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INFORMATION TECHNOLOGY INNOVATIONS IN LIBRARY MANAGEMENT: A CASE OF SIMS

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Abstract

Academic libraries are facing a piquant situation and unforeseen challenges in this age of information technology. They are reeling under pressure to fulfill their obligation of meeting the diverse information needs of their stakeholders. The rapid implementation of information technology in all areas of life, including libraries, has led to concerns about how information technology transforms the nature and quality of work. What is the impact of information technology on simplifying the service functions?. Library, office, and industrial automation research have shown that the impact of technology depends on how and why it is used, rather than on the technology itself. Library management systems are commonly used in all educational related institutes. Many commercial products are available. However, many institutions may not be able to afford the cost of using commercial products or may not get satisfaction in customization facilities available. Alternatively, the institution itself can take a decision to develop its library management system software using its own expertise. Library management system is a modern innovation that is expected to help in the circulation registration of processed books and register users. A case study is undertaken at SIMS library to know the effect of automation on the quality of providing library services, user satisfaction of library services, the effective automation of work, and the control of library functions. This paper discusses the impact of the automated system on staff, job satisfaction, and client relations. Results showed that the developed system made a significant impact on the quality library service management.

Index Terms: Automation, Library Automation, Communications, Participation, Consultation, Training & Staff Support

1. Introduction:

Information Technology innovations became a big boon to every field in the society. Being general purpose technology, the use of the computer is essential in order to improve the efficiency of any business processes. Higher education is re-defined due to advent of information technology mainly in the process of imparting knowledge, storage and transmission of information from one place to another. Library service in higher education system is mainly affected and improved in its way of providing services and found maximum changes in its way of providing service. The ancient methods of maintaining it are no longer dynamic and efficient. For expeditious retrieval and dissemination of information and better service for the clientele, application of modern techniques using computers and information technology have become absolutely indispensable. A properly computerized and networked library will help its users with quick and prompt service. Library automation refers to mechanization and automation of library housekeeping operations like acquisition control, serials control, cataloguing classification and circulation control. It also provides an opportunity to integrate and share various resources, both tangible and intangible, with other libraries and information provider through proper networking. The use of technology in effective handling of office administration in the form of innovations and best practices are already studied [1-4] and the possibility of effective management of the office functions

by working from home is also discussed [4-5]. Various studies on innovations and quality in higher education including Innovations and Best Practices can Transform Higher Education Institutions [6], Internal Quality Assurance Cell and its Contribution [7], Enhancement of Graduate attributes in Higher Education Institutions through Stage Models [8], Quality Enhancement in Higher Education Institutions [9], Effective Leadership and Governance [10], Strategy Development and Deployment in Higher Education Institutions [11], Faculty Empowerment Strategies in Higher Education Institutions [12], Unique & Successful Model in Integrated Development [13], Applying SWOC Analysis to an Institution of Higher Education [14], Techniques for Electric Energy Auditing in Education System [15], Societal Expectation And Institutional Accountability in Higher Education [16], Methods and Approaches for Employability Skill Generation in Higher Educational Institutions [17], Quality Enhancement in Higher Education Institutions through Best Practices in Library [18], Innovative Education Model to realize Ideal Education System [19], Learning through Team Centric Exercise & Key Point Pedagogy - An effective Learning Model for Slow Learners in Higher Education Training [20], Opportunities and Challenges for Private Universities [21], Innovations in Private Universities [22], Creating Innovators through setting up organizational Vision, Mission and Core Values : a Strategic Model in Higher Education [23], Comparative Study on MBA Programmes in Private & Public Universities [24], Impact of On-line Education on Higher Education System [25], Innovations in Higher Education - A new model implemented in MCA degree programme [26], Environmental Consciousness in Higher Educational Institutions [27], Analysis of Choice Based Credit System in Higher Education [28], Innovations in Student Centric Learning – A Study of Top Business Schools [29], Innovations in Experimental Learning – A Study of World Top Business Schools [30], How to Increase Research Productivity in Higher Educational Institutions [31], Academic Support through Information System [32], and Quality Teaching and Learning as Practice Within Different Disciplinary Discourses [33], Innovative Education Model to realize Ideal Education System [34], ABCD analysis of Stage Model in Higher Education [35],) Analysis of NAAC Accreditation System using ABCD framework [36], Application of ABCD Analysis Framework on Private University System [37], The Study of New National Institutional Ranking System using ABCD Framework [38], Educational institutions quest for service quality: customers perspective [39], Comparative study of quality practices in higher education institutions [40], Quality in higher education-a survey [41], and Strategic Planning in Higher Education Institutions [42] are studied and published. In this paper, we have discussed how information technology is used effectively to automate various functions of a library of a higher educational institution.

2. Information Technology Infrastructure at Libraries:

The nature and efficiency of information services provided by a library depends on the computer facilities it has. If a library lacks computer infrastructure and networking, then there is every possibility that it fails miserably to meet the demands of users. In the recent decades, a lot of information has been made available in a wide variety of formats like CD-ROM, online databases and e-journals. It becomes necessary for a library to have adequate computer facilities to serve users better. Organizational heads should be keen in order to ascertain the availability of computer infrastructure, updated status of automation, hardware and software availability in their library [18, 43-45].

The advantages of the library automation include:

- ✓ Save the time of the reader and library staff
- ✓ Explosion of information
- ✓ Reduce human resource / use proper human resources.

- ✓ Save printing cost (Register, Borrow cards and Book cards etc.
- ✓ Number of users can access at a time (OPAC)
- ✓ Error free services
- ✓ Keep up to date records
- ✓ Give modern IT bases services to the users like (Web OPAC/ Use of Barcode Technology)

Library automation, stated in single term, is the application of computer and utilization of computer based product and services in the performance of different library operations and functions in provisions of various services and production of output products. The advents in computer and internet technology have greatly increased the library automation. Library automation includes use of computers and other semi-automatic devises like punched cards to reprography. These are semi automatic because human intervention is greater in extent. So when we talk of library automation, it is principally the use of computers; associated peripheral media computer based products and services, and networking with other resources for library work.

3. Design and Implementation of Library Management Software in Srinivas Institute of Management Studies (SIMS) Library:

SIMS library Management system is windows based library management software developed from the help and advice of a team of experts from library professionals with many features like simplicity, multi user, user friendliness etc. This software can manage all library routine works like in circulation section books issues and returns. This report will provide a detailed account of the processes used to design and implement a database that can be used to manage a library system. Each sub section of the report corresponds to an important feature of database design. SIMS Library Management System, also known as an automated library system is software that has been developed to handle basic housekeeping functions of a library and some other features for users.

(1) Objectives of Library Management Software:

To Save the Time of Reader as Well as Library Staff: The new system will take less time in entering the data, processing it and getting its output. Fewer resources will be used as no large registers, files, Ledgers, pens; correctors will be needed or used.

To Make the Processing Faster: Less time will be taken to process the data. This will help to do more jobs in less time.

To Make it Easy to Search any Record: It will be much easier to find particular record rather then opening such huge files and finding a single record from them.

