling them. We men have no place to socialize anymore only in very few places along this street" (Hamis Ramadhani, 2013).* This narration gives a better understanding of the social functions of various spaces in the Swahili house as graphically described in Figure **7**.

4.2. Environmental Qualities Inquiry and Simulation Approach

As a result of urbanization and globalization, many cities have lost the features of local architecture, notably the demise of courtyard space in the Swahili architecture. In the city of Dar-es-Salaam especially, certain architectural styles which reflect the identity of the region, the lifestyle of the local people are fast disappearing. This phenomenon occurs in inner cities, with old structures giving way to a new architectural elements and social lifestyle. The erosion of the architectural heritage is intertwined with the loss of a socio-cultural identity, resulting in a deterioration of the quality of urban life. Urban dwellers have consequently resorted to various means to suit in this new living environment, despite of the high price in terms of energy costs and lack of cultural identity.

Swahili architectural style is found along the early towns of east coast of Africa (Kilwa, Mombasa, Malindi, Dar-es-Salaam, Zanzibar etc.), consisting of Bantu and Arab-building features such as plot layout, building layout, spatial distribution, relationship between a street and a building, roof layout and the original location of the courtyard space (Figure **8**). Furthermore, based on site study, a typical section of the original Swahili building featuring materials was shown in Figure **8**. Extruded 3-dimensional layout of several buildings forming a block and their relationship with the street as well as the linkage of the front part of the building "verandah and the rear space "courtyard" is shown in Figure **9**. In the same Figure **9**, the relationship between the rooms and the corridor which is the main

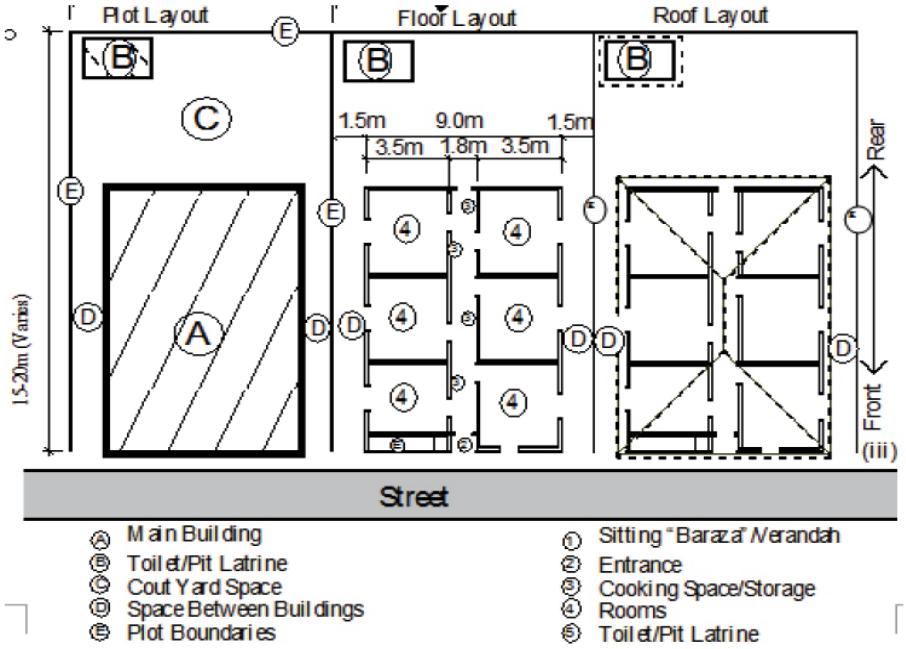

Figure 8: Plot and building layout of swahili architecture source; author, 2012.

space linkage facilitating all cultural and social activities in the building is documented.

