

# Effective Design of Coworking Spaces to Improve Users' Experience in Lagos State, Nigeria

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How to cite this paper: Memud, M. W., & Tabibi, B. (2023). Effective Design of Coworking Spaces to Improve Users' Experience in Lagos State, Nigeria. *Art and Design Review, 11*, 80-103.

https://doi.org/10.4236/adr.2023.112007

**Received:** March 12, 2023 **Accepted:** May 14, 2023 **Published:** May 17, 2023

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#### Abstract

Coworking has increasingly become the preferred way to work globally. In Nigeria, there is a recorded exponential growth in the development of coworking spaces across the country in the last decade. The research aims to point out that the success of these spaces is heavily reliant on the positive experience of their users. The experience of space is determined by the quality of its architectural design in terms of ergonomics. Given the limited research on the concept of coworking spaces and the perception of its users in Lagos State, this research sets out to establish a guided insight on ensuring users' experience in coworking spaces in Lagos State is improved through effective design. Following an extensive literature review of the concept, history, and typologies of coworking spaces, the perception of user experiences, the key drivers to the use of these spaces and its major design consideration, this research developed a questionnaire to achieve its outlined objectives. The data collected and analyzed provided important insights into the reasons for choosing to cowork, the users' perception of the existing spaces, and the design considerations to be upheld. The conclusion from the results was that the need for interaction is the most important driver for coworking, the coworkers were mostly dissatisfied with the functionality of the spaces and the need to achieve thermal comfort was the most important design consideration for a coworker. The results of the study informed the design of coworking spaces in Lagos State, Nigeria, and provided recommendations for improving the user experience.

# **Keywords**

Coworker, Coworking Spaces, User Experience

# **1. Introduction**

Coworking is a gathering of working individuals who share a space but work in-

dividually or in collaboration at will (Uda, 2013) while coworking spaces (CWS) are the physical spaces that support the phenomenon of coworking (Kojo & Nenonen, 2014). Although CWS are reported to have long been in existence (Uda, 2013), modern-day CWS evolvement is dated to have started in 2005 (Waters-Lynch et al., 2016) and exponentially increased to the present day (Abu Gosh, 2019; Ayodele et al., 2021a). This growth is evident in Africa (Akanle & Omotayo, 2019), Nigeria (Odunsi et al., 2019), and its largest economic city, Lagos State (Ezugwu, 2021). The users of CWS, mostly referred to as "coworkers" are a sophisticated crowd with varying work dynamics driven by their need to create value in collaboration (Waters-Lynch et al., 2016) and the success of these spaces lies heavily on its user's experience (Seo et al., 2017; Al-Hajji, 2017).

User experience (UX) which is synonymous with space ergonomics has become an important focus area in architecture as the design has moved from achieving mere functionality to spaces invested in users' perception (Eilouti, 2021). In the study of its ergonomics, the resulting user's perception recorded from their interaction with the space is paramount to their productivity, social interaction, health, and comfort (Rodriguez-Aguiñaga et al., 2020; Lee, 2022). In the wake of the rising numbers of CWS development, exploring the UX of coworkers is highly necessary. Unfortunately, reviews of the literature point out that there is a general lack of insight into users' experiences in these spaces (Appel-Meulenbroek et al., 2020).

Recent studies show decreased users and revenue loss on CWS (Northcourt Real Estate, 2020; Uzoho, 2020) due to the dissatisfaction of coworkers (Ayodele et al., 2021b; Kene-Okafor, 2020). While some studies project an increase in the development of CWS and postulate them as good investments, Rief et al. (2016) reviewed that the statement made earlier by Kojo and Nenonen (2014) and Waters-Lynch et al. (2016) is unlikely due to increasing number of unsatisfied users stemming out of poor UX. This dissatisfaction is linked to poor design and facility management (Rådman et al., 2022) as well as limited research on the subject to inform design decisions by professionals and stakeholders (Kraus et al., 2022). As CWS continues to saturate the work climate, attracting a series of investors (Nwanne & Awodipe, 2017), the UX needs to be fulfilled. Given the plethora of benefits that effective design has on the experience of space, it is important to harness this for the success of CWS to avoid spiraling developments that are likely to fail.

A close look at the few studies done on CWS globally since 2017 shows that most of them are country-specific, concentrating mainly on western countries (Kraus et al., 2022; Berbegal-Mirabent, 2021). In trying to adopt this research for Africa, Appel-Meulenbroek et al. (2020) and Kraus et al. (2022) explained that the varying work culture of these countries poses a hindrance. In addition, research is more efficient when conducted for a target user group or a local situation (Appel-Meulenbroek et al., 2020). Furthermore, Kraus et al. (2022) stated that most research on CWS was focused on management-related topics, neglecting the social sciences or architecture of the space. The low number of research on coworking spaces, the inability of their findings to be applied across countries, and the recommendation for more architecture-based and user-centered research justify the need for this research.

Thus, this research aims to establish a guided insight on improving the experience and satisfaction of coworkers in Lagos State, Nigeria through the design of coworking spaces. The following objectives are to be carried out to achieve the aim:

- To understand and establish the reasons why workers chose coworking spaces in Lagos State, Nigeria.
- To develop an insight into coworkers' experience of existing coworking spaces in Lagos State, Nigeria.
- To identify design considerations that would efficiently improve coworkers' experience in coworking spaces in Lagos State, Nigeria.
- To make recommendations for future development of coworking spaces that would improve coworkers' experience in coworking spaces in Lagos State, Nigeria.

