DEVELOPMENT OF WEB-BASED AUTOMATED JOURNAL MANAGEMENT SYSTEM FOR AKWA IBOM STATE UNIVERSITY

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Abstract— In this paper, the development of a web-based automated journal management system for Akwa Ibom State University is presented. The system is aimed at solving many of the challenges faced by the current manual and semi-automated system of journal management and publication processes Akwa Ibom State University. It provides numerous benefits which include: automation of the Submission process, review process, payment process and publication process all with auto-responders mail/SMS. The system was develop using PHP, CSS, Java Script, HTML, MYSQL, AJAX and was hosted locally using WAMP servers. The software development methodology adopted is a Participatory Incremental Process (PIP) Model. In order to ensure system usability, sociability, and flexibility to changes that may occur at the later stage of its development, a participatory Requirement Engineering process (PREP) Model was adopted for the system developments evaluation and support. The result shows that researchers, students, authors can access all the published articles from any location in the world since the system is a web-based system. The system, if adopted, will increase efficient service delivery and also provide added advantage to journal management.

> *Keyword: Journal Management System; Participatory Incremental Process Model; Functional Decomposition; User Access Privilege; Participatory Requirement Engineering Process Model.*

I. INTRODUCTION

Nowadays, advancements in information and communication technology ICT) are crucial in education related processes to promote solidarity among students', researchers, authors and journal managers [1,2,3,4,5,6,7,8]. Journal and conferences constitute the primary channel of academic research publication in today's academic world [9.10,11]. In the last century, most journal publications have been paper-based publications. The process of the paper-based publication is tedious, costly and time-consuming, not to mention the environmental waste management problem as it consist of mailing out the calls for paper to authors, receiving their submissions, submitting them for review, receiving reviews and after the decisions are made, publishing the copies and distributing them. However, with the advancements in ICT and the advent of the world-wide web, it has been found that most journal publishing outfits enjoy the benefits of information technology in their publishing works [12,13, 14]. Specifically, in this paper, the publication process can be differentiated by the way they digitize the processes, such as, call-for-paper, submission, reviewing and publication. Some publishing outfits use the web to a lesser degree in that they merely advertise their calls for papers online but process the submission, reviewing and publication offline. Other systems digitize more of the afore-mentioned processes. In such wise, only those journals that perform all their processes online can be designated as e-journals. Currently, many journal publishing firms are in the process of transition from completely offline processes to completely online processes. Certain journal, notably those published by Springer, Taylor & Francis, ACM's Digital Library, IEEE's Xplore etc. offer both print and electronic versions of their journals.

In this paper, the design of Akwa Ibom State University Automated Journal Management system (AKSUJMS) is presented. A detailed functional decomposition of the system is presented along with the flowcharts and process flow diagrams. Furthermore, the participatory requirement engineering process model used in the system development is presented.

II. FUNCTIONAL DECOMPOSITION OF THE SYSTEM

Participatory incremental or evolutionry softeware develop-ment mehod is used [15, 16,17,18,19]. In the design phase, the stepwise top-down functional decomposition method [15,16,17] is used as presented in Figure 1. The major modules of the system are Super Admin module, Users (Reviewers, Editors, other authors) modules, Manage Journals/articles module are presented in Figure 1 while sub-modules are presented and explained in details in subsequent sections.
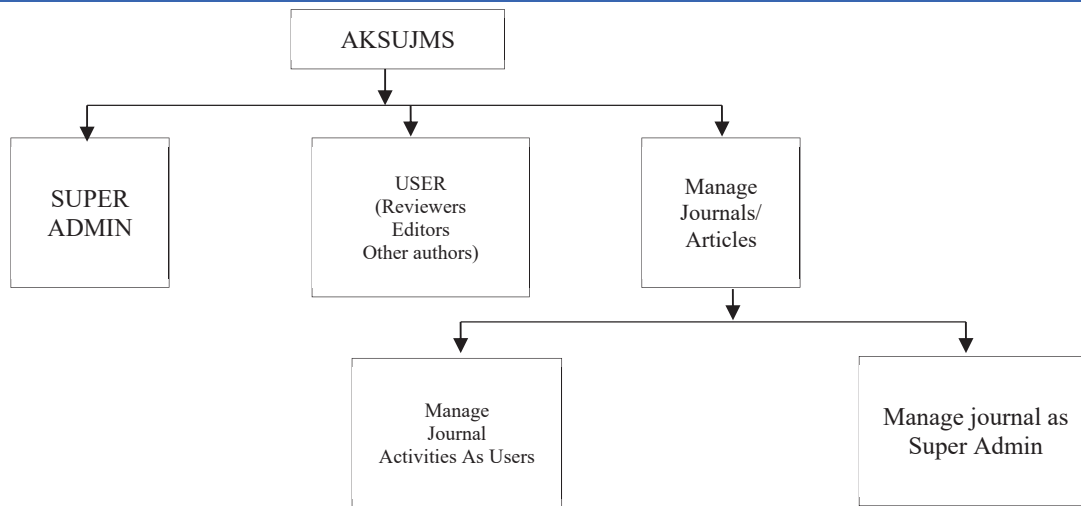
Figure 1. Functional decomposition diagram of the proposed AKSUJMS

A. THE SUPER ADMIN HOME

The Super Admin sub-system presented in Figure 2 provides basic web content tuning tools. Also, the personal data of all the users in the AKSUJMS can be viewed and edited. Additional database entries can be modified.
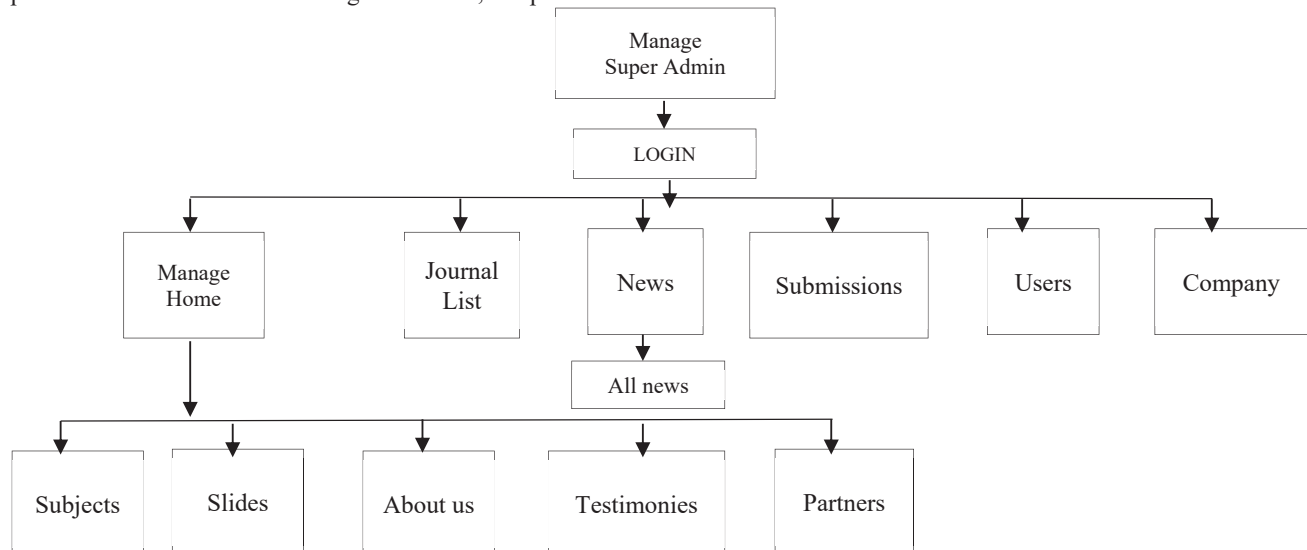

Figure 2 Super Admin sub system

The super admin can manage journal subject by adding, deleting or updating subject (department or discipline) of journals. Other key submenus which are managed from the Super Admin Home sub-module are:

- **Slides -** these are moving images in the home page of the AKUSJMS, super admin can add and remove slide show image.
- **About us**-Super admin can update the "About us" information of the AKSUJMS
- **Testimonial**- super admin can add testimonial, view list and update existing testimonials
- News– Super admin can view, update, delete and add news information to the AKSUJMS.

B. SUPER ADMIN JOURNAL

The key submenus which are managed from the Super Admin Journal sub-module in Figure 3 are:

- **Journal List-** Super Admin can view list, delete or update existing journal they can also add journal categories based on subjects.
- **Volume and Issues-**super admin can view list of issues and volume of journal and add volume and issues based on journal categories
- **Editorial board-** editor is someone with the responsibility of making corrections to a manuscript. Super admin can add editors, view list of editors and can delete editors. But an editor must apply to be an editor.
- **Reviewer-** A reviewer is someone with the responsibility of screening a manuscript after editing by the editor. Super admin can view and delete reviewer.
- **Journal guidelines -** super admin can publish and update guidelines for journal publication at the journal guideline dash board

- **Article processing fee-** super admin can view, update or add article processing fee. An article processing fee is the price fixed for publishing an article relative to journal
- **Copyright, FAQ and Publication Ethics -**super admin can add and update publication ethics

statement, copyright information and frequently asked questions FAQ. The super admin journal sub-system is presented in Figure 3.
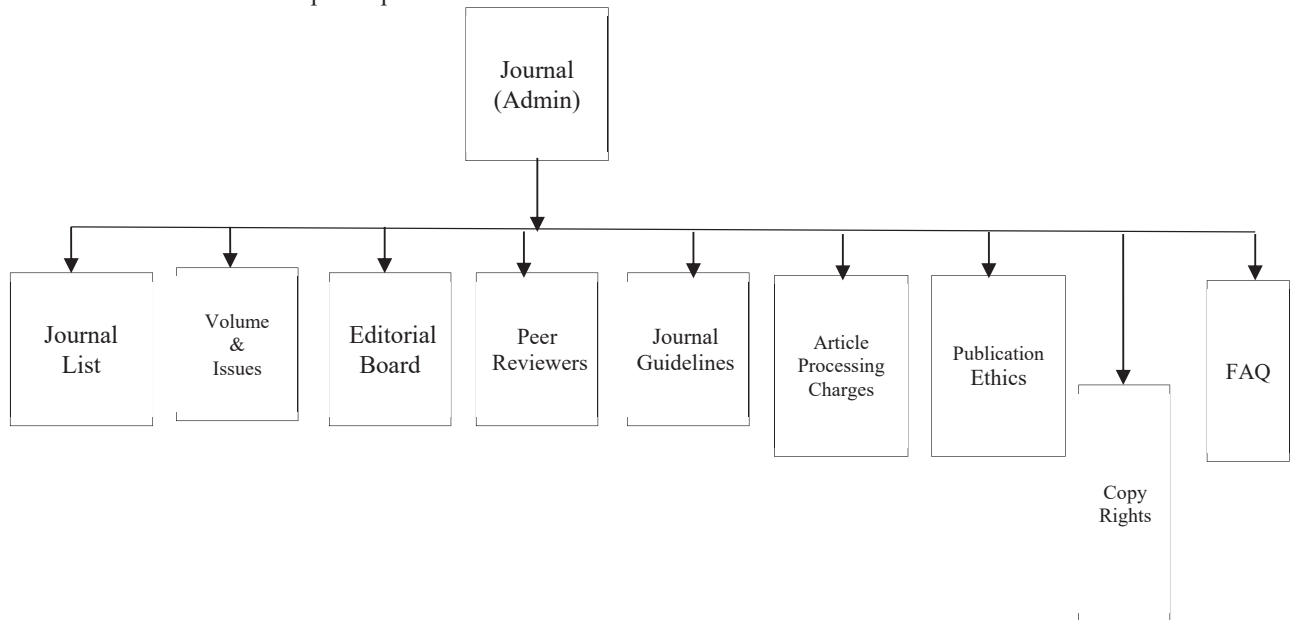

