THE IMPACT OF SOCIAL-PHYSICAL FACTORS ON PUBLIC HOUSING TRANSFORMATION IN TRIPOLI

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ABSTRACT

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Researchers have acknowledged that physical surroundings are a concrete manifestation of spatial organisation. Its arrangement outlines spatial relationship of social activity networks within housing units. In Libya, cities display minimal sensitivity to socio-physical attributes which affect public housing transformation. In order to focus on users' transformations experience and emphasis on socio-physical environment influence. Public housing dwellers are surveyed to determine the socio-physical impact on housing transformations initiatives. The aim of this study is to develop a socio-physical responsive design framework for public housing projects based on user-initiated transformation experience. A survey is carried out among 304 households in twelve public housings areas in western Libya to evaluate users' experience on the socio-physical model of housing transformation. Public housing such as neighbourhood influence, technology, plot size and quality of urban living standards are investigated using a questionnaire and analysed using SEM (AMOS). The findings revealed that socio-physical constituents have influence on housing transformation decisions made by house owners. It contributes to a housing design which respects both the users requirements and provide a healthy urban development at the same time.

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1 INTRODUCTION

The buildings spatial arrangements are related to the influence of physical environment and the correlation between the two is supported by the social atmosphere. According to a study concerning environmental determinism, users' behaviours are influenced by their physical environment [18], and in the Libyan context, the lack of efficient and effective urban planning system and urban regeneration has led to adverse physical development, lack of financial capability, weak organizational structure and poor enlightenment of the public [13]. Aside from the above, distortion is often the outcome owing to the misguided housing alterations carried out by the dwellers with the objective of

maintaining the local culture. This has risen to the common occurrence of limited development projects, particularly in new housing projects [4]. In majority of cases, the influence on the physical environment, devoid of professional guidance has been evidenced to be harmful. In prior related studies of housing transformation, findings showed that occupants' satisfaction is improved owing to the incorporation of the every-changing needs and cultural desires.

Moreover, house owners have been known to meet their housing needs with available alternatives despite the fact that [15] disequilibrium model suggests the need for residential mobility. Housing mobility is generally viewed as a positive alternative option but majority of house owners would rather opt for housing adjustment [15]. Therefore, socio-economic factors along with the lack of capacity to maintain equilibrium and stability following house shifting instigate the house owners' inclination towards opting for housing transformation [9]. This leads to the higher likelihood of public housing units to be transformed from initial homogenous designs, which lack involvement from the house owners. Developers need to be innovative in their new design strategies to achieve the house owners' future demands. Past findings indicate that technology is a significant factor influencing the choices made by the house owners, while other additional attributes that affect the decision of house owners in their housing transformation include prior living experience, social relationships with peers and lack of rooms.

2   TRANSFORMATION OF PUBLIC HOUSING

This study refers to transformation as the changes conduct on the original homogenous residential houses layout in the neighbourhood, which eventually results in heterogeneous residential unit. This has been proven to improve the efficiency of public housing and eventually enable the house owners to reap the benefits stemming from the practices of the public housing adjustments [16]. As a result, there is a dire need to meet the lifelong goals among house owners, which are generally varied regardless of their lifestyle [10], indicating the inevitable housing adjustment activities as a life process. Evidently, houses are viewed as a living entity rather than a physical-behavioural pattern [9] and despite the housing transformation objectives to meet socio-spatial factors and

obtain benefits, the regulating authorities generally do not support the changes [19] in that the actions of the house owners are considered as breaking the by-laws. In reality, transforming houses can mitigate the shock brought on by the increasing size of the household and the stress made by space changes that are required for enhanced lifestyle. Such benefits need to be addressed as housing shock and stress are often brought about by the every-changing structures of the family that influence the transformation of houses [20]. However, there is a need for intensive examination of how to go about maximizing the benefits of house owners from housing transformations and the corresponding physical factors. In this regard, the initial housing design and layout reflect the path offering the transformation transition that influences the layout of the initial housing design.

2.1 IDENTIFIED VARIABLES AND HYPOTHESIS

In this study, a research model is developed and proposed based on the correlations of socio-physical factors of public housing transformation in a composite analysis. Specifically, the Socio-Physical Environment Factors (SPEF) covers four main dimensions, namely neighbourhood influence (NI), quality of urban living (QUL), technology (T), and plot size (PS), each comprising of 5 items, and one dependent variable, namely public housing (PH), comprising of 8 items. The study hypotheses are as follows;

H1. Plot size has a positive influence on the homeowners' decision of housing transformation.

H2. Neighbourhood features have a positive influence on the homeowners' decision of housing transformation.

