
Copyright Content User Licensing Model for Collective Management Organizations in Uganda

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ABSTRACT

Collective Management Organizations (CMOs) negotiate and collect royalties for intellectual works on behalf of its owners. These royalties fund Collective Management Organizations (CMO) activities, with portions going to copyright holders and the government (VAT). Higher education institutions make substantial contributions to copyright as makers and users of copyrighted works. CMOs attempt to collect royalties from these creators in order to preserve their confidence. Throughout the royalty collection process, Collective Management Organizations (CMO) engage with and gather a large amount of user data. This paper suggests a copyright user licensing approach to help Ugandan CMOs manage their licensing operations. The model includes gathering user information, determining requirements, and granting licenses. Data security in the central database is a major concern. Object-oriented programming (OOAD) is used to develop a trial system for user evaluation. The project involved collaboration with CMO staff, copyright users, and IP practitioners across several African countries. Feedback was gathered through interviews, focus groups, and user testing of a system prototype. The tested prototype was assessed for user-friendliness, navigation ease, consistency, usability, task completion time, and information access speed. The study concludes that a copyright user licensing model can improve licensing processes for CMOs and reduce copyright infringement. It further suggests that this model can be adapted for use by other licensing firms and organizations.

Keywords: Collective Management Organization (CMO), Copyright user licensing, Copyright royalties, Higher education institutions, IP, Data security, OOAD, Copyright infringement

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1. INTRODUCTION

One of the four intellectual property regimes that has the most influence on how higher institution of learning runs on a daily basis is copyright. Textual, visual, intangible, and tangible materials are frequently used in educational programs, and most of these items are protected by copyright law of any African country. Almost all students, teachers, and staff in higher education create and work with copyrightable and copyrighted content on a daily basis, making them both authors and users of copyright works. Copyright is inextricably linked to two of higher education's most well-known goals: educating students through teaching and developing scholarship and research that benefits humanity (Rooksby, 2016).

There is an economic advantage for every original creative copyright work, which means that the author or creator of such a work is entitled to a payment, known as royalty, as stated by the registrar of copyright and registrar general-Uganda Registration Service Bureau. (URSB). Therefore, Collective Management Organizations (CMOs) are established by owners of Copyright to protect and enforce their economic rights which are provided for in the law; copyright and neighbouring Rights Act, 2006.

CMOs are mainly responsible for royalty collection and distribution to ensure members benefit from the use of their works. They also carry out licensing activities, collect revenue from users, carry out public awareness, act as agents for their members, pay royalties to their members and make reciprocal arrangements with foreign management organizations (Koskinen-olsson & Lowe, 2012).

Uganda has three main Collective management organizations, (Monyatsi, 2016), which include the Uganda Federation of Movie Industry (UFMI) for audio-visual works, the Uganda Performing Rights Society (UPRS) for musical works, and the Uganda Reproduction Rights Organization (URRO) for reproduction and distribution. CMOs provide the best solution for dynamic user demands to lawfully access copyright works through agreements and licenses for rights holders that are managed directly on their behalf. Furthermore, they provide the most seamless access to content from various rights holders in the safest, simplest, quickest, inventive, practical, and cost-effective manner possible, which is only possible if the CMO is well-governed, accountable, and transparent in its operation (Stokkmo, 2015).

Collective Management Organizations deal with an increasing amount of sensitive information which include works user information as well as their business details. According to the Registrar of Copyright & Registrar General URSB, UPRS only over 14,000 works from over 4,000 members are significantly registered and require protection, management and enforcement of their rights (UPRS, 2021). In addition, the number of copyright work user is horribly increasing with time. According to Chief Executive Officer, UPRS, over 24,000 copyright works users were currently known by 2021 August and they were scattered all over the country and every user has to be (re)accessed by the CMO licensing officers.

In this process users' data is captured by licensing officers and the information is stored in the local databases for example excel sheets. The process of reassessing and licensing of users is manually and locally handled by licensing officers, this involves manual interpretation of the tariff when allocating fees to each category of users. And due to this time consuming method and limited human resource since 2016 to 2021, the ratio of compliance costs to gross revenue expected at the end of the year was below 16%, and this was because of the limited licensing coverage scope (UPRS, 2021). In addition, users move to the CMO premises to get their license certificates after clearing payments.

Therefore, in the proposed model, tariffs for different CMOs will be automatically interpreted for the licensing officers during the licensing process, with the support of a mobile application, monitoring payments made by assessed content users, communication with the content user and payment database, geolocation of content users and generation of license certificates. This will provide a faster licensing mechanism, decentralized storage, distributed processing, and efficient lookup, capabilities, monitoring and follow up of any collective management organization licensing activity.

As collective management organizations (CMOs) move to digital systems for managing licensing data, it also exposes them to new cybersecurity risks. The storage of sensitive user data in databases and transmission of such data over networks means that strong encryption, access controls, and cybersecurity measures need to be implemented to protect against data breaches. Regular security audits, penetration testing, and staff cybersecurity training can help identify and mitigate vulnerabilities. Furthermore, disaster recovery plans, data backups, and systems redundancy need to be in place to ensure continuity of operations and rapid recovery from any cyberattacks. With proper cybersecurity controls and governance, CMOs can help securely unlock the value of copyrighted works in the digital age (Sujitparapitaya et al., 2012).

However, African CMOs face escalating cyber risks as licensing transitions to digital platforms. Recent high-profile cases illustrate the dangers: In 2021, a sophisticated cyberattack on BMI, a major US performing rights CMO, disrupted operations for months. Hackers used ransomware to encrypt systems and demand payment (BMI, 2012). A 2020 data breach at South Africa's SAMPRA CMO exposed thousands of users' personal information. Cybercriminals exploited a vulnerability in an outdated web server (Berger & Masala, 2012). In Uganda in 2018, hackers breached the Uganda Performing Right Society CMO, accessing financial records and member payment data. Weak passwords and unpatched systems enabled the attack (Serianu Limited, 2019).

These incidents demonstrate that CMOs are prime targets for cybercriminals, given the sensitive data they manage around copyrights, licensing, and user information. Threats include phishing, hacking, ransomware, and insider threats among others (Ikenwe et al., 2016). Without robust cybersecurity, CMOs risk licensing disruptions, copyright infringements, member payment issues, and loss of user trust (de Jager et al., 2015). Cybersecurity is critical for CMOs to safely transition licensing and copyright management to digital platforms. Proactive governance, controls, and risk management are essential.

This research proposes therefore a copyright user licensing model to improve licensing operations and copyright user data quality for Collective management Organizations in Uganda. This model will streamline the whole process of licensing, from reassessing of users to generation of user license certificates backed up with a mobile and web system for administration.

1.1 Problem Statement

Collective Management Organizations (CMOs) in Uganda face challenges efficiently collecting royalties and safeguarding copyright interests due to manual, decentralized licensing processes. CMOs collect payments from diverse users like hotels, radio stations, and casinos across the country (UPRS, 2021). However, the annual revenue collection rate is currently less than 5%, limiting royalty distributions despite unprecedented membership growth (UPRS, 2022).

Licensing agents manually calculate user fees using complex tariff formulas, recording data in localized spreadsheets. With over 12,000 geographically dispersed users, assessing all for licensing is difficult using manual methods. This leads to unclear user statistics, poor data quality, and duplication. It hinders royalty collection, causing discrimination and mistrust among members CMO (Stokkmo, 2015).