Figure 3 Super Admin Journal sub-system

1) C.   SUPER ADMIN SUBMISSIONS AND USERS:

The key submenus which are managed from the Super Admin Submissions sub-module in Figure 4 and Figure 5 are:

- **Assign articles-**Super admin can assign submitted articles to editor(s), Reviewer(s), and can send them mails. But with the auto responders integrated in the system, once an article is submitted in the system, an auto responder in sms and email are sent to the super admin and author.
- **Verify Payment-** Once payment is done by the author, super admin can verify the payment using the following information: name of author, article id, amount paid, amount expected, payment receipt, payment method, payment status and action.
- **Accept/Reject article-** Super admin can accept/reject articles submitted by a user. Article is rejected if it does not meet Aksu publishing standards and ethics.
- **Publish Article-** Once an article is accepted, the super admin after confirmation of payment and ensuring the article is okay for presentation, that article is then published by clicking on confirm article in the accept/reject article dashboard.
- **Applications-** Super admin can view, review, accept, reject and/or comment on application information.
- **Users-**Super admin can view & query users information.

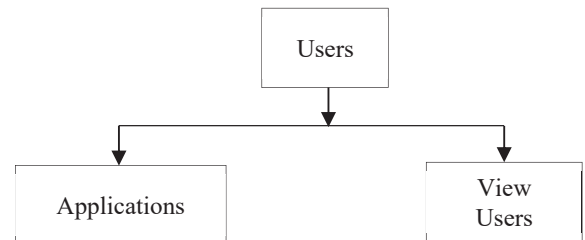The submission and user sub-systems are presented in Figure 4 and Figure 5 respectively.

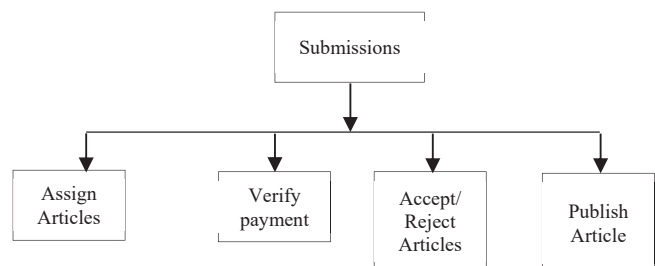Figure 4 Submission Sub systems

Figure 5 User sub system

D. THE MANAGE USERS

The Manage User sub-system module is presented in Figure 6, the major sub-modules of the manage users are General information, Reviewers/Editor, Journal Activities, Manages Profile, visit Home Page, and Log out. The General information is further broken down into my activities. Further sub-decomposition are as presented in the Figure 6. My Activities is further broken down into:

- **Submit manuscript:** Here, details of the manuscripts uploaded or accepted is carefully documented.
- **Join Editors:** This platform gives room for qualified professionals to join/apply as an editor or to the editorial board. The benefits of being an editor are highlighted in the page.

- **Join reviewers:** Manuscript reviewers are vital to the publication process, so it gives room for qualified professionals to join/apply as a reviewer and gain valuable experience in scientific publishing.
- **Submit special issues**: Details of special issues uploaded or accepted are also in the special issues dashboard.
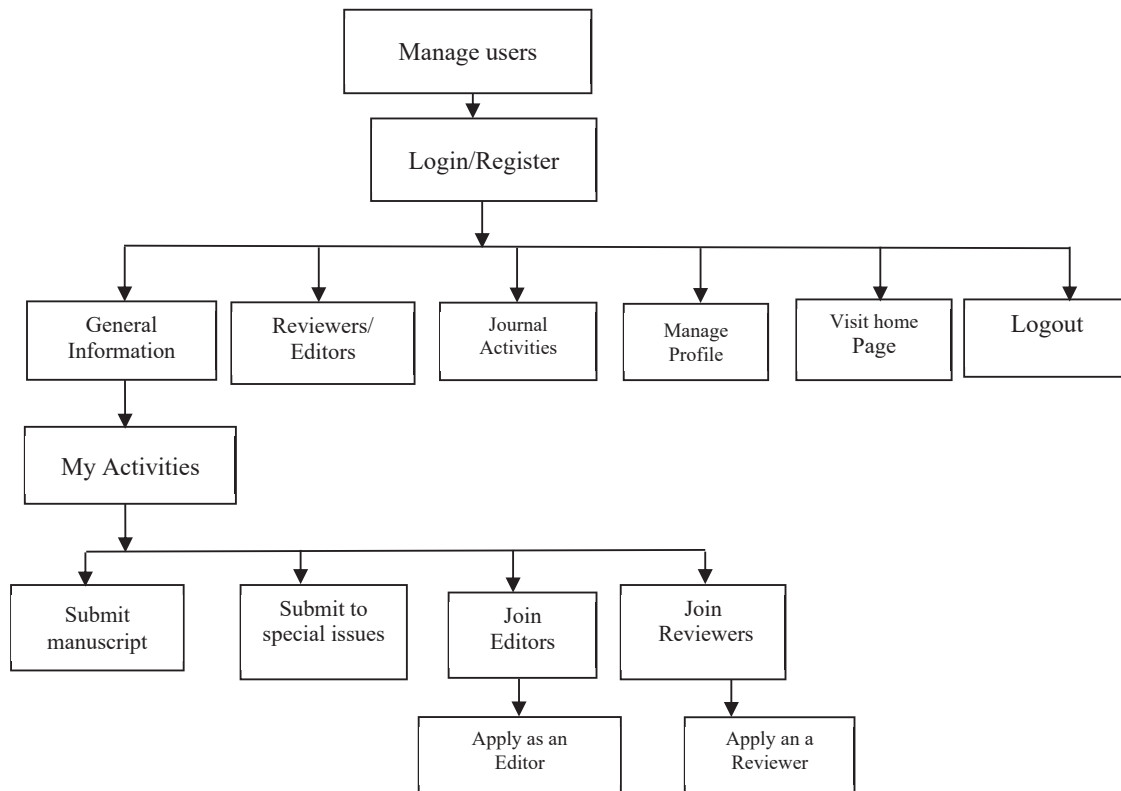
Figure 6 The Manage User sub system

E.   USER JOURNAL ACTIVITIES

The journal activities as managed by user are presented in Figure 7. The key submenus which are under the **User Journal Activities** sub-module are:
- **My Manuscript:** It gives a comprehensive details about the manuscript which includes the manuscript title, journal title, the manuscript number(Research article number), status(new submission or old), date and operation.

- **Pay for my Manuscript:** All manuscripts accepted are shown here, it displays payment status for manuscript, and grant payment operation.
- **Application result:** it displays the result/information for the application for editorial board member/ reviewer.
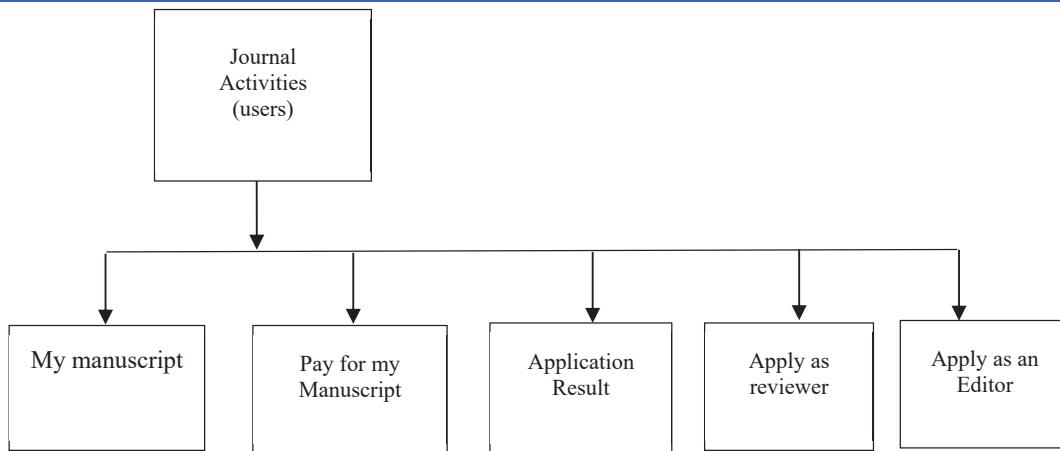
Figure 7 Journal activities sub system

2) F. MANAGE PROFILE

Manage profile sub-system is presented in Figure 8. The key submenus which are under the Manage Profile sub-module are:

- **Personal information:** Users can update their personal information according to the requirement
- **Profile Picture**: User can change or re-upload their profile picture
- **Work Experience:** The user can upload their work experiences in their dashboards
- **Project:** Project details of users are presented
- **Honour and awards:** The achievement and awards received by users can also be recorded
- **Change password:** Users can change/update their profile password to secure their profile.
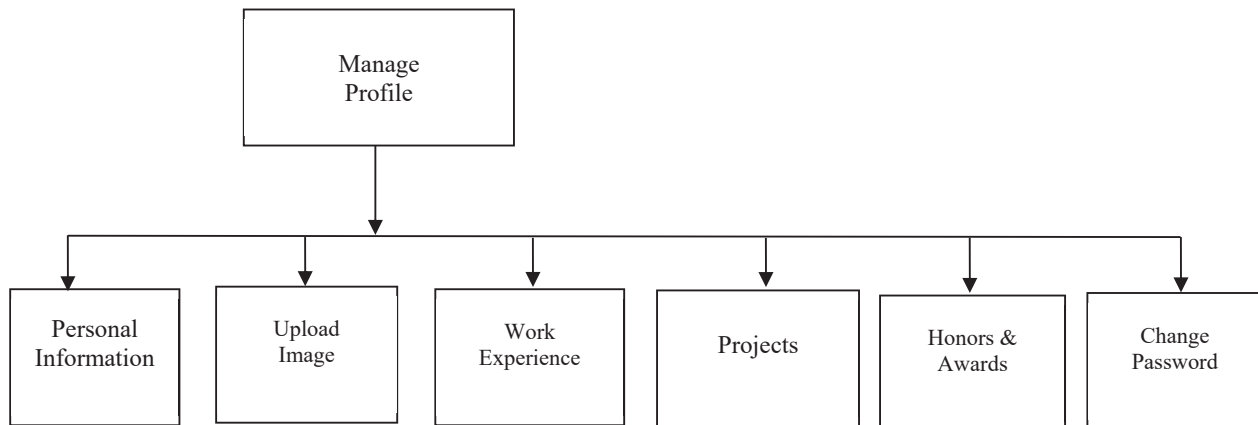
Figure 8 Manage Profile sub system