H3. Quality of urban living has a positive influence on the homeowners' decision of housing transformation.

H4. Technological advancement has a positive influence on the homeowners' decision of housing transformation.

2.2 SOCIO-PHYSICAL FACTORS

The need for urban spatial paradigm for spatial quality has been highlighted [21] particularly for low-income residents and as such, housing provision with spatial value for low-medium class residents need housing and spatial organization

considering the physical system that surround its [5]. Physical environmental elements have a significant affect over the perception and relationship of users with the environmental surrounding [8]. In relation to this, [11] stated that neighbourhood features significantly affect the satisfaction of house owners, which brings to the importance of public housing designs to be focused towards cultural diversity, family structure changes and socio-economic status of the homeowners [3]. In the Libyan context, architectural spatial changes are attributed to cultural infiltration, civilization and technological development, causing social changes in family and community values towards the adoption of western culture [4]. Aside from this, spatial organization in public housing design is often misaligned with the house owners' transformation activities.

2.3   CASE STUDY

Tripoli is a city in western Libya on the Mediterranean Sea of the African continent and it has four major urban settlements, namely, Zawat-Aldhmani, Sidi-Abdual Jaleal, El-Hadba and Aljamhoriya [1, 12]. The city is the focus of this study owing to its population's distinct advantages being that it is in close proximity to the economic activities of Tripoli. This also explains the changing enriched information of the cultural values of Tripoli.
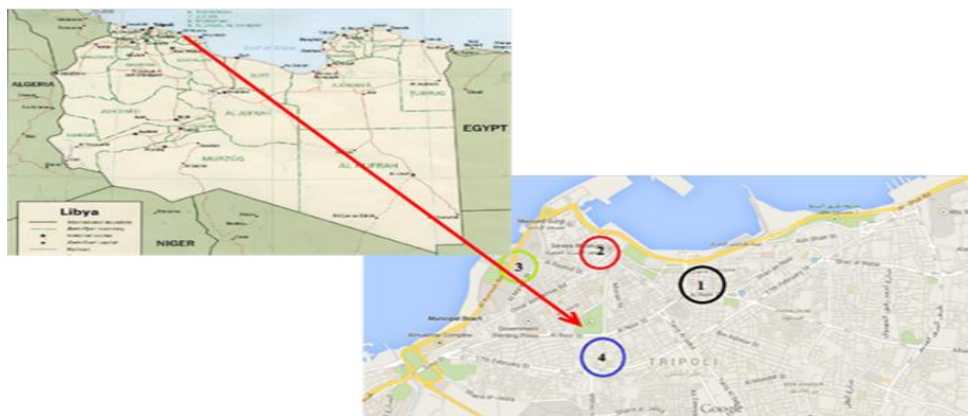

Figure 1. Case study area in Tripoli, a city in Libya

3 METHOD

The factors included in the study instrument were obtained from relevant prior literature and sampling was employed in selected housing estates in the area of study. Sample selection was made based on several criteria, among which is the housing estate's age (3-50 years), location in Tripoli, and owner-occupied. From the distributed questionnaires, 304 were retrieved, indicating a 94% rate of return, after which a series of psychometric analysis was conducted to examine the social-physical factors influencing housing transformation choices. First, the study conducted factor analysis to determine the significance of item attributes in their measurement of factors items, which were adopted from prior studies. Second, the study used confirmatory factor analysis to evaluate the factors strength and correlation and lastly, regression analysis was used to maintain the factors strength level in influencing the decisions made to transform the houses.