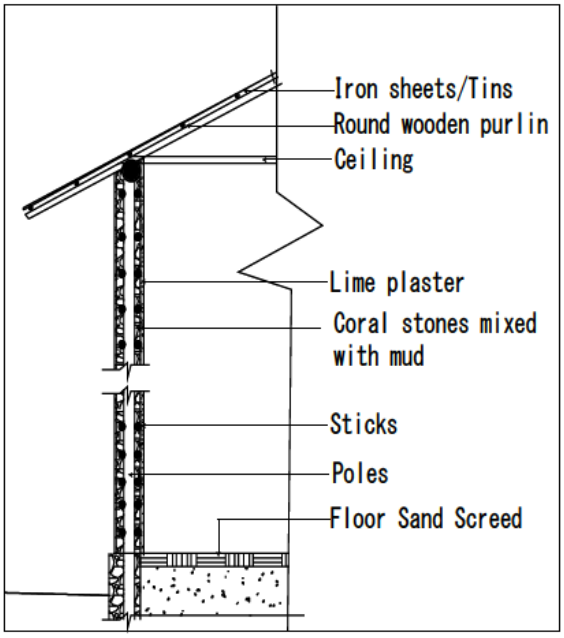

Figure 9: Materials and construction system of swahili architecture source; author, 2012.

The above spatial and cultural qualities of the Swahili architecture are some of the hidden treasures, which are found but now in the state of disappearing due to the on-going transformation. Also, the environmental function of the building-spatial organization (facilitating ventilation) is described in both building and block levels (Figure **10**). These are the basic qualities of the Swahili building observed in the study area. This is further elaborated in order to give more insights on the block organization in relation to its facilitation of natural wind ventilation, a typical block section was drawn based on the site layout, the wind direction monitoring, and the help from the residents who understand the wind pattern from the past. Accordingly, based on several sketches showing the existing condition of building arrangements, a separate detailed

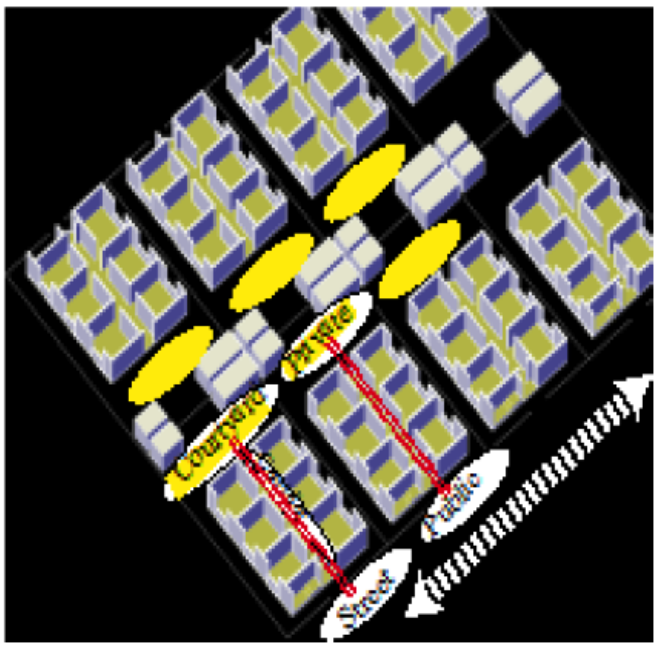

Figure 10: Isometric view of several buildings in a block-swahili architecture source; author, 2012.

drawing showing a typical building compaction within plots was drawn (Figure **11**). In the two drawings (Figures **10** and **11**), analyses of wind movement, which was used in the past to facilitate natural cross ventilation to the buildings within the neighbourhoods, were conducted.

The drawings showing the current situation clearly indicates the blockage of the air movements within the building, causing deterioration of the living conditions within the community as lamented by one resident.

"This place has changed, we used to stay here in the corridor and verandah enjoying the breeze from the courtyard. But these days, look, buildings are everywhere. Life is expensive, what can we do"? Mwanaidi Fatma, 2013.

