

IMPACT OF COVID-19 ON APARTMENT DESIGN ADAPTABILITY, LAGOS, NIGERIA.

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Abstract

Adaptability characteristics of the apartment design is recognized as a main factor affecting the different social uses of apartment space in a variety of ways without making physical changes. Emergence of the Covid-19 pandemic is speculated to affect the interrelationship between the apartment users and social uses of apartment space. This study aimed to investigate the impact of post Covid-19 on apartments design adaptability of Lagos State Property Development Corporation (LSDPC) in Lagos, Nigeria. A survey methodology was adopted. The LSDPC largest estate (Abesan Estate) was purposively selected. The study relied on a sample frame of 4272 apartments from which 7.5% (320) of sample frame was used as sample size. Systematic random sampling of apartment was employed. The data were analysed using descriptive statistics; involving tables. The findings revealed that the level of effect of Quarantining, Self-Isolating, and Physical Distance on Adaptability Characteristics during Covid-19 pandemic was significant. Self-Isolation was the most significant direct effect on the Adaptability Characteristics, followed by Physical Distance and Quarantining. This implied that the design of the apartment needed to meet the dynamic nature of the users as well as a usage for planning purposes. The study affirms that the possibility of quick interchangeable use of space to perform different functions without making physical change should be a primary focus of future research.

Keywords: Adaptability, Apartment Space, Covid-19.

1.0 Introduction

Numerous social and economic factors have precipitated a housing crisis in Lagos, much like in many other cities worldwide. These factors encompass various elements, including urbanization, labor mobility, industrialization, and social transformations. The emergence of the Covid-19 (Coronavirus) pandemic has introduced a new dimension to the relationship between housing users and apartment spaces, profoundly impacting their interplay. The pandemic has brought about significant shifts in the social, cultural, psychological, and functional aspects of individuals' lives during this unprecedented period. Measures taken to contain the spread of Covid-19, such as stay-at-home mandates (Claire, 2020), have

heightened the demand for quieter and less crowded neighborhoods. This heightened demand, in turn, has implications for the concept of adaptability design, which revolves around the capacity to alter the function of a housing unit without modifying its fundamental characteristics. It represents a means to accommodate changing household needs through the reconfiguration of interior spaces (Malakouti et al., 2019; Itma, 2019). This approach fosters a harmonious relationship between the spatial requirements of households and the physical boundaries of the housing unit. Key determinants of this functional quality encompass room sizes, room quantities, and the suitability and accessibility of components for household use (Anih et al., 2019). The dynamic in household characteristics and the requirements for space within the housing unit would be measured through the trans-functional and multifunctional of dwelling space. Incorporation of the current trend in social distancing and physical distancing into apartment system is often deemed unrealistic with operationalizing adaptability of apartment space. The dynamic nature of the new needs and requirements posed the biggest challenge in adaptability design. Danko (2013) explained that the future needs of the apartment users not necessary connected to the increase in demographic status but many time connected to changing the uses of the space. Also, emphasizes on the ability of the apartment space to switch the use of space guarantees the efficient use of spaces on both short and long terms. Switching of use could be on the scale of the space and on scale of housing unit. In light of these considerations, apartment spaces must adapt their spatial configurations to meet the evolving demands. This study is dedicated to investigating the post-Covid-19 impact on the adaptability of apartment designs within the study area. It seeks to understand how the pandemic has reshaped the requirements and expectations of housing users, shedding light on the ever-evolving challenges in adaptability design.

2.0 Literature Review

Adaptability Concept

Adaptability described something capable of being or becoming fit (as for a new use) often by modification. Scholars had proposed different definitions of the term ‘adaptability of housing’. Groák (1992) defined adaptability as “capable of different social uses as well as using a space in a variety of ways without making physical changes”. Similarly, Friedman (2002) suggested that providing occupants with forms and means that facilitate a fit between the space needs and the constraints of their homes either before or after occupancy’ was one interpretation of adaptability. Schmidt et al (2010) identified four characteristics that needed to be included in the definition of adaptability: “capacity for change, ability to remain ‘fit’ for purpose, maximizing value, and time- speed of change and through life changes”. Although Friedman’s definition of adaptability included some buildings that Schmidt and colleagues hardly classified as adaptable (in the long term), these definitions were similar in that both described buildings that fit or accommodate the occupants or context of that building at some point in time. Adaptability incorporated into architecture to enable designing of affordable housing that was environmentally, economically and socially sustainable. Holger (2010) established that adaptive architecture captured the buildings that designed to adapt to the user’s needs, and environments as well as those buildings that entirely drive by internal data. While, Manewa Anupa, et al. (2009) emphasized on lifetime of the housing by defining adaptability as dynamic systems that had the strength to cope with the set of inevitable change demands of space, function, and componentry. Bostrom, et al. (1987) went further to explain accessibility of adaptability approach was different from

