A Scientometric Review of Student Housing Research Trends

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Abstract. This paper presents a scientometric review of student housing studies; exploring the key authors and the collaborations among authors and countries, as well as the research trends with the aim of identifying gaps in this area of research where more studies is required. The VOSviewer software (version 1.6.13) was used for a Scientometrics review of 65 student housing publications from 2000 to 2020. The analysis focused on bibliographic coupling of countries, co-authorship of authors, citation of documents, and co-occurrence of keywords, which were further presented as network visualization maps. Scopus database was selected as the only data source. Therefore, the representation of publications presented in this study are limited to only one data source. The findings revealed that there is a satisfactory level of international collaboration in this research area. United Kingdom had the strongest link whilst Saudi Arabia had the weakest link. Both the keywords and documents citation analysis revealed three main trend of student housing research, i.e. residential satisfaction, post occupancy evaluation, and studentification. Gaps identified where more research is required include sustainable student housing, student housing safety and prioritisation of student’s requirement. This study provides invaluable information on the research trends in student housing studies. Thus, helping to identify gaps where more research is required.

Keywords: accommodation, facility, hostel, housing, network visualization maps, residence, scientometric, student

1. Introduction
Facilities create the physical environment to promote the activities of institutions of higher learning [1]. Although the facilities required in institutions of higher learning are wide ranged, each facility’s role is unique. Thus, each facility adds value to the institution [2]. One of the facilities that play an important role in institutions of higher learning is student housing [3]. The importance of student housing cannot be overemphasized. Student housing promote diversity and foster unity among students; enhance the integration of students; provide a community setting for students; make students see studying as their main occupation; offer students a feeling of home away from home; help to develop and maintain a vibrant student culture on campus; and stimulate a desirable educational outcome [4] [5] [6]. This indicates that student housing related studies are of great importance. Previous student housing studies focused on: student satisfaction [7][8][9][10]; student expectations/perceptions[3][11]; student housing quality or performance evaluation [12][13][14][15][16][17]; student housing safety[13][18]; and studentification [19][20][21][22]. Although studies on student housing abound, there is no evidence of studies that determine the trends in publications and collaborations among countries and authors, i.e. scientometric reviews, in this area of studies. This paper presents a scientometric review of student housing studies; exploring the key authors and the collaborations among authors and countries, as well as the research trends with the aid
of network visualization maps with the aim of identifying gaps in this area of research where more studies is required.

2. Methodology

The Scopus database was selected as a data source for this study. This database has a wide coverage of publications from diverse areas [23]. This study focused specifically on student housing facility or hostel. Therefore, the specific keywords used for the search were: “Student” AND “Housing” AND “Facility” OR “Accommodation” OR “Hostel” OR “Residence”. The search was limited to documents published between 2000 and 2020 (present). The output of the first search was 500 documents.

The search was further refined to include only articles, conference papers, and book chapters published in English from the subject areas of Engineering, Business, Management & Accounting, Multidisciplinary, Social Science, Energy, and Environmental science. According to Chadegani et al. [24], scientific research database such as Scopus, provides researchers with information on the most important academic literature in any scientific domain. Thus, journals, conference papers, books, and book chapters in the database of Scopus is reliable. This resulted in a reduction from 500 to 174 documents.

The 174 documents were further screened by checking the titles and abstracts. This was done to eliminate irrelevant papers which do not align to the research title or theme. After this filtration, a total of 65 documents were obtained. The search and filtering were done on 9th July 2020. A scientometric review was conducted to analyse the final (65) documents obtained.

The VOSviewer software (version 1.6.13) was used for the scientometric review. Olawumi and Chan [25] describe scientometric as a quantitative technique involving the visual and logical analysis of articles by assessing, mapping, and identifying structural patterns in a research domain using mathematical models, visualization clusters and algorithms. The VOSviewer software offers the functionality required to display large visualization networks in easily interpretable way [26]. For this study, data was imported from the Scopus database unto the VOSviewer software to create network visualization maps. The network visualization map represents items by their label in a circle. Four networks visualization maps (bibliographic coupling of countries, co-authorship of authors, citation of documents, co-occurrence of keywords) are presented in this study. Van Eck and Waltman [27] explained three key factors that influence the analysis. Firstly, the weight of an item determines the size of the label and the circle of the item; thus, bigger labels represent higher weight. Second is the color; all related items in a cluster network are presented in the same colour. The third consideration is the link; items are linked with lines, the closer two items are to each other, the stronger their relatedness.