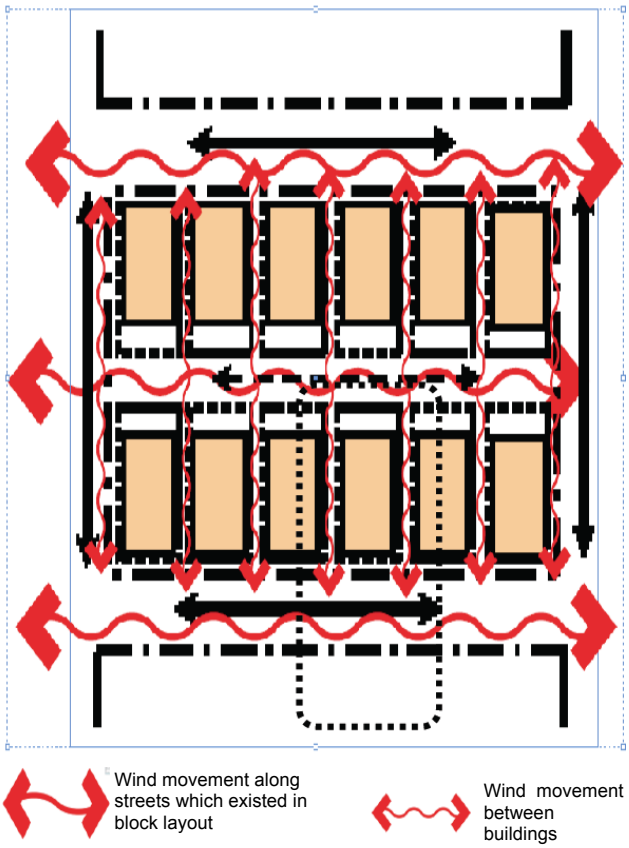

Figure 11: Block organization showing previous layouts to facilitate wind movements; author, 2013.

In order to understand the extent of the blocked wind channels as well as to get the speed and velocity of the wind based on altering the physical size of the courtyard, several simulation models were integrated in the study. The models were developed based on the site situation, but with assumption of vertical increase (Figure **12**), horizontal increase but varying size of the courtyard (Figure **13**), and crowding of the courtyard spaces (Figure **14**). The simulation results were to be used to judge or to compare with findings from the social-environmental feedback. Actual wind speed of 8-12km/h based on the site measurement and climatic data were used in the simulation.

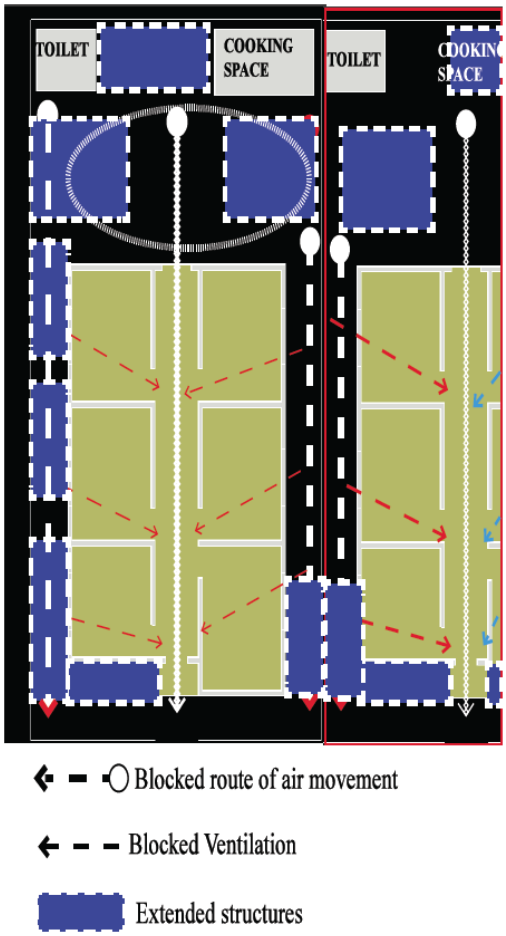

Figure 12: Extracted part of the block "part **A**" showing the current situation-based on the study; all the previous routes for wind are blocked source; author based on site measurement 2013/11.