This research focuses on coworkers and coworking spaces in Lagos State, Nigeria. Lagos State is the economic hub of Nigeria, having the highest continual economic growth in the country and the 7th largest economic city in Africa (Kazeem, 2016; Osho & Adishi, 2019). It is home to various cooperate headquarters, cooperate businesses, entrepreneurs, freelancers, start-ups, and creatives (Pilling, 2018). Thus, it is an important study area for the research in question as it houses a relatable demographic. It is also a valid starting point for the development of future research in Nigeria and Africa as a whole.

# 2. Literature Review

## 2.1. Definition and History of Coworking Spaces

The word "Coworking," as conceived by Bernard DeKoven refers to the idea of working independently in a shared environment and is differentiated from the word "Co-working" which meant to work together on a piece of work/project (Gandini, 2022). Coworking entails persons of different forms of employment converging in a space to perform given tasks while willingly cooperating communally in terms of knowledge and resource sharing (Uda, 2013). This modern work situation focuses on ensuring liberty and deliberate community building in work patterns amongst workers of different fields with like minds (Muth & Rauscher, 2022). The definition of CWS is further buttressed in terms of its users and their diversity, size, layout, motivation, work mode, location, services provided, and ambience (Rief et al., 2016; Holienka & Race, 2015).

Uda (2013) stated that the first traces of coworking were likened to examples of artist or writers gathering to work together in establishments located in Paris, Tokyo and New York around the 20th century. Nwanne and Awodipe (2017) compared its emergence in Nigeria within this context of Uda (2013) with examples of mechanic workshops and villages in which spaces or places are created for people to work together, depend on each other for knowledge and share resources. Kojo and Nenonen (2014) broke the history from the telecentres of 1960s to the CWS of 2000s as it passed through different developmental stages. In contrast to the aforementioned, Foertsch and Cagnol (2013), Adeniyi, (2020) and Mason (2021) reviewed that the oldest semblance to CWS was the 1995 C-base founded by seventeen computer engineers. Although the C-base set the pre-stage for CWS (Rief et al., 2016), the word "coworking" was introduced in 1999 by Bernard DeKoven depicting the mode of work which involved collaboration coordinated by technology and void of hierarchy (Gandini, 2022) setting the ideology and birth of many CWS around the world (Adeniyi, 2020). In Nigeria, the creation and growth of CWS in the real estate market is relatively new as the first CWS, the Co-creation Hub, was established in 2011 (Kamalu, 2021). Prior to that time, little was known and thus investments in it were low. Recently, data shows that it is fast becoming a recognized and required addition to the country's real-estate climate (Adeniyi, 2020).

#### 2.2. User Experience in Effective Space Design

In planning effective CWS, it is important to understand the typology which guides the use of the space. As the number of CWS increased over the years, various typologies of these spaces have emerged (Elif et al., 2019) based on ownership and expected users (Johns & Gratton, 2013), sizes, activities (Holienka & Race, 2015) or profit-making model (Kojo & Nenonen, 2016). In all typologies discussed, it could be deducted that the expected users remain a focal point to determining its nomenclature. Irrespective of the different typologies which exist, the spatial composition and design characteristics of CWS from the user's point of view fall under the four major work modes of focus, collaborate, socialize and learn (Ondia et al., 2018; Elif et al., 2019). These work modes cover the needs of coworkers and informs CWS spatial requirements (Hoay, 2022). This is clearly depicted by Firdaus and Fuad (2021) means-to-end hierarchal breakdown of the work modes based on the questions Why, What and How. Lazo (2018) added that the spatial arrangement of CWS has to take notes of proper zoning, space adjacencies, space requirements and furniture anthropometrics to fit diverse users.

Mak (2013) explained that an excellent design goes beyond the basic functionality and aesthetics to address the concerns from the users' perceptions in other to pan better spaces. He concluded that the best spatial planning stem from the users' experience. The term "user experience" (UX) as introduced by Norman et al. (1995) refers to the seamless interaction between human beings and any designed system. Hassenzahl and Tractinsky (2006) broke UX into three dimensions as the internal state of the user, the attributes of the designed system and the context of the space while Berni and Borgianni (2021) stated that UX can be categorized distinctively into three parts namely ergonomic, cognitive, and emotional experiences. Reddy et al. (2012), Mokdad and Abdel-Moniem (2017) and Eilouti (2021) explained that ergonomics is a broad scientific term which encapsulates cognitive and emotional experiences and is quite similar UX. They deducted that the ergonomics of a built space and the user is bordered on the factors of comfort, health and safety, security, sense of belonging, satisfaction, functionality, flexibility, aesthetics, cultural connection, adaptability, social relationship, personal goals, multi-use and performance of buildings.

The planning and design of a space can alter the experience for the user to a large extent. Tamasi (2016) delineated that in the design of physical spaces, it is important that in the early stages of design, key considerations be placed on the users' activities at different times and their preferred sequence to achieve the best user experience. Optix Team (2021) concluded that to achieve the best user experience in a space, the key step should be identifying the factors which propel users to choose and continuously use these spaces and then work on analyzing this data for implementation which is best understood by acquiring data from the space users (Schwab, 2019).

#### 2.3. Key Drivers to Adopting Coworking Spaces by Users

Huang et al. (2019) opined that the core driving forces to the use of CWS was the fact that the working culture has drastically changed and the new economy is keen on operating efficiently. This meant that work modes were now based on creativity, technology, knowledge and resources sharing. Following the increasing number of CWS in different economies, it is important to understand the motive that drives users into using or choosing a particular coworking space (Rådman et al., 2022). Various studies from different locations as summarized in **Figure 1** explored the reasons why people opt for coworking as best practice.

