



# Towards an Online Portal for Locating Students' Private Rental Accommodation in Tanzania

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## ABSTRACT

Student accommodation has been a challenge in higher education institutions. This paper presents the assessment of the current situation regarding the provision of student accommodation in higher education institutions in Tanzania and access to private rental accommodation as an alternative source of accommodation among students. Furthermore, the study presents an online portal, as a designed solution to address the challenges that students face during searching and locating private rental accommodation. The study was conducted in Arusha and Dar es Salaam regions of Tanzania and involved a total of 372 respondents, including 351 undergraduate students, four students' welfare officers in the selected institutions, ten brokers, and seven landlords. The questionnaires were randomly distributed to undergraduate students; semi-structured interviews were conducted to landlords, brokers, and students' welfare officers. Data obtained was analyzed using R software. The results show that: 69.5% of students were living in private rental accommodation, this indicates that majority of students depend on private rental accommodation; 47.5% described the searching process as being very difficult and 86.9% of them agreed on having information and communication technology tool as a solution for searching and locating private rental accommodation easily and at an affordable cost. The proposed solution, through the online portal, is an efficient method to seek accommodation in the rental market that will help students to save the time and money spent on searching and have easy access to information on available rentals. In addition, landlords and brokers will be able to advertise their properties to students.

**Keywords:** student accommodation, higher education institutions, private rental accommodation, online portal, student rental application, Tanzania

## INTRODUCTION

Housing is one of the essential basic needs in everyone's life. Just like it is for any other individuals, housing is the central need for students also, having an impact on the general wellbeing of students. As they pursue their studies, many students leave their homes and parents and reside in what is known as students' housing where they stay for the given time of their studies. In describing students housing various terms have been used which include accommodation, hostel, hall of resident and dormitory (Ghani and Suleiman, 2016).

In many countries, particularly in Less Developed Countries (LDCs), governments play a role as primary suppliers of accommodation to students in government-owned higher education institutions (Maslen, 2012). Due to constrained funds, governments are not able to sufficiently cover the need for accommodation for all higher education institutions (HEIs) (URT, 1999). However, the accommodation challenge affects not only public HEIs but also private HEIs to the extent of being unable to give accommodation to every single student, all because of an increase in the number of enrolled students (Gupta *et al.*, 2019). This increased enrollment is not in line with the available facilities necessary for the wellbeing of students enrolled (Istoroyekti and Hum, 2016). Despite that few other students may refuse to live on-campus or choose to reside in their family house still the provision of accommodation to every student in HEIs turns out to be a hard task. Due to this shortage of student accommodation in the HEIs, students need to find accommodation from other sources which mostly is through renting from private housing (Ghani and Suleiman, 2017).

In most cases, it is difficult for students to get a rental house in the private market in various towns where there are higher education institutions for the reasons that the supply of private house rental is insufficient, and students have no clue about the housing market, circumstances that often constrained students to rent houses which are below the standard having low or poorly provided with services and infrastructure facilities hence unqualified for them to live (Ghani and Suleiman, 2016).

However, Information and Communication Technology (ICT) offers opportunities in connecting people with various service providers. Through ICT platforms the service providers are able to advertise their services thus enabling people to know the various services offered by these providers and where these services are available. This way is beneficial to the two parties involved, the customer and the service provider as it is an easy and fast method that overcomes geographical barriers. The availability of internet paves a way for accessibility and utilization of various ICT solutions by many people. In Tanzania, the number of internet users has been progressively increasing. It is reported that, internet users have increased from 14,217,311 users in 2014 with 29% internet penetration to 25,794,560 users in 2019 with 46% internet penetration (TCRA, 2019).

Therefore, this paper presents the assessment of the current situation regarding the provision of student accommodation in higher education institutions in Tanzania and the access to information regarding private rental accommodation as an alternative source of accommodation among students. Furthermore, the study presents an online portal as a designed solution to address the challenges that students face during searching and locating private rental accommodation.

The organization of this paper is as follows: Apart from this introduction, section two presents the background information about the higher education and students accommodation in Tanzania; section three presents a review of similar works; section four describes the methodology used in carrying out the study; section five presents the results of data collected; section six is the discussion on the results obtained from the analysis; section seven presents the proposed solution and section eight is the conclusion and future work.

## BACKGROUND

### Student Accommodation in Tanzania's HEIs

Tanzania also like other countries in the world has experienced a significant increase in students' enrollment in HEIs. Tanzania Commission for Universities (TCU) reported that during the period from the year 2009 to 2014, a gross rate of enrollment in universities raised from 3% to 4.2%, which is a 1.2% increase (Tanzania Commission for Universities, 2015). It was observed that in 2010–2011, total enrollment by 11 public universities and university colleges was 92,977 students. In that same period, student enrollment increased by 380.4% whereas public universities increased by 175%. These phenomenal increases reflect the purposeful efforts of the government to expand the university sector (Ishengoma, 2017). However, these increases in enrollment naturally lead to questions on student/resource ratio in the universities. Among others, student hostels have been observed to be inadequate in most universities. Consequently, university leadership faces a number of challenges (Kessy *et al.*, 2018). In the face of growing global students' enrollment in HEIs, student accommodation has become one of the teething problems faced by HEIs especially in developing countries (Nimako and Bondinuba, 2013). According to Sundkvist (2010), accommodation service which is usually provided by Tanzanian universities for their students is not enough for all students admitted to the particular university. Ishengoma (2017) observed that in 2010–2011, only 49.5% of the total population of students at the University of Dar es Salaam, Mlimani Campus were staying on-campus and hostels belonging to university; this implies that remaining 50.5% students were staying off-campus in private housing facilities. An empirical study done by Morley (2012) which involved two public and two not-for-profit private universities in Tanzania and Ghana, found that lack of accommodation was among other several complaints from students in both countries in the two private universities in the case study (Morley, 2014). Thus, student accommodation is a challenge to both public and private HEIs. Another study which was conducted by Nyahende, Bangu and Chakaza (2015) in 70 public and private universities in Tanzania proved that there is a low number of dormitories within the universities; the study found that more than 60% of the students lived off-campus.

It is evident from the studies that HEIs in Tanzania are faced with inadequate student accommodation, subsequently, the majority of the students are either required or prefer to look for their own accommodation from the private rental (Nyahende, Bangu, and Chakaza, 2015). However, studies in the area of student accommodation in relation to private rental accommodation are scanty. For example, concerning the shortage of accommodation in HEIs, Mtani and Nuhu (2019) studied its effects on students based on gender and sought to find a more vulnerable gender. The study revealed that the shortage of on-campus accommodation affects highly female students than male students. Furthermore, it was observed that houses that off-campus students rented did not match the financial capability of students and their requirements. Sundkvist (2010) studied student housing in urban areas of Tanzania; it was observed that rental housing is a major issue for students in higher education, particularly in urban areas. It was found that students' success at university is affected by the physical and social-demographical environment with most outstanding aspects being, bad conditions, location of residency high/increasing rents and the low availability of housing that led to students sharing or being accommodated at houses with bad conditions and high rents.

The studies on student accommodation in Tanzania looked at how living in private rental accommodation as a result of the shortage of institutionally provided students accommodation affects students in higher education but the question remains about how easy/difficult is the access to private rental accommodation and what these students go through in the whole process of searching for accommodation in the private rental market as the alternative solution to accommodation challenge in HEIs, especially in cities where there is high housing demand due to dramatic increases in migration and financial flows (World City Report, 2016). According to Rudic (2016) having information about the house rentals might not be an easy task which usually involves methods such as middlemen or word of mouth, signboard or simply notes written on walls by owners indicating that the house is for rent. Other searching methods include asking around, using one's social network or approaching a broker. The searching process looks complicated and is even more complicated for students coming from other regions of the country (Sundkvist, 2010).

## Influencing Factors for Students' Choice of Accommodation

Students consider various factors when choosing accommodation to live during the period of pursuing their studies. A study by Razak, Shariffuddin, and Padil (2017) on phenomenon living in off-campus accommodation among University Teknologi Mara (UiTM) Students in Malaysia found that students will consider the distance from the university and the rental cost when choosing private accommodation. Furthermore, the study also revealed that the students prefer a distance of private accommodation from the university campus to be less than 1 km while enjoying less expensive rental, free from regulations and rules of the university and having choices to stay in one house with their best friends. In studying the student housing market in Nigeria, Zubairu, Noralfishah, and Mohammed (2018) found that location impact significantly the attractiveness of the rented place for students. Moreover, a study by Muslim, Karim and Abdullah (2012) found that students are satisfied to stay in off-campus accommodation when they are able to stay near the campus, able to collaborate with other residents' friend, able to hang out with friends easily and able to stay near many facilities.