To Keep the Data Secure: The data will be much secure from any unauthorized access. It will be made secure by using passwords and by taking other security measures.

To Edit the Records and Update the Database Easily: Records will be easily edited and the database will easily be updated at the time of entering a record.

To Make the System User Friendly: The system will be much more easy to use and the operator will feel no difficulty.

Issue of Books:

- ✓ A student of any course should be able to get books issued.
- ✓ A limitation imposed on the number of text books and only 4 books is issued for 15 days only.
- ✓ The reference book for one day.
- ✓ The software takes the current system date as the date of issue and calculates date of return. The due date for return of the book is stamped on the book.
- ✓ The faculties can take any number of books with no fine and no due date.

Return of Books:

- ✓ Any person can return the issued books from the library at any time.
- ✓ The system displays the student details on whose name the books are issued as well as the date of issue and return of the book.
- ✓ The system operator verifies the duration for the issue.
- ✓ The information is saved and the corresponding updating takes place in the Database.

Book Bank Issue:

- ✓ The Book bank is maintained for issued for a whole semester in the beginning.
- ✓ The member will get 5 books at the cost of Rs.2000/- as a security deposit paid in the office. Security deposit is refundable at the end of the course after getting no due certificate from the librarian.
- ✓ Only Book Bank Books can be issued for this section.
- ✓ Student can issue 3+1 books from the library as normal issue with card other than this.

Study Material:

- ✓ The SIMS Library is providing the study materials of each subject for students. After completing the respective semester all study materials should be returned otherwise the succeeding semester study materials won't be available for the students.
- ✓ The books should be returned soon after completing examination or beginning of the succeeding semester.

Purchase Register: The purchase register should be the same as the format of Accession Register in the library.

Query Processing:

The system should be able to provide information like:

- ✓ Availability of a particular book by Title
- ✓ Availability of book of particular author.
- ✓ Availability of book by barcode number.
- ✓ Number of copies available of the desired book.

The system should also be able to generate reports regarding the details of the books available in the library at any given time. The corresponding printouts for each entry (issue/return) made in the system should be generated. Security provisions like the 'Login authenticity should be provided. Each user should have a user id and a password. Record of the users of the system should be kept in the log file. Provision should be made for full backup and restore of the system

(2) Feasibility Study:

Operational Feasibility:

- ✓ The management and the staff are willing to operate, use and support the proposed system.
- ✓ The students and other staff this will be beneficial of using books through this SIMS Library System.

Technical Feasibility: We can strongly say that it is technically feasible, since there will not be much difficulty in getting required resources for the development and maintaining the system as well. All the resources needed for the development of the software as well as the maintenance of the same is available in the organization.

(3) Project Planning:

To solve actual problems in industry settings, software engineer or a team of engineers must incorporate a development strategy that encompasses the process, methods and tools layers and generic phases. This strategy is often referred to as process

model or a software engineering paradigm. A process model for software engineering is chosen based on the nature of the project and application, the methods and tools to b used, and the controls and deliverables that are required. We develop our project in sequential manner i.e. the system level progress through analysis, design and coding, testing, support. The sequential model has four activities as shown in fig. 1.

(4) Software Requirement Analysis:

Design: After deciding the requirement we move to the design phase during this phase we have searched many sites for reference to serve the better and the best work.

Code Generation: The design must be translated into machine readable form. So after successful completion of design phase, the coding phase had begun. The functional approach in codes being used.

Testing: After completion of coding we moved to the testing of our system. Here we checked our system against different cases and ensured that defined input have produced actual result that agree the required result.

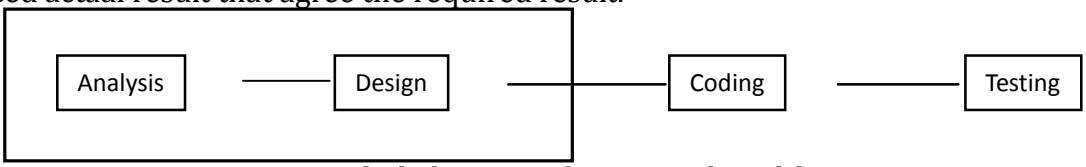


Figure 1: Block diagram of sequential model.

(5) Software Engineering Paradigm:

In Waterfall model, first stage is preliminary analysis, which deals with the study of the current system, finding problems and establishing whether the new system will benefit the organization. In this mode all transactions are done manually. Each member is allowed a certain number of books to subscribe. He/she has cards to subscribe books. Against each card a member can subscribe one book from the library. Whenever a member wishes to issue a book and there are spare cards, then the book is issued. Otherwise that request is not entertained. So all the students of college have cards. It is becoming a problem to manage the cards of members. So an automated system is required that can maintain the details about the books subscribed by different system. After this preliminary investigation, second phase of Waterfall mode, i.e., analysis phase begins. In analysis, a detailed study of the system is performed. Each operation is looked into more details. From the preliminary analysis we know that the members are increasing and managing their cards is now a difficult task for the library staff. Let us find out why increasing members is a problem.

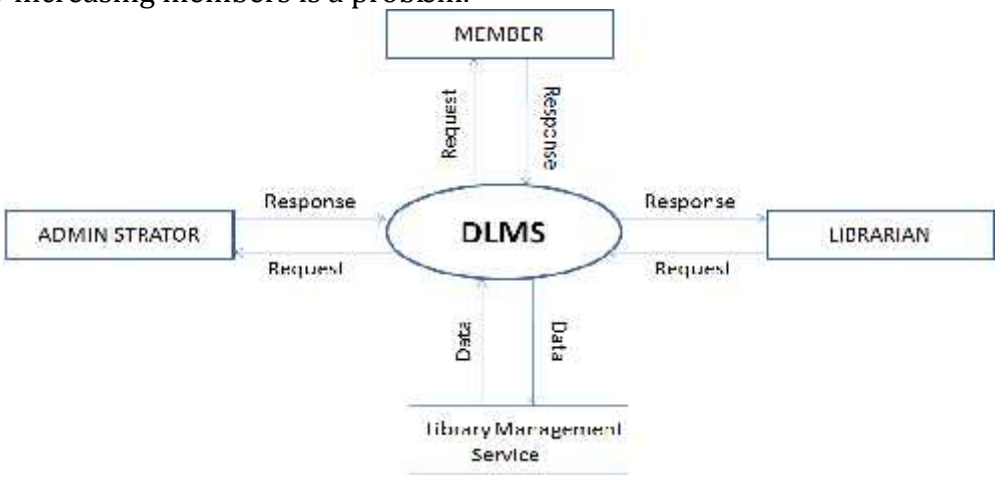


Figure 2: Block diagram of Detailed Library Management System (DLMS) adopted at SIMS.

There might be a case when a card gets misplaced either by library staff or member itself. If this is indeed the case then a duplicate card is made. But a member can lie about it and can make a duplicate card even if the card is not lost. In that case the at particular member is having more than maximum allowed cards. There is no means to identify such members. Presently there is a need to have a system that can record the details about the books issued to members. Card system needs to be discarded. To solve this situation our library needs a computer application that has a database that contains details corresponding to each book issued. The block diagram of Detailed Library Management System (LMS) is shown in fig. 2.