3) G. EDITOR AND REVIEWER SUB-SYSTEM

The editors and reviewers can view assigned manuscript and attended manuscripts as depicted in Figure 9 and Figure 10 respectively.
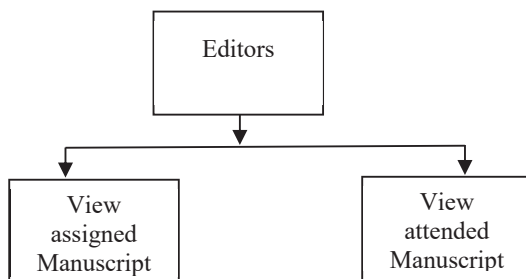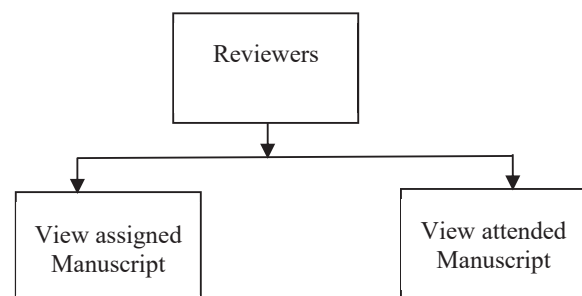

Figure 9 Editor sub system

Figure 10 Reviewers sub system

III.   REQUIREMENT ENGINEERING

Participatory requirement engineering process was used [16, 20,21]. The requirement engineering process model for AKSUJMS is shown in Figure 11. It includes:

requirement elicitation, requirement analysis, requirement specification, requirement validation, requirement negotiation, requirement documentation, requirement maintenance. Requirement Elicitation techniques/methods used in AKSUJMS is a traditional technique. The activities include:

1. **Interviews:** Head of departments, lecturers, technologist as well as other non-academic authors who are potential users of the proposed system were interviewed. Interviews are effective for understanding the problems in existing system and to find the general requirements of the stakeholders.

2. **Ethnography:** This is also known as observation. The researcher observed the current work flow on the duties of the staff (authors, reviewers, super admin and editors) and requirements were collected in the process.

3. **Documents Inspection and Evaluation** : as part of the investigation process, some documents were closely examined Through the inspection, some deductions and interference, which are of immense benefit to this research, were drawn
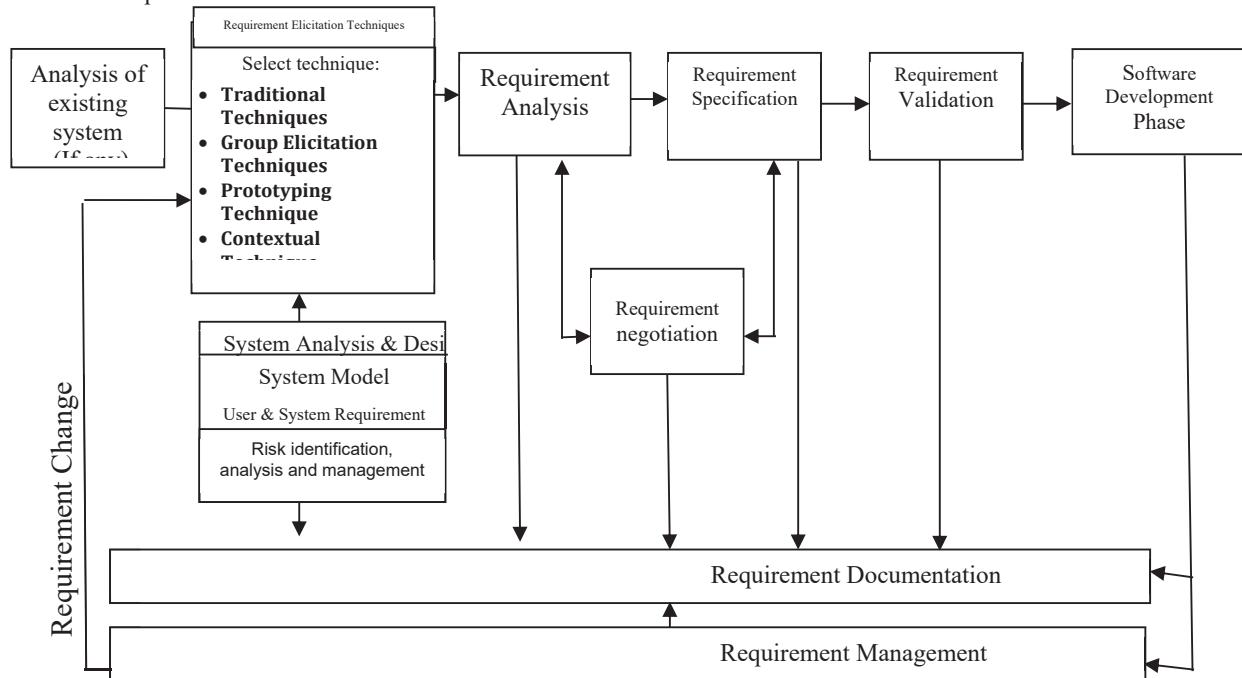

Figure 11 : Participatory Requirement Engineering Process (PREP) Model

The requirement gathered at the elicitation stage was analysed and triangulated to ensure that the requirement specification is free of inconsistency, ambiguity, redundancy etc. Every conflict with AKSUJMS was reconciled through the process of negotiation. Authors and management were asked to rank requirement and then discuss conflict in priority. Risk associated with each requirement was identified and analysed. The requirement specification is the final blueprint for the system realization. It consists of functional and the Non-functional requirement of the system.

During the validation stage, the work product was assessed for quality. Specifications were examined to ensure all the system requirements have been stated unambiguously. Inconsistencies, omissions and errors were detected and corrected. In AKSUJMS a formal technical review team was used to carry out the validation. They examined the system specifications looking for errors in content or interpretation, areas where clarification was required, missing information, inconsistencies, conflicting requirements or unrealistic requirements.

During the requirement management phase, a set of activities to identify, control and track requirements and changes to the requirements at any time as the project proceeds was performed. Each requirement was assigned a unique identifier. The requirement was then placed into one or more traceability tables and these tables are stored in a database that relate features, sources, dependencies, subsystems and interfaces to the system requirements.

B. IV. *FLOW CHARTS OF DIFFERENT MODULE AND SUB-MODULES OF THE SYSTEM*

The flowchart Figure 12, 13, 14, 15, 16, 17, 18 and 19 describe the action of different users on the system. Each of the user must first register in the system in order to obtain login information that will enable him/her gain access to the system functionalities. The key module of the system includes registration/login, general information, reviewers, editors, journal activities, manage profile, Home page, logout. A system user can access these modules and perform specific task with them based on his/her privileges.

A. AKSUJMS REGISTRATION AND LOGIN MODULE

In the beginning, the user creates a new account to benefit from the services provided by the portal. The registration process is done by filling a form of personal information shown in the login page of the user. If the user has an account already, he logs in with his/her username and password; a specified session and cookies are created for that user. Cookies are fragments of information used for saving the user's activities in the web application and transacted between the server and the client. Figure 12 shows the flowchart for the registration and login process. The session and cookies are saved for the current user and the registration information is saved to the database. For security reasons a reCAPTCHA is used during the registration process. This is integrated by the system developer to ensure that only authorized persons can register in the portal and not robots.
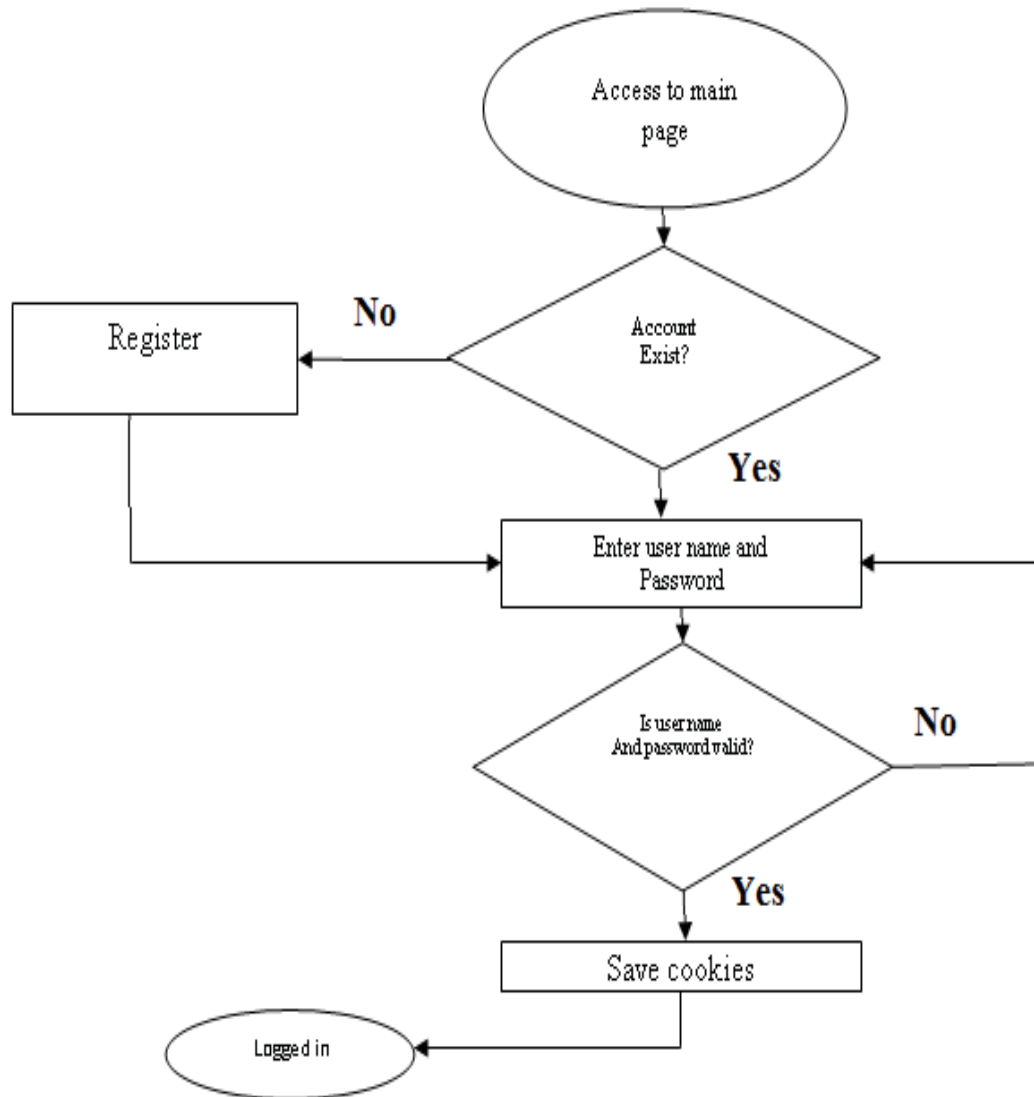