## RELATED WORKS

There have been studies on computer applications for finding room/house rentals. The study by Abella *et al.*, (2017) focused on designing and developing an android based mobile application to enable the users to search and locate the closest boarding house in the university belt in Sampaloc, Manila, Philippines. The application makes use of the Global Positioning System (GPS) to get the closest boarding house.

Other researchers discussed the development of a mobile application to give information regarding boarding houses. Among other features, the application pushes notifications to users and provides chatting capability (Manalu *et al.*, 2017).

There are applications specifically designed to facilitate the search of accommodation by students that are available internationally. Among them is Placesforstudents, available at places4students.com that allows users to search for accommodation and view the housing details being posted by landlords (Places4Students, n.d). There is a requirement for partnership establishment between application owners and higher education institutions a procedure that may have a financial implication and thus a burden to higher education institutions in Tanzania. Therefore, it is unsuitable for the local higher education institutions in Tanzania.

Rightmove, available at rightmove.co.uk is another application for searching student accommodation; it allows landlords to post their listings which can be seen by all the users. There is general-purpose renting and student property renting (Rightmove plc, n.d). The application is based in the United Kingdom and only the United Kingdom based properties are listed which creates geographical barriers hence not applicable in our country's local settings.

In Tanzania, there are some existing applications that provide information on private rental housing. They include web and mobile applications. Among them is Dalali GIS, an android mobile application based in Tanzania that provides information and geographic information concerning house/rooms, hotels, plots, halls, office buildings, and restaurants. The information provided includes price to rent or buying, street, location, landlord contacts as well as satellite view and distance from apartments to other places around that house/room (Rwechungura, n.d.). Also, the application provides search capability and a general description of houses/rooms with pictures. However, the application does not provide filtering capabilities for the search results obtained. Moreover, it is a general-purpose application, not suited to the students' accommodation reality hence does not meet students' needs in Tanzania.

Dalali App is another mobile application in Tanzania that allows brokers or owners to list houses for sale or rent and plots for sale. The application has features such as submitting orders, property owners or brokers are able to respond to customer's orders, the ability to call broker, house owner or customer instantly (Mixtape, n.d). The user is able to search for brokers, houses or plots by region and street and can filter results. However, a search result filtering is limited to rent fees per month and the number of rooms only. Moreover, it is a general-purpose application, not suited to the students' accommodation reality hence does not meet students' needs in Tanzania.

Kupatana is another application in Tanzania available at kupatana.com; it is an online and mobile web-based classifieds platform that offers a market place for buyers and sellers to meet (Kupatana AB, n.d). Apart from listing various items for selling, the application has a section for real estate. Among other items listed in this section include houses/apartments/rooms for rent. A user can search by specifying the region and category and then filter the search by using various criteria. The user is also able to send an email to the landlord. With the mobile app, the user can call or send a message to the landlord. However, the application does not show the geographical location of the house/apartment/room for rent on a map. Also, the application does not provide house sharing or roommate finding options. Moreover, it is a general-purpose application, not suited to the students' accommodation reality hence does not meet students' needs in Tanzania.

Currently, in Tanzania there is no application dedicated to serving the needs of students regarding private rental accommodation, the existing applications are general-purpose applications that do not meet students' requirements as they search for private rental accommodation. Therefore, this study proposes the development of an online portal that will provide a link between prospective student tenants and private rental accommodation service providers and will act as a central source of information regarding private rental students' accommodation for HEIs in Tanzania, described in terms of the geographical setting of Tanzania, and according to the needs of students in HEIs in Tanzania, hence making room/house finding an easy process to students. Portals usually provide an entry to services and information from different sources. HEIs are adopting online portals for

various purposes as they offer search capabilities, registration for new users, database access and personalization (Vairamuthu and Anuncia, 2016).

## MATERIALS AND METHODS

### Study Area

The study was carried out in Dar es Salaam and Arusha regions of Tanzania where there are more HEIs hence making a higher demand for private rental students' accommodation. The regions are also among major cities in Tanzania.

Dar es Salaam, which has an area of 1,400 km<sup>2</sup>, is one of 31 regions in Tanzania. The region is located in the coastal zone and found at latitude 6.802353 and longitude 39.279556; it is bordered by the Pwani region to the north, west, and south; and the Indian Ocean to the east. Dar es Salaam has over 28 higher education institutions (Tanzania Commission for Universities, 2019b).

Arusha is the city located in the northern part of Tanzania. It is found at latitude -3.386925 and longitude 36.682995, covering a total area of 37600 km<sup>2</sup>; to the north, it is bordered by Kenya, to the south by the Manyara Region, to the east by the Kilimanjaro region and the west by the Mara and Simiyu regions. The region is located near several tourist attractions including Mount Kilimanjaro, Kilimanjaro National Park, Arusha National Park, Lake Manyara National Park, Tarangire National Park, Ngorongoro Conservation Area, Serengeti National Park, and more others. Arusha has over 8 higher education institutions (Tanzania Commission for Universities, 2019a).

### Sample Size

In this study, a total of 372 people was involved as respondents, including 351 students from four selected higher education institutions in Arusha and Dar es Salaam in Tanzania of which three are government-owned institutions and one is privately owned institution. Among the HEIs that participated in the study are Tengeru Institute of Community Development (TICD) and Arusha Technical College (ATC), from Arusha; Institute of Social Work (ISW) and Tumbani University Dar es Salaam College (TUDARCo) from Dar es Salaam. Other respondents were four officers, one from each of the four HEIs. The four officers, work in students' welfare offices of their respective institutions hence considered familiar with matters of students' accommodation. Lastly, ten accommodation-related brokers and seven landlords who directly or indirectly are involved in providing private rental accommodation services to students were also involved as respondents. The sample size for students was determined by using Kish Formula (Kish, 1965) as shown in (1):

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)} \quad (X)$$

Where;

$n'$  = Sample size with finite population correction,

$N$  = Population size,

$Z$  = Z Statistic for a level of confidence,

$P$  = Expected proportion,

$d$  = Precision

By using Kish Formula, with a total population of 3987 undergraduate students from all the four HEIs, 1.96 as Z statistic for a level of confidence, expected proportion of 50%, the precision of 5%, confidence level of 95%, the sample size required for the study was found to be 351 students as seen below:

$$\frac{3987 \times 1.96^2 \times 0.5(1-0.5)}{0.05^2(3987-1) + 1.96^2 \times 0.5(1-0.5)} = 351$$

### Sampling Technique

In order to reduce the overall research costs, the four HEIs were purposively selected from the study area as their students are more affected by the accommodation problem. From the selected HEIs, students were randomly selected among undergraduate students pursuing a bachelor's degree. Convenience sampling was applied to select brokers and landlords to participate in the study.

### Data Collection Methods

In this study, data were collected in a period of three months, from April to June in 2019. The study applied both qualitative and quantitative approaches whereby semi-structured interviews and questionnaire survey were used to collect data. The questionnaire was paper-base, self-administered with both open-ended and closed-ended questions. A total of 351 questionnaires were randomly distributed to students while in their classrooms in the presence of the research team. Prior distribution, the information about the study and its objectives were well introduced to students by the research team and emphasized by an officer from students' welfare office and a leader from students' government. Students were allowed to ask the research team in case of any clarifications while filling in the questionnaire. At the end of the survey, a total of 351 fully filled questionnaires were returned of which all had valid answers.

Semi-structured interviews were conducted to the officer in a students' welfare office from each of the four HEIs. The main objective was to understand the current situation regarding students' accommodation at the institution level since the office is the one responsible for the welfare of students which includes accommodation matters. Semi-structured interviews were also conducted to landlords who have rented their properties to students and house brokers whose activities involve helping the students find private rental accommodation.

### Data Analysis

Quantitative data from the survey was analyzed using powerful and flexible R software (Falissard, 2011; Spector, 2008). Descriptive statistics were applied in the analysis which described data in frequencies, percentages, tables, and graphs.

### User Requirements Planning and Analysis

This is carried out to understand the current situation and identify the system requirements. The analysis of the data obtained provided an understanding of the overall current situation regarding student accommodation in Tanzania, practices in searching and locating student accommodation and system requirements for the proposed ICT solution.

### Development Technologies

The study makes use of various development technologies including, database management system programming language, framework, and other technologies to implement the portal.

For data storage requirements, the study uses MySQL This is a relational database management system (RDBMS) that is used in the backend to store data; MySQL is chosen for being free and open-source software (Wikipedia.org, 2019).

For the coding purpose, the study uses hypertext pre-processor (PHP) as the main computer programming language for the development of the portal. PHP is a popular and widely used language in the development of web applications. In this study, the PHP language communicates with MySQL in the backend.

To facilitate web programming and making it better organized, the Laravel framework is used. Laravel is a free, open-source PHP framework. The framework was created by Taylor Otwell specifically for web application development.