Additionally, decentralized datasets and analog processes pose cybersecurity risks. With licensing data fragmented across agents in inconsistent formats, ensuring data protection and accuracy is challenging. Lack of digital systems enables threats like data tampering and unauthorized access. As licensing transitions online, cyber-attacks could disrupt collections or breach sensitive user information (Sujitparapitaya et al., 2012).

To address these inefficiencies and cyber risks, this research proposes a digital licensing model for Ugandan CMOs. The system will automate fee calculations using centralized tariff data, improving accuracy and compliance. Digital processes will provide real-time user statistics and role-based access controls. The model will also implement cybersecurity technologies like encryption, multi-factor authentication, and malware prevention to safeguard licensing transactions and data integrity.

By modernizing and securing licensing digitally, CMOs can enhance collections and distributions, improving transparency and member relations. The model aims to balance licensing improvements with cyber protections as CMOs adopt emerging technologies. This comprehensive approach can help CMOs manage rights efficiently and safely amid rising digitalization.

1.2 Objectives of the Study

The purpose of the study is to develop a copyright user licensing model for Collective Management Organizations in Uganda. The specific objectives are to:

- To analyse the current approaches used in the process of copyright user licensing by the CMOs in Uganda.
- To design an architecture of a copyright works licensing model for CMOs.

1.3 Scope and Limitation of the Study

This study focused specifically on developing a copyright licensing model for collective management organizations (CMOs) in Uganda. The scope will cover analyzing current CMO licensing limitations, investigating stakeholder perspectives, identifying enhancements, and formulating a contextualized licensing framework. While there are multiple CMOs in Uganda covering different creative sectors, the study will prioritize engaging with the national CMOs for literary works, music, visual arts, and audiovisual media, as these manage the majority of copyright licensing. The study is limited to copyright licensing and will not address other CMO activities like royalty collection and distribution. The proposed licensing model was developed based on the Ugandan context, but with consideration of best practices from other developing countries. The intent is not to duplicate licensing models from other nations, but to formulate tailored recommendations to improve Ugandan CMO licensing specifically.

2. LITERATURE REVIEW

Copyright and user licensing are critical in creating the legal and ethical framework for intellectual property protection and creative work use. The copyright user licensing processes have gotten increasingly complex as content usage has increased, posing new issues for creators or content owners, as well as middlemen or CMOs. This literature review intends to provide information about current and upcoming trends in copyright works user management and licensing referencing, which will be sourced from articles, published papers, text books, and other internet sources to gain a thorough understanding of the subject. The emphasis will be on the research topics posed in the preceding chapter, and prior studies, as well as Copyright licensing-related systems, will aid in avoiding duplication of study

2.1 Enhanced License Management Model

For the online music industry, an enhanced license management model allows both online and offline purchases. The concept is made for digital rights management systems with the goal of increasing user satisfaction with DRM technology by offering a variety of ways to access and use music and, to a lesser extent, other media materials that are DRM-protected. When a customer listens to rights-protected music, the audio player initiates the license acquisition procedure. Figure 2.1 depicts the license acquisition procedure, which requires the audio player to validate the consumer's licensing status. If there is a legal license, the audio player can play the music.

In the absence of a valid license, the process of obtaining one will either result in the receipt of an official license from the external DRM services center, which serves as the official license site, or the receipt of a temporary license from the local DRM services center, which functions as the local license site. Always go with the official license above any other option. As a result, the player will communicate the consumer's private key, client information, and music identification to the external DRM services center if the user is online. If no local DRM services center is available, the player will request a temporary license from the center if one is available.

To generate a temporary license, the nearby DRM services center requires a music identity and the customer's private key. When the token or coupon is downloaded from the official license site, the location of the local DRM services center is disclosed to the audio player, while the address of the external DRM services center is contained in the digital music. As a result, depending on whether the consumer is able to connect to the external DRM services center, the license acquisition operation can be performed in either the external or local DRM services center (Kwok, 2002).

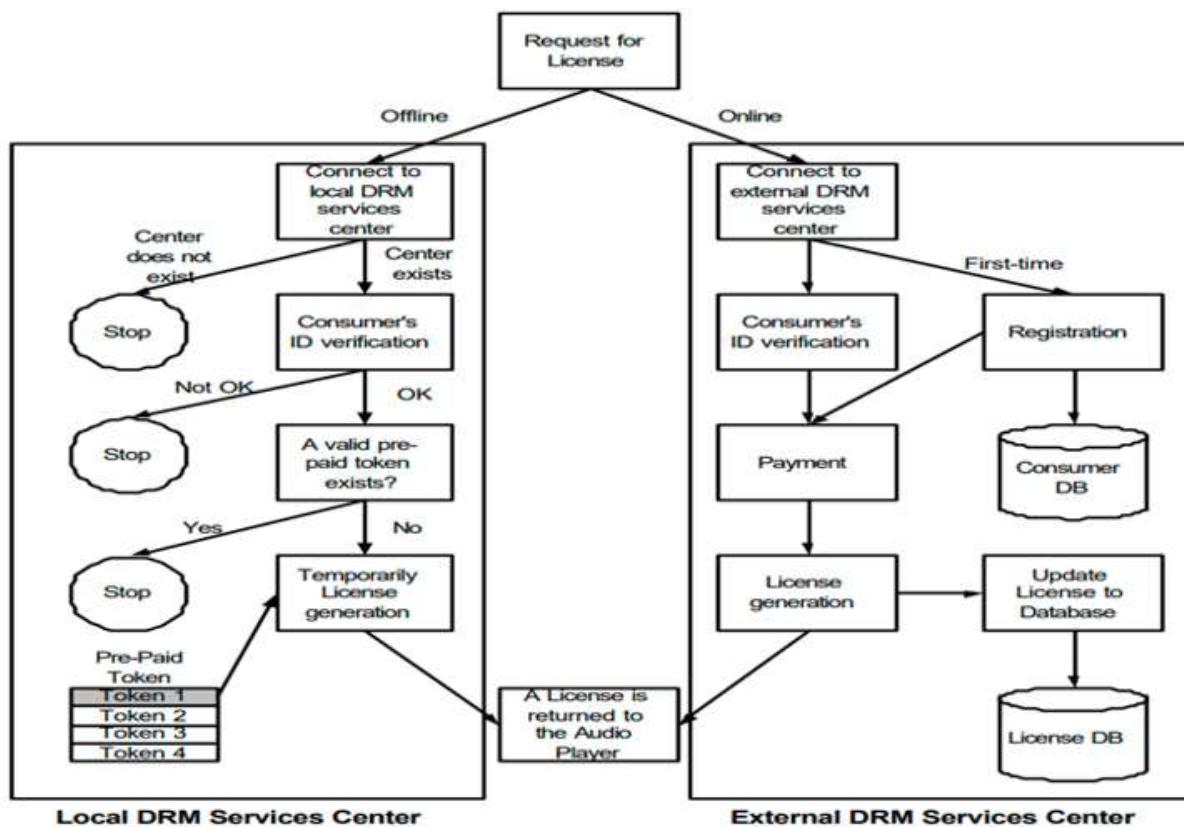


Figure 1. The license acquisition process in the enhanced license management model (using both local and external DRM services centers) (Kwok, 2002)

2.2 Copyright license model and CMO

Copyright licensing refers to the permissions granted by rights holders to access and utilize creative works under specific conditions. Collective management organizations (CMOs) play a key role globally in copyright licensing by issuing licenses and collecting royalties on behalf of rights holders (IPO, 2016). Research indicates CMOs help reduce licensing transaction costs through collective administration, but still face challenges developing optimal licensing models (Towse et al., 2008). Studies of CMOs in developing countries like Nigeria and Indonesia reveal persistent issues with licensing efficiency and rate-setting (Tabaro, 2005).