3. Data Analysis

3.1. Annual publication Distribution

Figure 1 shows the number of publications from 2000 to 2020. The figure shows that only 2 documents were published between 2000 and 2005. Publications picked up from 2006 and surge gradually until 2009 but declined in 2010. The biggest decline was recorded in 2013. However, there was a significant increase from 1 in 2013 to 5 publications in 2014 and a dip from 5 to 3 in 2015. The number of publications rose from 3 in 2015 to 7 in 2017 and 2018 and dropped again to 5 in 2018. 2019 recorded the highest number of publications and 2020 has recorded 6 publications as at the time the analysis was done (8th July 2020). The general trend of publications has been upward, and it appears 2020 will continue in that trajectory.
3.2. Bibliographic coupling of countries

A bibliographic coupling analysis of countries was done to evaluate the level of collaboration between/among countries. The minimum number of documents of a country was set at 2 whilst the minimum number of citations of a country was set at 5. Out of the 25 countries, only 11 met this threshold. United Kingdom had the highest number of documents (15) and citations (208) followed by the United State. These two countries recorded more than 10 documents. It is also revealing that Saudi Arabia had the third highest citations with only 6 documents whereas South Africa had the third highest number of documents but recorded only 20 citations.

Regarding the link among the countries, United Kingdom had the strongest link whilst Saudi Arabia had the weakest link. It is evident from the network visualization map in Figure 2 that four countries - United Kingdom, South Africa, Malaysia, and Australia - had links with all other countries. Norway and Nigeria had links with 7 other countries whereas the remaining countries had links with 6 countries. Thus, there is a satisfactory level of research link among the 11 countries. The network visualization map also reveals 4 clusters: cluster 1 (Malaysia, Nigeria, Saudi Arabia, South Africa, and United State); cluster 2 (Australia, Portugal, and United Kingdom); cluster 3 (Netherlands and Norway); and cluster 4 (Italy).

Table 1. Bibliographic coupling of countries

| No. | Author          | Documents | Citations | Total link strength |
|-----|-----------------|-----------|-----------|---------------------|
| 1   | United Kingdom  | 15        | 208       | 513                 |
| 2   | South Africa    | 8         | 20        | 298                 |
| 3   | Malaysia        | 7         | 41        | 257                 |
| 4   | Australia       | 4         | 27        | 205                 |
| 5   | United state    | 13        | 156       | 122                 |
| 6   | Portugal        | 2         | 18        | 88                  |
| 7   | Norway          | 3         | 45        | 86                  |
| 8   | Italy           | 3         | 7         | 72                  |
| 9   | Netherlands     | 2         | 30        | 70                  |
| 10  | Nigeria         | 4         | 16        | 70                  |
| 11  | Saudi Arabia    | 6         | 95        | 33                  |
3.3. **Co-Authorship Network**

According to the bibliographic records, a total of 141 authors had publications on student housing or accommodation or hostel or residence. Using the VOSviewer software, a minimum number of documents was set at 2 and the minimum citations was set at 10. This helped to determine both the collaboration of authors and the citations of author’s documents. Out of the total of 141 authors, only 8 met this threshold. It is evident from Table 2 that Hubbard, P had the highest number of publications with only 3 documents, followed by Hassanaian, M.A with 6 documents and 95 citations. Figure 3 depicts the author co-authorship network visualisation map – collaboration of researchers. The map shows that collaboration exist between two groups – Hassanaian, M.A and Sanni-Anobire, M.O; and Smith, D.P and Hubbard, P. It is worth highlighting that these four authors had the highest number of documents. It can be inferred that all these 8 authors have had varying levels of knowledge contribution to this area of research; however, the contributions of the first four authors and Thomsen, J. is quite remarkable.