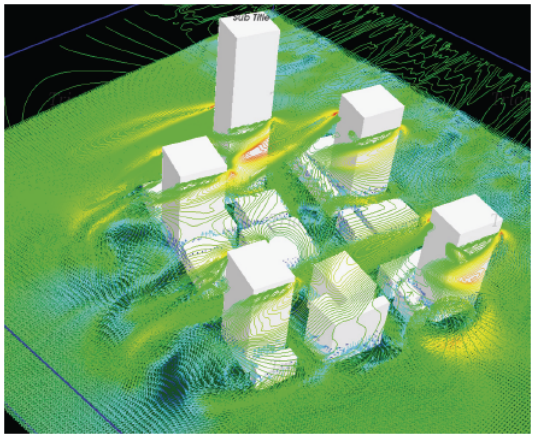

Figure 13: Wind flow trend with assumption of vertical growth in the neighborhood. Source: author, 2013.

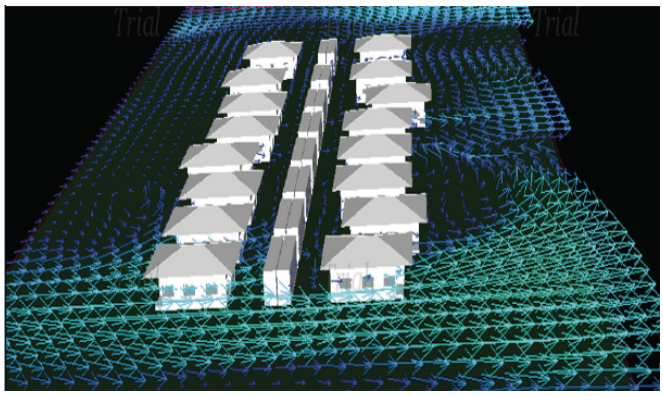

Figure 14: Wind flow trend in single structures-swahili architecture model. Various sizes of courtyards were considered source; author 2013.

The changes which have taken place due to the transformation of courtyard spaces have not only affected the flow of air in the buildings but also they have occupied the space, which were used for landscaping. Due to the size of plot were super high density, residents used to plant some flowers and other plants in the courtyard and on the sides of the buildings. In the recent wave of transformation, most of the green plants have been removed to pave way for building extensions as confirmed by one of the residents. "*We used to plant flowers and vegetable here, pointing at a place where a building was extended. Nowadays, flowers are of no value as compared to rent we get from these few tenants" said Musa Uledi, 2013.* When asked what alternative they will take in order to have a few green plants in the house he said… *May be we will try to hang flowers on the wall then because some of these are useful to us*".

This can be also confirmed by the findings by Mng'ong'o [18] whose study showed that in the recent years there is a high disappearing of green spaces at all level and increase of concrete structures in urban areas. The same author further affirmed that even the quality of the remaining green spaces and structures is decaying and that the disappearing of the green plants in the city has a detrimental impacts to the ecological functioning of the green as a system, infrastructural and health aspects on the city. Both transformation and gentrification of buildings and urban spaces both at household "micro" and at urban level "macro" are a major alarm as far as green plants are concerned.

4.2. Environmental Qualities Inquiry and Simulation Approach

The socio-statistical analyses show that the residents of Magomeni neighbourhood associate the current weather condition with the ongoing transformation in the courtyard space when they compare the past living conditions and the current situation. For example, among the three studies, the response in terms of their perception on the increase of temperature and lack of cross ventilation in buildings shows that people express their dissatisfaction with the air movement in and around buildings, where for day and night time, 65 and 60 people responded to their dissatisfactions (Figure **15**). The study continues to unveil that in the household, there are areas that have different qualities of natural ventilation based on factors not limited to the location, orientation and morphological structure of the buildings. Due to these differences, three mostly used spaces in buildings, which are the front veranda, rear courtyard and rooms were investigated based on the user preferences and the time they mostly use the spaces. Based on the responses, it was revealed that veranda and courtyards, which, in principle, are the outside spaces, score more points in terms of receiving good ventilation in the three studies.