others except adaptability has features that promote easy adjustment, addition or removal as regarded to fit the users whether young, older, disabled, or non-disabled. This study viewed adaptability as the interchanging capacity to change function without changing the housing unit characteristics. This social change will be measured through the trans-functional and multifunctional of dwelling space. Multi-functionality was the capacity to have different functions at the same time and place. This dwelled on use-value than the expansion of the housing unit size. Malakouti et al. (2019) noted the potential benefit of multifunctional spaces was the ability to adapt to different functions using minimal budgets and time frames to find diverse functions of the spaces by varying the distribution of furniture.

Apartment Space

Apartment design had basic rules that guide the spaces that needed to be provided such as; minimum acceptable ceiling heights, floor area per ratio, energy consumption, ventilation and light requirements and so on. The standards were formulated by adding up the required spaces for a number of activities measured as suitable in the home, such as sleeping, eating, and entertaining. Velayutham (2004) argued further that every space should have a dimension that ensures fitness of space for the intended purpose. The internal spaces were identified in existing study as the space for sleeping, eating and entertaining. Each internal space within housing unit could be classified into five categories, based on the functions and activities that took place in them. These were: (a) living, (b) work and study, (c) resting, (d) service and (e) circulation (as cited in Iweka's doctoral dissertation, 2012). He went further to grouped resting, living, work, and study space as sub-set of Primary Spaces while referred to services and circulation spaces as support spaces. While, World Health Organization (1988) slice the internal spaces into two components: (a) dwelling space areas comprising living rooms, bed rooms, and Kitchen, (b) ancillary spaces comprising corridors, stairs and storage. Other school of thoughts argued for inclusion of cultural factors. Where, some scholars went further to contend the need for the inclusion of economic and social status of the households in the indoor space requirements. Other schools of thought argued for inclusion of cultural factors. While, some scholars went further to contend the need for the inclusion of economic and social status of the households in the indoor space requirements. The current study supports World Health Organization's position on interior space of housing unit. Within the context of this study, living space, sleeping space, cooking space and connecting space were used to investigate the impact of post Covid-19 on design adaptability of apartment in the study area.

Covid-19 Pandemic

The first wave of coronavirus emanated between December 2019 and January 2020 in Asia-China-Wuhan, and spread to Europe, America and Africa. Egypt was the first country recorded case in Africa on 14th February, 2020; followed by Algeria on the 25th February, 2020. The first outbreak in Nigeria happened in Lagos on 27th February, 2020 and Lagos had the highest number of COVID-19 cases in the country (NCDC, 2020). Covid-19 affected day to day life and slowed down the global economy. The most common symptoms of this viral infection were fever, cold, cough, bone pain and breathing problems, and ultimately leading to pneumonia (Abid & Mohd,2020). The previous studies revealed protections in form of physical, psychology and social as vital characteristics of housing concept. The outbreak of Covid19 pandemic threatened these

attributes. Garber (2020) viewed apartment as the main site through which Covid-19 was experienced. Poate (2020) emphasised on how home became unsafe for many due to the impact of the Covid19 pandemic on users' experiences. While, Adewoye (2020) revealed further that the Covid19 impact was much in Lagos most especially the mainland part of study area. Taub (2020) went further to explain the slide increased in domestic violence during the period of lock-down due to financial and psychological stress. Hang (2020), and Shafi and Ren (2020) itemised social distancing and social isolation as vital public health measures. While, quarantining and self-isolation approaches were employed as key measure in many homes.