Other languages include JavaScript which is used to manipulate elements on the web page, the styles applied to them or even the browser itself hence making a web page more active. Furthermore, the study uses jQuery, a JavaScript framework which is a collection of JavaScript functions that provides simple solutions to many of the common, day to day details of JavaScript.

The study also uses HTML for creating documents on the World Wide Web and Cascading Style Sheet (CSS) for describing the look and feel of content in web pages.

## RESULTS

This section of the paper presents quantitative and qualitative results obtained after data analysis.

### Results from Student Questionnaires

The study involved 351 student respondents who filled the questionnaires. A total of 351 respondents returned fully filled questionnaires with valid answers. The data obtained was analyzed and the results are as follows:

#### Demographic characteristic of student respondents

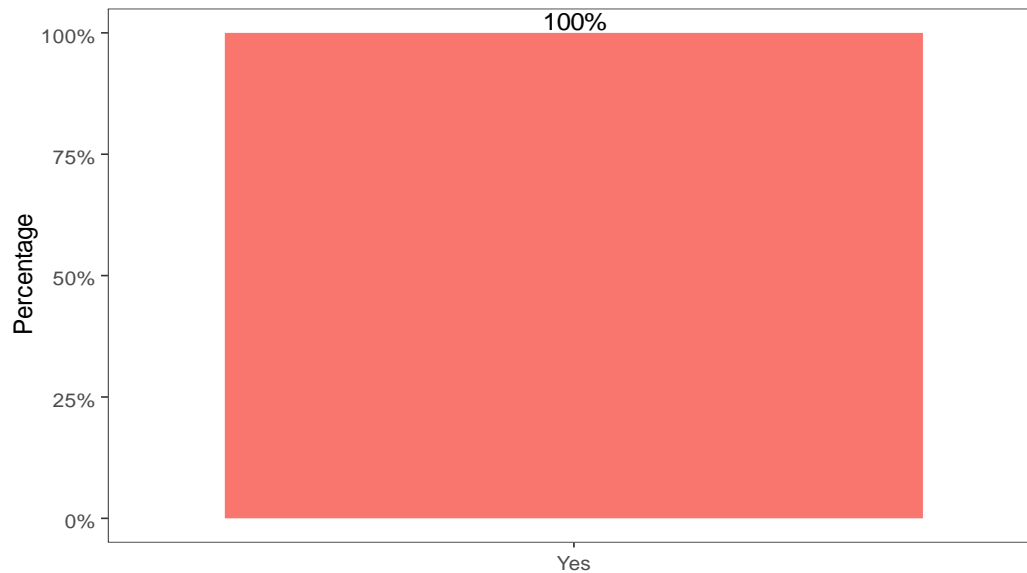
Of 351 student respondents, 50.7% were males and 49.3% were females. Most of the respondents (49.9%) were 24-29 years of age. All respondents were in the bachelor program and 43.6% were in the third year of studies, 32.2% were in the second year of studies while 24.2% were in the first year of studies. Among 351 respondents, 50.71% were from institutions in Dar es Salaam and 49.29% were from institutions in Arusha. **Table 1** summarizes the demographic information of students.

**Table 1.** Demographic Information of Students

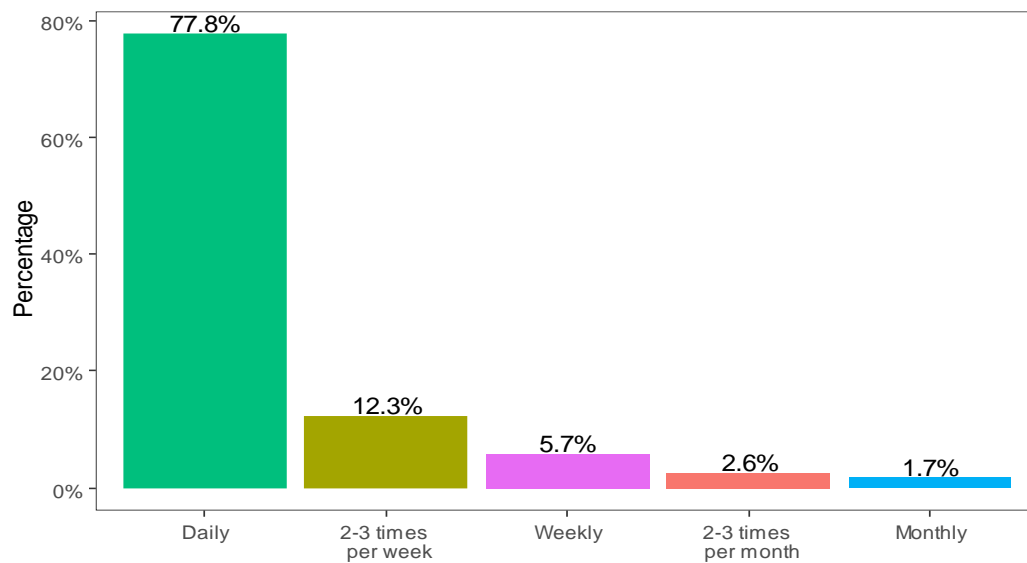
Variable	Category	Respondents	%
Gender	Male	178	50.7
	Female	173	49.3
Age of Respondents	18-23	143	40.7
	24-29	175	49.9
	30-39	33	9.4
Education Level	Bachelor	351	100
Year of Study	Year 1	85	24.2
	Year 2	113	32.2
	Year 3	153	43.6
Institution's Location	Dar es Salaam	178	50.71
	Arusha	173	49.29

### Access to the internet among students

The study sought to find out if students have access to the internet which is a necessary condition for the ICT solution proposed in this study. All student respondents that answered the question had access to the internet. **Figure 1** summarizes the results.



**Figure 1.** Internet Access among Students



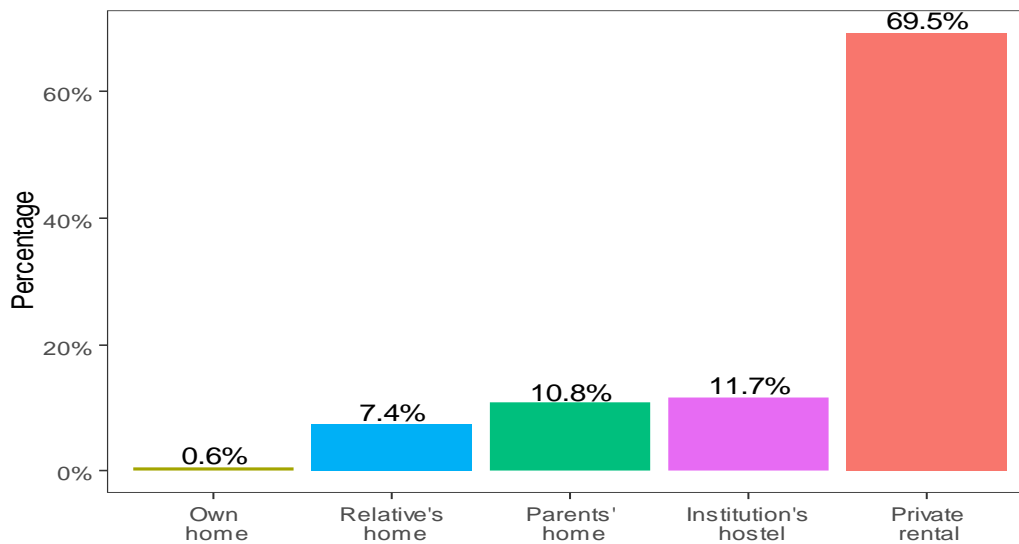
**Figure 2.** Internet Usage Frequency among Students