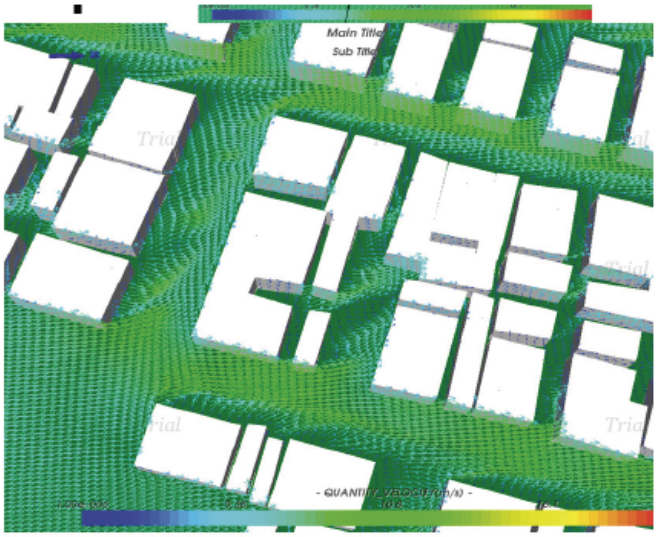

Figure 15: Wind behavior as courtyards get smaller-variation of sizes of courtyards were considered; author, 2013.

The studies conducted between January and February in 2013 and 2014 show that according to the users' feelings on ventilation, verandah scored 42, 39 during the day, and 32, 46 during the night respectively. This was followed by the courtyard, which scored 30, 32 during the day and 41, 39 during the night. Likewise, for the study conducted between June and August, both verandah and courtyard spaces won more people throughout. Contrarily, the three studies show that indoor spaces are the spaces receiving the least amount of wind and ventilation; notably, the studies between January and February indicate very little

appreciation of the amount of wind and ventilation in day and night (Figure **16**).

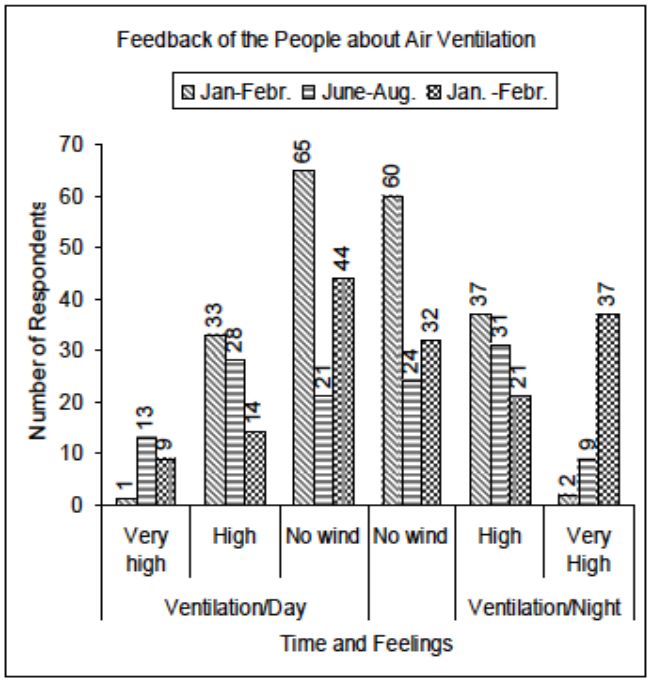

Figure 16: Qualities of wind and ventilation-author 2013.