**Table 2. Top 8 most productive authors**

| No. | Author            | Documents | Citations |
|-----|-------------------|-----------|-----------|
| 1   | Hassanaian, M. A  | 6         | 95        |
| 2   | Sanni-Anobire, M. O | 3        | 21        |
| 3   | Hubbard, P        | 3         | 155       |
| 4   | Smith, D. P      | 3         | 58        |
| 5   | Amole, D         | 2         | 16        |
| 6   | Holton, M        | 2         | 15        |
| 7   | Thomsen, J       | 2         | 45        |
| 8   | Yusof, N. A      | 2         | 14        |
3.4. Citation of documents

A citation analysis of documents was done to determine the level of citations of the specific documents. The minimum number of citations of a document was set at 10. Out of the 65 documents, 21 met the threshold generating 13 clusters. Only three clusters had more than one item. These are: cluster 1 – Holton, M., Hubbard, P., Kinton, C. and Malet Calvo, D., and Smith, D.P; cluster 2 – Hassanaian, M.A., Sanni-Anibire, M.O., Toyin Sawyerr, P.; and cluster 3 – Thomson, J. Thomson, J., and Ulyani Mohd Najib, N. Cluster 1 consisting of 5 documents relate largely to studies on studentification. Cluster 2 (3 documents) is mainly made up of studies on assessment of student housing facility performance and student satisfaction. Whilst cluster 3 (3 documents) is more of student housing facility satisfaction or experience. A review of the topics of the remaining clusters reveals a relationship with these three main themes, with the majority being studies on studentification and student satisfaction. Thus, the dominant area of student housing or accommodation or hostel or residence research are studentification, evaluation of student’s satisfaction or experience, and evaluation or assessment of the performance of the housing facility.

Table 3: Citation of documents

| No. | Author | Citations | Link |
|-----|--------|-----------|------|
| 1   | Hubbard, P. (2009) | 77        | 4    |
| 2   | Smith, D.P (2014)  | 47        | 4    |
| 3   | Thomsen J. (2007) | 15        | 3    |
| 4   | Hassanaian M.A. (2008a) | 42  | 3    |
| 5   | Holton, M (2016)   | 15        | 3    |
| 6   | Toyin Sawyerr, P. (2013) | 13  | 2    |
| 7   | Sanni-Anibire M.O. (2016) | 14  | 2    |
| 8   | Malet Calvo, D. (2018) | 18  | 2    |
| 9   | Ulyani Mohd Najib, N. (2011) | 20  | 2    |
| 10  | Kinton, C. (2016)  | 10        | 2    |
| 11  | Thomsen J. (2010)  | 30        | 1    |
| 12  | Hassanaian M.A. (2008) | 10 | 0    |
| 13  | Schudde I.T. (2011) | 24        | 0    |
| 14  | Obeng-Odom, F. (2012) | 18 | 0    |
| 15  | Donaldson, R (2014) | 14        | 0    |
| 16  | Sage, J (2012)     | 31        | 0    |
| 17  | Hassanaian M.A. (2007) | 22 | 0    |
| 18  | Zhou, J. (2014)    | 29        | 0    |
| 19  | Shaikh, B.T. (2006) | 15        | 0    |
| 20  | Harwood, S.A (2012) | 74        | 0    |
| 21  | Amole, D (2009)    | 15        | 0    |
3.5. **Network of Keyword Clusters**

A keyword co-occurrence analysis was conducted to determine the trends of student housing publications. Clustering analysis helps to identify patterns by grouping sources that share similar words and attribute value [32]. Keywords are used to describe the scope of a specific research study. A network of keyword clusters was derived from a total of 446 keywords. A minimum number of 3 co-occurrence of keywords was set and 28 keyword co-occurred. Four noticeable clusters emerged (as shown in Figure 5). Cluster 1 had 10 keywords: the notable keywords were student, studentification, England, United Kingdom, urban housing, neighborhood, and university sector. Cluster 2 had 9 keywords: the notable keywords were students, housing, survey, structural design, higher education, and education. Cluster 3 had only 5 keywords: the noticeable keywords were student housing and residential satisfaction. Finally, cluster 4 had 4 keywords (i.e. affordable housing, buildings, sustainable development, and university student). It is worth noting that none of the keywords in cluster 4 had a high occurrence or strong link. Coincidently, the three clusters with notable keywords have a direct relation with those that emerged when the citation analysis of documents was done. This suggest that both the network of keywords and citations of documents revels similar trends in the publications.