(6) Installation and Operation:

System Requirements:

Operating System: Windows 95/98/2000/NT/XP/ME
Processor: Pentium II or above
RAM: 64 MB (Min)
Hard Disk: 200 MB Free Space.
CD-ROM: 24X or above.
Bar Code Reader (optional)

Communication Interface: TCP/IP, GSM modem and internet connection is needed to send information.

Memory Constraints: Since the SIMS Library System contains lots of books and member information. The detail of every book, its member and his transaction must be stored in a database. The backup of these data must also be taken care of. Hence there is a need of at least 20 to 30 GB of storage space.

Installation: Run the setup program of the SIMS Library System in the compact disc. The setup program will guide the user through the rest of the process.

Operation Manual: After successful installation SIMS Library System need to create a shortcut of that file as shown in Figure 3.

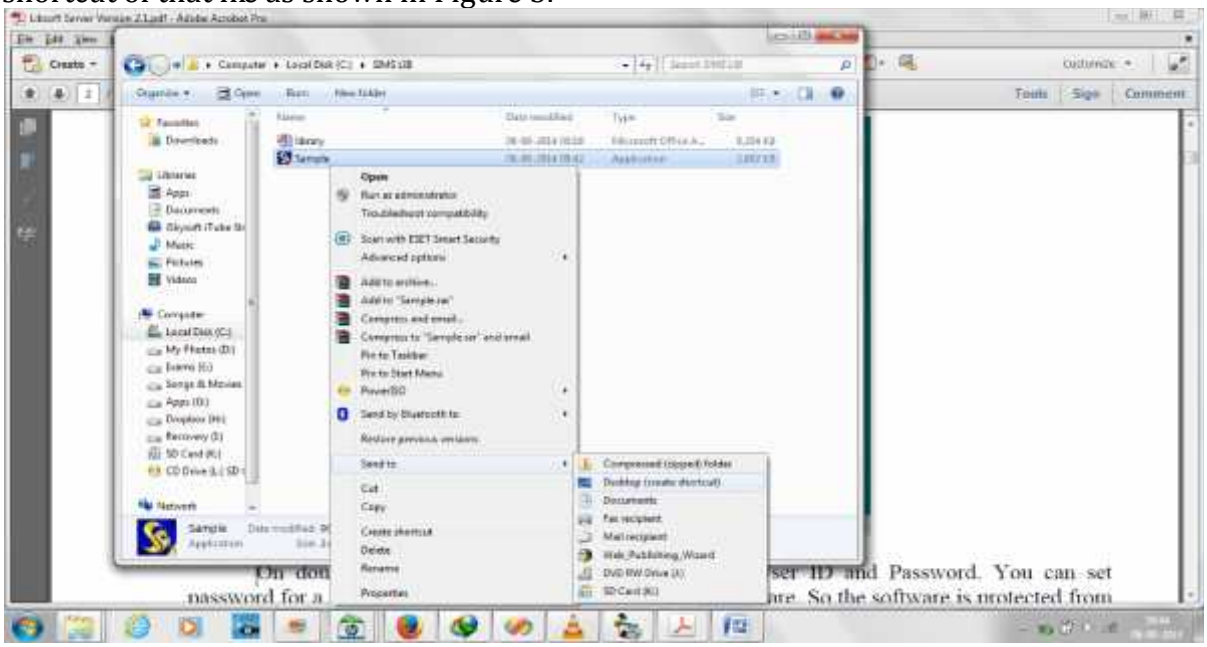


Figure 3: Home page of SIMS Library System

On double clicking a window will display asking User name and Password as shown in figure 4. One can set password for a specific user to only a specific area of the software. So the software is protected from unauthorized use.

Figure 4: Window displaying Login Page

If the login is successful it will display the message shown in fig.5 and fig. 6 shows the initial window of the SIMS Library system after login.

Figure 5: Successful Login display

Figure 6: Initial window of the SIMS Library system after login

Transactions Menu:

The Transactions menu consists of the following menu.

- ✓ Book Issue
- ✓ Book Bank Issue /Return
- ✓ Study Material Issue/Return

Entry Menu:

- ✓ Book Entry
- ✓ Study Material
- ✓ Purchase Register
- ✓ Membership
- ✓ Project Report
- ✓ News Paper

Reports Menu:

- õ Daily
  - ✓ Book Issue
  - ✓ Book Return
  - ✓ Book Fine
- õ Weekly
  - ✓ Book Issue
  - ✓ Book Return
  - ✓ Book Fine
- õ Monthly
  - ✓ News paper
  - ✓ Purchase
  - ✓ Book Issue
  - ✓ Book Return
  - ✓ Book Fine
- õ Study Material
- õ Purchase Register
- õ Book Details
- õ Book bank
- õ Project
- õ News Paper

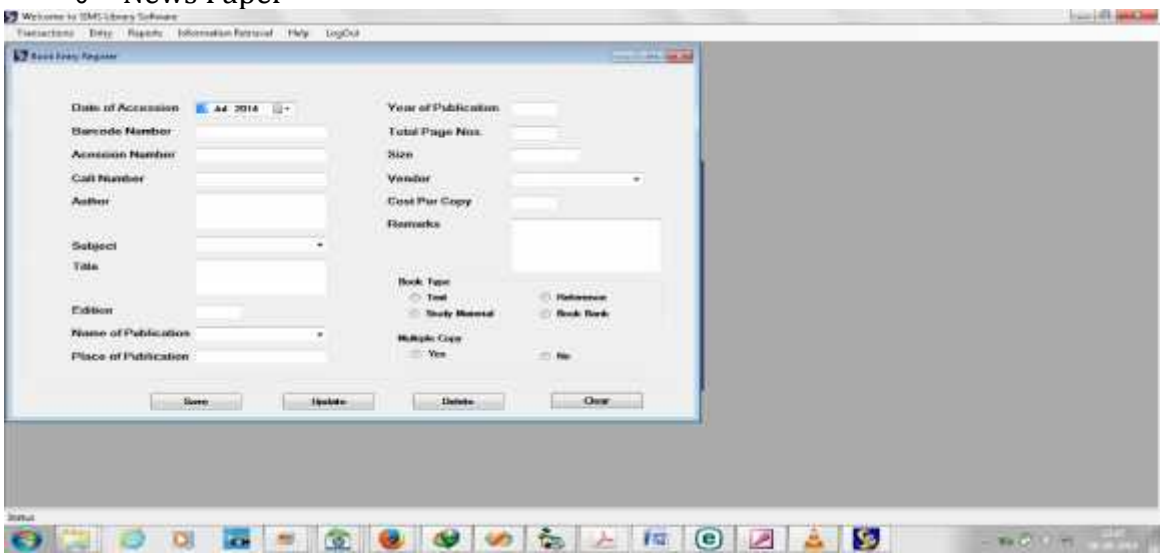


Figure 7: Book entry window

Information Retrieval: This menu is used for search details

Help: This menu consisting the two submenus:

- ✓ Manual
- ✓ About Us

Log Out: The Log Out menu is used for quitting the application after use.