#### ***Frequency of using the internet***

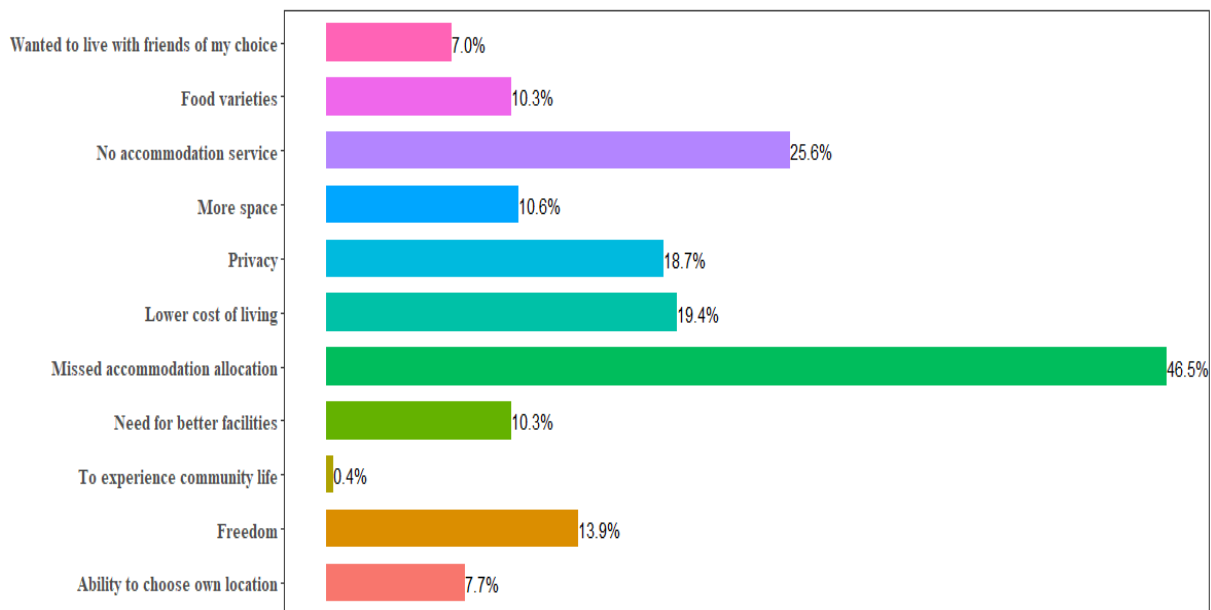
The study sought to find out how often the respondents with internet access used the internet. The respondents were therefore asked to indicate the frequency of using the internet on a scale ranging from “daily” to “monthly”. Among them, 77.8% used the internet daily, 12.3% used the internet 2-3 times a week, 5.7% used the internet weekly, 2.6 % used the internet 2-3 times per month and 1.7% used the internet monthly. The results are summarized in **Figure 2**.

#### ***Students' accommodation during academic years***

This study sought to find out where students were living during the academic years. It was found that out of 351 respondents, 244 students (69.5%) were living in either a room or a house in private rental, 41 students (11.7%) were living in a room in institution's hostel/hall of residence, 38 students (10.8%) were living in their parents' homes, 26 students (7.4%) were living in their relative's homes, and only 2 students (0.6%) were living in their own homes. **Figure 3** shows where students were living during the academic year.



**Figure 3.** Where Students Live During Academic Years



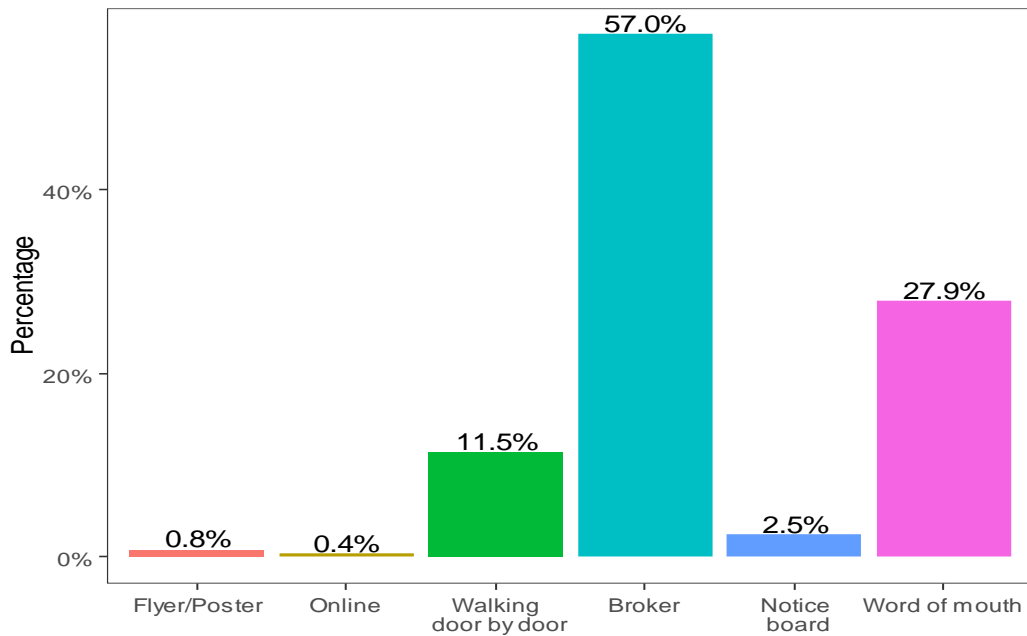
**Figure 4.** Reasons for Renting Accommodation from Private Rentals

#### ***Reasons for renting accommodation from private rentals***

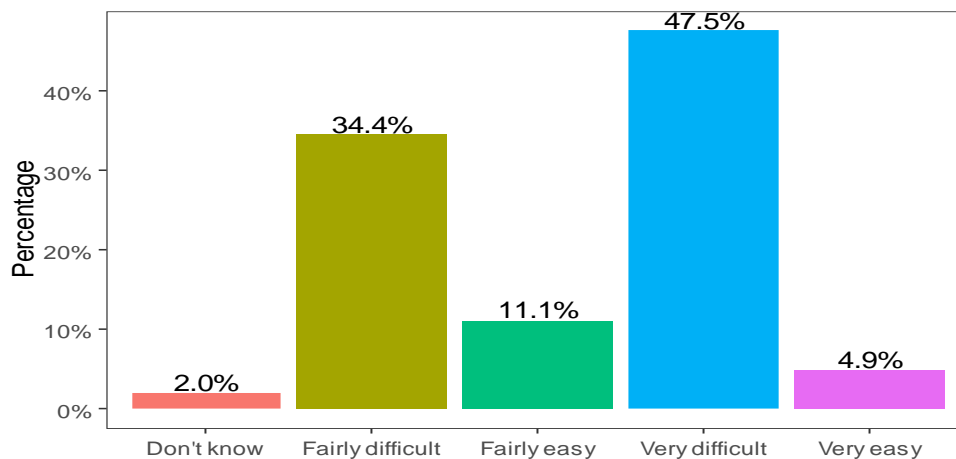
It was important to know from 244 students who were living in private rental accommodation, the reasons for doing so. Respondents were allowed to choose more than one reason. It was found that most of the respondents (45.8%) had missed accommodation allocation from their institutions, they had to look for accommodation elsewhere, and hence they had rented accommodation from private rentals. **Figure 4** summarizes the reasons for renting accommodation from private rentals.

#### ***Methods used to get private rental accommodation and the challenges***

After knowing various reasons for renting accommodation, this study also sought to find out from students living in private rental accommodation, the method they used to get the accommodation they were living in. Of the 244 students living in private rental accommodation, 57.0% got the accommodation through brokers, 27.9% through word of mouth, 11.5% by walking door by door, 2.5% through university notice board, 0.8% through flyer/poster and lastly 0.4% through online. In using those methods students experienced various challenges including incurring a lot of costs, delay in getting accommodation as the methods are time-consuming which consequently affects the time to settle down for academic activities. Other challenges are receiving incomplete information regarding the accommodation, being taken to accommodations with poor quality and tiredness. **Figure 5** shows the searching methods used by students.



**Figure 5.** Accommodation Searching Methods



**Figure 6.** Description of Accommodation Searching Process

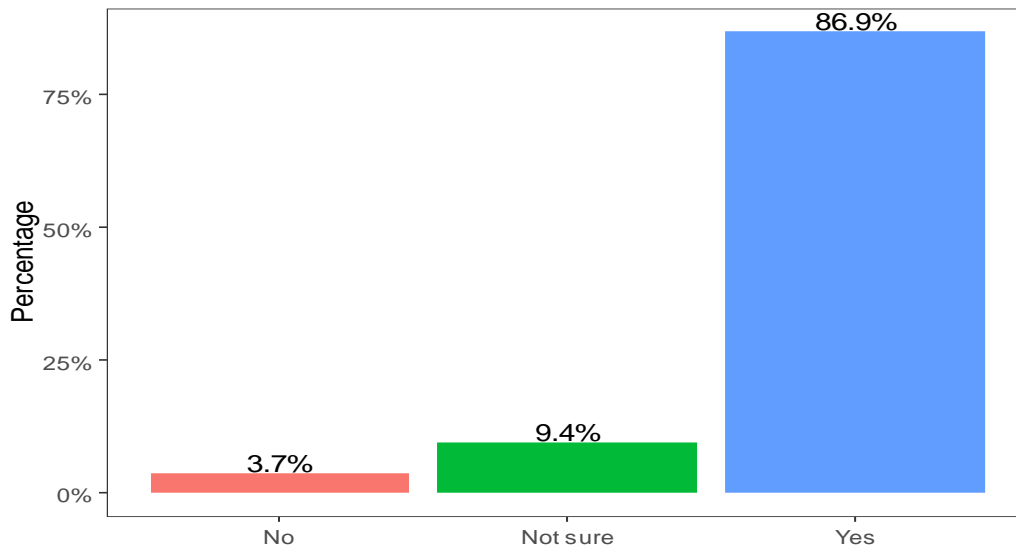
#### ***Students' description of the current searching process***

244 students who were living in private rental accommodation were asked to describe the easiness/difficultness of the whole process of searching for private rental accommodation. Among them, 47.5% described that the process is very difficult, followed by 34.4% who described the process being fairly difficult, 11.1% described the process being fairly easy while 4.9% found the process very easy. Lastly, 2.0% did not know how to describe the process in terms of easiness /difficultness. **Figure 6** shows the easiness/difficultness of the searching process as described by students living in private rental accommodation.