3.0 Methodology

The data related to adaptability design characteristics and Covid-19 were sourced from published materials (dissertation, journal, article, magazine, report), interview and questionnaire administration. Structured questionnaires were used to get relevant information from Abesan Housing Estate's apartment. The estate was purposively selected being the largest estate built by LSDPC; comprising of 4,272 apartments of 2-bedrooms and 3-bedrooms. The systematic random sampling was used on the 7.5% (320 apartments) of the apartments against 5% recommended by Krejcie & Morgan (1970) as sample size.

4.0 Results and discussion of findings

Analysis and Discussion

301 questionnaires were returned out of 320 distributed. 8 questionnaires were returned uncompleted. 298 questionnaires were used for the analysis. Examinations of the relationship between adaptability design characteristics and quarantining as indicated in Table 1 using pooled mean revealed that the respondents Agree on quarantining during COVID-19 Pandemic with mean response rating of 3.85 (4). The respondents also agreed that quarantining affects the possibility of space performing different functions without making physical change and quarantining affects the quick interchangeable use of space without making physical change during COVID-19 Pandemic with a mean response rating of 3.90 and 3.80 respectively.

Table 1: Relationship between Adaptability Design Characteristics and Quarantining

Item	Frequency (%)					Mean Response Rating			
	SD	D	N	A	SA	Mean	SD	Scale	Remark
It affects the possibility of space performing different functions without making physical change.	0 (0.0)	3 (30.0)	0 (0.0)	2 (20.0)	5 (50.0)	3.90	1.370	4	Agree
It affects the quick interchangeable use of space without making physical change.	0 (0.0)	2 (20.0)	0 (0.0)	6 (60.0)	2 (20.0)	3.80	1.033	4	Agree
QUARANTINING						3.85	1.131624	4	Agree

Source: Field Survey 2022. SD (Standard Deviation). Scale: Strongly Disagree (1), Disagree (2), Neutral (3) Agree (4), Strongly Agree (5). Scale mean = 3.0.

The pooled mean results on relationship between self-isolation and adaptability design characteristics as revealed on Table2 indicated that the respondents Agree on Self-Isolation during COVID-19 Pandemic with mean response rating of 3.55 (4). The respondents also agreed that Self-Isolation affects the possibility of space performing different functions without making physical change during COVID-19 Pandemic with a mean response rating of 3.90 (4). But the respondents were neutral on the Self-Isolation affects the quick interchangeable use of space without making physical change during COVID-19 Pandemic with a mean response rating of 3.20 (3).

Table 2: Relationship between Adaptability Design Characteristics and Self-Isolation

Variables	Frequency (%)					Mean Response Rating			
	SD	D	N	A	SA	Mean	SD	Scale	Remark
It affects the possibility of space performing different functions without making physical change.	1 (10.0)	1 (10.0)	1 (10.0)	2 (20.0)	5 (50.0)	3.90	1.449	4	Agree
It affects the quick interchangeable use of space without making physical change.	2 (20.0)	2 (20.0)	0 (0.0)	4 (40.0)	2 (20.0)	3.20	1.549	3	Neutral
SELF ISOLATING						3.55	1.383434	4	Agree

Source: Field Survey 2022.SD (Standard Deviation). Scale: Strongly Disagree (1), Disagree (2), Neutral (3) Agree (4), Strongly Agree (5). Scale mean = 3.0.

The pooled mean results on relationship between physical distance and adaptability design characteristics as indicated in Table 3 revealed the respondents are neutral on Physical distance during COVID-19 Pandemic with mean response rating of 2.75 (3). The respondents are also neutral that physical distance affects the possibility of space performing different functions without making physical change during COVID-19 Pandemic and Physical distance affects the quick interchangeable use of space without making physical change during COVID-19 Pandemic with a mean response rating of 2.80 (3) and 2.70 (3) respectively.

Table 3: Relationship between Adaptability Design Characteristics and Physical Distance

ITEM	Frequency (%)					Mean Response Rating			
	SD	D	N	A	SA	Mean	SD	Scale	Remark
It affects the possibility of space performing different functions without making physical change.	3 (30.0)	1 (10.0)	2 (20.0)	3 (30.0)	1 (10.0)	2.80	1.476	3	Neutral
It affects the quick interchangeable use of space without making physical change.	2 (20.0)	2 (20.0)	3 (30.0)	3 (30.0)	0 (0.0)	2.70	1.160	3	Neutral
PHYSICAL DISTANCE						2.75	1.160703	3	Neutral

Source: Field Survey 2022. SD (Standard Deviation). Scale: Strongly Disagree (1), Disagree (2), Neutral (3) Agree (4), Strongly Agree (5). Scale mean = 3.0.