3.1 Brief questionnaire of socio-physical, environmental factors
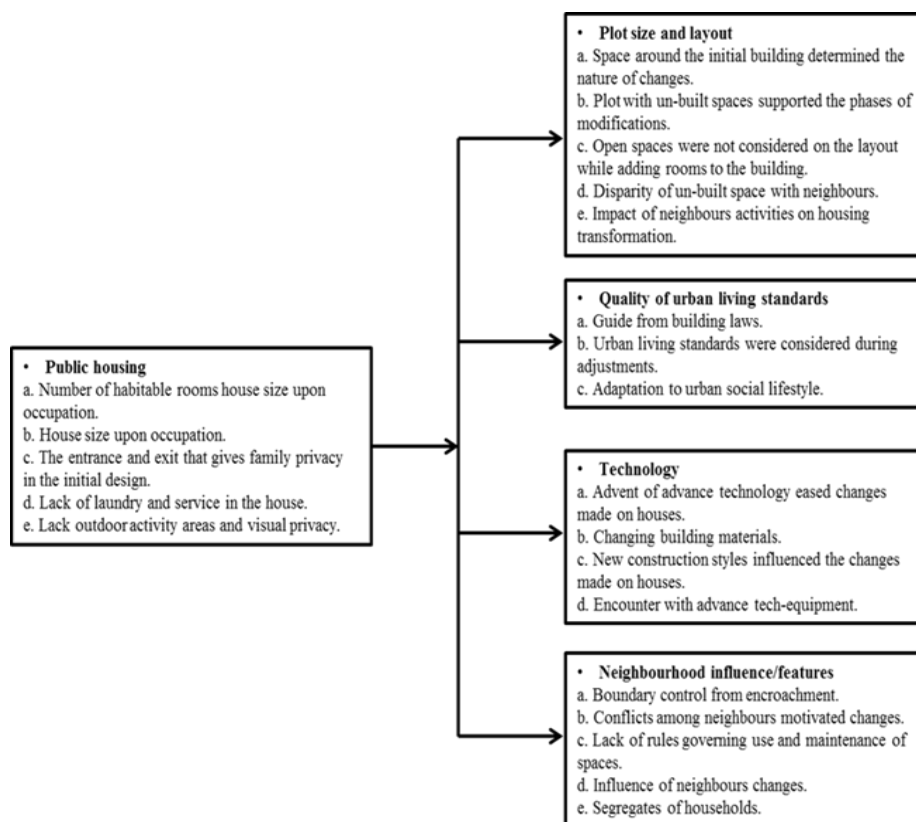
Figure 2. Proposed Socio-physical environment effect on public housing transformation

4   RESULT AND DISCUSSION

The study carried out the analysis using exploratory factor analysis on the factors and their correlations to determine their strength and direction. Under this section, the social, physical and environmental factors are analyzed. The EFA analysis outcome required the exclusion of 6 items, as a result of which the remaining 22 items were used to determine the factors relationship. The study dropped items with loading coefficients of ≤ 0.40 as they were deemed as weak and not suitable for further analysis. The EFA results with the factors loadings (exceeding 0.40) are displayed in Table 1.

Table 1. Exploratory Factor Analysis (EFA) of Socio-Physical Environmental

Public Housing	Neighbourhood influence	Quality of urban living	Technology	Plot size layout
PH1 0.809	NF1 0.724	QUL1 0.737	T1 0.823	PS1 0.803
PH2 0.850	NF2 0.716	QUL2 0.767	T2 0.857	PS2 0.618
PH3 0.877	NF3 0.503	QUL3 0.818	T3 0.764	PS3 0.765
PH4 0.751	NF4 0.724		T4 0.825	PS4 0.884
PH5 0.690	NF5 0.795			PS5 0.782

Moving on to Confirmatory Factor Analysis (CFA), the results showed that socio-physical and environmental factors had chi-square ($\chi 2$) value of 568.688, degrees of freedom of 196, and $\chi 2/df$ ratio of 2.630 (less than 5). The results of additional indicators are as follows; CFI (0.922), IFI (0.923), TLI (0.908), RMSEA (0.072, less than 0.08) – all these indicators values support the good fit of the model [6]. Added to the above, RMR value was 0.097 (less than 0.10) with p-value of 0.000.
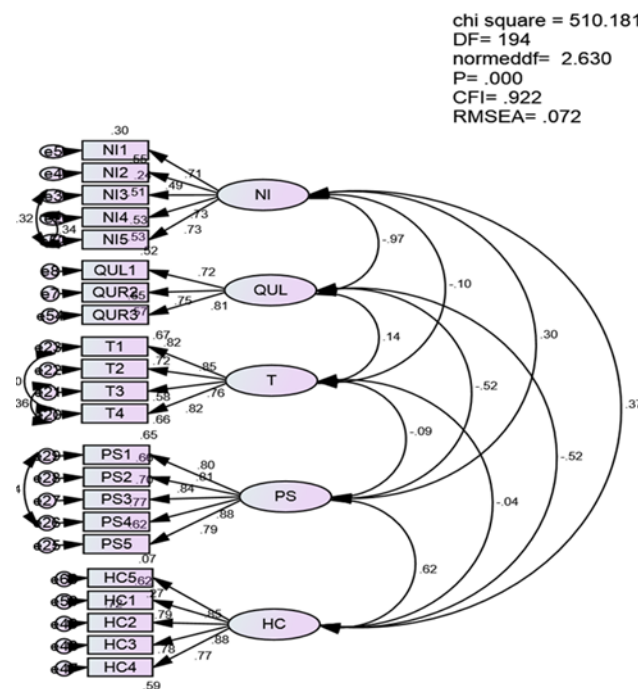
Figure 3. CFA for Social, physical environmental factors (SPEF)

Table 2. Results of fit indices for CFA- Social, physical environmental factors (SPEF)