S/N	Author	Conclusion on Key Drivers to the Use of Coworking Spaces					
1.	Kojo & Nenonen, (2014) Extensive review and analysis of academic papers that researched CWS	<ol> <li>The new ways of working which involves working in a mobile way and connecting people with technology</li> <li>The attractiveness of its ambience and variety in space</li> <li>Diverse group of users fostering work and social collaborations</li> </ol>	<ol> <li>Ability to offer work–life balance</li> <li>Economic efficiency in rent and resources</li> <li>Alternative for a sustainable lifestyle</li> </ol>				
2.	Appel-Meulenbroek et al., (2020) Research on workers in cities and CWS in Netherlands, Germany and the Czech Republic in a period of three years (2016–2019).	<ol> <li>The vibrant and creative atmosphere</li> <li>Interactions and networking opportunities</li> <li>Professional, attractive and supportive work environment</li> </ol>	<ol> <li>Separating work and private life</li> <li>Affordable accommodation</li> <li>Flexibility in rental terms</li> <li>Being part of a community</li> </ol>				
3.	Clifton et al., (2019) Questionnaire survey of coworkers across two CWS in South East Wales, UK.	Good office infrastructure     A socially enjoyable space     Interaction with others     A ti s a community     Good value for money	<ol> <li>A close distance to my home</li> <li>Knowledge sharing</li> <li>Flexible work time</li> <li>Random discoveries and opportunities</li> <li>Possibility to work in groups</li> </ol>				
4.	Howell, (2022) Researched based on the online platform Coworker.com and a large CWS in the eastern United States.	<ol> <li>Efficiency by saving entrepreneurs time and money</li> <li>Flexibility by allowing new ventures to grow or shrink on an as-nee</li> <li>Legitimacy by providing a professional setting where entrepreneurs</li> <li>Value of belonging to a community</li> </ol>	ded basis s can take clients, investors, or hires				
5.	Holienka & Race, (2015) Research on active members of CWS in Slovakia in April 2015	<ol> <li>Social/enjoyable atmosphere</li> <li>Interaction with others</li> <li>Community</li> <li>Knowledge sharing</li> <li>Good value for money</li> </ol>	<ol> <li>Close distance to home</li> <li>Good transport connections</li> <li>Flexible work time</li> <li>Office infrastructure</li> <li>Easy to change work place</li> </ol>				
6.	Rådman et al., (2022) Research on members of 3 CWS in Gothen-burg, Sweden, for six months (January–June 2020)	<ol> <li>Social needs to be part of a community and enjoy the benefits of a</li> <li>To have a standard space for business and show business competer</li> <li>For business networking</li> <li>Knowledge exchange between peers and like minds</li> <li>Increased productivity by focusing on work without technical distration</li> </ol>	community nce nctions				
7.	Seo et al., (2017) Research on Users and host of Korean CWS	Relationship facilitation     Networking event and party     Community and communication     Service diversity and price plan     Service not and public relations	<ol> <li>Alliance and partnership</li> <li>Space and interior</li> <li>Facility and device solution</li> <li>Mentoring and education</li> </ol>				

Figure 1. Conclusion on key drivers to the use of coworking spaces.

Kojo and Nenonen (2014) analyzed users' perspective of these spaces and found the key reason that drives coworking is the growth of technology. This was quite different from the findings by Holienka and Race (2015) who reported that users are drawn to coworking spaces for their perceived ambience first, and secondly for their ability to give users a sense of community and positive interactions with like minds. In another vein, Seo et al. (2017) stated that the two key drivers are the need to facilitate relationship and the economic benefits of sharing a space. This study was supported by Cruz et al. (2021) and Huang et al. (2019) adding that that the urge for professional and social interaction are pivotal to coworking. Clifton et al. (2019) state interaction, expansion to social business, cost savings and being in a creative environment as first four reasons people chose to co-work. Appel-Meulenbroek et al. (2020) cut across three countries in co-analysis and found the key motivators to be perceived ambience and efficiency in resources/time management. According to Hoay (2022), the most important drivers were flexibility and sense of community these spaces offer. In a bid to classify these reasons, Rådman et al. (2022) grouped the various drivers of coworking into social needs, Business networking, Knowledge exchange, Productivity and Physical wellbeing. Generally, all studies in review pose similar motivation to cowork and deducting from the various literature, this study summarizes the key reasons that drives workers to CWS are productive interactions, flexibility in work modes, economic efficiency, the growth of technology, the new demographics of worker, the need for professional yet relaxed environment, availability of constant services and facility management

#### 2.4. Spatial Design Factors and Their Effects on Users' Experience

Given the five core values that define a coworking space; Collaboration, Openness, Community, Accessibility and Sustainability as generated by Kwiatkowski and Buczynski (2011), the spatial design of CWS has a tremendous effect on users' attainment of these values (Cheah & Ho, 2019). Its design poses quiet a dilemma as it struggles to find a balance between a professional space which is highly motivational, efficient and productive and a space that champions social interaction and extracurricular lifestyle (Koramaz & Ozturk, 2019). This was supported by Gandini (2022) and Waters-Lynch et al. (2016) who explained that CWS designs are to house a paradox of activities.