Book Entry: The new book details need to be added in book entry window as shown in fig. 7 and the details are shown in figure 8. Book Entry has following fields:

- ✓ Date of Accession
- ✓ Barcode Number
- ✓ Accession Number
- ✓ Call Number
- ✓ Author(s)
- ✓ Title
- ✓ Edition
- ✓ Name of Publication
- ✓ Place of Publication
- ✓ Year of Publication
- ✓ Total pages Numbers
- ✓ Book Size
- ✓ Vendor
- ✓ Cost per Copy
- ✓ Remarks
- ✓ Book Type

This is mainly used to Book Entry in to the software.

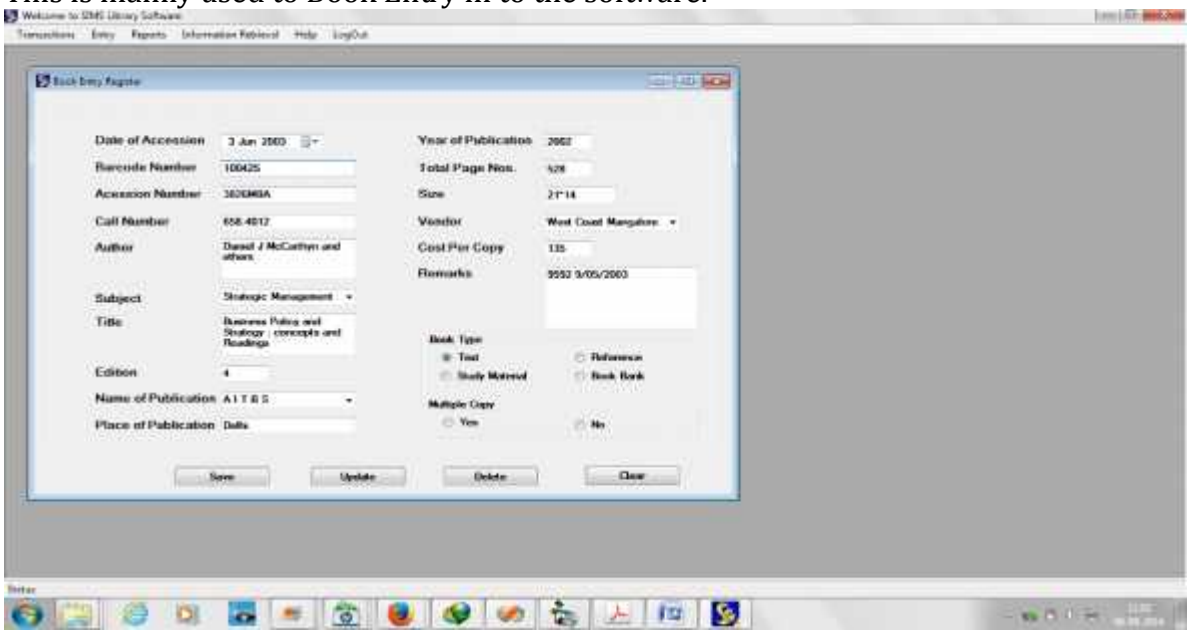


Figure 8: Details in Book entry window.

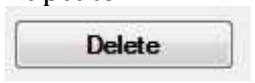
Barcode Number is unique to the book and the barcode has to be generated and stick to the book.

Accession Number: it must be if Book is MBA book the number and its Course name Should be given (Ex:-2533MBA, 5688BBM,.)

Rest of the fields of the software are same the register in the college

The **Save** button is used to save the records and after saving it will display successful message to the user.

The Update Button is used to modify the records which are already entered in the database. To update database the Barcode number has to be type in textbox and press enter so if the database contains the records then it will display the records and user can perform the updating part and enter update



This is used to delete the book details

Study Material: This is Form is used to entry the study material. The Study Material Contains same field as book entry as follows:

- ✓ Date of Accession
- ✓ Barcode Number
- ✓ Accession Number
- ✓ Call Number
- ✓ Author(s)
- ✓ Title
- ✓ Edition
- ✓ Name of Publication
- ✓ Place of Publication
- ✓ Year of Publication
- ✓ Total pages Numbers
- ✓ Book Size
- ✓ Vendor
- ✓ Cost per Copy
- ✓ Remarks
- ✓ Book Type

The Save, Update, Delete Buttons are used to Save records, Updating of entered study material and deleting the study material.

Purchase Register: The purchase register is used to enter the purchase of the books
It Contains following Fields:

- ✓ Purchase Date
- ✓ Title
- ✓ Author
- ✓ Publication
- ✓ Vendor
- ✓ Bill No
- ✓ Cost Per copy
- ✓ No of Copy
- ✓ Total

After entering in the all fields enter the

The records will be added into the database

Membership: The membership form is used to enter the details of the Teaching staff, Non-teaching staff, Students, Library persons need to add the personal details Fields

- ✓ Member Type

- ✓ Register Number
- ✓ Name
- ✓ Address
- ✓ Issued Year
- ✓ Course
- ✓ Valid up to

The add member button is used to add the member details to the database.

The update button is used to update the details of the members

The Delete Member Button is used to delete the member from the database

Project Report: The project report form (fig. 9) is used to enter the details of the final years which are done by the students under the curriculum. Fields in Project Report forms are:

- ✓ Project ID
- ✓ Title of Project
- ✓ Register Number
- ✓ Name of Student
- ✓ Course
- ✓ Semester
- ✓ Year
- ✓ Name of Guide
- ✓ Industry