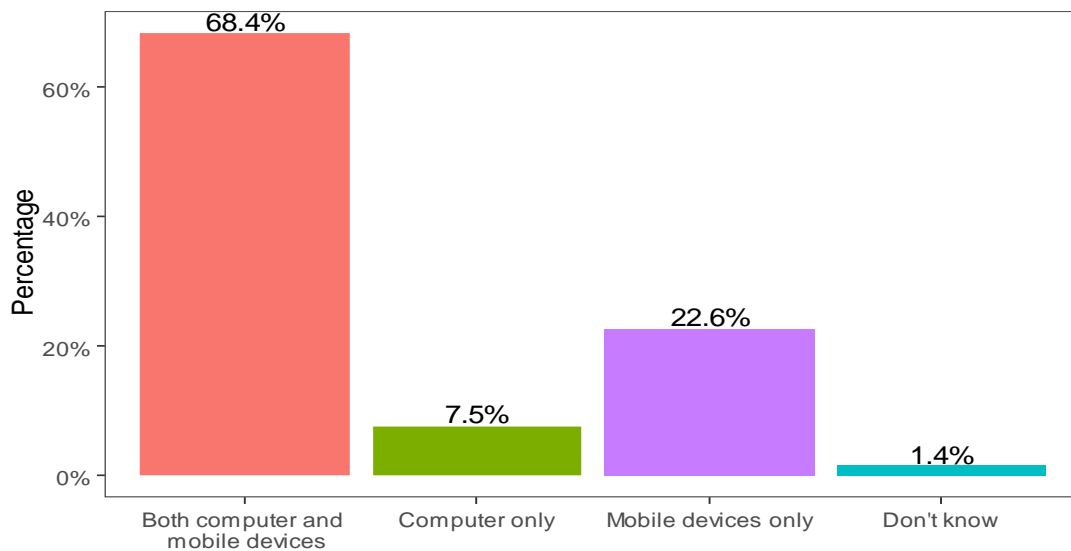
#### ***The need for ICT tool for searching for private rental accommodation***

The study sought to find out from 244 students who were living in private rental accommodation if they would like to have an ICT tool for searching for private rental accommodation. Among them, 86.9% said yes, while 9.4% were not sure if they would want and 3.7% said no to the ICT tool. **Figure 7** summarizes the results.





**Figure 7.** The Need for ICT Tool



**Figure 8.** Students' Desired Device for Accessing the Proposed Solution

#### ***The desired device for accessing the proposed ICT solution***

The study sought to find out from students about the device on which they would desire the proposed ICT solution for searching for private rental accommodation be accessed. **Figure 8** shows the results where 68.4% of students wanted the proposed solution to be accessed on both computer and mobile devices.

#### **Results from Interviews**

##### ***Students' welfare officers***

These are the officers in the students' welfare office in HEIs in the study: the office responsible for the welfare of students which including accommodation matters.

Of the four HEIs in the study, three own accommodation facilities within the institutions' compound and hence they provide the service to their students. However, none of them provides the service to all of the students enrolled not even to 50% of the total students. The hostels in ISW, ATC and TICD had the capacity to accommodate about 10.39%, 27.73%, and 40.65% respectively, of the total students enrolled. The remaining institution does not at all own accommodation facilities but the service is available indirectly through privately owned hostels.

Institutions that participated in the study have set various criteria for accommodation allocation for their students. The criteria varied from one institution to another with few criteria in common such as being disabled students

In this study, it was also found that some initiatives have been taken by institutions to assist students without accommodation from their institutions. The initiatives taken include a partnership with some private landlords who own hostels; therefore,

students are being directed to these hostels for further inquiries. The officers from the office of the dean of students, responsible for the students' welfare visit the hostels that are available around the institutions to check if the environment is conducive for their students. Institution's Students' Organizations also play part in assisting fellow students to locate private rental accommodation around the institutions. The compiled list of some hostels around institutions was found to be in a printed sheet of paper with some description in tabular form with limited information for a student to make a decision. Some landlords would bring a brochure that would be available on the notice board for students to see some of the details. Despite the initiatives taken, the demand for private rental accommodation is still high that not all students stayed in the hostels that are being linked by their institutions through the dean of students' office; some students use their own means to search for accommodation from private rental.

From the officers in the students' welfare office perspective, following features were considered important for students' accommodation in private rentals: distance of the accommodation from the institution; rental costs; room size; access to electricity and water services; safety of the accommodation which may be measured by the presence of the gate; other facilities such as toilets, bathrooms and disposal areas, cleanliness; and the surrounding neighborhood that is conducive for students to have private studies without disturbance from the surrounding environment such as noise from the bars or clubs that are near.

It was also found that, in the whole process of searching for private rental accommodation, students faced challenges which include wastage of time, incurring a lot of costs including transportation costs and also for those who come from other regions of Tanzania the problem becomes even more since they do not know the geography of the cities.

It is also worth noting that, the officers from the students' welfare office agreed on the need for the ICT tool for searching for private rental accommodation that would assist students during the search since there is a shortage of accommodation facilities in HEIs. The tool would also help students in the challenges that they currently face during searching.

### **Landlords**

The study sought to find out more from the private landlords who provide the accommodation service to students. A total of seven landlords from both Arusha and Dar es Salaam were interviewed.

Regarding the motive behind the establishment of the accommodation service to students, it was found that being surrounded by higher education institutions that have a shortage of accommodation facilities to their students in these higher education institutions motivated the landlords to establish the accommodation service to students, and so they took that as a business opportunity. These landlords provide the accommodation service of various types which include a shared room, single room, and whole apartment.

The landlords mentioned various ways they used to search for the tenants for this case; students in higher education institutions. Among the methods mentioned include posters/flyers, reaching out to higher education institutions management, and talking to brokers about the availability of rooms. Despite the various ways that landlords use to search for student tenants, still, there are challenges in the process of searching for student tenants. The most challenge that stood out from landlords is the lack of the right way to reach as many student tenants as possible.

Taking into account the desire of landlords to reach as many student tenants as possible, the landlords agreed on the need for an ICT tool for them to be able to advertise their properties and the service they provide to students. In that way, more students will be reached and hence increase the chance for landlords to expand businesswise while providing the service to students.

### **Brokers**

In this study, ten brokers from Arusha and Dar es Salaam were interviewed. The brokers involved in the study, work as freelancers and have been doing the work for not less than four years, while in service they have participated in assisting students to search for private rental accommodation with some charges involved.

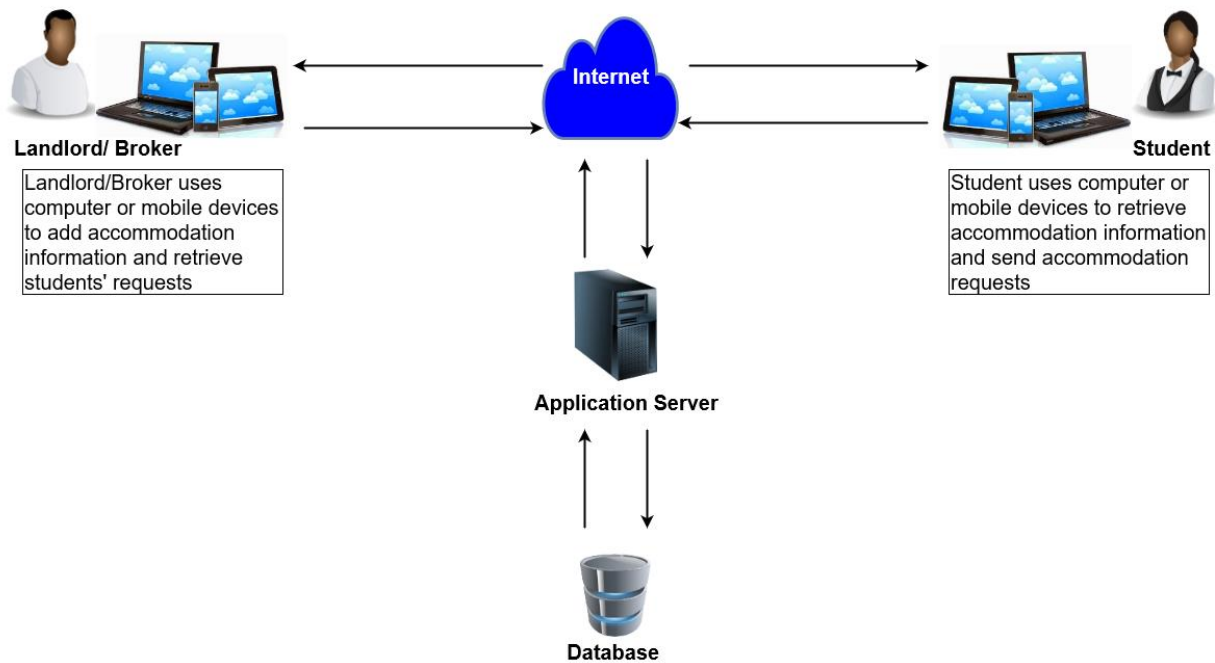
It was found that brokers were first contacted by the students in need of the accommodation and thereafter the search begins. When it happened that the broker had accommodation in need of a client the common method used is to pass the information among fellow brokers and sit and wait for the client. The mode that brokers are currently operating on is that they do not know when the client will come; some depend on the links established with previous clients they have worked for or fellow brokers.