Variables	χ^2	d.f	Ratio	P-value	CFI	RMSEA	RMR
Social physical environmental factors (SPEF)	510.181	194	2.630	***	0.922	0.072	0.097

Technology, plot size and neighbourhood influence had significant correlation and as such, the study contends that modern household appliances and equipments, common home appliances among the neighbourhood, would have been acquired in the households via their interactions with neighbours. Moreover, novel styles of construction affected the house changes and space availability surrounding the initial building and activities with neighbours also influences the adjustment decisions made by the homeowners. Neighbourhood changes and lack of rules regarding common spaces use and maintenance,

differences in family values and origin also affects the transformations made on houses, with the obtained benefits further influencing the spatial changes made by others to achieve the same societal status.

The study findings pertaining to the structural model supports good model fit, through indices; normed χ2 at 3.034 (less than 5), CFI of 0.852, TLI of 0.828, IFI of 0.853, and lastly, RMR of 0.098. Evidently, IFI, IT and CFI values all exceed 0.90, which is indicative of good model fit. Specifically, values ranging from 0.80-0.90 are deemed as moderate [2] and the model is acceptable [17], which means the study has good model-data fit. The findings showed RMSEA value to be 0.072 (less than 0.08), which is within the recommended value [7].

The study's regression analysis outcome involved four socio-physical factors (refer to Figure 2) whose influence on the public housing transformation decision by the house owners was examined. Based on the regression weight, coefficient loadings were more than 0.50, which contributes as a good indicator [14], with p-values significant from 0 at the level of 0.01 (two-tailed). The results show support for hypotheses H2 to H4, indicating the positive and significant influence of factors on the home owners' decisions to transform their house units.

5 CONCLUSION

This study is motivated by the requirement for public housing design archetype in the context of Libya. The main objective of the study is to determine the implication of design on public housing transformation by identifying the influence of socio-physical and environmental factors on the decisions of homeowners to transform their housing units. Based on the obtained findings, socio-physical environmental factors have a significant influence on such decisions. More specifically, technology has a significant correlation to the decisions and unused available space enables the creation of additional habitable space to accommodate the changing spatial requirements. In addition, the plot size regulates the added additional spaces in light of scale and extent. This trend

in housing transformation has benefits for public housing that remain under examined.

In this study, the author proposes design inferences to be considered in public housing design. First, developers have to consider the average household occupancy rate with priority placed on the number and size of habitable spaces and second, they also have to consider household equipment and appliances to determine spatial provision of activity spaces and use flexibility rather than space customized usage. Another consideration is the extent of socio-physical environment influence and the house-owners participation in the initial design. The findings may be validated for extensive generalization through an extensive investigation of the research measurement model, using various samples.

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تأثير العوامل الاجتماعية المؤثرة في تحوير الاسكان العام في طرابلس

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الملخص

اقر الباحثون بأن المحيط المادي هو مظهر ملموس للتنظيم المكاني. يحدد ترتيبها العلاقة المكانية لشبكة الأنشطة الاجتماعية داخل الوحدات السكنية. في ليبيا، تظهر المدن حدًا أدنى من عدم استقرار للسمات الاجتماعية والمادية التي تؤثر على تحوير الإسكان العام. من أجل التركيز على تجربة تحويرات المستخدمين والتأكيد على التأثير البيئي الاجتماعي والمادي، تم أخذ العينة على سكاني المساكن العامة لتحديد التأثير الاجتماعي والمادي على مبادرات التحويرات السكنية. الهدف من هذه الدراسة هو تطوير إطار تصميم مستجيب اجتماعيا وماديًا لمشاريع الإسكان العام بناءً على تجربة التحوير التي بدأها المستخدم. تم إجراء دراسة استبيانيه على 304 أسرة في 12 منطقة سكنية عامة في غرب ليبيا لتقييم تجربة المستخدمين على النموذج الاجتماعي المادي للتحوير السكني. يتم التحقيق في الإسكان العام مثل تأثير الحي والتكنولوجيا وحجم قطعة الأرض والتخطيط وجودة مستويات المعيشة في المناطق الحضرية باستخدام استبيان وتحليلها إحصائيا (SEM) باستخدام برنامج أموس (AMOS). كشفت النتائج إن المكونات الاجتماعية المادية لها تأثير على قرارات التحوير السكني التي يتخذها أصحاب المنازل. ساهمت هذه الدراسة في وضع تصميم المساكن الذي يحترم متطلبات المستخدمين ويوفر تنمية حضرية صحية في نفس الوقت.

الكلمات الدالة:
الإسكان العام.
التحور.
العوامل الاجتماعية.
والمادية.

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