Common limitations include use of statutory rates rather than market-based pricing, lack of segmentation for different user groups, and insufficient data to set fair rates (Mark, 2009). This literature demonstrates shortcomings in CMO licensing models especially in developing country contexts similar to Uganda.

2.3 Royalty collection and licensing

In Uganda, copyright law grants CMOs authority to license and enforce rights, but research has identified limitations in local licensing models. Tabara (2005) found an overreliance on arbitrary statutory royalty rates, exacerbated by a lack of rate-setting data. And also highlighted a lack of differentiated pricing for various uses and users (Tabaro, 2005). Kuchena (2020) noted cybersecurity and transparency concerns. These studies expose need to improve the sophistication of Ugandan CMO licensing to balance stakeholder interests (Kuchena, 2020).

Royalty collection and licensing is the process of collecting payments from users for the use of copyrighted works. It is a complex process that involves multiple parties, including copyright holders, users, and royalty collection organizations. Copyright holders are the owners of copyrighted works, such as music, movies, and books. They have the exclusive right to authorize others to use their copyrighted works. Users are the people who use copyrighted works. They may be individuals, businesses, or organizations.

According to Registrar of Copyright and Registrar General URSB, every original creative copyright work has a financial benefit, which means that the author or creator of the work is entitled to compensation for its use, also known as a royalty. The main job of CMOs is to collect and distribute royalties so that members can profit from the use of their creations (Ariana, 2016). CMOs are permitted to represent the copyright and neighbouring rights interests of their members under the provisions of the Copyright and Neighboring Rights Act of 2006. Because of this agency relationship, CMOs like UPRS are obligated to efficiently collect royalties and safeguard the copyright interests of their members. A single artist may be owed royalties by a variety of users, including hotels, radio stations, television stations, and casinos, but it can be challenging to collect these payments (UPRS, 2021).

2.4 Copyright Works in Higher Institutions of Learning

According to Rooksby (2016), copyright is the most important component of how higher institutions of learning operates on a daily basis. Copyright protects a huge percentage, if not the majority, of the textual, visual, intangible, and tactile resources utilized in education. Every day, most people in higher institutions of learning, including teachers, staff, and students, generate and use copyrighted and copyrighted works. Copyright is inextricably linked to two of higher institutions of learning's most fundamental goals: teaching and creating scholarship and research that improves humanity. All of these activities involve the use and creation of original works of art that have been recorded on a tangible medium. In addition, Bynum (2012), argues that, copyright is an author's inherent right to control their creative outputs, and copyright protection promotes the creation and dissemination of educational resources in the higher institutions of learning.

This point of view is reflected, for example, in scholarly standards regarding credit-giving and plagiarism-prohibition, which encapsulate the sense of natural justice shared by many people. The availability of learning resources, in particular, in African educational systems, is relevant to both utilitarian and natural rights-based conceptions of copyright.

According to Ravas (2016), Campus copyright conversations should be sparked by open education initiatives. A clear policy statement or memorandum of understanding might aid in defining the standards at a particular organization. Currently, librarians provide some training on these areas. Establishing legal ownership is critical, but so is ethics, especially when students are active in the knowledge generation process. The fundamental decision about who will own OER and whose guidelines will govern how this frequently collaborative effort can be shared relates to core openness ideals. Rather than relying on broad assumptions about academic tradition, the field must decide how to balance these issues and incorporate our beliefs into these legal agreements.

According to Cox, et al (2020), faculty understanding of OER is growing. As a result, learner-centered pedagogies such as OER-enabled pedagogy, which encourages faculty and student creation of publicly licensed materials, are gaining traction. This is especially true in digital learning environments, which have become important as a result of the corona virus sickness in 2019. Closer investigation of copyright ownership restrictions is required to establish any potential legal repercussions for open education as a whole, which is dependent on the sharing ethos.

2.5 Copyright User Tariffing System

Copyright user tariffing system is a system that lets copyright holders to charge users royalties for using their copyrighted works. Governments or business organizations are normally in charge of implementing Copyright user tariffing system. Copyright user tariffing system works by levying a fee for the usage of copyrighted material. The tariff is usually determined by the type of copyrighted material, the number of users, and the length of use. The tariff is paid by the user to a CMO, which subsequently distributes the royalties to the copyright holders. Copyright user tariffing system have several advantages over other systems of royalty collection, such as voluntary licensing. Copyright user tariffing system are more efficient since they do not necessitate individual licensing negotiations with each user. Copyright user tariffing system is also more equitable because they require all users to pay the same rate for the use of copyrighted material.

According to FICSOR (2002), Owners of rights grant permission to collective management organizations to monitor how their works are used, negotiate with potential users, grant licenses in exchange for reasonable compensation based on a tariff system and under reasonable conditions, collect that compensation, and then distribute it to the rights holders.

According to (Sterling, 2004), the rights of each area should be valued based on how much it is exploited, and licensing fees should be computed in accordance with the destination country's tariffs, either based on the volume of users or the intensity of use. Each national collecting society may set a global cost for multi-repertoire and/or multi-territory licensing.

Insofar as the applicable national percentage tariff is applied in proportion to the amount of such revenue or the number of users that can be assigned to each territory, these tariffs take elements such as the advertising revenue stream generated or the intensity of use in each country into account.

According to UPRS (2022), the tariff system provides equations for assigning payments to various sorts of copyrighted information consumers. Normally, the tariff Because of fluctuating economic conditions and the expanding licensing structure, this is done every five years, albeit the most recent review was in 2016, and the next one isn't due until 2021. The existing digital licensing tariff is insufficient to generate the desperately needed funds. The broadcasters' tariff does not currently include a sound recording tariff. Since the existing tariff does not cover the smallest music users, proposals for a fourth class have long been floated.

This has had an impact on our business operations and has encouraged noncompliance. Some of User Tariffs in Uganda include: -

- Beaches and similar open-air premises
- Live music performances, libraries, hotels, guest houses, and similar multi-roomed establishments
- Amusement arcades, parks, and fairgrounds
- Roadhouses, takeaways, and similar premises bars, gardens, pubs, and similar premises,
- Restaurants, cafes, coffee shops, and similar premises
- Shops, stores, showrooms, offices, banks, gyms, and similar premises and many others.

2.6 Challenges faced by CMOs

As CMOs conduct their operation, they deal with an increasing amount of sensitive information which include works owner information, works user information as well as the works information. According to the Registrar of Copyright and Registrar General URSB, UPRS only over 14,000 works from over 4,000 members are significantly registered and require protection, management and enforcement of their rights (UPRS, 2021).

The number of copyright work user is horribly increasing with time, according to Chief Executive Officer, UPRS, over 24,000 copyright works users were currently known by 2021 August and they are scattered all over the country and every user has to be (re)accessed by the CMOs making the licensing process tedious. The process of reassessing and licensing of users is manually and locally handled by licensing officers, this involves manual interpretation of the tariff when allocating fees to each category of users. And due to this time consuming method and limited human resource since 2016 to 2021 , the ratio of compliance costs to gross revenue expected at the end of the year is below 16% because of the limited licensing coverage scope (UPRS, 2021).