Moreover, brokers agreed on the need for an ICT tool for students to search for private rental accommodation as this will help them (brokers) to get student tenants easily and hence have a reliable source of clients while at the same time helping students in need.

## **DISCUSSION**

It is evident from the results of this study that students' accommodation is a challenge in HEIs. The number of enrolled students in the higher HEIs exceeds the capacity of the accommodation facilities that are available in these institutions. Unfortunately, the increase in enrollment does not go with the expansion of the facilities, this leaves a considerable number of students without accommodation and hence students have to search for accommodation from private landlords who play a vital role in providing accommodation service to students of HEIs.

It was also noted that the search for private rental accommodation is challenging for students as most students rated the process to be very difficult. The search is even more challenging in major cities where there is a high demand for accommodation as there are more HEIs also a considerable number of students come from other regions different from the institutions' locations



**Figure 9.** Conceptual Framework for The Proposed Solution

hence they are unaware of the places and do not know any brokers around. With the current searching methods, students have experienced challenges such as incurring a lot of costs including transportation costs as they move around during the search from one point to another; delay in getting accommodation which consequently, affects the time to settle down for academic activities; and tiredness as a result of long walks during searching. Other challenges include receiving incomplete information regarding the accommodation and being taken to accommodations that have poor quality. Generally, the existing searching methods are not user friendly and efficient for students.

It is worth mentioning that the study has shown the need for an ICT tool, an efficient method to seek accommodation that helps students to search for private rental accommodation due to the great need for accommodation from private rentals as a result of the existing shortage of accommodation from HEIs, but also as a tool to relieve the challenges faced by students as a result of using the current traditional searching methods.

## THE PROPOSED ICT SOLUTION

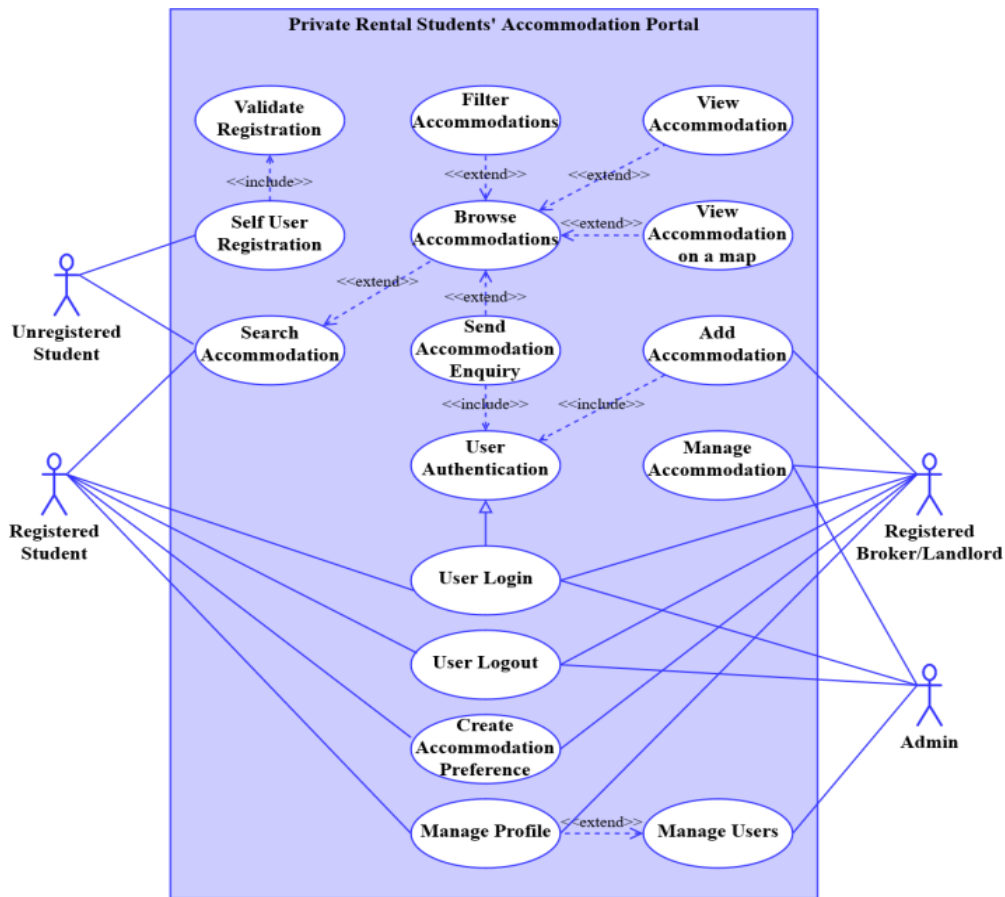
From the study findings, numerous problems on the traditional methods of searching for private rental student accommodation were identified, for instance; incurring a lot of costs including transportation costs, delay in getting accommodation, tiredness, getting incomplete information regarding the accommodation, and being taken to accommodations that have poor quality. Therefore, as a solution to the mentioned problems, the study has designed the online portal for easy searching and locating of private rental student accommodation around HEI.

The portal has major components which are as shown in **Figure 9**. These components include application and database servers; and the application. The application has interfaces for students and landlords/brokers. All components communicate over the internet. Students and landlords/brokers can access the application through a web browser on computers as well as smartphones or tablets as the application is mobile friendly.

The application connects prospective student tenants with accommodation service providers which in this case are landlords or brokers. Either landlords or brokers through their interface on the application provide inputs to the application. Inputs provided by landlords/brokers are the student accommodation information which is stored in the database. The stored student accommodation details can be searched and viewed by students and the public.

On the other hand, students are able to send accommodation search requests to the application server which brings results according to the matching accommodation information stored in the database. The students are able to view all details of accommodations as they receive a response from the application. Through the student's interface, students are able to send enquiries about accommodations being viewed; the application server delivers these enquiries to the intended landlords/brokers who through their interface are able to view all enquiries sent to them and respond to senders in return.

**Figure 10** shows the use cases for the proposed online portal where the landlord will have to register him/herself in the portal, in order to be able to advertise on the portal. Upon posting a house/room for rent, the landlord will have to provide all details about the accommodation, including pictures of the accommodation with its surrounding environment, and location.



**Figure 10.** Use Case Diagram for The Proposed Solution

A broker, just like a landlord will have to register in the portal so as to be able to post a number of houses/rooms that are available for rent and provide full details of the posted houses/rooms including pictures of the place and location, which become available for viewing by prospective student tenants.

As per **Figure 10**, prospective student tenants will have to access the portal online to search for available houses/rooms for rent. The student will be able to search based on his/her HEI, and thereafter will be able to view all available houses/rooms for rent according to the location of the specified institution, also the student is able to filter search results according to his/her preferences once satisfied with the accommodation the student can establish the contact for further renting procedures.

The search results of available accommodation would also be viewed on the map where one can see the specific location on the map. Students value their time and money highly, and therefore, prefer to live near the university (Strzalka, 2019). In this regard, the portal will show the distance of the accommodation from the higher education institution specified during the search.