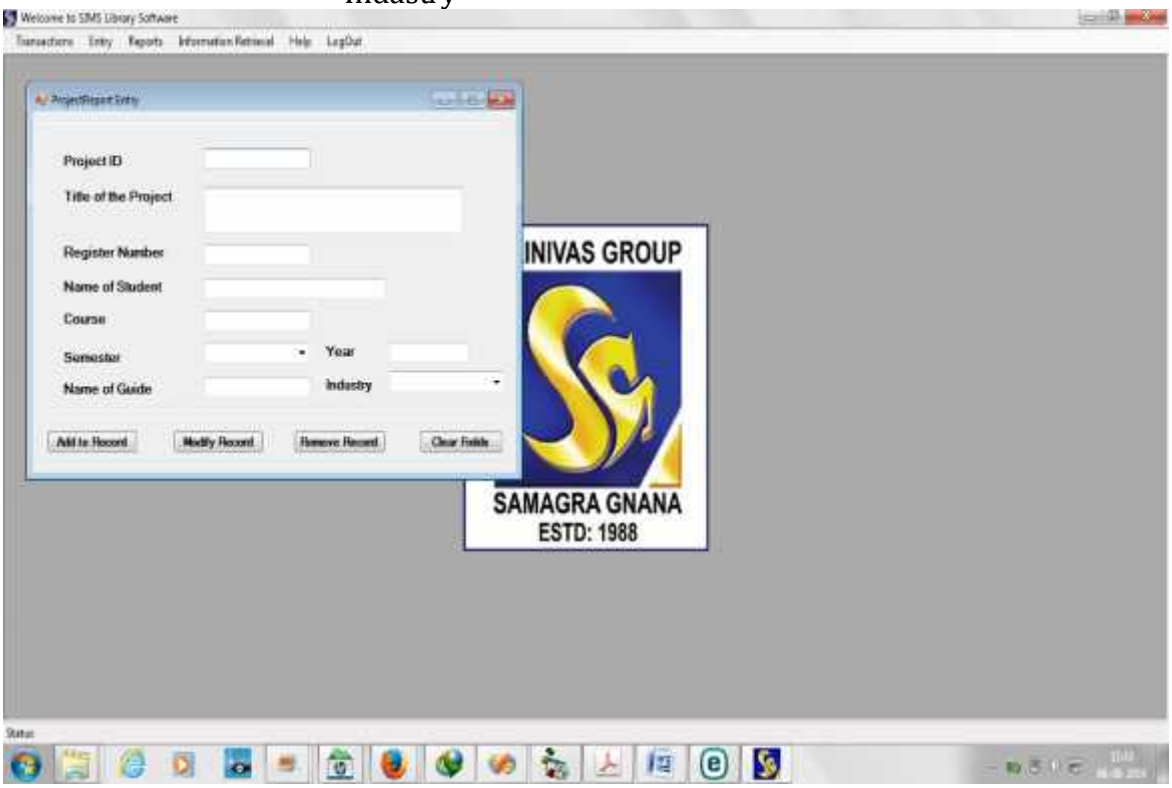


Figure 9: Project Report form.

Add to Record

The add to record button is used add the project report to the database

Modify Record

The modify Record button is used to modify the details of the project which is already entered in the database

Remove Record

The remove button which is used to remove the record from the project details

News Paper: The News Paper form is used to add the news paper details to the database It contains three fields

- ✓ News Paper Title
- ✓ Date
- ✓ Cost

Add to Record

The add to record button which is used to add the newspaper in to the database

Book Issue: The Book issue form (fig. 10) which is used to issue book to the staff and students. This is the core function of the library. For issuing books required two fields mandatorily:

- ✓ Register Number
- ✓ Barcode Number

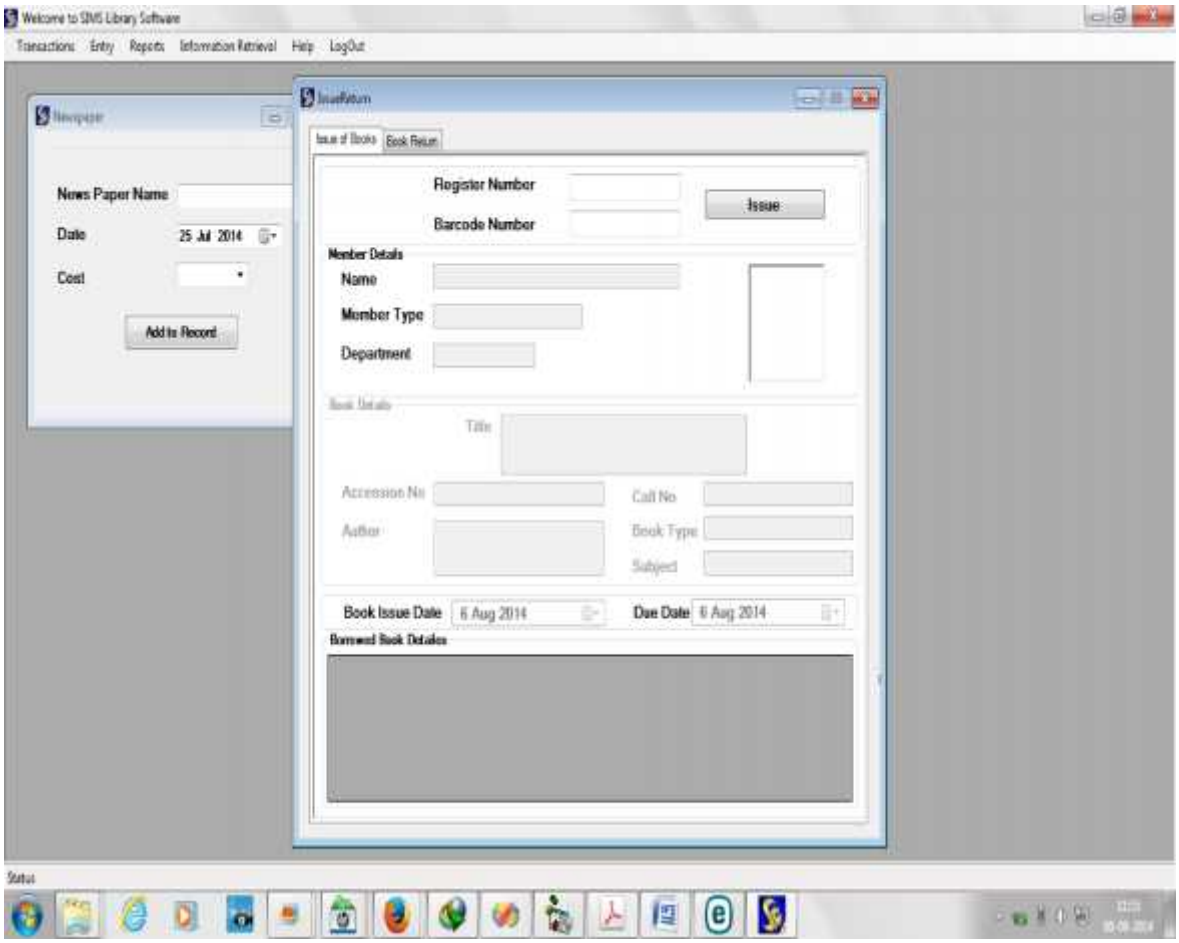


Figure 10: Book issue form

The details the librarian has to be typed with the register number. Then it will display the student's details with the books which books he/she has borrowed from the library. Again the librarian has to scan the barcode number from the book and press enter