### Table 4. The most active keywords

| No. | Keywords                  | Occurrences | Total link strength |
|-----|---------------------------|-------------|--------------------|
| 1   | Students                  | 22          | 73                 |
| 2   | Housing                   | 21          | 66                 |
| 3   | Student                   | 15          | 56                 |
| 4   | Student housing           | 16          | 39                 |
| 5   | Surveys                   | 7           | 32                 |
| 6   | United Kingdom            | 6           | 30                 |
| 7   | Studentification          | 9           | 28                 |
| 8   | Education                 | 7           | 27                 |
| 9   | England                   | 4           | 23                 |
| 10  | University sector         | 6           | 22                 |
| 11  | Neighborhood              | 4           | 21                 |
| 12  | Urban housing             | 4           | 20                 |
| 13  | Higher education          | 6           | 19                 |
| 14  | Structural design         | 4           | 17                 |
| 15  | Residential satisfaction  | 4           | 15                 |
Figure 5. Network of co-occurring keywords

4. Discussion of Findings
It is evident that the general trend of student housing facility publications has been upwards since 2000. It appears there is a high level of international collaboration in this research area. In fact, there are collaborations within continents and across continents. This is obviously a good sign because a high level of collaboration within and across countries and continents aid knowledge proliferation. A total 141 authors are involved in this area of research. However, only 8 authors have had a high level of impact. Also, the network map shows that collaboration exist between only two high impact groups, i.e. four authors – Hassanaian, M.A and Sanni-Anobire, M.O; and Smith, D.P and Hubbard, P. It is worth highlighting that student satisfaction, performance/post occupancy evaluation and studentification are the predominant research focus of these 8 authors. These research trends are correlated with the document’s citation analysis. In fact, the documents citation analysis also revealed three main trend/focus in the topics, i.e. residential satisfaction, assessment of student housing facility performance and studentification. These trends are further revealed in the keyword analysis. As previously stated, the keywords analysis revealed four clusters. Although there were four clusters only three had significant keywords. The keywords from cluster 1 reveals studentification as the focus of research. It also reveals that most of the studentification studies were published in UK and England. The keywords in cluster 2 shows structural design (i.e. performance evaluation) as the research area. Whilst the focus of cluster 3 is student satisfaction.

It is evident that these three research areas (i.e. residential satisfaction, performance evaluation and studentification) dominate student housing studies. In fact, assessment of the topics reveals a similar trend. Moreover, the literature reveals that most of the previous student housing studies focused on: student satisfaction; performance evaluation; and studentification. Very few focused specifically on student housing safety. Hassanaian, M.A as an example has done aspects of student housing safety, i.e., fire safety; however, studies which focuses of the broader student housing safety measures are lacking. In fact, safety has become a very important consideration for facility management [28][29]. Thus, student housing facility safety is obviously an area where more studies is required. Secondly,
there were two related keywords in cluster 4 (i.e. affordable housing, sustainable development) which had very low occurrence. This implies that not many studies were conducted on sustainable student housing facility. Only one study ‘on the performance evaluation of sustainable student housing facilities’ focused on sustainable student housing facility [30]. Thus, sustainable student housing facility is another gap where more research is required. Moreover, as much as student and students had very high occurrences and appeared in cluster 1 and 2 respectively, most of the studies focused on student satisfaction. The focus was not on student’s requirement. Only one author determined and prioritised the requirement of students [11]. Prioritisation of student housing requirements is an important area of research due to the challenge of securing enough funds for managing facilities [31]. Thus, there is need for more research in this area as well. Therefore, three gaps identified are student housing safety, sustainable student housing, and prioritisation of student’s requirement.

5. Conclusions
This study presented a scientometric analysis on student housing studies using publications from the Scopus database. The publication distribution across countries and continents, co-authorship network and citation of documents as well as research trends were discussed. It is evident that the trend of publications has been upward since 2000. Moreover, the level of international collaboration in this research area is good. Both the keywords and the documents citation analysis revealed three main trend/focus of student housing facility research, i.e. residential satisfaction, performance evaluation and studentification. The study identifies three gaps where more research is required, i.e. sustainable student housing, student housing safety, and prioritisation of student’s requirement. The study’s contribution and value are the gaps identified for further research. The data set used for the analysis was limited to Scopus database only. Hence, representation of publications presented in this study are somewhat limited. Also, only documents published in English were considered, excluding other possibly relevant documents published in other languages. Since only Scopus database was used as the data source for the study, the study recommends further studies be conducted using more than one database. Moreover, studies on student housing safety, sustainable student housing and prioritisation of students needs in student housing is recommended.

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