Figure 12 Flowchart showing registration and logging into the portal

B. REVIEWERS/EDITORS

The user logs into the portal as a user when he or she needs to benefits from the services provided by the portal. If the user intends to join as a reviewer or Editor, the user will apply as a reviewer and if the application is approved the user can access reviewer's privileges and gain valuable experience in scientific publishing. Flowchart of reviewers or Editors registration is presented in Figure 13
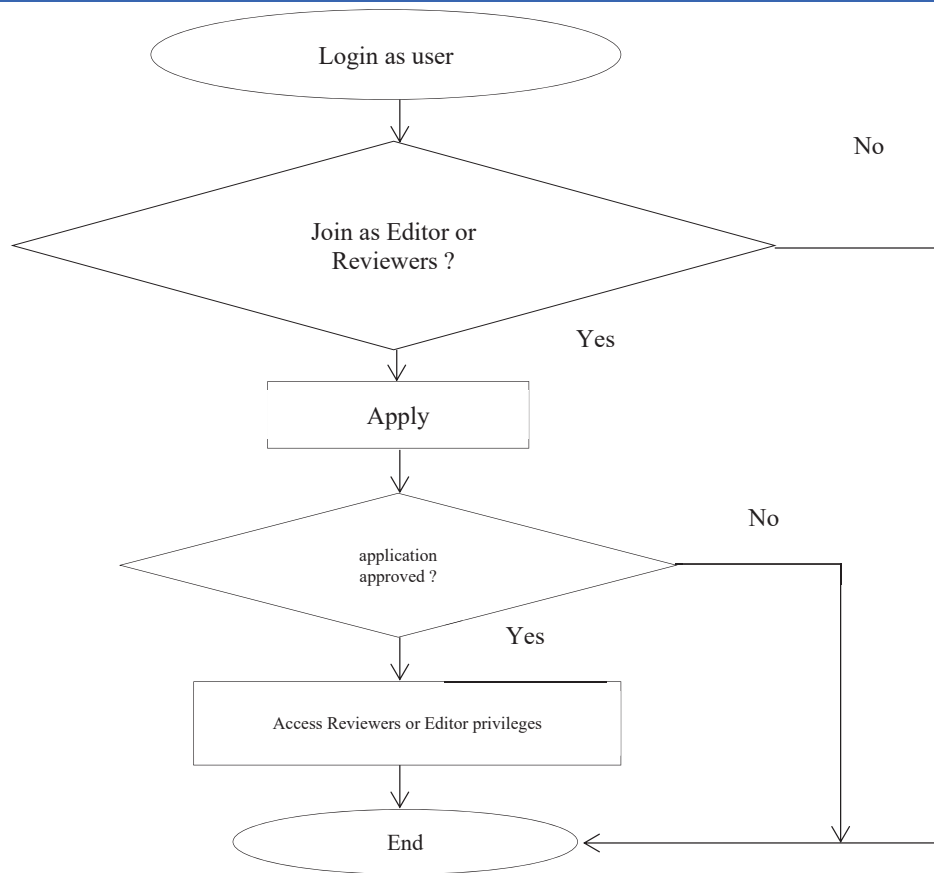
```
                    ┌─────────────────┐
                   (  Login as user   )
                    └────────┬────────┘
                             │                              No
                             ▼
                        ◇ Join as Editor or ◇ ──────────────┐
                          Reviewers ?                        │
                             │ Yes                           │
                             ▼                               │
                        ┌─────────┐                          │
                        │  Apply  │                          │
                        └────┬────┘                          │
                             ▼                   No          │
                        ◇ application ◇ ─────────┐           │
                          approved ?             │           │
                             │ Yes               │           │
                             ▼                   │           │
                 ┌──────────────────────────┐    │           │
                 │ Access Reviewers or       │   │           │
                 │ Editor privileges         │   │           │
                 └────────────┬─────────────┘    │           │
                             ▼                    │           │
                        (   End   ) ◄─────────────┴───────────┘
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Figure 13 Flowchart of reviewers or Editors registration

1) C. AUTO RESPONDER MAIL/SMS