The Pearson's correlation results suggested that there was significant correlation between Quarantining and Self-isolation, Adaptability characteristics at $r = 0.644$ ($p < 0.05$), 0.736 ($p < 0.05$) But there was no significant correlation between Quarantining and Physical Distance at 5% significance level. Meanwhile, there was a significant correlation between Self-Isolating and Adaptability characteristics at $r = 0.909$ ($p < 0.05$). Also, there was a significant correlation between Physical Distance and Adaptability characteristics at $r = 0.611$ ($p < 0.05$).

Table 4: *Pearson Correlation Analyses*

		Quarantining	Self-Isolating	Physical Distance	Adaptability Characteristics
Quarantining	Pearson Correlation	1			
	Sig. (2-tailed)				
Self-Isolating	Pearson Correlation	.644*	1		
	Sig. (2-tailed)	.044			
Physical Distance	Pearson Correlation	.032	.372	1	
	Sig. (2-tailed)	.931	.290		
Adaptability Characteristics	Pearson Correlation	.736*	.909*	.611*	1
	Sig. (2-tailed)	.015	.000	.032	

*. Correlation is significant at the 0.05 level (2-tailed).

In addition, there is no significant correlation between Self-isolation and Physical Distance at 5% significance level. The model summary results revealed goodness of fit index $R^2 = 0.785$ (78.5%); indicating model fit is significant at F-value = 49.401 ($p < 0.05$) significant level. Hence the model is acceptable for further analysis. To determine the level of effect of Quarantining, Self-Isolating, and Physical Distance on the Adaptability Characteristics during Covid-19 pandemic, multiple regression analysis method was used.

Table 5: *Multiple Regression Analysis of Influence of Quarantining, Self-Isolating, and Physical Distance on the Adaptability characteristics during COVID-19 Pandemic*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Rank
	B	Std. Error	Beta			
(Constant)	445.16	.000		.000	1.000	
QUARANTINING	.333	.000	.404	801.167	.000	3
SELF ISOLATING	.333	.000	.494	909.705	.000	1
PHYSICAL DISTANCE	.333	.000	.415	997.078	.000	2

Dependent Variable: Adaptability Characteristics
 Model Summary: $R^2 = 0.785$ (Goodness-of-fit Index)

ANOVA: F-value = 49.401 (p-value = 0.000<0.05)
Source: Researcher's Computation, 2022.

The Adaptability Characteristics represented the dependent variable while Quarantining, Self-Isolating, and Physical Distance represented the independent variables. The result of the analysis as indicated in Table 5 revealed that all the causative factors had significant effect on the Adaptability Characteristics at $t = 801.167$ ($p < 0.05$), 909.705 ($p < 0.05$) and 997.078 ($p < 0.05$) respectively. Therefore, the level of effect of Quarantining, Self-Isolating, and Physical Distance on Adaptability Characteristics was significant. The identified causative factors had significant direct effect on Adaptability Characteristics. Further, based on the standardized Beta coefficients, Self-Isolating was the most significant direct effect on the Adaptability Characteristics with 0.494 (49.4%), followed by Physical Distance with 0.415 (41.5%), Quarantining with 0.404 (40.4%).

5.0 Conclusion and Recommendations

The Covid-19 pandemic impacted the connectivity between the apartment users, and multifunctional and trans-functional usage of apartment space as dictated by adaptability design stance. The operationalization of adaptability of apartment space during the pandemic was unrealistic. Moreover, the findings could have public policy implications. The adaptability design of the apartments in the study area should be conceptualised to accommodate any future change in social, cultural, psychological and economical needs of users. This may lead to more functional adaptability design of apartment.