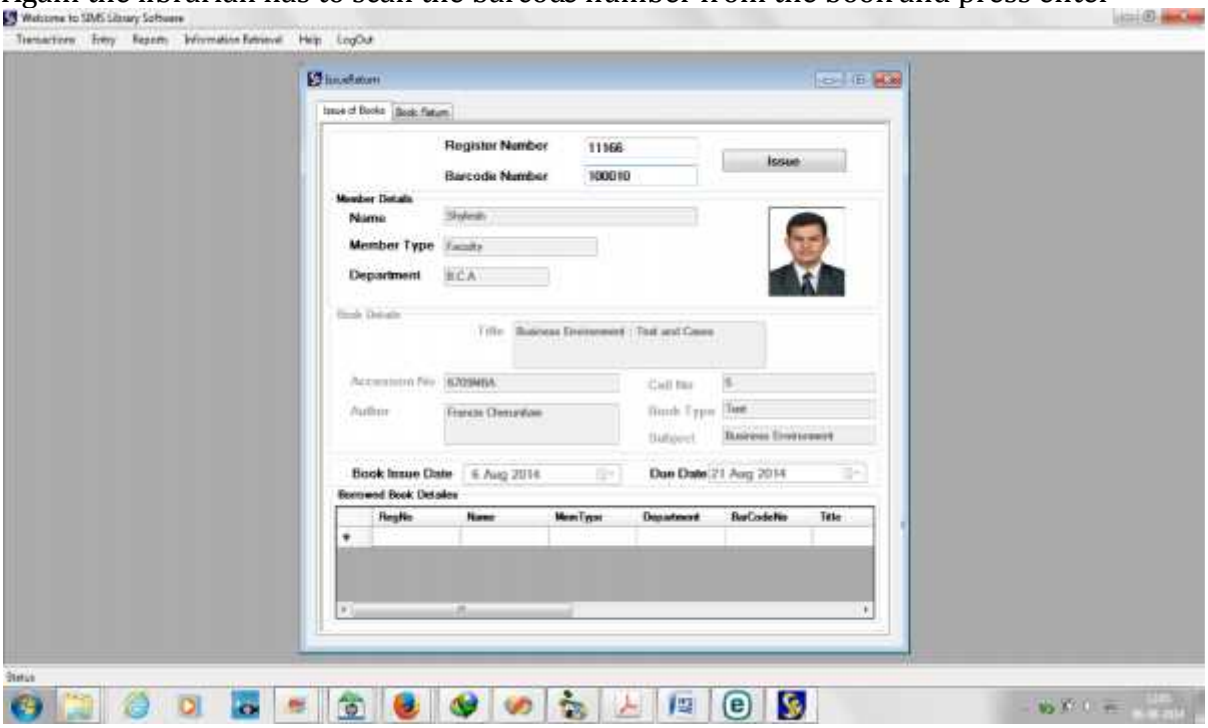


Figure 11: Book details

Then it will display the book details. After issuing the book it will display the successful message. And also displays in the subscribed book details section (fig. 11). Only four books will be issued to the students at a time valid for 15days. In the case of reference books, students retain only for a day.

Book Return:

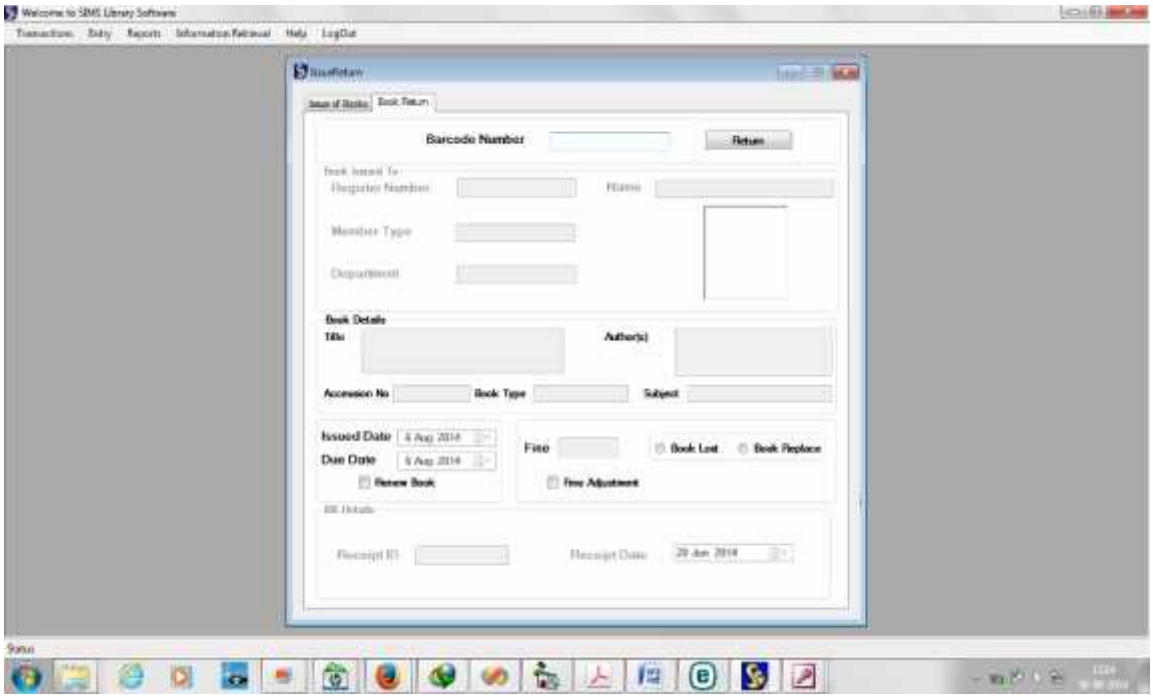


Figure 12: Book returns form

Students should use the book return form at the time of returning books to the library as shown above. In the case of students failing to return the books on or before due date, shall be liable for paying a fine in the office/library and the details of the bill has to be entered in the Library Management System. Students who do not return books on or before due date, cannot be issued books till they settle odd dues.

Book Bank: The book bank details for respective semester period will be provided in this library management system (fig. 13).

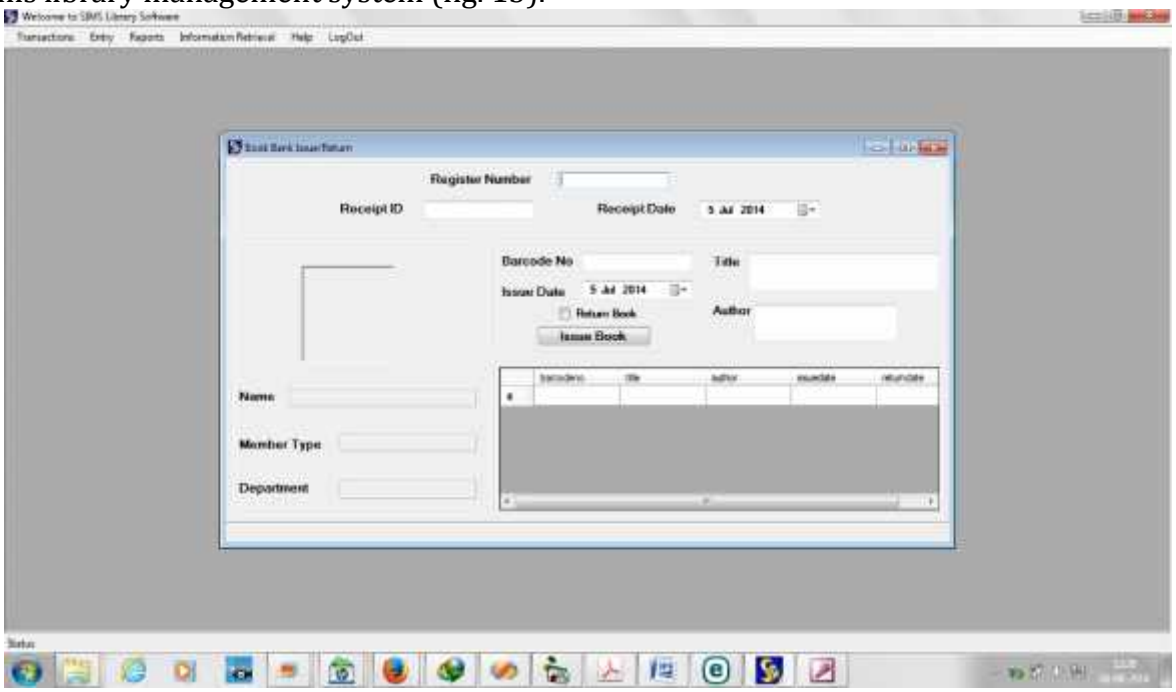


Figure 13: Book bank form

The librarian has to enter the register number of the student in the textbox to see the student details. Then the librarian has to enter the book bank number followed by press enter will displays the book details so that the book can be issued to the students. The maximum books can be given from the book bank is 7(seven).