Fayard and Weeks (2007) and Appel-Meulenbroek (2010) found that to improve users experience of CWS in terms of spatial design, the most important factors to address are its visual/aural accessibility, proximity/privacy, location of building, layout and functionality of internal spaces, availability of building facilities, poor environmental ambience and availability of meeting areas. Appel-Meulenbroek et al. (2020) discussed that the design attributes of CWS are three namely its location and ease of access, its interior space layout and its relaxing/comfortable functionality and ambience. Lukman et al. (2018) opined that large spaces, flexible spaces, good lighting and ventilation, minimal distraction and a controlled population density are the key features that make a successful CWS. Koramaz and Ozturk (2019) suggested that emphasis be laid on creating spaces whose technicality lies in achieving motivation, productivity and the creation of social interactions and social networks.

Following these reviews, this study elaborates on the key spatial design elements that affect users experience in CWS as thus; Prime Location, Space Composition, Complexity and functionality, Multiple types of spaces, Ambience and Functional Aesthetics, Flexibility of Space.

#### 2.5. Summary of Literature Review

The definition of CWS pointed out that they are distinctive from the traditional offices and other third places of works in that it houses both formal work environment and lifestyle environment for diverse group of workers who use the space voluntarily at their own flexibility, void of echelons. The study traced the history of this trend to the early 20th century of like-minded people coming together to work down to the present-day arrangement which has its roots tied to San-Francisco, USA. Currently, this concept has spread globally and is regarded as a growing one in Nigeria.

Delineation from the review showed that user experience is key to the success of CWS as users are one of the two most important stakeholders in these developments. The definition of the UX and the scientific function referred to as ergonomics which studies human interaction with a designed system are quite similar. Thus, the measure of UX is bordered on factors of ergonomics such as health, comfort, safety, functionality, aesthetic etc. In understanding the spatial distribution of CWS, the typologies show that although they are referred to in different groups based own ownership, users, size, activities etc., their design all incorporate similar spaces and all groupings consider users activities. The coworkers' activities carried out in CWS are essentially covered in the four work modes of focus, collaborate, socialize and learn.

The review revealed various drivers to the use of coworking spaces and critical comparison of these pointed out that these drivers could be grouped as productive interactions, flexible work modes, economic efficiency, the rise of technology, the change in workers demographics, professionalism of environment and availability of services/amenities. Further to this, the research creates an understanding of design factors which could aid better UX and concluded that they are a function of prime location, Space Composition, Complexity and functionality, Multiple types of spaces, Ambience and Functional Aesthetics and Flexibility of Space.

### 3. Materials and Methods

#### 3.1. Methods

Following the outline of the research onions as postulated by Saunders (2009), this thesis adopts the pragmatism philosophy in conjunction with the inductive approach as its focus is to achieve the research aim with all necessary means, fo-

cusing on the reality and practicality of things (Dudovskiy, 2022), gathering specific information in a specific context based on the research objectives (Creswell, 2014). This helps to build rich data in the development of effective conclusions and recommendations. The mixed research method was adopted as it combines both qualitative and quantitative methods by the collection, analysis and interpretation of data in numerical and non-numerical manner thereby affording the research the much-needed flexibility to acquire data and deeper understanding of its objectives as well as strengthen its credibility and validity (Saunders et al., 2016; Akoh, 2018). The survey research strategy was adopted as it is most suitable for data collection about a particular event/relationship of people based on their thoughts, beliefs or actions which could not be experienced by the researcher (Alshdiefat, 2017). The research objective requires information from the users of coworking spaces and thus, the questionnaire survey method was used to acquire primary data. The time horizon followed in this research is the cross-sectional as data was collected from the respondents at a single point in time. This was most suitable as data needed was based on users' past experience (Creswell, 2014).

In collecting data with the use of a questionnaire, a sample size of 60 respondents was postulated using the non-probability sampling method called selective sampling was adopted. This method respondent based off the researcher's judgement in other to justify generalization of findings (Sharma, 2017). The bias of selective sampling was eliminated by ensuring all respondents were current or longtime users of CWS thereby ensuring experienced responses. The respondents were all above the age of 15 which is the age limit for non-hazardous employment in Nigeria (Nigeria Labour Act, 2004). This research adopted the use of self-administration of questionnaire via online distribution of links developed with the aid of Google forms and administered in real time. With this, ease of dissemination, use and feedback was achieved (Halim et al., 2018). The safety of this data was ensured by allowing access to only respondents and questionnaire developer. At the end of the questionnaire administration, 55 (91%) were filled and returned.

#### 3.2. Materials

The questionnaire in this thesis was developed to collect relevant information about the subject matter in real-time, quickly and effectively. The questionnaire is structured to cover a specific objective per-section thereby ensuring its relevance. It consists of choice questions as well as close-ended questions placed on a Likert scale of points 1 - 5. It starts with an introductory page for the respondents and an option to decide if they want to participate. After the consent of the respondent, the following section ensued:

• *Section A*: Professional demographic of the respondent. This covers the relevant demographics of respondents as it relates to the research. It is designed to give an insight on the age ranges, level of education, professional hierarchy, length of use of CWS and current profession of the respondents.

The questions in Section B-D were developed from an extensive literature review to be tested in the study area.

- *Section B*: Drivers to the use of coworking spaces in Lagos State, Nigeria. This had 12 questions to the respondents on their agreement on the drivers to the use of CWS in Lagos State based on a 5-point Likert scale of agreement. It also asked an open-ended question to record their personal reasons in case they are omitted by previous literature.
- *Section C*: Users perception of Ergonomic factors of Coworking Space based on their Experience. This section investigated the users experience in current CWS in Lagos State based on a 5-point Likert scale of dissatisfaction.
- *Section D*: Design Considerations to ensure improved users experience in coworking spaces in Lagos State. This had 15 projected design considerations to the respondents to rate their level of importance based on a 5-point Likert scale of importance.
- *Section E*: Miscellaneous and Optional. This section urges respondents to make inputs to the data collection based on their intuition. It also gives respondents the option of requesting for this research when published.