The proposed system will handle some of the problems of semi-automated systems. One of the problems inherent in the current system is time wastage in tracking of processes/activities.

This problem will be eliminated in the proposed system using auto-responders in mail/SMS presented in Figure 14. All functions are fully automated. The query article status uses internal search engine function to query article status using the article subject, sender's name, or date of submission. As presented in Figure 14.   The system receives a request, If it's to submit manuscript by author, it will send automated mail/SMS to super admin and author, if an article is assign to a reviewer/editor, an autoresponder mail/SMS will be sent to the editor and notify author, also if article is re-assigned to reviewer/editor, the auto responder will be triggered, if the article is rejected or accepted, the system will notify the author, if there are messages for all members, a mass mail will be sent to members. Users can also contact support and send mails to super admin.

Figure 14 Flowchart for Auto Responder Mail/SMS

D. ACCESS SUPER ADMIN*:*

The super admin plays a very important role in the effective and proper functionality of the AKSUJMS hence certain levels of protection and accessibility is employed against popular hacki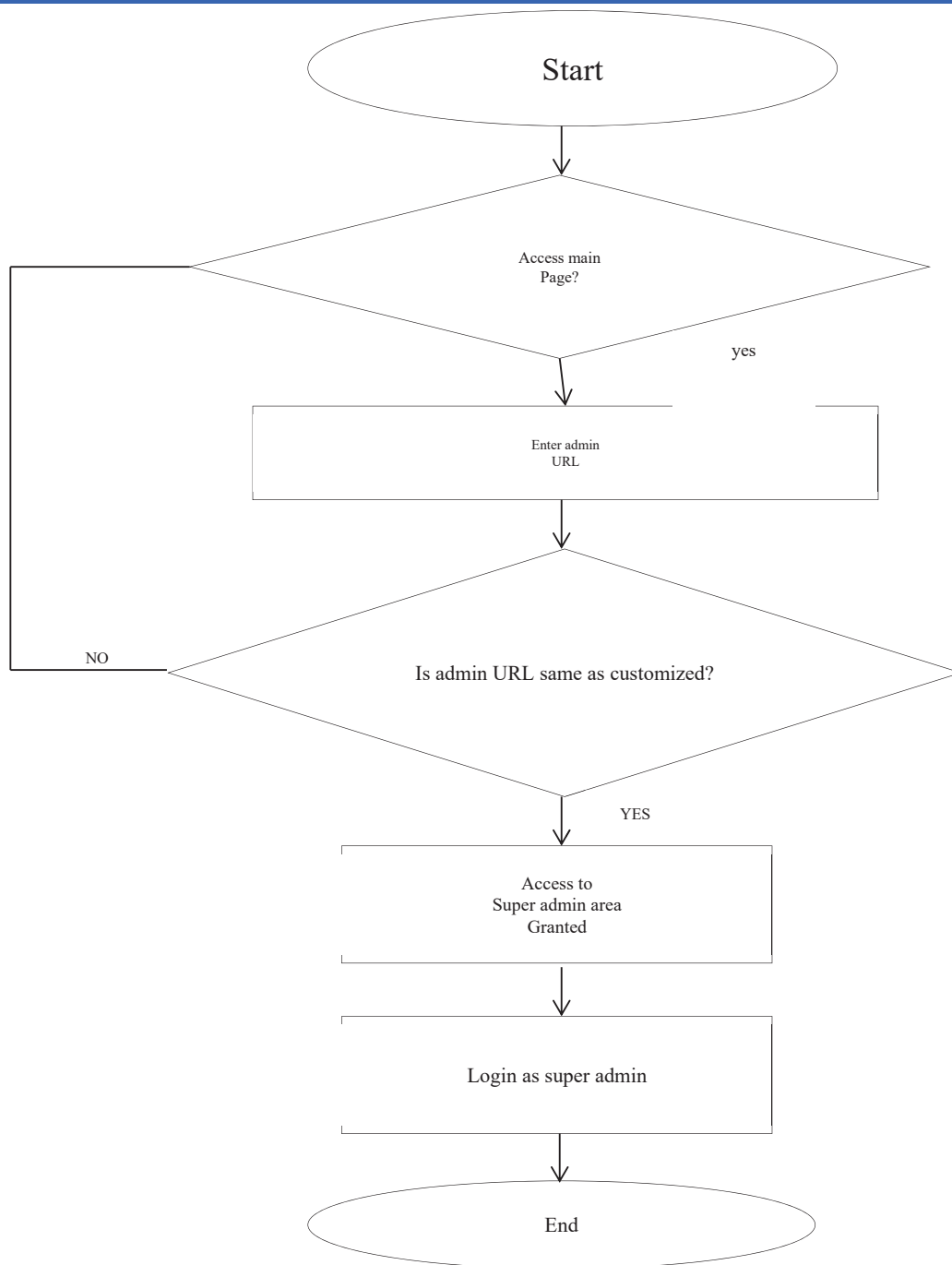ng attacks such as SQL injections, brute force, remote URL/file inclusions, remote code executions and XSS Based attacks. The flowchart of Figure 15 explains the security process.

Start

Access main
Page?

yes

Enter admin
URL

Is admin URL same as customized?

NO

YES

Access to
Super admin area
Granted

Login as super admin

End

Figure 15 Flowchart showing access to super admin area

E. ARTICLE SUBMISSION AND PROCESSING

The process of article submission and processing is presented in the flowchart of Figure 16.
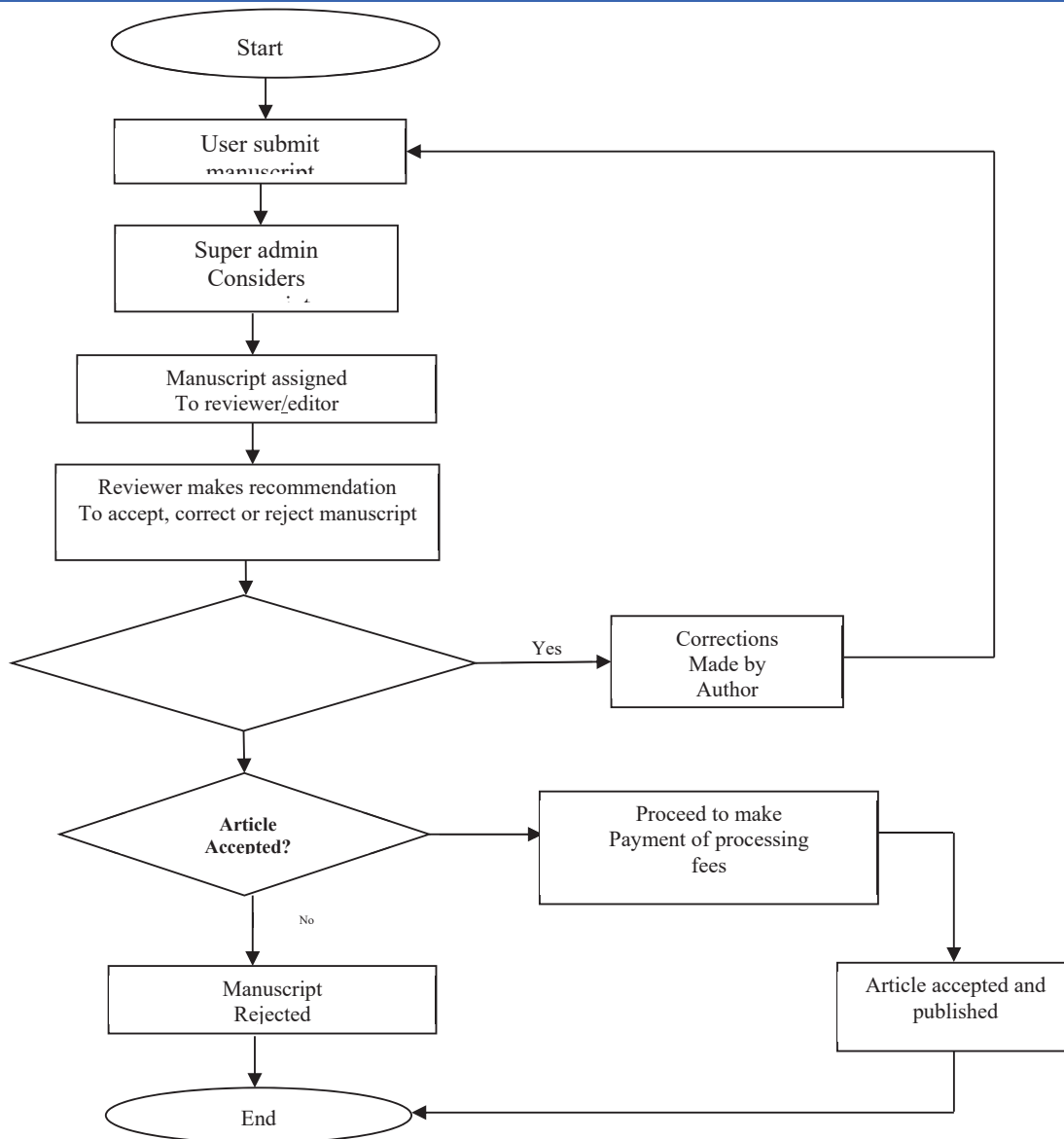
Figure 16 Flow chart for article submission and processing