References

- Abid, H. & Mohd, J. (2020), Effects of COVID-19 pandemic in daily life. *Department of Orthopaedics, Indraprastha Apollo Hospital, Sarita Vihar Mathura Road, New Delhi, 110076, India.*
- Adewoye, M. (2020). The Impact of Covid19 on Residents living Conditions in Lagos, Nigeria. 2nd International Conference, The Federal Polytechnic, Ilaro.
- Anih, E K; Sam-Amobi, C; Okere, C.E; Odoh, P.E; Andy, N.N; Onubeze, I.P. & Ugwu, C.C. (2019). Design adaptability as a tool for achieving affordable housing in developing economies. 1st International Conference on Sustainable Infrastructural Development. IOP Conf. Series: Materials Science and Engineering 640 (2019) 012008 IOP Publishing doi:10.1088/1757-899X/640/1/012008
- Bostrom, J. A., Mace, R. L., & Long, M. (1987). *Adaptable Housing: A Technical Manual for Implementing Adaptable Dwelling Unit Specifications.* 1987. U.S. Department of Housing and Urban Development -HUD USER, PO Box 6091, Rockville, MD. 20850.
- Claire, A. (2020). Homes Health and COVID-19: how poor housing adds to the hardship of the corona virus crisis: ESCR Research Centre for Micro- social Change. Institute for Social and Economic Research, University of Essex. Retrieved June, 25, 2020 from <https://www.smf.co.uk/homes-healthcovid-19/>.
- Danko, M. R. (2013). *Designing Affordable Housing for Adaptability: Principles, Practices, & Application.* .Pitzer Senior Theses. Paper 35.

- http://scholarship.claremont.edu/pitzer_theses/35.
- Friedman, A. (2002). *The Adaptable House: Designing Homes for Change*. McGraw-Hill
- Garber, M. (2020). Homes actually need to be practical now. Retrieved June 26, 2020 from <http://www.the-atlantic.com/culture/archive/2020/03/finding-privacy-during-pandemic/>.
- Groák, S. (1992). *The idea of building: thought and action in the design and production of buildings*. E & FN Spon, London.
- Hang, M. (2020). Preparing cities for Epidemics: Lessons from the COVID -19 Outbreak. *International Journal of Urban and Regional Research* Retrieved June 30, 2020 from <http://www.ijurr.org/the-urbannow/preparing-cities-for-epidemics>.
- Holger, S. (2010). *Adaptive Architecture-A Conceptual Framework*. Proceedings of Media City, 2010.
- Iweka, A. C. O. (2012). *A post-occupancy evaluation of dwelling density in multifamily apartments in public housing estates in Lagos* (Unpublished doctoral dissertation). University of Lagos.
- Itma, M. A. F. (2019). Strategies of Adaptability: An Approach for Affordable Housing Design. *European Journal of Advances in Engineering and Technology*, 2019, 6(10):1-6
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607-610.
- Malakouti, M., Faizi, M., Hosseini, S. B. & Norouzian-Maleki, S. (2019). Evaluation of flexibility components for improving housing quality using fuzzy TOPSIS method. *Journal of Building Engineering*, 22, 154-160, <https://doi.org:10.1016/j.job.2018.11.019>.
- Manewa, A. (2009). *A paradigm shift towards Whole Life Analysis in adaptable building*. <https://www.researchgate.net/publication/48353488>
- Nigeria Centre for Disease Control (2020). First case of Corona virus Disease updates and toll in Nigeria. Retrieved 26th June, 2020 from <http://first-case-of-coronavirus-disease>.
- Poate, S. (2020). 75% increase in domestic violence searches since Coronavirus. NBN News. Retrieved on 7th April, 2020 from: <https://www.nbnnews.com.au/2020/03/31/dvsearches-coronavirus/>.
- Schmidt III, R; Toru, E; Simon, A. & Alistair, G. (2010). *What Is the Meaning of Adaptability in the Building Industry?* Bilbao, Spain.
- Shafi, M., Liu, J., & Ren, W. (2020). Impact of COVID-19 Pandemic on Micro, Small, and Medium-Sized Enterprises Operating in Pakistan. *Research in Globalization*, 2, Article ID:100018. <https://doi.org/10.1016/j.resglo.2020.100018>.
- Taub, A. (2020). A New COVID-19 Crisis: Domestic Abuse Rises Worldwide. *New York Times*. <https://www.nytimes.com/2020/04/06/world/coronavirus-domestic-violence.html>
- Velayutham, P. (2004). *From top structure to home; Incremental growth of subsidized housing in Mamelodi* (Unpublished masters thesis). University of Pretoria, Pretoria.
- WHO. (1988). *Guidelines for healthy living*. Copenhagen: Regional Office for Europe.