A pilot study of the questionnaire was carried out as a trial run before the administering in other to prevent a total failure, ensures protocols are followed, questions are important and methods are appropriate (Van Teijlingen & Hundley, 2002). This was done by 2 selected coworkers and then edited accordingly for final administration.

#### 3.3. Data Analysis

The section A of the questionnaire was analyzed using descriptive statistical analysis of percentage calculation. The sections B, C and D which had a 5-point Likert scale question set were analyzed using the relative importance index (RII). RII was selected in this study to rank the factors considered according to their relative importance to one another in other to determine the key factors and also determine if the factors were relevant. The formular used was:

 $RII = Likert weight summation (\Sigma W)/(Highest weight (A) * Number of respondents (N))$ 

The importance of each factor was based on Jeng et al. (2018) review of the five-importance level of RII values.

Section B part 2 was analyzed using a world cloud to show the visual representation of most frequented words from the open-ended question.

# 3.4. Limitations and Ethical Considerations

Despite the notable limitation of online surveys such as poor response rate, respondents who do not fit the sampling selection and difficulty of respondents to ask for clarity (Nayak & Narayan, 2019), this research overcame these by distributing the questionnaire only in CWS and motivating respondents highlighting the importance of the research to their development. The ethical considerations

adhered to were ensuring the privacy and confidentiality of respondents, seeking of respondents consent and the use of information obtained solely for research and academic purposes. Also, the development of the questionnaire was based solely on the guide from extensive literature review and void of the researcher's bias.

## 4. Results

#### 4.1. Section A: Demographic Distribution of Respondents

The demographic distribution of respondents as shown in **Table 1** showed that majority of the respondents (69.2%) were millennials followed behind by the Millennials age range with (27.3%) while the older generations had the lowest representation just 1.8% each and there was no respondent that fit into others. 90.9% of the respondents have a bachelors or post-graduate degree and the

Factor	Variables	Frequency (N = 55)	Percentage (%)
	14 - 26	15	27.3
	27 - 42	38	69.1
Age (in Years)	43 - 58	1	1.8
	59 - 68	1	1.8
	Others	0	0
	OND/HND	4	7.3
Level of Education	Undergraduate	1	1.8
Level of Education	Bachelor's degree	26	47.3
	Postgraduate	24	43.6
	Senior level	21	38.2
	Junior level	16	29.1
	Entry level	8	14.6
Professional Hierarchy	Partner/owner	6	10.9
	Intern	2	3.6
	Contract	1	1.8
	Mid-level	1	1.8
	Less than 5 yrs	31	56.4%
	6 yrs - 10 yrs	18	32.7%
Length of Use of CWS	11 yrs - 15 yrs	4	7.3%
	16 yrs - 20 yrs	1	1.8%
	Over 21 yrs	1	1.8%

Table 1. Descriptive statistics of key demographics in the research.

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remaining 9.1% were educated with lesser degrees. Majority of the respondents (38.2%) and 29.1% and 14.6% are at junior and entry level respectively. Over 56.4% of the respondents have worked in coworking spaces for 5 years and below. This was followed by respondents who have used coworking spaces for 6 - 10 years with a percentage of 32.7%. As depicted in **Figure 2**, majority of the respondent are into Information technology and Building construction with 17% followed by service-based professions with 11%.

#### 4.2. Section B: Drivers to the Use of Coworking Spaces

A total of twelve factors derived from literature review were investigated to understand why workers chose to use CWS. The result to this is presented in **Table 2** below. This analysis was further represented using a bar chart to give a pictorial representation of the data as shown in **Figure 3** below. All factors had their



Figure 2. Pie chart showing demographic distribution of respondents' profession.



**Figure 3.** Relationship between respondent levels of agreement to the factors that drive the use of CWS in Lagos State, Nigeria.

Factor Code	Drivers (Reasons) Why Coworking Spaces Are in Demand	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)	RII	RANK		
Response in Frequency and (Percentage %)										
B1	The need to interact, network and collaborate with likeminded people	32 (58.2)	20 (36.4)	2 (3.6)	0 (0.0)	1 (1.8)	0.898182	1		
B2	To escape the isolation of working from home	15 (27.3)	21 (38.2)	14 (25.4)	2 (3.6)	3 (5.4)	0.756364	10		
B3	The need to separate home activities from work activities	24 (43.6)	21 (38.2)	7 (12.7)	3 (5.4)	0 (0.0)	0.84	5		
B4	Availability of flexible working hours	15 (27.3)	27 (49.1)	6 (10.9)	5 (9.1)	2 (3.6)	0.774545	8		
B5	Availability of flexible lease and lease payment	11 (20.0)	21 (38.2)	17 (30.9)	5 (9.1)	1 (1.8)	0.730909	11		
B6	The ease to change work location or space at will	13 (23.6)	25 (45.5)	13 (23.6)	2 (3.6)	2 (3.6)	0.763636	9		
B7	The economic efficiency of renting office spaces and sharing facilities/resources/bills	13 (23.6)	31 (56.4)	5 (9.1)	5 (9.1)	1 (1.8)	0.781818	7		
B8	Availability of uninterrupted basic services such as electricity and water	27 (49.1)	23 (41.8)	2 (3.6)	2 (3.6)	1 (1.8)	0.865455	3		
B 9	Availability of office services such as office equipment and internet connection	31 (56.4)	19 (34.6)	4 (7.3)	1 (1.8)	0 (0.0)	0.890909	2		
B10	Advancement in technology such as personal computers, work-sharing and virtual meetings which eliminates the need for employers' offices	24 (43.6)	23 (41.8)	5 (9.1)	3 (5.5)	0 (0.0)	0.847273	4		
B11	The new age and professional demographics of workers cannot align their lifestyle to that of the traditional offices	10 (18.2)	23 (41.8)	14 (25.5)	7 (12.7)	1 (1.8)	0.723636	12		
B12	Coworking spaces are presumed to have a relaxed ambience that attracts users	17 (30.9)	30 (54.6)	5 (9.1)	2 (3.6)	1 (1.8)	0.818182	6		

Table 2. Ranking of factors that drive the use of CWS in Lagos State, Nigeria.