When the user submit the manuscript, the super admin then considers the manuscript, assigns it to the reviewer/editor for review, if need for correction arises, the author makes correction and re-submits it to AKSUJMS, but if there are no corrections to be made and the article is accepted, the author can proceed to pay the processing fees, and article is published by the superadmin.

F.   *REAL TIME TRACKING OF MANUSCRIPT*

The author can query and track the submission through the editorial process (awaiting review, in-review, accepted as it is, not accepted, major revisions required etc.) as well as participate in the proofreading of submissions accepted for publication by logging into their various accounts. The flowchart of Figure 17 explains real time tracking of manuscript
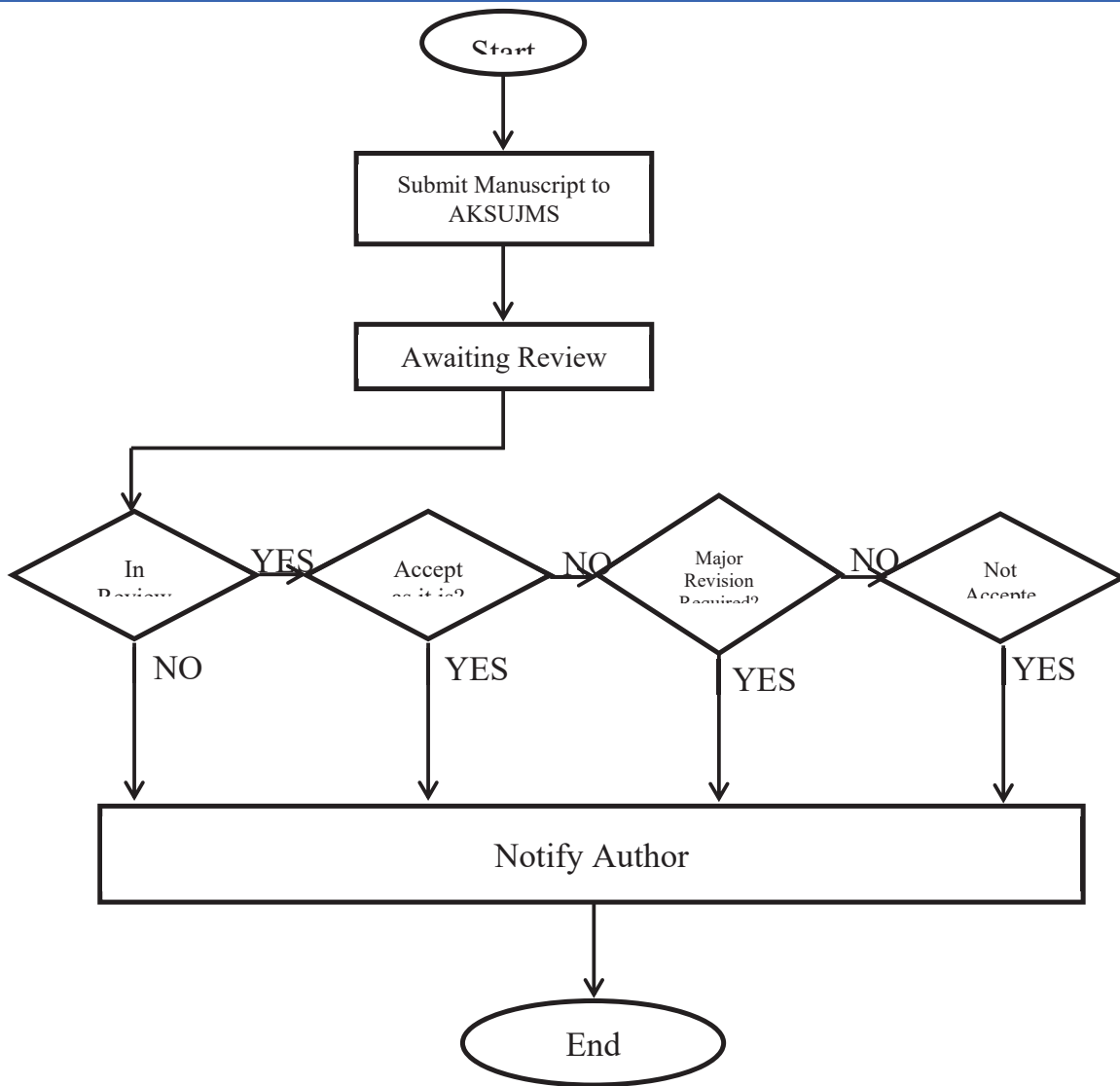
Figure 17 Flow Chart for Real time tracking of manuscript

2) V. PROCESS FLOW

In this section, the process flow [22] of AKSUJMS is presented using Use Case diagrams, actor's description, Use Case description and sequence diagrams.

3) A. USE CASE DIAGRAM

Use Case of the system are identified to be "registration", "manage journal", "manage users ",

"manage applications", "manage submissions",. "Manage home", "submit manuscript/special issues", "join reviewer/ editor ", "manage profile"," pay for manuscript", " view assigned manuscript", "view attended manuscript ", " review manuscript", "edit manuscript". The diagram depicted in Figure 18 shows the Use Case diagram of system.
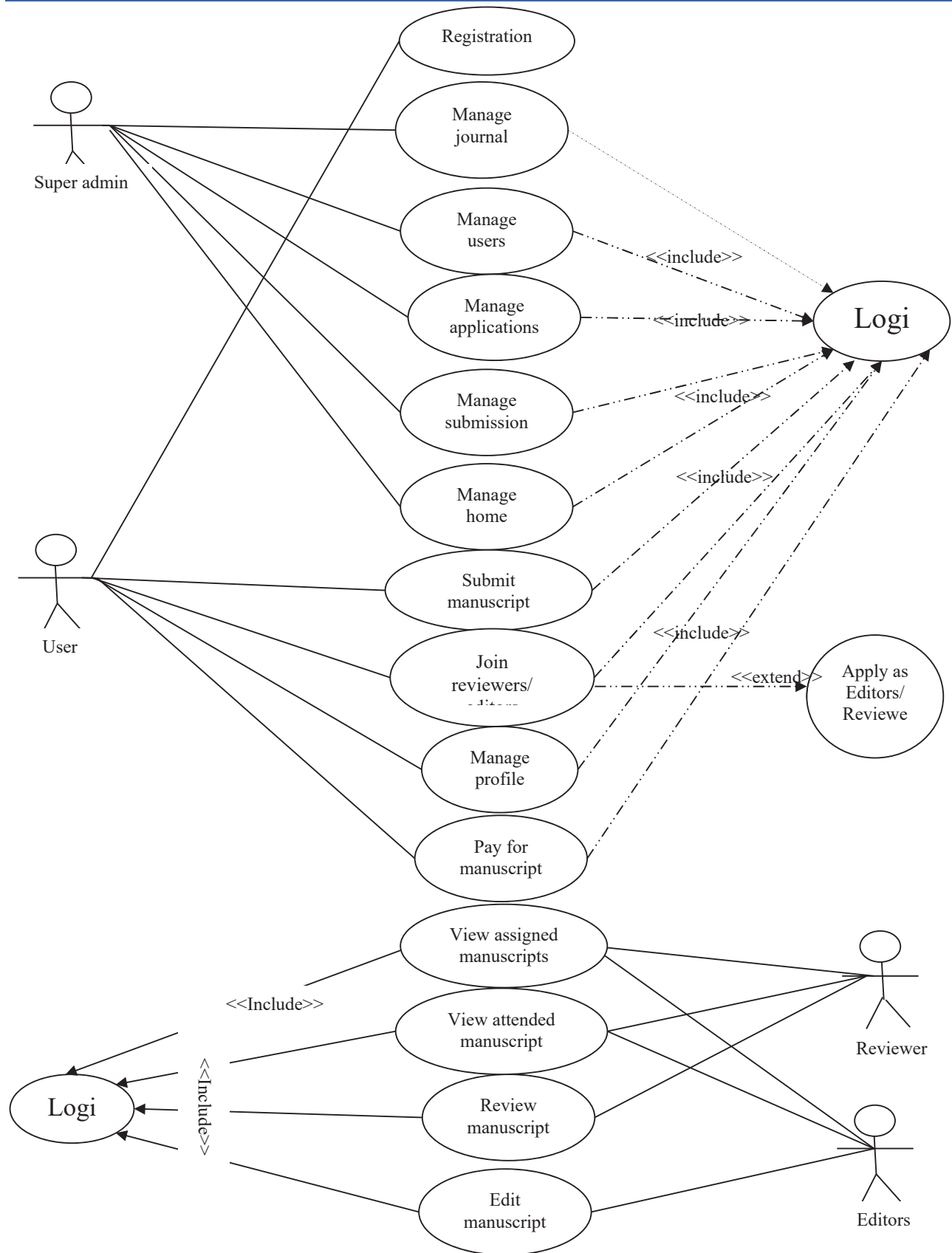
Figure 18 Use Care diagram for AKSUJMS (Author 2020)

C. **B.   DATAFLOW FOR AUTO RESPONDERS (MAIL & SMS)**

The Dataflow diagram(DFD) presented here is used to show:

I.   Information that enters and leaves the AKSUJMS

II.   The people that interact with the system and how they interact with the system

III.   The Information that is stored in the system

The DFD presented in Figure 19 illustrate the data flow in the system when the author submit manuscript to AKSUJMS, super admin will assign the manuscript to Reviewer/Editor. The Reviewers/Editors review the articles and make recommendation.
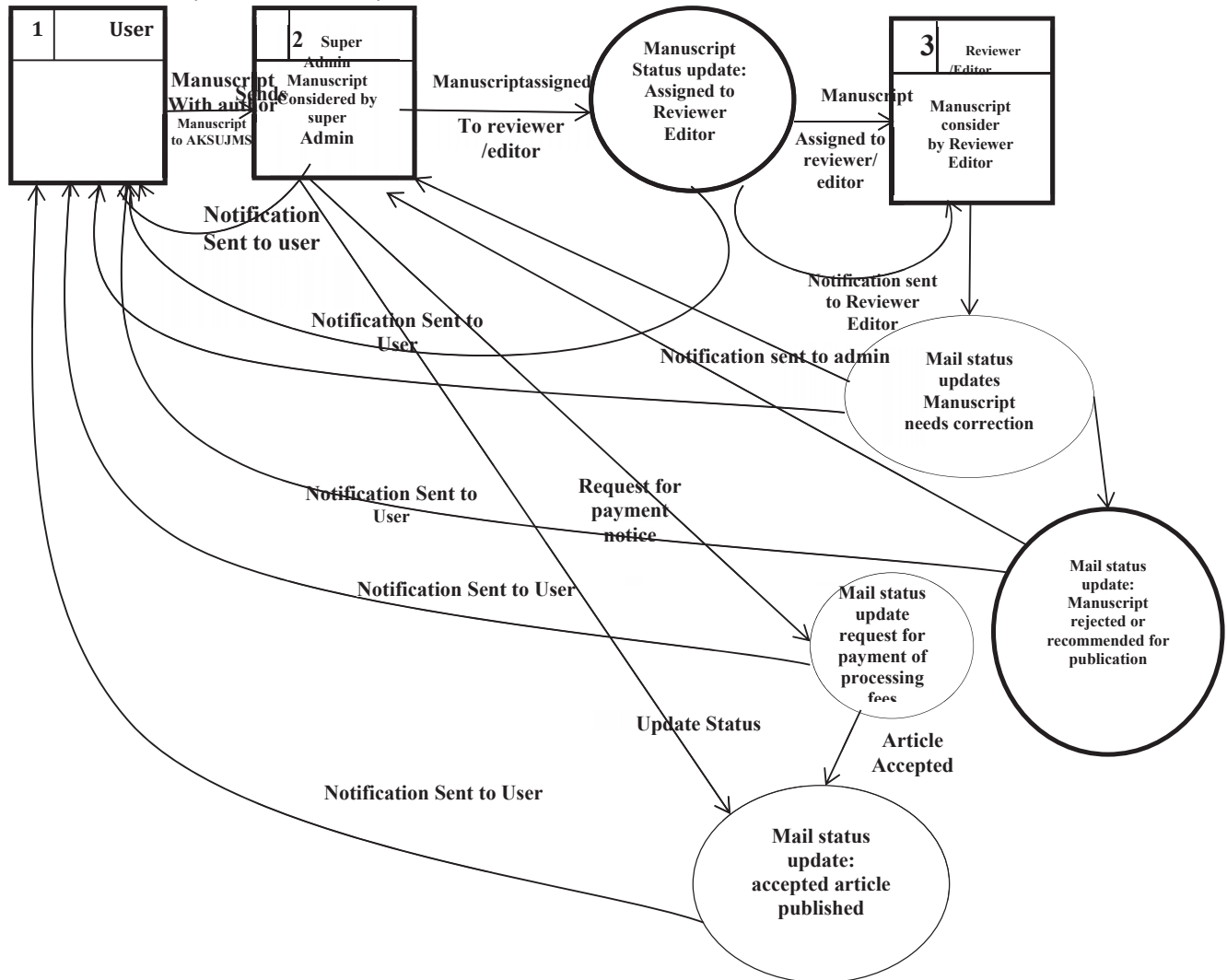