Further observation revealed that the change of weather based of the analyses of both climatic parameters and social experiences have influenced the use of outdoor spaces in lieu of the indoor ones. For example, in the studies between January and February, it shows that the use of the veranda in the daytime dominates 43, while it is least used at night. Courtyard is the most used space during the day and night time among all three studies (Figure **17**). This is due to its private nature in the Swahili architecture where it is surrounded by other rooms. The second factor is that the courtyard is a semi-covered, semi-opened space that permits all-weather usage in day and night. The author observed some people using the courtyard as a resting place, as well as a sleeping place. Others contended by saying that they sleep in the courtyard until late at night when all the indoor spaces are cooled down, and then they move in the rooms.

Due to the economic position of many people in the neighborhood, the majority do not use the air conditioner, only a few of them were using it (9, 11, and 14) during the day, and 17, 21, and 19 at night in the three studies consecutively (Figure **18**). Enquiring them as to why don't they use air conditioners, a total of 52 people responded that: the cost of running the system will add an extra burden in their daily expenses. For that matter, they opt for a natural ventilation system, which in actual sense is also becoming difficult to sustain due to the increase of daytime temperatures. On the other hand, many (48 and 44) prefer to use the air conditioner, especially for the months of January and February (Figure **19**).

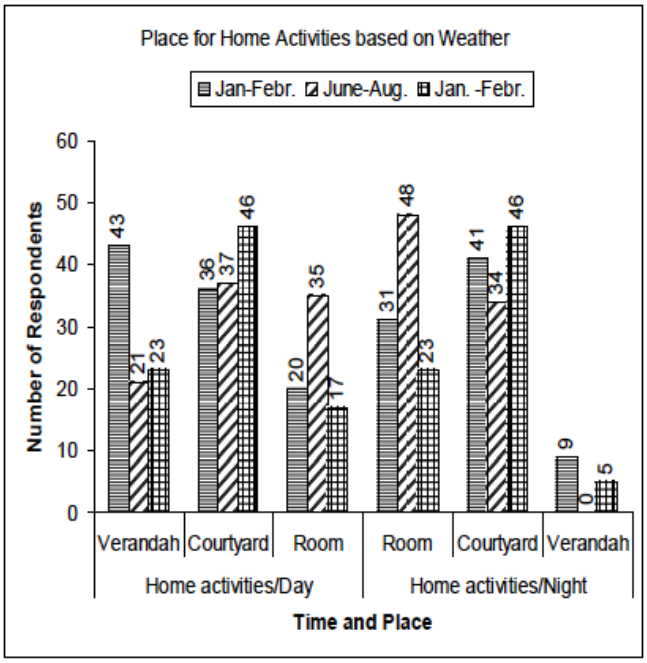

Figure 17: Preferred places to conduct home activities due to weather condition-author 2013.

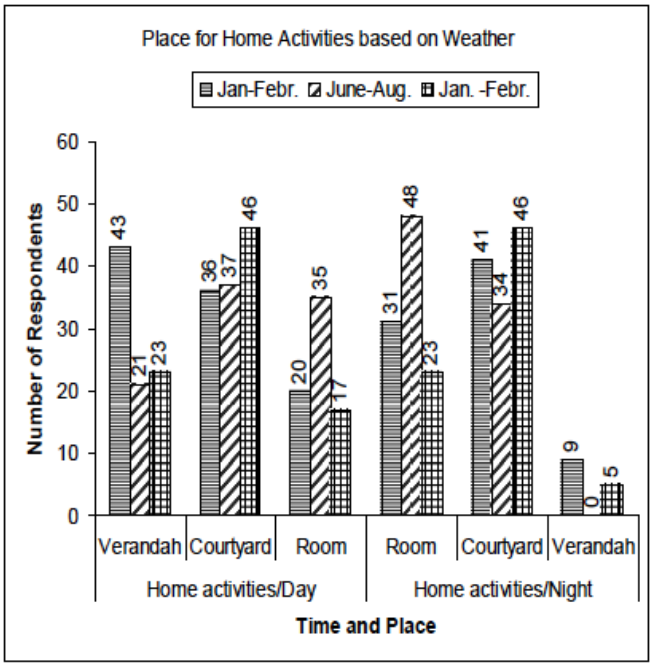

Figure 18: Preferred places to conduct home activities due to weather condition-author 2013.