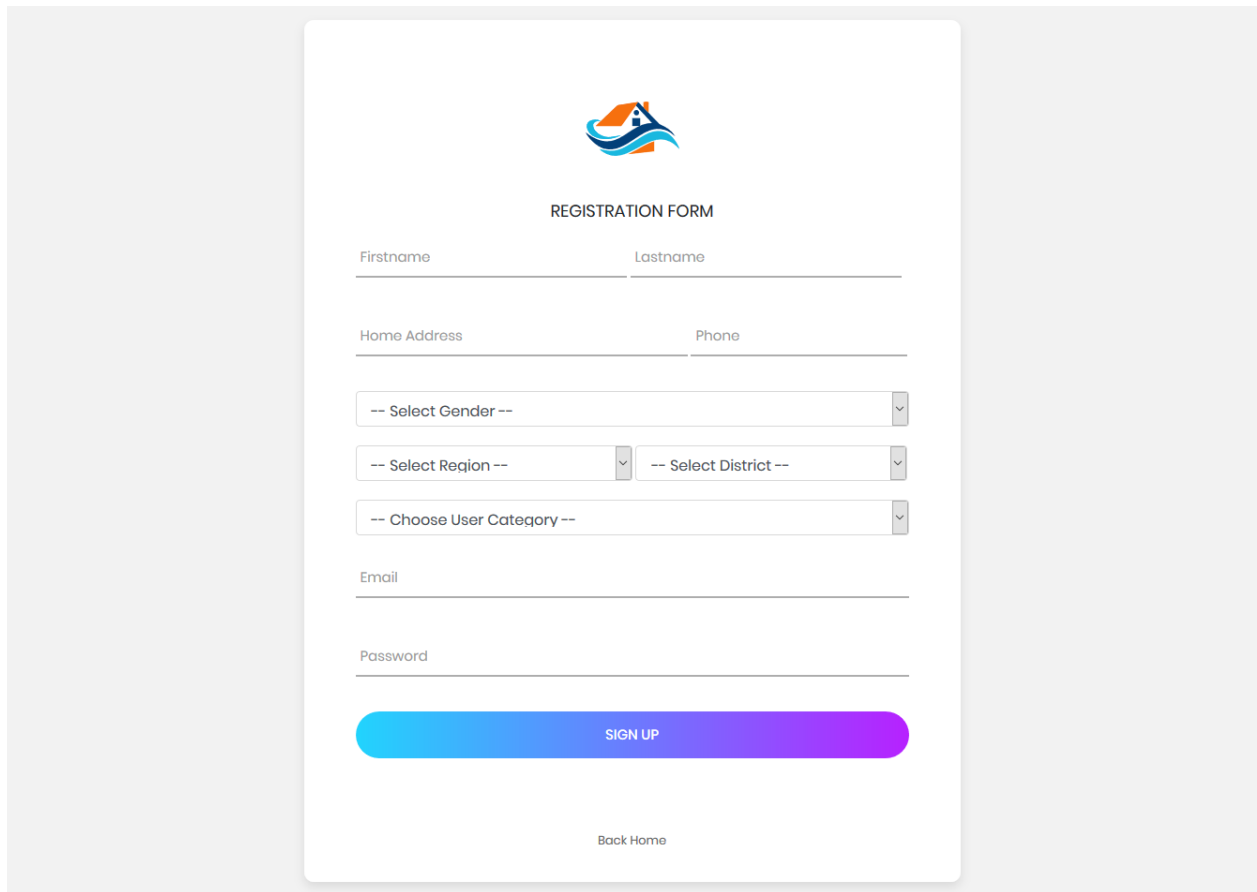
The portal will also provide the ability for students looking for shared housing to interact and be able to rent a house/room in a shared manner which will enable rent cost reduction and hence improved standard of living.

## THE DEVELOPED ONLINE PORTAL

The online portal serves as a link between students who are looking for private rental accommodation and on the other hand student accommodation service providers (landlords and brokers) in the rental market who are looking for tenants. This section provides a description of various features of the online application that have been implemented.

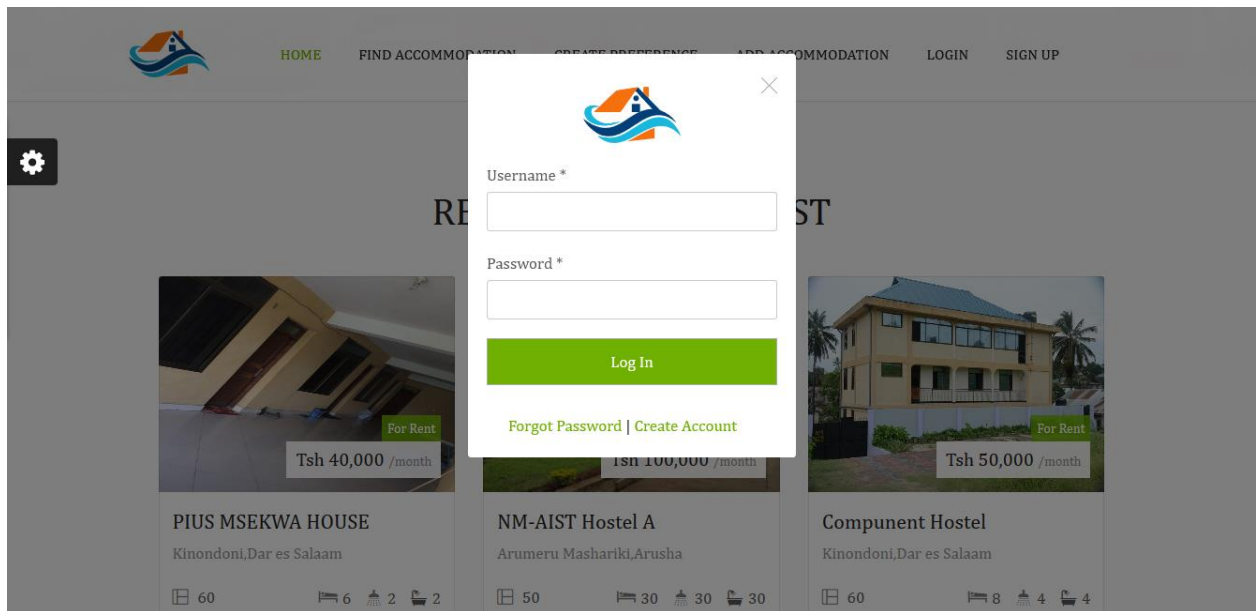
### Create Account

**Figure 11** shows the registration interface for students, landlords and brokers. This enables students, landlords and brokers to perform functionalities that require authentication. During registration students, landlords or brokers are required to provide personal information into the portal.



The registration form is titled "REGISTRATION FORM" and features a logo at the top. It includes input fields for "Firstname" and "Lastname", "Home Address" and "Phone", a "Gender" dropdown menu, "Region" and "District" dropdown menus, a "User Category" dropdown menu, "Email", and "Password" fields. A prominent "SIGN UP" button is located at the bottom, with a "Back Home" link below it.

Figure 11. User Registration Form



The login form is a modal window titled "Log In" with a logo and a close button. It contains "Username \*" and "Password \*" input fields, a green "Log In" button, and links for "Forgot Password" and "Create Account". The background shows a list of accommodation listings such as "PIUS MSEKWA HOUSE" and "NM-AIST Hostel A".

Figure 12. Login Form for Registered Users

### Login

The portal allows the registered students, landlords, brokers and administrators to login into the portal to perform functionalities that require user authentication. In order to be authenticated the user supplies a valid username and password. Figure 12 shows the login page for users.

**Figure 13.** Interface for Adding Accommodation Details into the application

**Figure 14.** Interface for Searching for Accommodation

### Add Accommodation

The portal allows registered landlords and brokers to add information about the new student accommodation into the portal. **Figure 13** shows the interface for adding new accommodation information. When adding accommodation, landlords or brokers enter the basic information about the accommodation including rental price, location, available services, etc and upload pictures of the accommodation.

### Find Accommodation

The portal allows students and other visitors to search for accommodation in the portal; the search can be by specifying the region or by specifying a name of a higher education institutions. **Figure 14** shows the search box where the user supplies the data either the region or the name of HEI. **Figure 15** shows the search results when the student enters the name of HEI where the distance of the accommodation from the specified HEI is also calculated and displayed. The student can browse through the list for further actions.

### View Accommodation

The student can select one of the listed accommodations for a more detailed view where more information about the accommodation including features, pictures and location are available. **Figure 16** shows how the information will appear to the visitors of the application when they choose to view one of the listed accommodations.