Figure 19 Dataflow diagram for AKSUJMS with autoresponders (mail &SMS)

II.   VI. RESULT AND DISSCUSION

In this section, the result of the research are presented and discussed. The screenshots of the system are provided to show the system functionalities and modules.

A.   *SCREENSHOT OF LOGIN PAGE*

Figure 20 shows the User Login page. Here every user whether Author, Editor or Reviewer must login in order to be granted access to submit manuscript or to access his/her dashboard if the user is already registered.
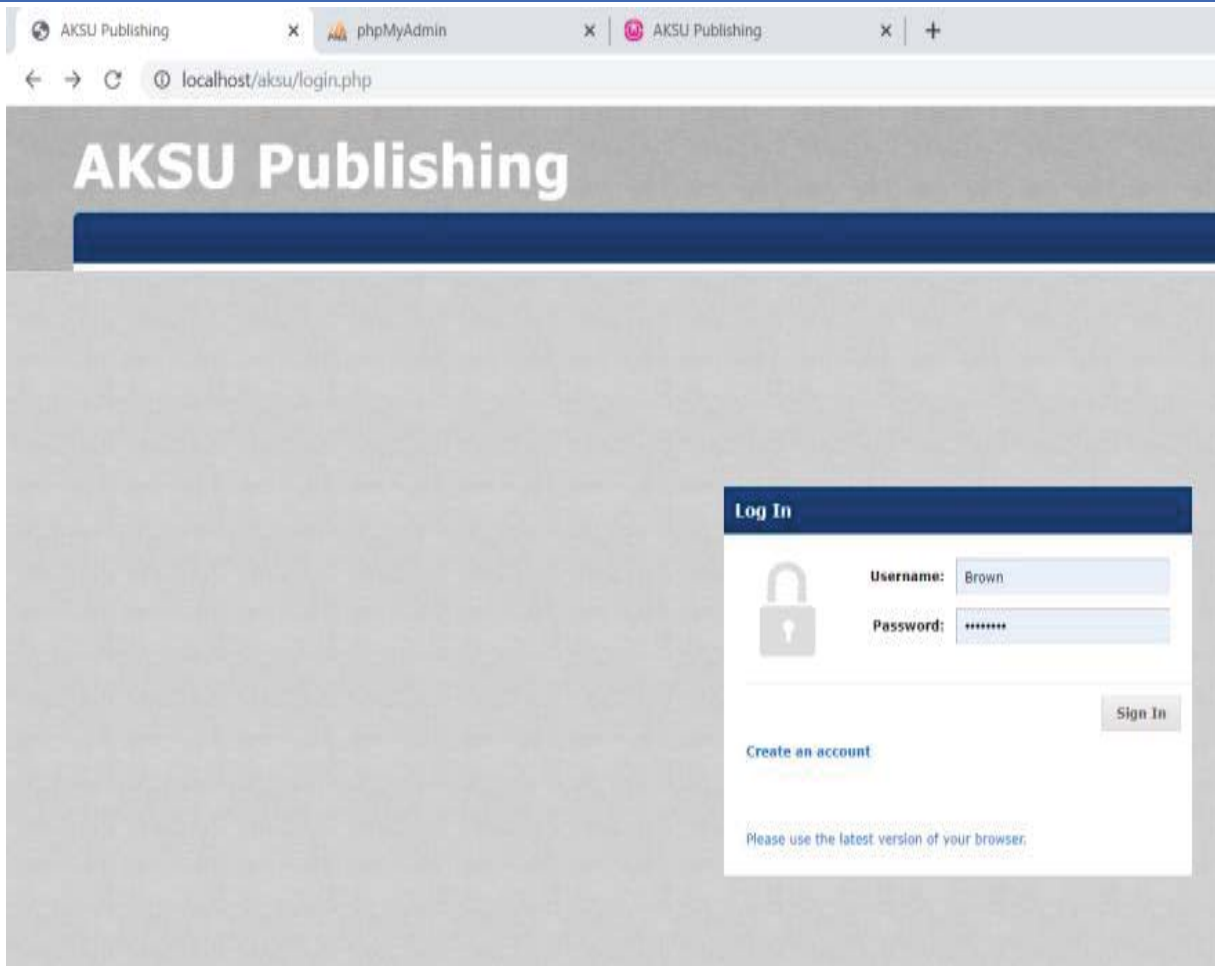
Figure 20 User Login Page

B. SCREENSHOT OF REGISTRATION PAGE

Figure 21 shows the User Registration page. Here every user whether Author, Editor or Reviewer must register (Create an account) in AKSUJMS to benefit from the various resources available in the system.

Figure 21 User Registration Page

C.   SCREENSHOT OF USER VIEW AFTER LOGIN

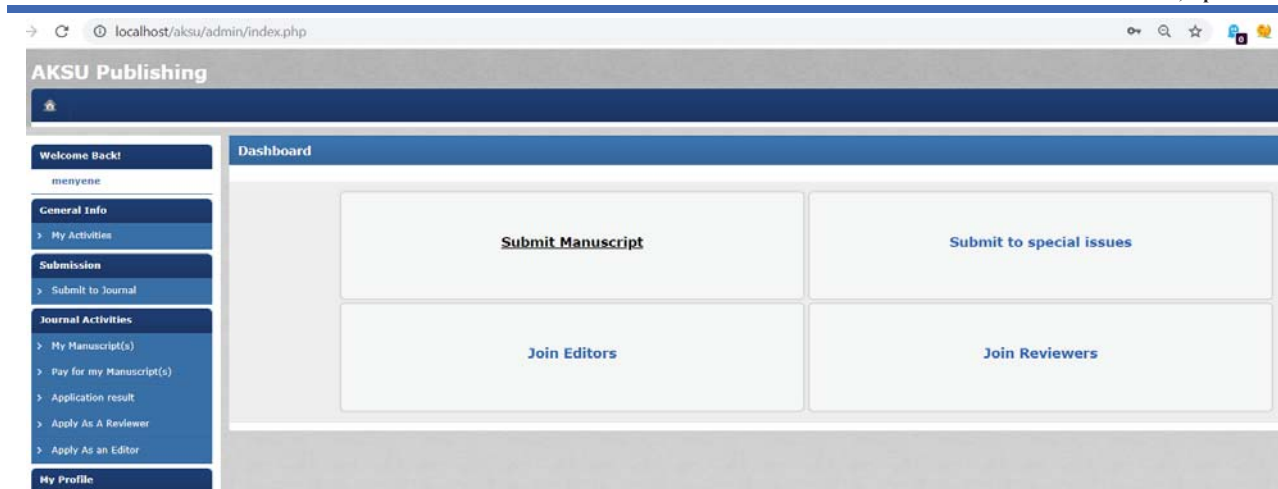After carefully filling the form provided with correct details. The User is now granted access to the Journal services dashboard as shown in Figure 22.

Figure 22 Users view After Login

D. *SCREENSHOT OF USER'S MANUSCRIPT UPLOAD PAGE*

Figure 23 shows the User's Manuscript Upload page. It shows the category of subject the user should choose to submit manuscript.
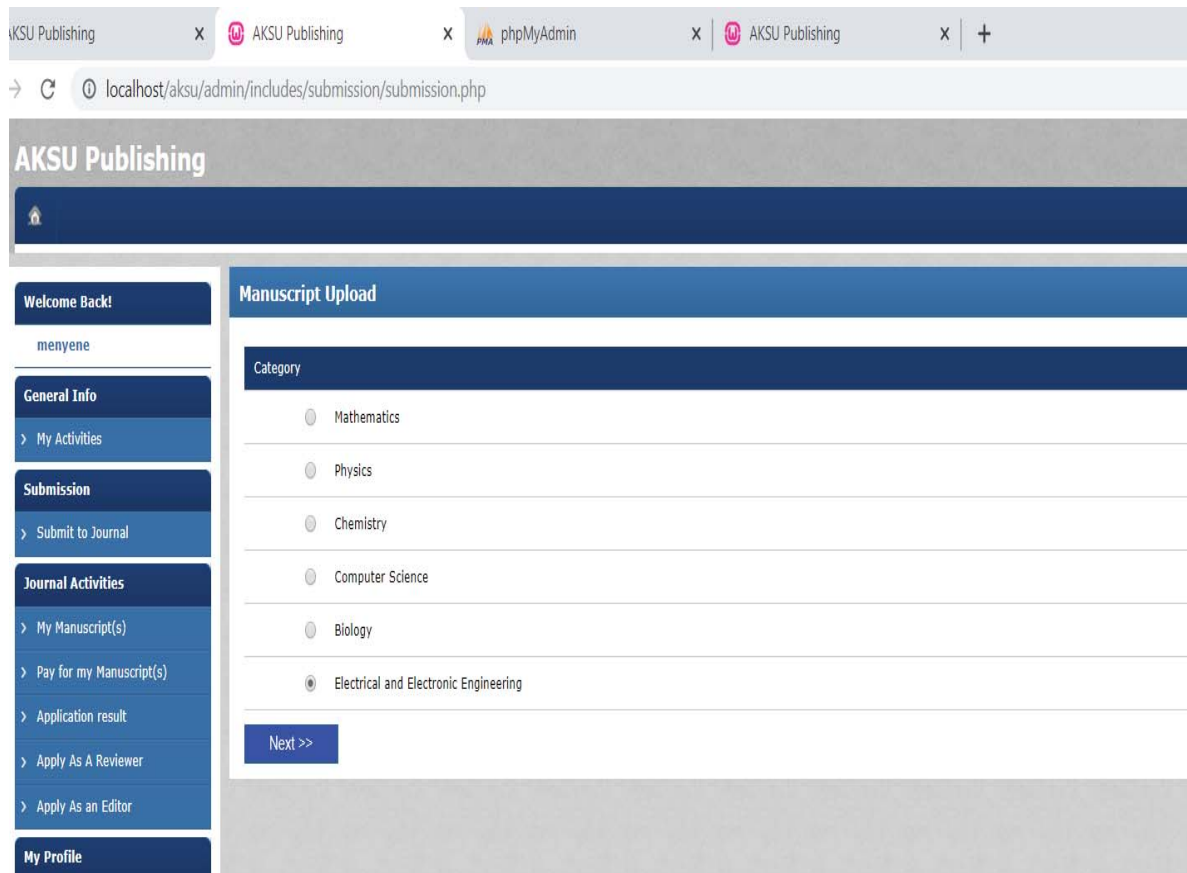
Figure 23 User's Manuscript upload page

E. *SCREENSHOT OF SUPER ADMIN JOURNAL ISSUES AND VOLUMES PAGE*

Figure 24 shows how super admin view journal issues and volumes and can add new issues and volumes within a particular year.

Figure 24 Journal issues and volumes page

F. SCREENSHOT OF EDITOR'S SUBJECT CATEGORY PAGE

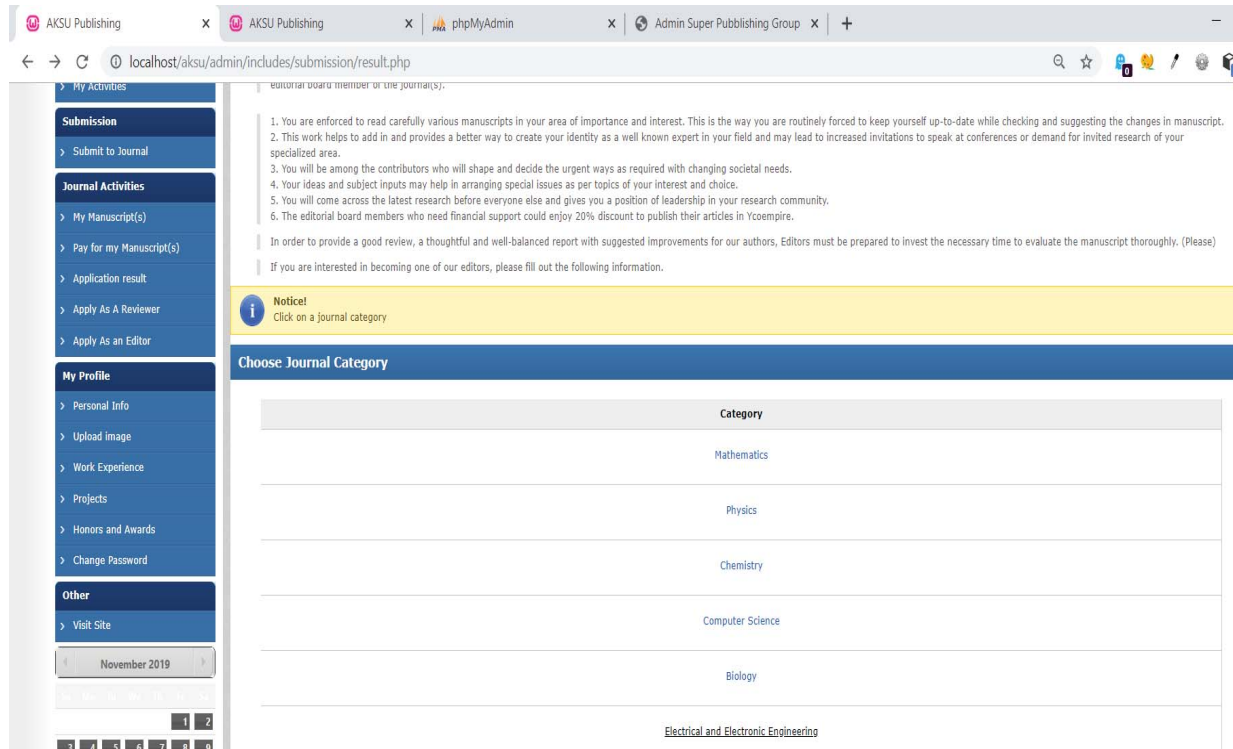Figure 25 shows editors dashboard and the list of activities he/she can perform

Figure 25 Editor's Subject category

G.   LIST OF USERS PAGE

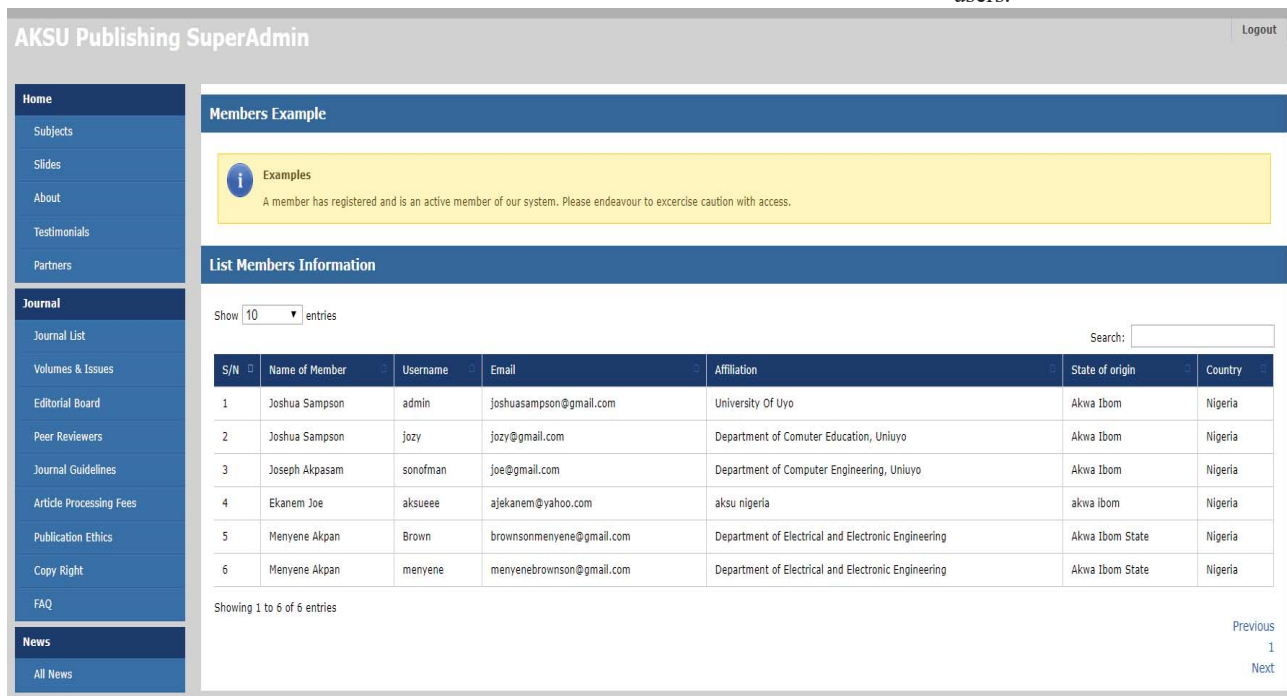Figure 26 show how super admin can view list of system users.

Figure 26 List of users page

H.   SCREENSHOT OF SUPER ADMIN EDITOR'S LIST PAGE