With the help of international organizations like World Intellectual Property Organization (WIPO) and International Confederation of Societies of Authors and Composers (CISAC) platforms and databases of musical works are freely accessed to register , access and manage the copyright works on behave of their members (CISAC, 2022) .

The glittering market scope on the cyber space has attracted CMOs to promote the usage of digital / online music consumption channels and support right owners, especially the upcoming creators to host their own online music channels as a way to promote the works of their members, which is an open space for downloading and live streaming of the works (Watson, 2015). This requires an intelligent data security model with a different protection set of practices that limit access to those who have permission to access it for efficiency in copyright management and royalty allocation among multiple copyright holders in cyberspace which is a virgin environment for piracy (Kapsoulis et al., 2020)

2.7 Summary matrix for the existing systems

According to most computer-based Collective management Organization systems, the existing system is insufficient to cater for the increasing duties of CMOs, and thus with them in use, CMOs are likely to encounter some problem that will affect the smooth operation of the organization as well as their annual target objectives. Tariffing, licensing, record keeping, and material handling are all examples of duties.

The existing system may be mismanaged due to insecurity, time consuming, and the fact that the majority of content users and CMO staff do not know how to operate the existing systems, making CMO's daily activities tedious for them. From the interview conducted shows that there is currently no user-centered CMO system in place for managing licensing processes and content user data, and all of these activities are performed manually.

According to observations made and literatures read, licensing coverage is very low in relation to the increasing number of copyright content users due to difficulties in translation of the tariff by licensing officers during the user assessment process. Furthermore, there is difficulty in trucking content users (both those who have paid and those who have not paid) as well as licensing officer performance when in the field at the end of the day. Finally, most existing systems only handle one type of copyright work, namely musical works, leaving other works unaddressed and thus favouring a specific type of CMO.

After identifying the problem with the existing systems, the purpose of this research is to address it so that the new system does not suffer the same fate as the present systems. The CMO will now benefit from the new system in terms of cost savings, simplicity of work in everyday tasks, and the security of content user information contained in the system's database. It's also good at translating tariffs and determining how much loyalty the user should pay.

Table 1. Matrix for the existing systems

Name of the system / framework	Features			
	Main Objective	Copyright Works	Used in Licensing Process	Tariff Interpretation
1. QuickBooks	Create, update, and identify conflicts in musical rights	All	No	No
2. CIS-Net platform	Distributed platform providing Documentation databases and common tools to CMOs	All	No	No
3. WIPO Connect System	Collective management of copyright and related rights	All	No	No
4. Open Data Kit (ODK) system	Platform for capturing content user data	All	No	No
5. Unified Communication and Collaboration System (UCCS)	Platform for communications and collaboration within organization	None	No	No
6. Composers, Authors and Publishers Association (CAPASSO) Portal	Portal for collecting and distributing mechanical rights royalties online	Musical	No	No
7. Proposed system	Copyrights Licensing model (Copyright User Licensing System)	All	Yes	Yes

3. METHODOLOGY

3.1 Research Design

This design made use of object-oriented programming (OOAD) as the design methodology. A programming paradigm known as object-oriented programming (OOAD) portrays the software design process as actual objects. These objects are entities with associated methods and data fields (attributes that describe the object). In order to implement a computer application and programs, objects that are given in a code format are typically instances of classes. The state (data) and the behaviour (method) are its two basic parts

3.1 The User Case Diagram

The use case diagrams are usually referred to as behaviour diagram used to describe the actions of all user in a system. All user describe in use case are actors and the functionality as action of system. The Use case diagram is a collection of diagram and text together that make action on goal of a process. In copyright user licensing system and database there will be three actors that can do all the activities to run the system. Super admins, CMO staff, and users of copyright works as shown in Figure 3.3.

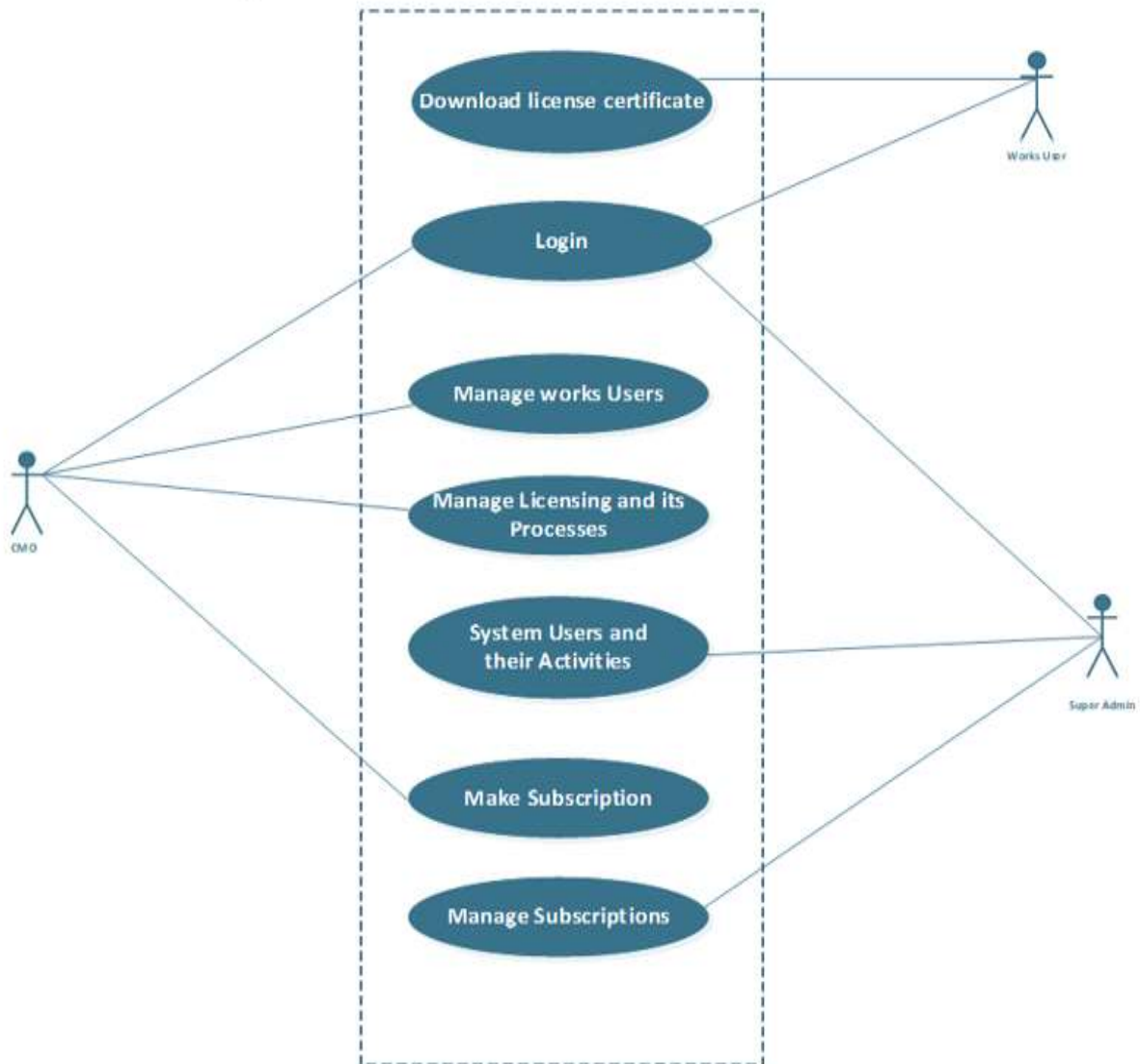


Figure 2. Use Case Diagram For The Proposed System

3.2 System Architecture

Copyright User licensing architecture shows a diagrammatic representation of all major components involved in the software and their linkages. In this project, only three user types are guaranteed access