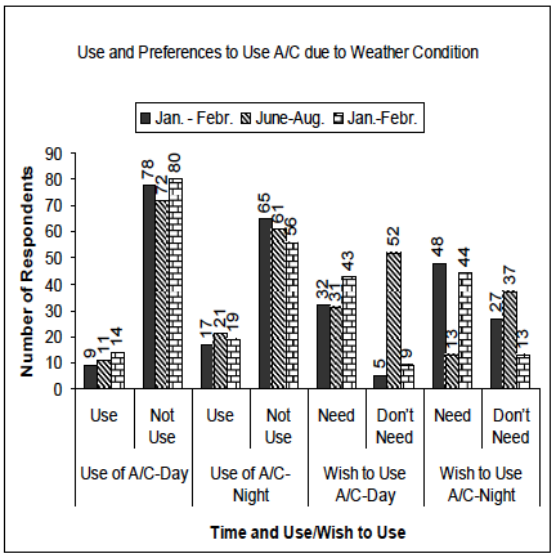

Figure 19: Preference to use A/C due to weather condition-author 2013.

CONCLUSION AND RECOMMENDATIONS

This study was meant to elucidate the downfall of the courtyard space in the Swahili architecture in Magomeni neighbourhood where, three consecutive studies were conducted in 2012, 2013 and 2014. Magomeni area like many other parts of Dar es Salaam was taken as a case of fast transforming urban spaces, whereby Magomeni is changing by extending buildings in the courtyard space which used to be a vital and a center of life and activities in the Swahili architecture. The study was pegged on firstly giving an insight of the Swahili architecture found in the study area and many other parts of Dar es Salaam and the coast of East Africa. Various graphical analyses of layouts and characteristics of the Swahili architecture and the way various spaces of the building (front verandah, corridor, rooms and courtyard) are intertwined in the culture and lifestyle of the coastal people was described. Through the interviews, residents confirmed their concerns on the current situation where most of the courtyard spaces have been converted into habitable rooms due to both economic and spatial demand. This was translated into the social, physical, environmental and economic impacts which the process has caused in the study area. The results were as follows:

The increase of buildings in the courtyard space has blocked movement of air thus affecting the cross ventilation in 80% of the buildings thus causing uncomfortable living environment in dwellers. This has gone further by changing the preferences of using some of the spaces in the buildings. Alongside these impacts, the old style of planting flowers and vegetable garden in the courtyard space is no longer practiced due to lack of space. This has been pointed out that it has a detrimental effect to the lives of people, environment, infrastructure and micro-organisms.

Socially, the changes in the courtyard has also affected the lifestyle of people by altering their spaces where they used for cultural attachments. For example, the front verandah which was used as a socialization space for men, is currently used in the morning and evening as a space for women to sell bites in order to support family due to economic hardship. This has not only affected men in the household level but it has broken social cohesion and network that used to be built during social activities conducted by men in the front verandah such as playing "*bao*" (local chess game), drinking coffee, talking and passing time.

Consequently, the changes in the courtyard has raised the demand to use air conditioner although the question of affordability is still a challenge. Never the less, to those who have opted for air conditioners, they have also end up in economic hardships. Conclusively, this study has unveils that the courtyard space in the Swahili architecture plays a central role in organizing movements, convening activities, regulating weather condition thus making it a vital space environmentally, physically, socially and culturally which, when altered, it affects all other systems in the Swahili architecture.

The study recommends that due to some irregularities and lack of enough supervision from the respective organs with authority to oversee the development of Magomeni, there is a need to rethink the strategies for urban development of Swahili townships where the core attributes will be incorporated in the new development. Furthermore, efforts ought to be made to reduce the conflict between residents' aspirations in terms of culture and quality of life which are the foundation of a resilient society on one hand and the changes in space and lifestyle that accompany development on the other hand. This will enhance the cohesion between the space and the user.