Figure 27 show how the Super Admin view Editor's List. The super admin can assign journal categories to editors and can also remove an editor from a journal category.
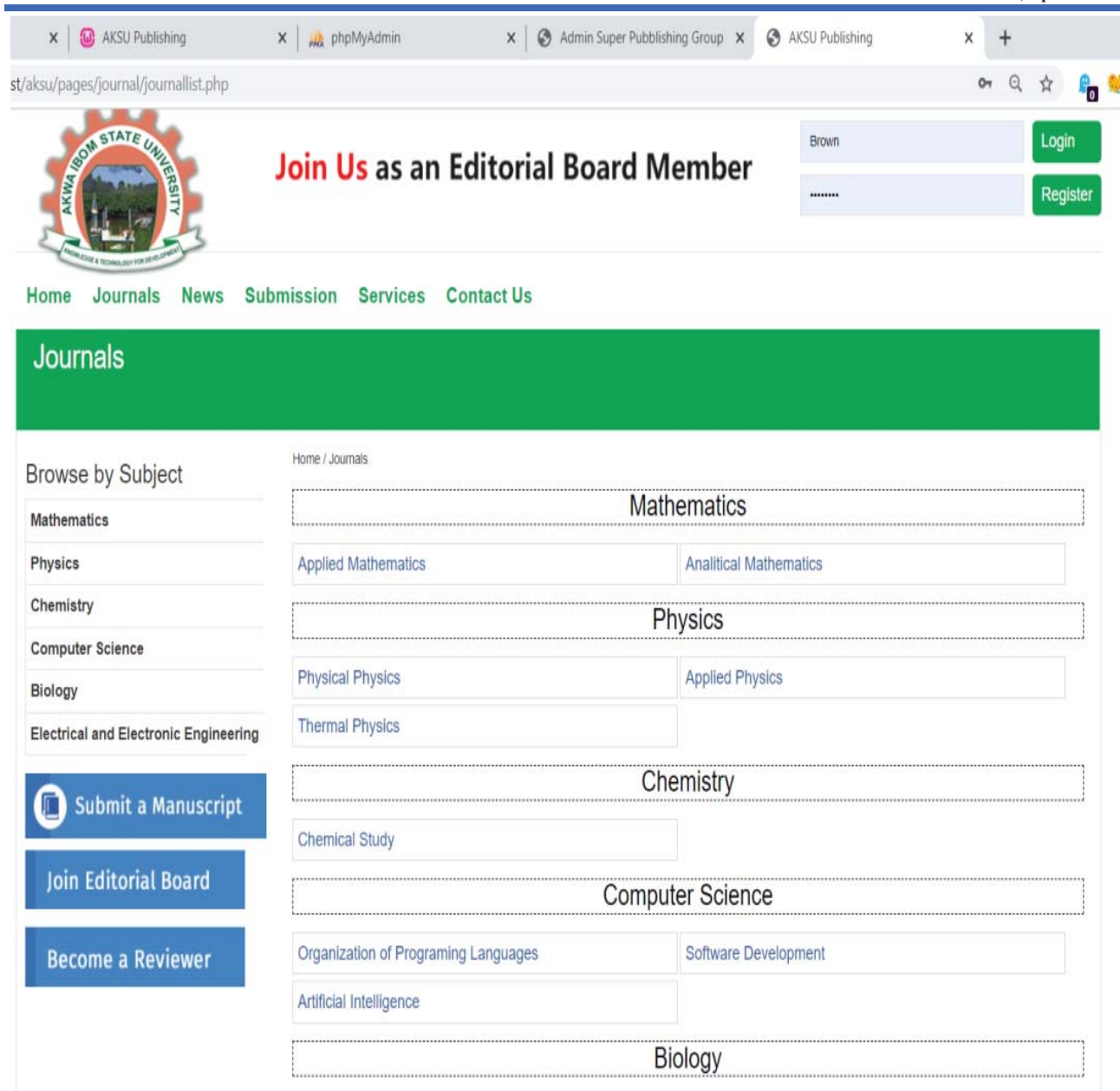
Figure 27 Editor's List page

A. I.   JOURNALS

The Journals management modules are presented in Figure 28. Options such as Browse by subject, Submit by

Manuscript, Join Editorial Board, Become a Reviewer are available as shown in Figure 28

Figure 28 Journals Sub Module

B. J.   SYSTEM SECURITY

The security of AKSUJMS is very important and as such different approaches are used to secure the system. This section discusses the different methods used in securing the system.

Figure 29 shows how user's password are being encrypted with SHA512 and salted. Here the passwords are being converted to 128 hexadecimal random codes and are salted, then the SHA code and the salt are hashed to further strengthen the security and making it difficult for intruders to break into user's account.
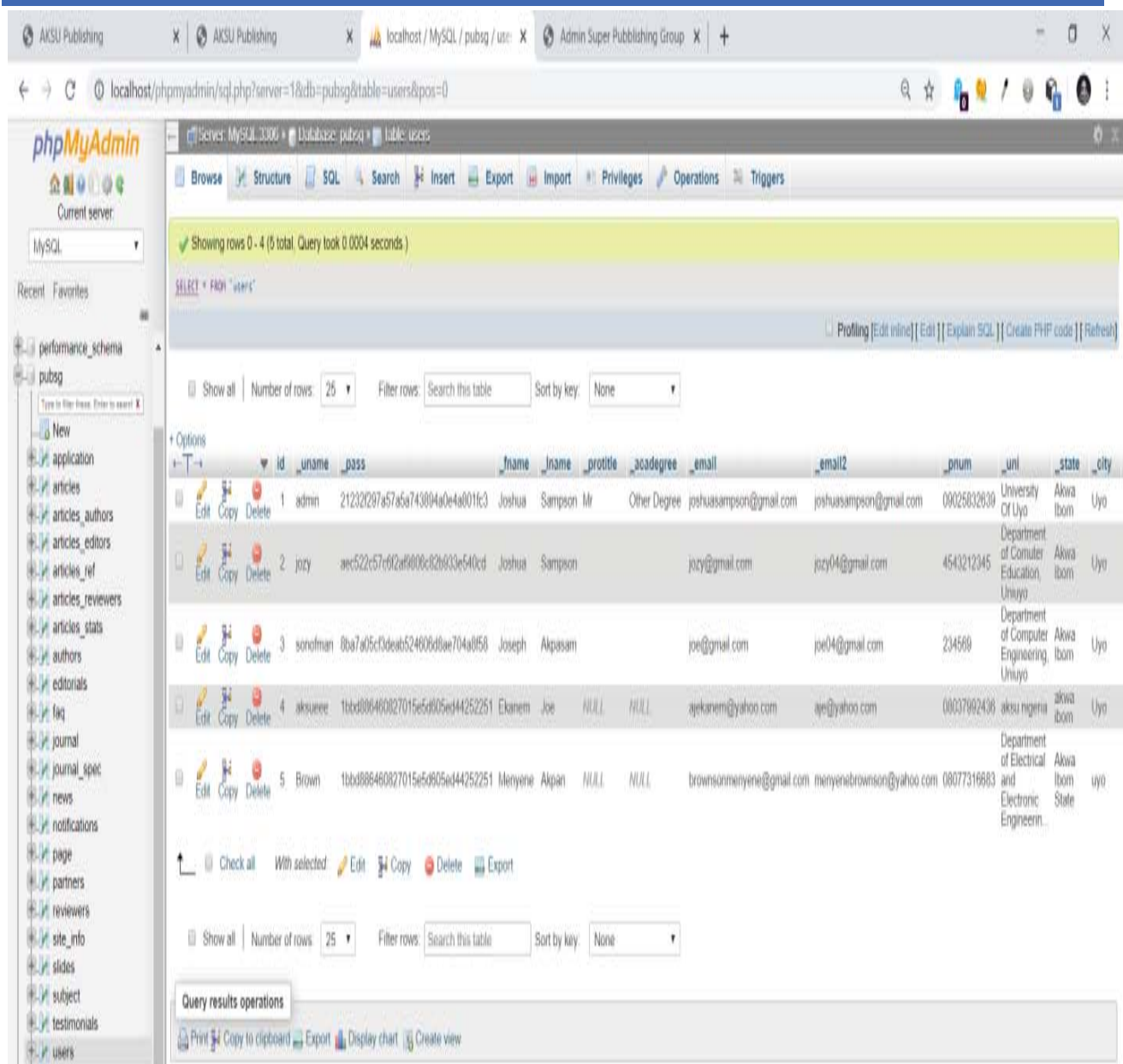
Figure 29 System Security

VII.   CONCLUSION

In this paper, Akwa Ibom State University Journal Management System is presented to address the challenges facing Journal authors in Akwa Ibom State University.

This work has reached to the following conclusions:

1. AKSUJMS maintains many levels of security including user authentication mechanism, back-end security, data encryption, and navigation security which is not present in the manual.
2. In order to ensure the system Usability, sociability and flexibility, to changes that may occur at the later stage of its development , a participatory Requirement Engineering Process (PREP) Model is adopted for the system development, evaluation and support.

3. The problem of loss of manuscripts and the difficulty of tracking manuscript inherent in the manual system is solved using auto responder and tracking system found in the proposed AKSUJMS.
4. The proposed AKSUJMS is able to offer real time and error-free services in terms of manuscript processing which is not available in the semi-automated and manual system.

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