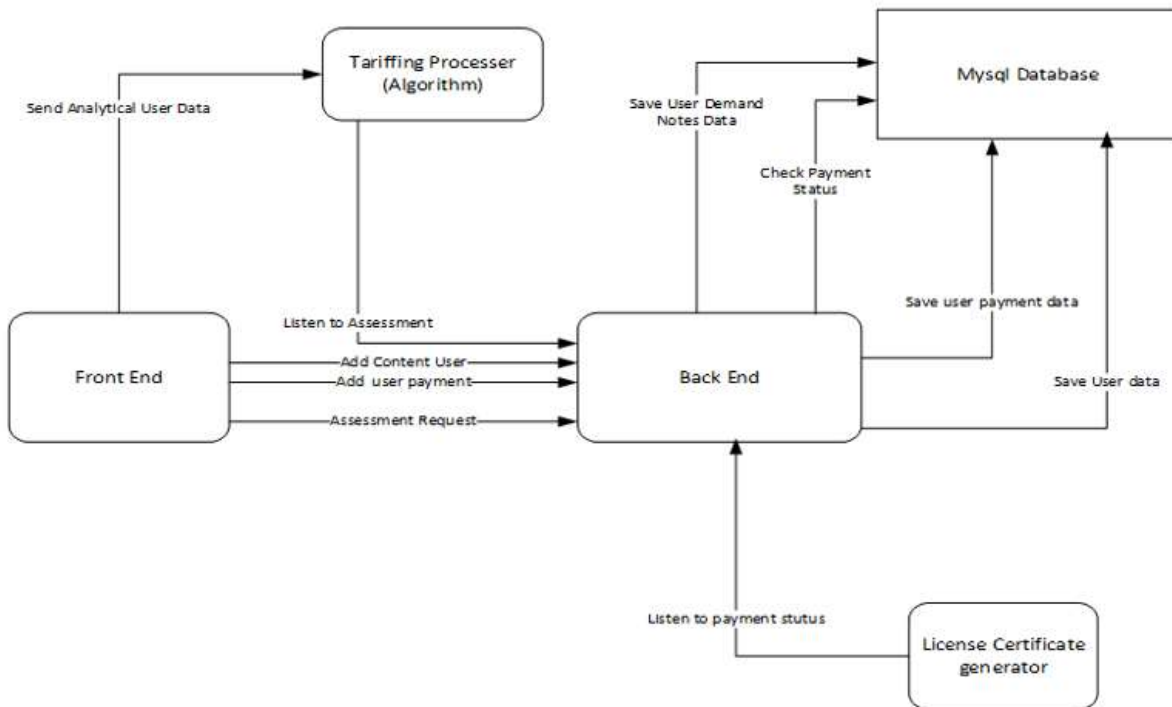


Figure 3. Architecture of Copyrights Licensing model

According Figure 3.19, the Front end represents the user interfaces that is what the user interacts with, the Back end represents the engine of the system with connections to data store and processing APIs for interpreting CMO tariff. First the front end (Licensing agent) will register or adds the new content user details whose data will be saved in the MYSQL database.

The front end (Licensing agent) will request assessment of a user on selection of a content user, with the help of the captured the user type (i.e., hotel, bar) during the content user registration, the backend calls the Tariffing processor API, and displays the key fields to be captured from that type of user i.e., number of rooms, or number of seats or dimensions and etc. According to the measurements or quantity from the front end the backend will auto generate a quotation and the amount with its details which will be saved to the database and then sent back to the front end to be viewed by the licensing agent, accounts office and content user.

The process of listening to payment status event and saving payment details in the database by the backend will be dependent on the user payment data captured from the front end.

Front end once the payment status has been confirmed (fully paid) by the backend, next is generation of content user license certificate by the system which is downloadable at the content user front end.

3.3 Tools and Technologies

3.3.1 Hardware Tools

The hardware components of a computer system refer to the physical part that makes up the computer system. For an effective operation, the system was implemented with the following hardware components: a windows computer with at least 8GB RAM, 500GB HDD and 1.9 GHz for smooth running of the development tools as well as the virtual machine for IOS. The following hardware is required for the efficient work of the system: Any computer device which has web browser for web system, android phone of at least version 4.4 and iOS phone of at least version 8.0 for mobile application users.

3.3.2 Software Tools

Computer software is a collection of computer programs and related data that provides the instructions for telling a computer what to do and how to do it. In other words, software is a set of programs, procedures, algorithms and its documentation concerned with the operation of a data processing system. Program software performs the function of the program it implements, either by directly providing instructions to the computer hardware or by serving as input to another piece of software. For effective development of Copyright User Licensing system, the software required include, sublime text as a text editor for web, android studio as a mobile development tool, MACOS virtual machine Xcode as a testing tool for iOS version, XAMP as a local server for database development and local hosting

3.3.1 Choice of Development Environment

The choice of programming language used depends on the suitability of the language attributes to the scope and usage of the system developed. PHP is a scripting language and dart programming is used in flutter framework. They facilitate the development of a web-based program and creation of web-pages as well as hybrid mobile applications respectively. The XAMP server has some sets of scripts, logs, SQL manager and PHP code that enable communication between the MYSQL database and HTML as well as flutter. The system developed is an online system that allows multi usage. The XAMP server enables data to be shared among users online and secures the data from the various users. The cascading style sheet formats the presentation of a web page to the end-user. It creates a suitable and user-friendly outlook for the user interface. These attributes informed the choice of the language used.

3.4 Approach and Technique(s) for the proposed solution

The Copyright user Licensing system allows content user data management and content user licensing process management and the key licensing process is the tariffing during assessment and license certificate generation for members with cleared annual Fees as showed in the algorithms in Figure 3.1 and 3.2.