Reports: The reports section can generate various reports. For example the daily return report (fig. 15 & Fig. 16).

Figure 15: Format of daily return report

Daily Report Generation:

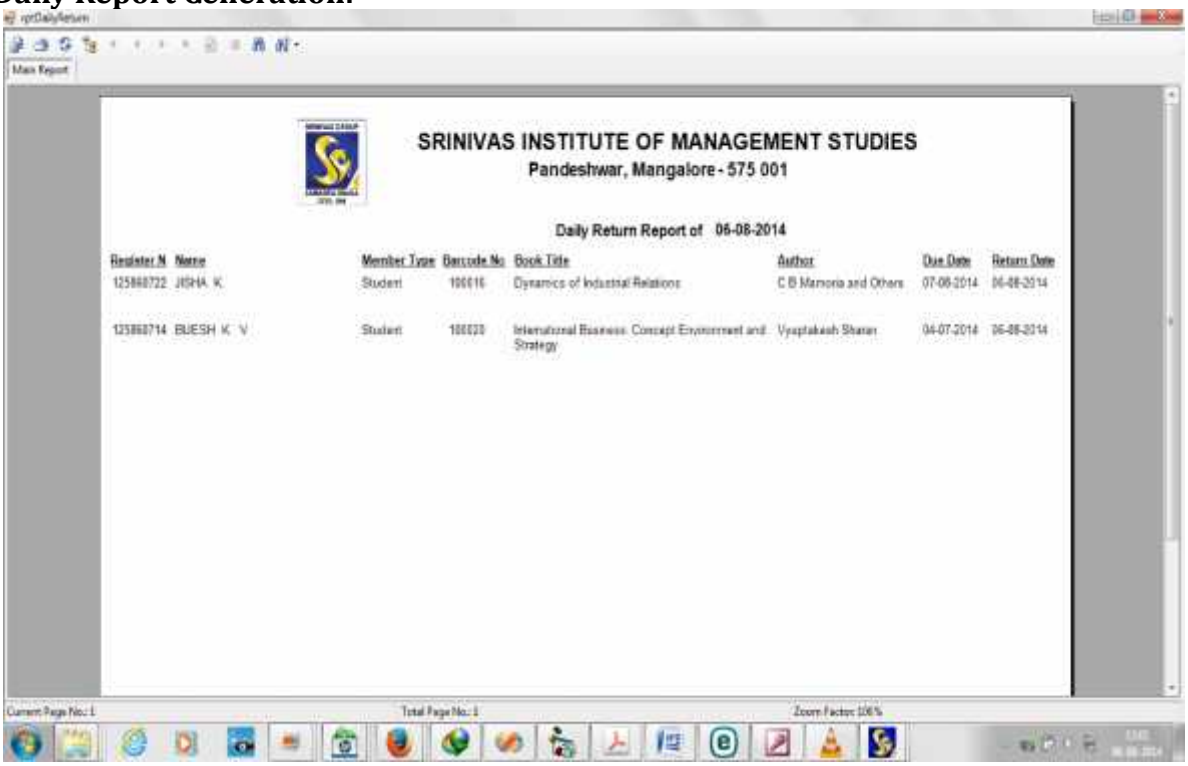


Figure 16: Format of report generated

Export Report button located on top left of the report and by selecting file type as (.pdf), pdf format of report files can be generated for further processing and printing as shown in fig. 17-18.