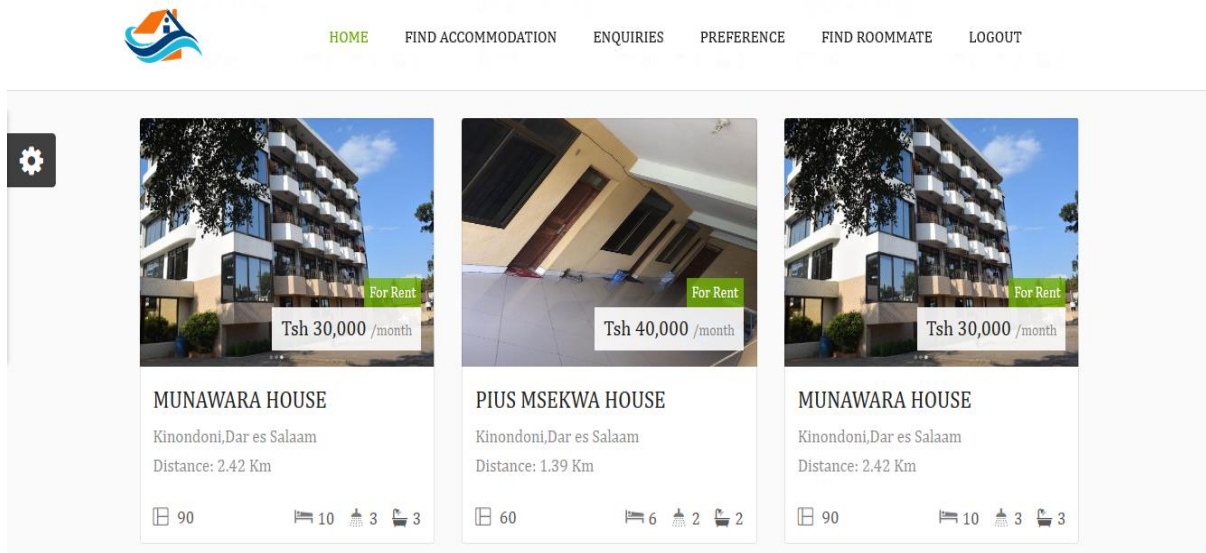


Figure 15. View of Search Results

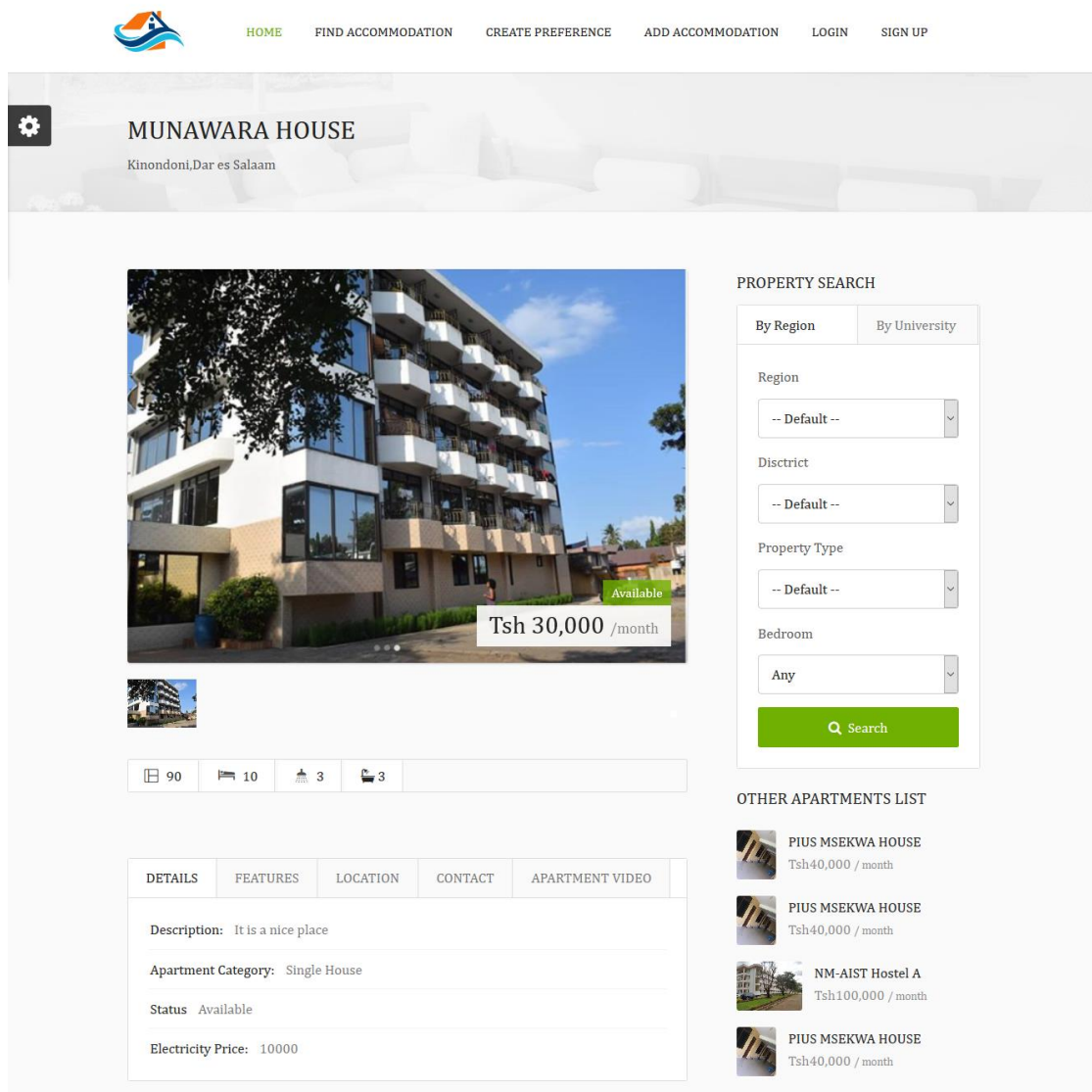


Figure 16. View of Accommodation Details

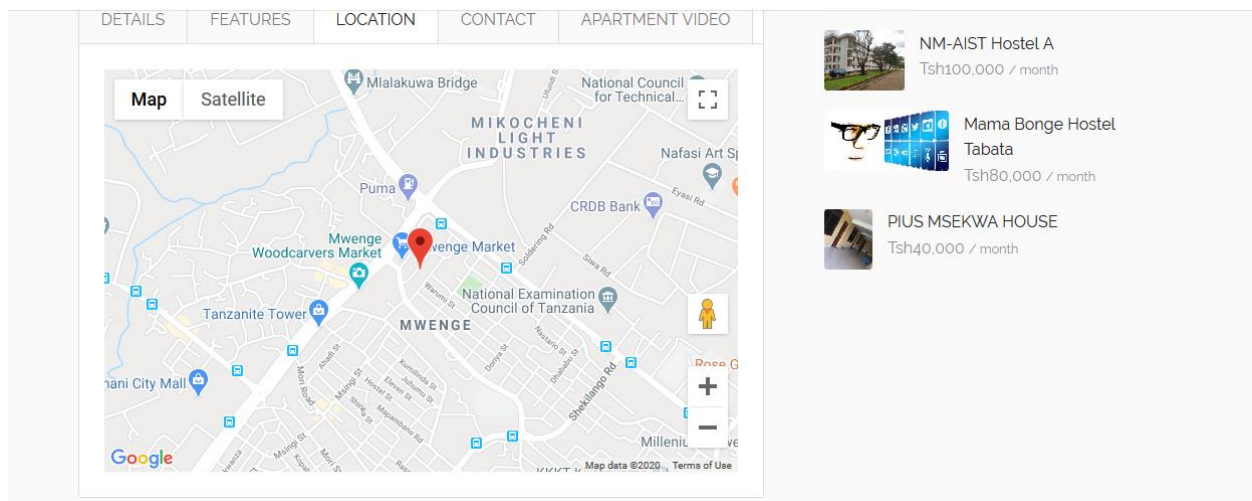


Figure 17. Geographical Location of the Accommodation on the Map

Figure 18. Interface for Creating Accommodation Preference

### View Geographical Location of Accommodation on a Map

Upon viewing accommodation details, a student is also able to view the location of the accommodation on a map; this enables a student to have a clear picture of the geographical location of the accommodation being viewed. Figure 17 shows the view of the map as it appears in the portal.

### Create Accommodation Preference

The portal allows registered students to describe the accommodation they are looking for so that landlords/brokers may know the accommodation desired by the student. The student supplies the type of accommodation, the range of rent amount, the region, the district and other descriptions as preferred. Figure 18 shows the form where a student can use when specifying the preferred accommodation.

## CONCLUSION AND FUTURE WORK

The paper has presented the overview of the current situation regarding students' accommodation, the role of the private sector in providing the accommodation service to students in need of private rental accommodation, the means used by students when searching for the private rental accommodation and their readiness towards the use of ICT tool as a solution to address the difficultness in finding private rental accommodation for students.

The study shows that HEIs are faced with the shortage of accommodation for their students and the private sector plays a big role in filling the gap. However, searching for private rental accommodation is difficult for students causing challenges like



incurring a lot of costs such as transportation costs, delay in getting accommodation, tiredness, getting incomplete information regarding the accommodation, and being taken to accommodations that have poor quality. Consequently, the design and implementation of the online portal that provides an efficient method to seek accommodation were made to relieve the problems faced by students. Future work consists of conducting a follow-up study to access the acceptability of the developed application by users.

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