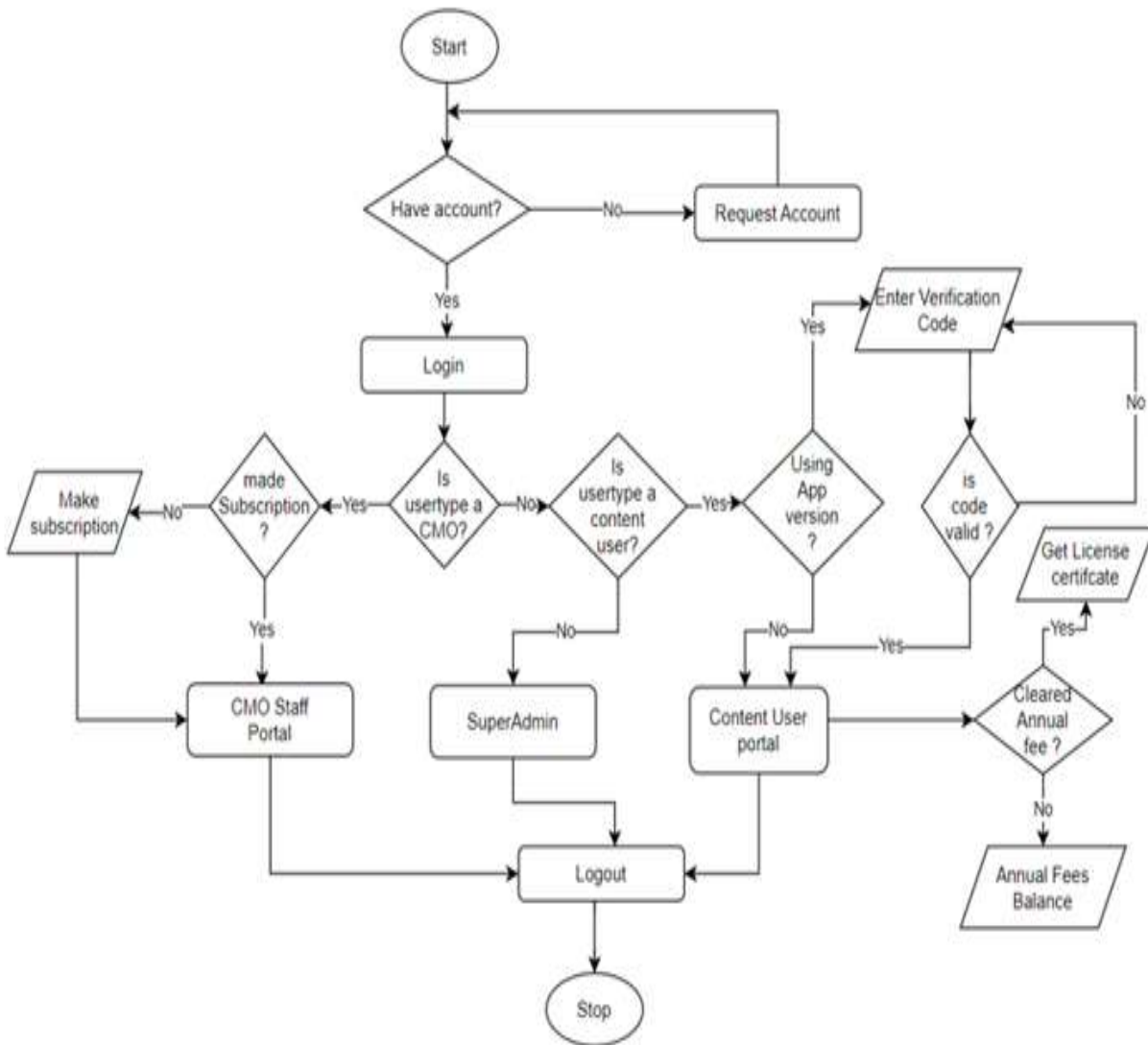


Figure 4. Flowchart of System Access and License access algorithm

To access the system the user's login with username and password which is encrypted by MD5 digest a key factor of Initialization vector generation algorithm. If the credentials are valid, user type is checked if the user type is a CMO staff, the system checks for the CMO subscription and if it is subscribed the staff under it, can access the system. If the user type is a copyright content user, and using the web system, they directly access the portal but if using mobile app, a two-factor authentication occurs, the system sends a verification code which is to be entered before accessing the portal as showed in Figure 3.2.

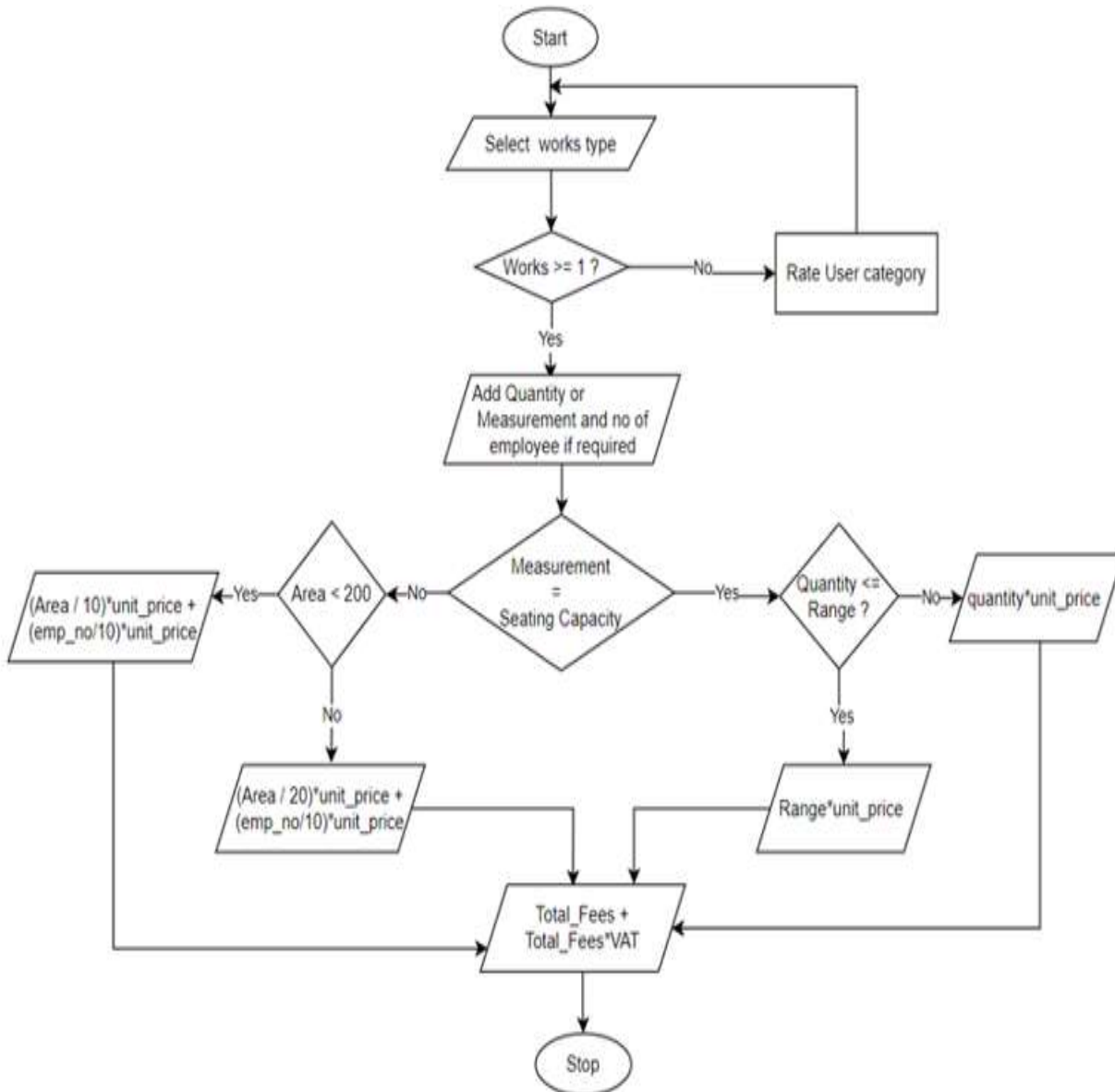


Figure 5. Flowchart of Tariffing Algorithm

The key factors in the process of tariffing during assessment are the user category, work type, quantity and their corresponding measurements. The system first checks for the rating after user selecting the user category and work type in the tariff rating table, if rating exists (work and user category), the quantity or measurements are added. The system checks for the measurement type (seating capacity or Square Meters). If square meters found, the system checks if the area > 200,