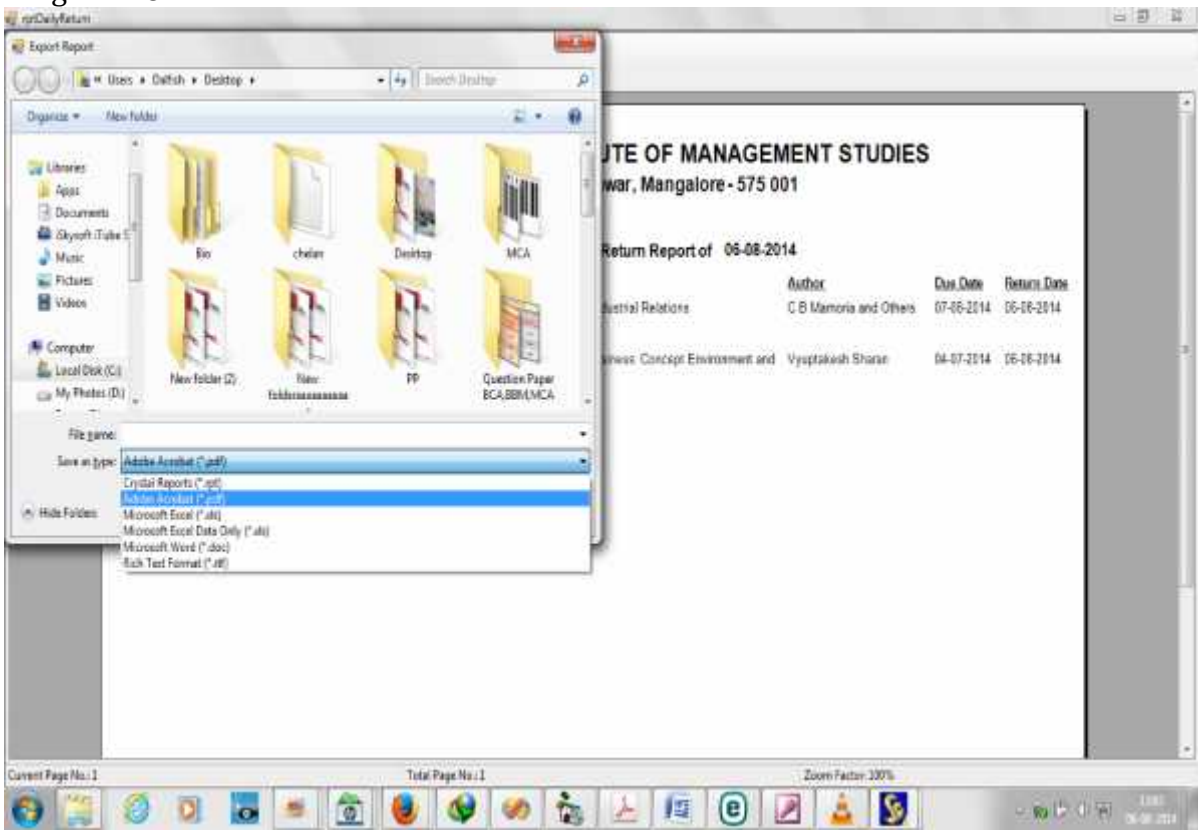


Figure 17: Storing PDF format of records

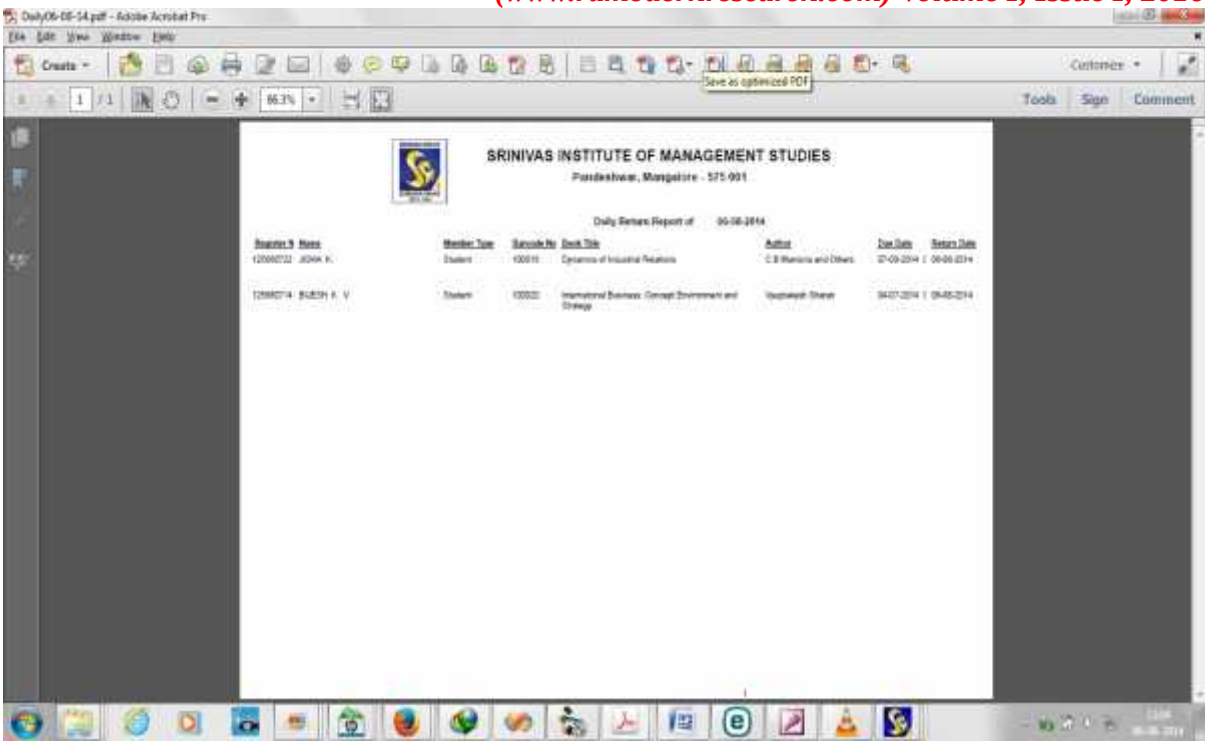


Figure 18: PDF format of the record

4. Impact of Automated System on Stakeholders:

Features of Developed SIMS Library Information System:

- ✓ Keep record of different categories like; Books, Journals, Newspapers, Magazines, etc.
- ✓ Classify the books subject wise.
- ✓ Easy way to enter new books.
- ✓ Keep record of complete information of a book like; Book name, Author name, Publisher's name, Date/ Year of publication, Cost of the book, Book purchasing date/ Bill no, etc.
- ✓ Easy way to make a Book Return.
- ✓ Easy way to make a book issue.
- ✓ Automatic fine calculation for late returns.
- ✓ Different criteria for searching a book.
- ✓ Different kind of reports like; total no. of books, no. of issued books, no. of journals, etc.
- ✓ Easy way to know how many books are issued to a particular student.
- ✓ Easy way to know the status of a book.
- ✓ **Advantages of SIMS Library System:**
- ✓ The data of the member would be entered in the database.
- ✓ There would be a safe storage of information of the member in the database.
- ✓ Quick, easy, flexible generation of member reports.
- ✓ A dynamic and fully computerized system is developed.
- ✓ With the database any data can be added, modified, deleted very quickly.
- ✓ Security features are very much provided in the system.
- ✓ User friendly environment.

Benefits to Stakeholders: We have identified following processes for the quality management system and their application for the benefits of the stakeholders. It has also

been kept in view that necessary resources, support and periodic review is provided for ensuring satisfactory results and continual improvement through these processes.

- ✓ Circulation Transactions.
- ✓ Acquisition of Books, Journals, and other non-Book Materials.
- ✓ Processing of Information Materials.
- ✓ Organization of Collection and Services.
- ✓ Storage of materials.
- ✓ Dissemination of Information to Stakeholders.
- ✓ Distribution of Library and Information services**.**

Limitations of SIMS Library System:

- ✓ If software is corrupted, the whole data will be collapsed.
- ✓ The infrastructure cost of digital library i.e. the cost of hardware, software.
- ✓ SIMS Library management requires high band for transfer of multimedia resources but the band width is decreasing day by day due to its over utilization.
- ✓ With the much larger volume of digital information, finding the right material for a specific task becomes increasingly difficult.
- ✓ Students cannot find where the exact book in shelves through this system.

Impact on Student and Faculty Service:

- ✓ They need not have to carry the library cards with them.
- ✓ They can search the status of a particular book by without going through all the shelves.
- ✓ Students will be notified if they not returned their book on time.

Impact on Staff Performance:

- ✓ Their workload has reduced.
- ✓ No need of maintaining manual records anymore.
- ✓ This will save time. They can avail any information within seconds in their fingertips through this system.

5. Conclusion:

Academic institutions and their libraries are experiencing a massive change in the way they function. Management institution libraries are no exception to this. Information technology innovations have found their way into applications in management and business libraries. The accelerating pace of information technology continuously raises the standards of users' anticipations and expectations of new value-added services. Today information is available in variety of forms like CD-ROM's, online databases, e-journals, etc. Inventions of devices like CD-ROMs and flash memory cards, which have huge storage capacities, have changed the outlook of libraries. These digital sources of information and storage devices bring drastic changes in the management libraries because of their distinct advantages in convenience of searching, low search times, most up-to-date information, etc. These digital sources also require considerable expenses in infrastructure development. However, this can be overlooked when we see the manifold advantages. Information technology also has a positive impact on all library and information services like reference services, current awareness services, online public access catalogue, etc. Human resource is another aspect which is influenced by the developments in IT and its application in libraries. This case study is on planning and development of an indigenous Library Information System at SIMS library to know the effect of automation on the quality of providing library services, user satisfaction of library services, the effective automation of work, and the control of library functions. This paper discusses the impact of automated system on the staff, job satisfaction, and

client relations. Results showed that the developed system made a significant impact on the quality library service management.

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