RII above 0.7 showing that all factors tested are highly important drivers to the use of CWS in the study area. From the analysis, the most important drive to use coworking spaces is Factor B1 "The need to interact, network and collaborate with likeminded people". This is followed very closely with B9 and B8 which covers the Availability of office services and utility services, and then B10, the ease which technological advancement has offered. From the top 4 ranked factors, the data presented shows that CWS aim to fufill their primary function in an environment which offers a community of people with similar goals and the physical resources to achieve that goal.

According to the respondents, the three least important factors consider according to respondents are B10, B5 and B11 which covered isolation of working from home, flexibility in lease and lease payment and the change in workers demographics. This shows that although important, these are not keen driving factors.

On enquiry to state their personal drive for coworking without the guide of the listed factors, respondent responses were interpreted using a word cloud which revealed that "collaboration," "Interaction," "Work," "networking," "innovation," and "people of like-minds" were the most frequently used words to explain their drive.

# 4.3. Section C: Users' Experience through Ergonomic Factors of Space

Ten factors derived from literature review were investigated to understand the coworkers' experience of existing CWS. The result to this is presented in **Table 3** below and further represented using a bar chart to give a pictorial representation of the data as shown in **Figure 4** below. The results shows that although all factors cross the 0.70 mark of a high dissatisfaction of the space design, majority of the factors considered are between an RII of 0.70 to 0.75 which is not so high up the scale.

The highest ranked factor that caused users' dissatisfaction was the factor C5—"Availability and Functionality of space". This reiterates the limitation in the number of available CWS and the poor functionality of the design of available

Factor Code	Users' Perception of Ergonomic Factors of Coworking Space Based on Their Experience	Very Dissatisfied (5)	Dissatisfied (4)	Neutral (3)	Satisfied (2)	Very Satisfied (1)	RII	RANK	
Response in Frequency and (Percentage %)									
Cl	General comfortability	12 (21.8)	20 (36.4)	13 (23.6)	8 (14.5)	2 (3.6)	0.716364	6	
C2	Mental, physical and social Health	14 (25.5)	22 (40.0)	11 (20.0)	6 (10.9)	2 (3.6)	0.745455	5	
C3	Safety and security	16 (29.1)	18 (32.7)	6 (10.9)	10 (18.2)	5 (9.1)	0.709091	7	
C4	Sense of belonging	24 (43.6)	18 (32.7)	5 (9.1)	6 (10.9)	2 (3.6)	0.803636	2	
C5	Availability and functionality of space	31 (56.4)	17 (30.9)	5 (9.1)	1 (1.8)	1 1.8)	0.876364	1	
C6	Social relationship with other users	17 (30.9)	12 (21.8)	13 (23.6)	9 (16.4)	4 (7.3)	0.705455	9	
C7	Alignment with personal goals of users	24 (43.6)	17 (30.9)	2 (3.6)	8 (14.5)	4 (7.3)	0.778182	3	
C8	Cultural connection to spatial design	18 (32.7)	13 (23.6)	8 (14.5)	13 (23.6)	3 (5.5)	0.709091	7	
C9	Flexibility and adaptability of environment (allowance for immediate and future changes)	21 (38.2)	12 (21.8)	14 (25.5)	4 (7.3)	4 (7.3)	0.752727	4	
C10	Aesthetics (beauty of space and sceneries)	15 (27.3)	12 (21.8)	20 (36.4)	2 (3.6)	6 (10.9)	0.701818	10	

Table 3. Ranking of satisfaction of ergonomic factors based on users' experience of CWS in Lagos State, Nigeria.



Users Perception of Ergonomic Factors of Coworking Spaces Based on Experience

Figure 4. Relationship between respondent levels of satisfaction to the ergonomic factors of CWS in Lagos State, Nigeria.

ones. The 2nd, 3rd and 4th ranked factors with a considerably lower RII from the first were C4 "Sense of belonging", C7 "Alignment with personal goals of users" and C9 "Flexibility and adaptability of environment". This shows that coworkers to not relate cognitively to the provided spaces and also experience rigidity in transforming the space to fit their needs. The two most satisfactory based on factors considered, with the least RII were the factor C6 "Social relationship with other users" and the factor C10 "Aesthetics (Beauty of space and sceneries)". This shows that respondents, although not satisfied, viewed the ability to socialize and the aesthetics of the space as the best manageable feature.

### 4.4. Section D: Design Considerations for Improved User Experience

Fifteen factors derived from literature review were investigated to understand the design considerations which affect user experience from the view point of coworkers. The data is presented using a bar chart seen in **Figure 5** below its ranking shown in **Table 4** below. The 15 factors fell within the high significance bracket of RII above 0.70 and thus, all factors are considered important with most of the RII marks above 0.80.