Last but not least, the potentialities of Magomeni neighbourhood, due to its location and land value, as well as the cultural bindings of the Swahili architecture, render both the neighbourhood and its architecture to be of equal importance. Hence, there is a need to re-develop and transform this neighbourhood to become a

better and more decent settlement based on the Swahili culture and architecture while appreciating the existing attributes of the Swahili culture and space relationship. Changes in the Swahili social structure and its culture seem to be inevitable despite efforts to control or manage them. Nevertheless, it is important to anticipate the impacts of the changes in order to prepare the groundwork to accommodate it and to exploit it to advantage.

REFERENCES

[1] Brzuszek F. Creative Courtyard Spaces. (http://msucares.com/lawn/landscape/types/courtyard.htm 2010), updated in October 14, 2010, accessed May 2011.

[2] Abdullah and Sarkawi. Urban Planning: An Islamic Perspective. Arah Publications, Negara, Malaysia 2008; 95-105.

[3] Koch-Nielsen. Stay Cool; a design guide for the built environment in hot climates. Earhscan, UK 2002; 57-64.

[4] Muhaisen S. Shading simulation of the courtyard form in different climatic regions. Journal of Building and Environment. Elsevier Ltd 2006; 41: 1731-1741. https://doi.org/10.1016/j.buildenv.2005.07.016

[5] Wang F and Liu Y. Thermal environment of the courtyard style cave dwelling in winter. Journal of Energy and Buildings Elsevier 2002; 34: 985-1001. https://doi.org/10.1016/S0378-7788(01)00145-1

[6] Swai O and Deguchi A. Socio-urbanization and its Impacts to Courtyard Spaces and Courtyard-lifestyle in Swahili Architecture and Culture: Case study of Dar es Salaam, Tanzania. European Journal of Social Sciences 2010; 18(1): 51-73.

[7] Ahmed K. The Rural Bangladeshi Courtyard, Department of Architecture. BUET, Dhaka 1000, Bangladesh, BRAC University Journal 2006; 3(1): 9-15.

[8] Sayigh AH. Marafiaj Renewable and Sustainable Energy Reviews. 1998; 2: 25-37, extracted from Architecture Comfort and energy Editors C. Gallo, Sala, m. Sayigh Elsevier, Singapore 1998; 2: 36-38.

[9] National Bureau of Statistics. Population and Housing Census. Ministry of Finance Dar es Salaam, Tanzania 2012.

[10] Ministry of Lands Housing and Human Settlement Development. Survey and Mapping Division 1994.

[11] Ying RK. Case study Research: Design and Methods 1994; 5: 3rd Edn. SAGE publications, London.

[12] Badke WB. Research Strategies: Finding Your Way through the Information Fog. San Jose, Calif. Writers Club Press 2000.

[13] Yin R. Case Study Research. Design and Methods, Applied Social Research Methods Series, 3rd Edn 2003; 5: 39-43.

[14] Gilgun J. A Case for Case Studies in Social Work Research. Academic journal 1994; 39(4).

[15] Ghauri P and Gronhaug K. Business research methods in business studies: A practical guide. (2nd ed). Sydney, Australia: Prentice Hall 2002.

[16] Schramm W. The process and effects of mass communication (Rev. ed.). Urbana. IL: University of Illinois Press 1971.

[17] Swai O and Deguchi A. Socio-spatial Transformation Process and Impacts on Urban Centers of Dar es Salaam as an African Colonial City. Kyushu University, Unpublished Doctor Dissertation 2009; 167-169.

[18] Mng'ong'o S. A Browning Process: The case of Dar es Salaam city. Doctoral Thesis Stockholm: KTH 2005; 170-220.

Received on 17-11-2016 Accepted on 25-01-2017 Published on 31-01-2017

DOI: http://dx.doi.org/10.15377/2409-9821.2016.03.02.1