Total Annual fees = $\left(\left(\frac{\text{area}}{10} * \text{unit_cost} \right) + \left(\frac{\text{no of employees}}{10} * \text{unit_cost} * \text{no of days} \right) \right) + \left(\left(\frac{\text{area}}{10} * \text{unit_cost} \right) + \left(\frac{\text{no of employees}}{10} * \text{unit_cost} * \text{no of days} \right) \right) * \text{VAT}$ and else if area ≥ 200

Total Annual fees = $\left(\left(\frac{\text{area}}{20} * \text{unit_cost} \right) + \left(\frac{\text{no of employees}}{10} * \text{unit_cost} * \text{no of days} \right) \right) + \left(\left(\frac{\text{area}}{20} * \text{unit_cost} \right) + \left(\frac{\text{no of employees}}{10} * \text{unit_cost} * \text{no of days} \right) \right) * \text{VAT}$ and if the measurement is seating capacity quantity, and if the seating capacity quantity \leq range from the database, then $\text{Fee} = (\text{quantity} * \text{unit_cost})$ else if quantity $>$ range then $\text{Fee} = (\text{range} * \text{unit_cost})$ and finally Total Annual fees = $(\text{Fee}_1 + \dots + \text{Fee}_n) + (\text{Fee}_1 + \dots + \text{Fee}_n) * \text{VAT}$ as shown in Figure 3.2.

3.5 Data Dictionary

A data dictionary was created to define the database fields, relationships, and data types, facilitating the creation of the system's database and understanding how data is related.

Table	Action	Rows	Type	Collation	Size	Overhead
admins	Browse Structure Search Insert Empty Drop	1	InnoDB	latin1_swedish_ci	16.0 KIB	-
asmt_particular	Browse Structure Search Insert Empty Drop	48	InnoDB	utf8mb4_general_ci	16.0 KIB	-
assessment	Browse Structure Search Insert Empty Drop	11	InnoDB	utf8mb4_general_ci	16.0 KIB	-
cno	Browse Structure Search Insert Empty Drop	3	InnoDB	latin1_swedish_ci	16.0 KIB	-
content_users	Browse Structure Search Insert Empty Drop	6,508	InnoDB	utf8_unicode_ci	1.5 MIB	-
country	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KIB	-
demand_note	Browse Structure Search Insert Empty Drop	11	InnoDB	utf8mb4_general_ci	16.0 KIB	-
district	Browse Structure Search Insert Empty Drop	112	InnoDB	utf8mb4_general_ci	16.0 KIB	-
division	Browse Structure Search Insert Empty Drop	5	InnoDB	utf8mb4_unicode_ci	16.0 KIB	-
license_officer	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KIB	-
my_log	Browse Structure Search Insert Empty Drop	415	InnoDB	latin1_swedish_ci	64.0 KIB	-
payment	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KIB	-
region	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_unicode_ci	16.0 KIB	-
subscription	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_unicode_ci	32.0 KIB	-
tariff_category	Browse Structure Search Insert Empty Drop	10	InnoDB	utf8mb4_general_ci	16.0 KIB	-
tariff_rating	Browse Structure Search Insert Empty Drop	116	InnoDB	utf8mb4_general_ci	16.0 KIB	-
terrif	Browse Structure Search Insert Empty Drop	30	InnoDB	utf8_unicode_ci	16.0 KIB	-
users	Browse Structure Search Insert Empty Drop	1	InnoDB	latin1_swedish_ci	16.0 KIB	-
works	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KIB	-
19 tables	Sum	7,282	InnoDB	utf8mb4_general_ci	1.9 MIB	0 B

Figure 6. Database Tables

3.6 Validation Techniques

User testing and heuristic evaluation were employed as validation techniques. User testing involved users testing the system's prototype and providing feedback on their experience, while heuristic evaluation involved a team of experts reviewing the prototype for usability issues. The project concentrated on how users navigate through the system while performing their daily tasks. This was then used to assess the system's efficiency in terms of meeting user requirements. We also tested whether users could easily find the information they needed on the web or mobile app.

4. DATA ANALYSIS AND PRESENTATION

The purpose of this study was to develop a copyright content user model for CMOs. A total of 11 prototype testers including 2 CEOs from different CMOs and the remaining 9 were licensing officers who were randomly assigned to access and test the developed prototype of the model. The testers were followed for 3 days after training them on how to navigate through the system, and after google doc questionnaires link was shared to get feedback about the designed model. The results showed that the newly developed copyright user licensing model was significantly more effective than any existing Copyright user licensing model in managing the licensing processes of content users by CMOs.

4.1 Data Analysis

In the copyright user licensing model, the results parameters from the tested developed prototype comprised interface user friendliness, ease of navigation within the design, consistency of the system in Tariff interpretation, system ease of use, time taken to perform tasks, and quick information access as shown in Figure 4.11

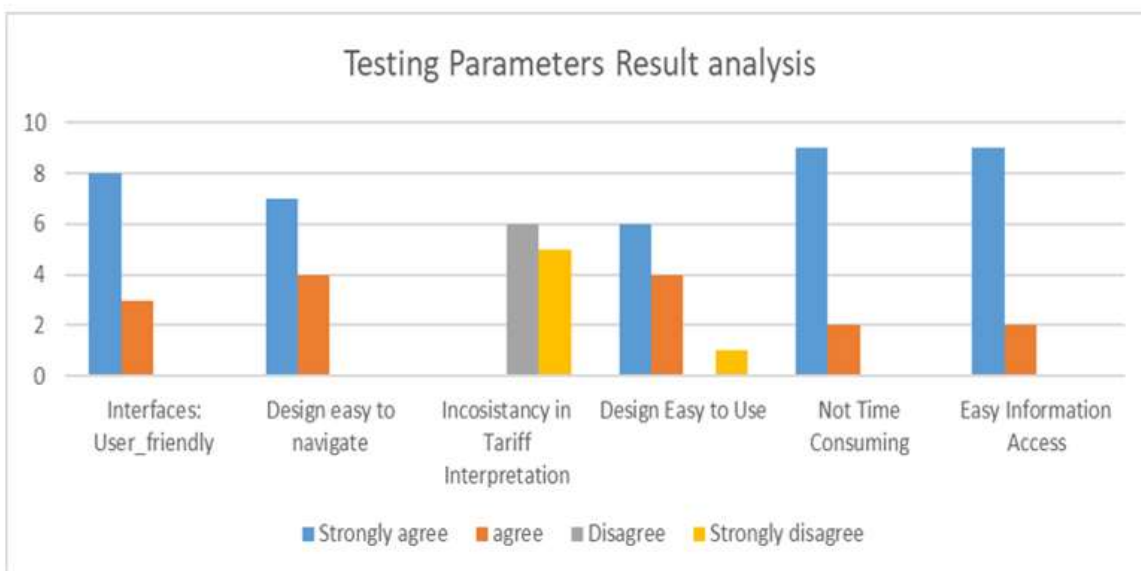


Figure 7. Testing Parameter Results Analysis

According to Figure 4.11, the highest number of system testers were satisfied with the design, most especially with the user interfaces, how easy to navigate while using the system, the system being not time-consuming as well as the ease in accessing required information during the licensing process as all respondents agreed and strongly agreed. In addition, all respondents denied the system being inconsistent in interpreting the CMO tariffs as they all indicated strongly disagree and disagree. The highest number of respondents strongly agreed that the system is easy to use, followed by those who indicated agree and finally one respondent who strongly disagreed the system being easy to use.