Comparing the factors in consideration, the factor D15 "Design should ensure thermal comfort (space temperature not too hot or cold)" was the most important for the users to attain. This was followed very closely with D1 "Easily accessible by public transport system". The 3rd, 4th and 5th factors which also followed each other closely were D7, D10 and D5 which all laid emphasis on the flexibility, variety and comfort in these spaces. The two least factors as considered by the respondents were D9 "Availability of different sceneries" and D11 "A homely Interior design ambience which is warm and cozy".

Factor Code	Design Considerations for Improved User Experience	Very Important (5)	Important (4)	Moderately Important (3)	Slightly Important (2)	Unimportant (1)	Rll	RANK		
Response in Frequency and (Percentage %)										
D1	Easily accessible by public transport system	42 (76.4)	9 (16.4)	2 (3.6)	2 (3.6)	0 (0.0)	0.930909	2		
D2	Located close to residential areas (closer to employees)	29 (52.7)	14 (25.4)	8 (14.6)	2 (3.6)	2 (3.6)	0.84	7		
D3	Located in commercial, industrial or city centers (closer to other business organizations)	21 (38.2)	23 (41.8)	6 (10.9)	5 (9.1)	0 (0.0)	0.818182	12		
D4	Spaces should be more of open plan for better interactions	23 (41.8)	20 (36.4)	7 (12.7)	5 (9.1)	0 (0.0)	0.821818	11		
D5	Availability of closed spaces for privacy and acoustic comfort	26 (47.3)	21 (38.2)	7 (12.7)	1 (1.82)	0 (0.0)	0.861818	5		
D6	A mixture of open plan and private, closed or demarcated offices	23 (41.8)	24 (41.8)	7 (12.7)	1 (1.8)	0 (0.0)	0.850909	6		
D7	Availability of various seating arrangements and furniture	28 (50.9)	24 (43.6)	2 (3.6)	1 (1.8)	0 (0.0)	0.887273	3		
D8	Ease of changing space layout according to space activity	23 (41.8)	21 (38.2)	7 (12.7)	3 (5.4)	1 (1.8)	0.825455	9		
D9	Availability of different sceneries	23 (41.8)	19 (34.6)	8 (14.5)	4 (7.3)	1 (1.8)	0.814545	14		
D10	Availability and functionality of social/relaxation spaces	30 (54.6)	19 (34.6)	3 (5.4)	2 (3.6)	1 (1.8)	0.872727	4		
D11	A homely Interior design ambience which is warm and cozy	20 (36.4)	21 (38.2)	8 (14.6)	5 (9.1)	1 (1.8)	0.796364	15		
D12	An official interior design theme but a shift from the traditional office ambience	22 (40.0)	21 (38.2)	9 (16.4)	1 (1.8)	2 (3.6)	0.818182	12		
D13	Natural lights, artificial Lights and colours to enhance interior ambience and space function	29 (52.7)	17 (30.9)	4 (7.3)	1 (1.8)	4 (7.3)	0.84	7		
D14	The use of branded inspiration walls, Alt, potted plants etc. to create an inviting and inspiring interior ambience	28 (50.9)	16 (29.1)	3 (5.4)	5 (9.1)	3 (5.4)	0.825455	9		
D15	Design should ensure thermal comfort (space temperature not too hot or cold)	43 (78.2)	9 (16.4)	1 (1.8)	1 (1.8)	1 (1.8)	0.934545	1		

Table 4. Ranking of Importance of design consideration factors for improved users' experience of CWS in Lagos State, Nigeria.



Design Consideration for Improved User Experience

**Figure 5.** Relationship between respondent rating of importance of design factors for improved user experience in CWS in Lagos State, Nigeria.

#### 4.5. Section E: Contribution to Questionnaire by Respondents

The questionnaire, in a bid to increase respondent engagement with the research encouraged them to contribute to the research based on their understanding of the research topic. Only 3 out of 55 responded and their responses were thus:

1) "Office space should be as comfortable as much as possible, keen attention to lighting, thermal comfort and probably a homely feel to ease the mind for maximum productivity".

2) "This is very sophisticated and should be able to drive insight through the feedback".

3) "Then offices should have creche to accommodate working mums".

### 5. Summary and Discussion

#### 5.1. Summary of Research Findings

In summary, this research finds that every factor considered in all sections of enquiry exceed the 0.70 mark, making them all highly important in this study and by extension, the study area. Furthermore, it could be seen that the factors under design considerations to be upheld had exceedingly higher RII than those of other sections. This could point to the fact that users of CWS are very invested in expressing their desire for better design. In general, although the factors were ranked with level of importance based on their height of RII, the difference between each factor were not considerably wide.

#### 5.2. Discussion

The millennials age group as found by this study agrees with the findings of previous studies that this generation make up the bulk of the world current workforce and one of their key requirements are a healthy work-life balance (Hoffower, 2021; Stannett, 2022). Given that CWS promotes this lifestyle, it is thus postulated that its growth is eminent in years to come. Although the literature points out that CWS is void of hierarchical constraints and embraces flexible social interaction (Johns & Gratton, 2013), the distribution of coworkers amongst every category is quite uneven. The reason for this disparity is worthy of further research. Furthermore, given that most coworkers have been involved in coworking for less than 5 yrs and less than 10 yrs, it to the fact that coworking in Lagos State started to gain traction in 2013 and has had almost a 50% considerable growth within the last 5 yrs. The resultant demographics agrees with previous studies that coworking spaces houses a variety of users as, majority of them being information technology and construction industry professionals, trickling down to counsellors and sales managers. These findings are in line with that of Holienka and Race (2015) and Clifton et al. (2019) which revealed that the top users of coworking spaces included IT related workers and architects.

Similar to various definitions of CWS and key drivers to its use reviewed globally, the result of this research points that the most important drivers to coworking in Lagos is the need to interact, network and collaborate with likeminded people. The growth of CWS is also hinged on to its ability to easily offer office/business services, building services and amenities. Although this is not seen as an important factor globally, Ayodele et al. (2021b) previously emphasized its importance in Nigeria. Although all factors considered fell in the importance range, the least relatable were the conditions of leasing and the modern-day work dynamics. In conclusion, it could be stated that coworking in Lagos is fueled by the need for interaction, office and utility services, technological advancement, work-life balance, economic efficiency, flexible lease, working hours and space, and the changing workforce demographics.

Coworkers in Lagos are most importantly displeased with CWS functionality which is a key point in architectural developments covering functionality in layout, space planning, furniture and even aesthetic (Fitchett, 1998; Gandini, 2022). The next two ergonomic concerns were the lack of sense of belonging and alignment of space to coworkers' personal goals. This means that available CWS has no emotional, cultural, personal or symbolic connection to the coworkers. Although this concept is both objective and subjective, they are important for increasing users' satisfaction and lack thereof a detrimental to the goals of coworking (Reza et al., 2021). Also, the spaces lack flexibility and adaptability meaning that they cannot be easily maneuvered to fit pressing needs or activities (Seo et al., 2017). This can be related to the previous concerns as a flexible and adaptable space is a subset of a functional space which fits users' personal needs. Given all these concerns, is not surprising that the space is perceived to lack comfort and seen as detrimental to the health of its users. The pursuit for a comfortable work space which prioritizes mental health is a driving force for coworking (Hoffower, 2021) and the lack of this regards these existing spaces as unsuccessful. The findings point out that the most satisfactory experience was the achievement of social relationship and the general aesthetics of the spaces. Comparing this with the findings of Elif et al. (2019), the achievement of aesthetics but lack of functionality suggests a failure in CWS in Lagos and begs for the consideration of all ergonomic factors in parallel for a successful space and better user experience.

To improve user experience through design, it is most important to achieve thermal comfort. Thermal discomfort in spaces is a known issue as Nigeria's temperature and humidity levels are always high and thus, design needs to factor adequate cooling systems naturally and artificially (Nwalusi et al., 2019). Given the population density of the state, the lack of properly designed spaces for natural ventilation and the constant lack of electricity, it is no wonder that users of coworking spaces are keen on this consideration. Users also importantly desire easy access by road to CWS. This need might be fueled by the traffic situation of the state. According to the Economic Intelligence Unit Ministry of Economic Planning & Budget (2013), Lagos State is known for its constant traffic congestion, especially during peak working hours and this has been reported to have high negative impacts on workers wellbeing. Following this, coworkers prefer work spaces closer to their homes rather than in commercial areas and central business areas. This aligns with the thought process and conclusion of Hölzel et al. (2022) and Kene-Okafor (2020) who stressed the need to reduce commute time to work. The limitations of the open plan layout might be a great reason for the higher preference for a closed layout. In another vein, coworkers are also not keen on the homelike office design and prefer a more serious office ambience. Other major design considerations would most likely elevate users' experience varied seating and privacy seating, creating a relaxed environment, variety in sceneries and a generally welcoming ambience.

# 6. Conclusion, Contributions and Recommendations

# 6.1. Conclusion

This research draws the conclusion that coworking in Lagos is fueled by the need for interaction, office and utility services, advancement in technology, keeping a work-life balance, economic efficiency, flexibility in a lease, working hours and space, and the change in the workforce demographics. Also, there is a high level of displeasure with the design and ergonomic considerations of existing CWS. All ergonomic factors have to be considered in parallel for a successful space and better user experience. Furthermore, the major design considerations which would likely elevate users' experience of CWS in Lagos are the focus on achieving thermal comfort, the ease of access of coworking spaces which are to be situated close to places of residence, and the focus on achieving an office-like designed space which prioritizes functionality, varied seating, and privacy seating. Other considerations include creating a relaxed environment, variety in sceneries, and a generally welcoming ambience.

#### 6.2. Research Contribution and Recommendations

The research shifts the focus of CWS development from the core of profit-making to being user-centered. It provides insight into the expected growth of coworking,

and the current state of user experience and highlights major design tactics to be adopted for future design and research. It also gives the basis for policy development by the government. It is highly recommended that future development of CWS key into focusing on satisfying their users as the ripple effect of this is guaranteed success for all stakeholders involved. Coworkers' concerns recorded as poor experiences are to be addressed and the design consideration rated as preferred is to be focused on. Investors and building professionals should key into available research for decision-making.

# 6.3. Research Limitations and Recommendations for Future Research

It should be noted that the findings and conclusion of this research are peculiar to the research area and are not to be generalized, but serve as a basis for comparison in future research. Also, future research should consider focusing on a deeper understanding of CWS ergonomics, larger sample sizes for robust findings, and structured interviews for a greater understanding of user experience. Translating research into design intervention is a challenging task and thus, further research should try to join empirical and analytical tools in other to facilitate the implementation of research findings.

# Acknowledgements

We are grateful to Dr. Baharak Tabibi for providing me with her support and mentorship throughout my academic journey. Istanbul Okan University has also been instrumental in shaping my success by providing a nurturing academic environment. We are thankful to my family, friends, and colleagues for their unwavering support and encouragement. We extend our gratitude to everyone who has contributed to my academic achievements.

# **Conflicts of Interest**

The authors declare no conflicts of interest regarding the publication of this paper.

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