4.2 Discussion of Results

The model was created in the form of a web and mobile application that people may engage with. CMOs in Uganda, like our case study, were mostly utilized for physical prototype testing with the researcher, who was also capable of performing usability assessment. The online system was hosted as a subdomain of the lysmultd.com domain (culs.lysmu.com), and the resulting android APK was directly shared with the sampled testers, primarily CMO licensing agents, for installation on their android mobile devices. This allowed the created model to be evaluated against several copyright user groups, and the model performance results were obtained and presented in a graphical way for simpler interpretation and analysis.

The model's performance was measured in terms of system user utilization, tariff interpretation, and charge allocation time, which are all essential parameters for this model. The model was evaluated for three days with CMO stakeholders, and a google doc questionnaire link was distributed to all persons chosen to test the system. As presented in the user feedback shown in Figure 4.11, the main focus of discussion was on the following: -

System efficiency, the model was designed to manage all aspects of copyright user licensing, including copyright user data management, usage assessment management, tariff interpretation, copyright user location, payment management, and license certificate allocation. The user friendliness and ease of system navigation, as well as uniformity in interpreting the CMO tariff, were essential components that represented the system's efficiency, since all testers agreed on the corresponding components. The CMO stakeholders identified the system as meeting all of the requirements for the copyright user licensing procedure and deemed the model to be efficient.

Tariff Interpretation Speed and Fees Allocation Time

The model's primary task is to interpret the CMO tariff based on the user categories; the system easily and consistently interprets the tariff and allocates an annual fee at the fastest possible speed because it only requires the user to click a button after selecting the user to assess and the measurement. Because tariff interpretation and fee allocation are among the most difficult processes confronting licensing officers during fee allocation to copyright users, the task that takes more than 40 minutes by more than two licensing officers (UPRS, 2021) can be completed in one minute or less by the developed prototype operated by a single licensing officer. This prompted the testers to state unequivocally that the system is consistent and has perfect processing speed.

Data Access

To complete the licensing procedure, many data is required. The key data required includes copyright user data, CMO tariff data, tariff rating data, user payment data, and many others. The majority of this data is kept both locally on the device and externally in the form of an external database. The model makes data available for system users to quickly select in order to complete the licensing procedure. The data is made available based on the user role, as various users have varying levels of access to certain data in the system.

System and Data security, before the testers began interacting with the system, the CMO administrator was registered by the SuperAdmin, who licenses or adds the CMO to the system, and the CMO administrator adds the CMO staffs, primarily the licensing officers, accountants, and licensing managers. After registering, users can log into the system using their usernames and passwords; a verification code is given to the user's phone, which must be provided to gain access to the system; and all of these users can access different information based on their user role or user type. The two-factor authentication and access user role offer the model with high-level data and system protection.

Benchmark of the Results

The enhanced licensed management model allows both online and offline purchases of musical works licenses, so the model only caters to online musical works, leaving other copyright works like movies and books unattended to, so it is only applicable to audio visual CMOs to a limited extent. It provides automatic licensing to online musical works. The strategy becomes onerous for individuals who want many musical works because each work is licensed independently of the others, requiring the user to purchase multiple licenses to use multiple forms of works from separate content owners.

Furthermore, CMOs are not considered as actors in the music licensing process, yet they do provide a good new revenue source for creators who are members of a CMO. CMOs can grant content users a wide license that enables them to utilize all copyrighted works, including musical works, because their main legal objective is the collection and distribution of allegiance to their members. For the entire year, a broad license is given to utilize any kind of music in your commercial endeavours.

The copyright user licensing model is adaptable to many types of CMOs, and each CMO can manage their content users, tariffs, licensing processes, employees, and performance. The model includes an API for interpreting any tariff with their accompanying tariff rates for a given CMO uploaded to the database. This allows for rapid copyright user evaluation and licensing. Furthermore, all data such as content user data and tariff data are saved both locally and in an external database and synchronized to provide licensing authorities easier access to data.

5. SUMMARY AND CONCLUSIONS

5.1 Summary

The new copyright user licensing system is an enhanced automated software that is built to eradicate the major problem inherent in the current system. The development of this system arose because of the low rates of loyalty collection on the alarming growing number of copyright content user distributed all over the country which has led to (no) low financial benefits to copyright content creators. A study investigated the cause of these problems and conclusion was drawn that the caused by low rate of copyright user assessments and licensing done by CMO and the manual methods used in the copyright user licensing. Therefore, the new system targets to curb this situation by building features in the software that could not only produce a better system but mandate CMOs to centrally manage copyright content users and all licensing processes.

In addition, the study into the licensing system exposed the laborious nature of the system; it is time consuming and less effective and non transparent as most of the key licensing process element like tariff interpretation is manually done by licensing agents. The new system is developed with the capability to automatically interpret any CMO tariff depending on the licensing agents' selection, generation of demand notes as well as licensing Certificates.

Having come to completion of this project work a lot of achievement was made and they include;

- The replacement of error prone manual system with new automated copyright user licensing system;
- Data can now be processed with great speed and efficiency;
- The system has the ability to interpret the CMO tariff, geo-locate content users as well as licensing agents and generation of license certificates;
- The security of data is ensured;
- The use of database server was implemented.

5.2 Conclusion

The main goal of this study was to develop a copyright user licensing model to improve CMO copyright user licensing procedures such as content user evaluation, geolocation, loyalty collecting, licensing, license certificate user access, and content user data protection and storage.

To achieve this, the current processes used in the licensing of copyright users where studied. This was accomplished by conducting in-person interviews with CEOs and licensing agents from various CMOs, as well as examining CMO annual reports. Furthermore, the researcher travelled with licensing agents in the field to conduct user evaluation and licensing, gaining exposure to all of the procedures involved in the copyright user licensing ecosystem. As a result, all system functional and user needs of a copyright user licensing system were identified, and it was determined that all processes in the copyright user licensing ecosystem are carried out manually.

In addition, a copyright user licensing model was developed using PHP, JavaScript, HTML and Flutter to improve CMO copyright user licensing procedures such as content user evaluation, location, fee collecting, licensing, license certificate user access, and content user data protection and storage.

The model was designed following an enhanced license management model and the identified system user requirements, the system was designed in the form of a web and mobile application to automate the manual copyright user licensing process. CMOs and involved members tested the prototypes with the researcher and usability assessment was performed. Culs.lysmu.com, a subdomain of the lysmu.com domain, hosted the system's online version, and the resulting android APK was distributed directly to the sampled testers, the majority of whom were CMO licensing agents, to be installed on their android mobile devices.

This enabled the performance of the developed model to be evaluated using data from a variety of copyright user groups. System user use, tariff interpretation, and charge allocation time were all used to evaluate the model's performance. Each person chosen to test the system was given a link to a Google doc questionnaire, and the model was tested with CMO stakeholders over the course of three days.

It was observed that the model is more efficient and speedier in handling all aspects of copyright user licensing, from user assessment to license certificate generation. The system is 20 times faster than the manual technique in terms of tariff interpretation and charge allocation, as well as locating content users using GPS and retrieving critical information during content user assessment. This means that a vast assessment scope can be covered in the shortest amount of time feasible, enhancing user licensing coverage and raising the rate of royalty collection for CMOs, which can be distributed to their members as well as the government via VAT.

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