

Library Management System Using RFID, TQM and Artificial Intelligence

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Abstract

In today's dynamic environment, library and information center are adopted integrated library management System (ILMS) for effective and efficiency services. Libraries are designed to fulfil the needs of the users, which are ever growing at very fast rate. Total Quality Management (TQM) key center of attention is to keep quality values as per need of the consumers. TQM application in library services is a framework of various TQM elements which influence the library services, as well as Artificial Intelligence (AI) is board complex area of study, AI technologies. Numerous prototype intelligent library systems have been created of cataloguing, indexing, information retrieval, reference, and other purpose; however, relatively few of these systems have evolved into product or systems that are used in the day-to-day operations of libraries. In this paper, author presents an overview of RFID, TQM and AI can be used in libraries and information to run the libraries in a healthy environment.

Index Terms - RFID (of Radio Frequency Identification,) TQM(Total Quality Management) and AI (Artificial Intelligence)

Introduction

RFID is an abbreviation of Radio Frequency Identification that is a combination of radio-frequency and microchip. In (Stockman, 1948) discussed the basic theory for reflected power communication and implementation of RFID in published paper entitled (Communication by means of reflected power). (Vernon, 1952) published paper entitled (Application of the microwave homodyne) respectively. After that, the development of RFID continued. It has emerged rapidly as a key element to use as a security and access control system in library.

TQM always shows the way to motivate the employees to make their contribution in making decision for providing quality service. TQM approach directed to “Do the work right in the first instant” rather than to reply after the difficulty occur. To reach the expected benchmark of services and to achieve the goal of fulfilling the education requirements of its users has motivated libraries to introduce the principles of total quality management (TQM) into library services. This move toward Quality Management in the libraries can help them fully satisfy the users as well as increase the efficiency and work pleasure for the library staff.

Artificial intelligence (AI) encompasses the following general areas of research: (1) automatic programming, (2) Computer vision, (3) expert systems (4) intelligent computer- assisted instruction (5) natural language processing. Intelligent library systems utilize artificial intelligence technologies to provide knowledge-based services to library patrons and staff.

RFID Component

- Tag
- Reader
- Server

TAG –

It is an electronic tag that is pasted on the library documents for exchange data with reader via radio waves. Almost RFID tags have two main parts namely antenna and IC (Integrated circuit). Where antenna works as a channel between the reader and chip to receive the radio waves.

READER –

An RFID reader is a radio frequency transmitter and receiver device. When the tag comes in the reader's effective reading range, it activates a transponder and retrieves data from an RFID tag, which is used to track people, books or assets. Two types of reader are used on the libraries exit gate, first type that communicates with the Integrated library system (ILS) to verify that all material leaving the library has been checked-out and another type relies on a 'theft' byte in the tag that is turning off at time of charge and on at time of discharge' (Ranawella, 2006). RFID reader has three main components; antenna, transceiver and decoder. “When the reader receives

any signal from a tag, it passes that information on to the decoding software and processes it for forwarding to the information system”(Wyld 20060).

SERVER –

Server is a core element of the RFID systems which manages access to a centralized service and works as a communication gateway between the various components. Readers are integrated with the RFID server. Server can receives the information form tags through one or more readers at a time, checks these information with in the circulation database of library integrated management system and send information again to tags through readers that the items are proper checked out or not; which going outside the library.

RRID technology have successfully implemented in indian libraries, some of them

- Anna university, Chennai
- Indian institute of management, Lucknow
- Indian law institute library, New Delhi
- Vivekananda Library, M.D. University Rohtak
- Parliament library , New Delhi

TQM

The role of inspection is to confirm and certified the variance data producing finished goods, inspected to ensure whether the product met the specified tolerance limits or not where as services inspected by checking the devliverytime.(Hill. 1995)

TQM is the forth and the last step of quality initiative till date as shown in figure 1.1. (a) and 1.1 (b). The term of TQM was firstly use by the defence authorities in the United States (Evans & Lindsay,2001). At the time TQM considered as the new term given to Total Quality Control (TQC) and it is considered the quality is not to control but is is to manage (Kanji&Barker,1990). Firstly Japanese started their special work towards quality in 1962 and invented a concept of quality circle. USA aslo makes progress towards quality management but with less force than the Japanese. In the early 1980s American realized that the are lagging behind as compare to the Japanese in producing the quality products. At the time American take this as a crucial factor for their organizations accomplishment and take is as a management strategic in product as well as in service sector to satisfy the needs of the customers. Today, it is well known structured approach used by

most leading organization to develop their quality improvement programmers.

Inspection (1910) → Quality Control (1924) → Quality Assurance (1950) → Total Quality Management (1980)

TQM Principles in library Services –

The success rate TQM implementation as an executive attitude in product and process segment; this approach is also ever more adopted by service sector including libraries(Duren,2012). There are many approaches that can be used in libraries to achieve quality service but all these approaches lie down under the roof of TQM principles. TQM application in library services is a framework of various TQM elements which influence the library services (Sharma 2013a). From these TQM elements, the management's scientists have derived various principles of TQM in library services.

AI

Artificial intelligence the system helps simplifying book issuing process and record maintenance as complete solution to conventional library management system.

Library management system is an application which refers to library system. It is used by librarian to manage the library using a computerized system where he/she can record various transactions like issue of books, return of books, addition of new books addition of new students etc.

Along with easy work flow for both the admin and the librarian this system also consists of an android application for users which has AI (chat-bot). students can request to issue book directly from this application remotely over internet.

There will be three main function entities as admin, Librarian and students. Admin has overall control over system and will perform functions like add librarian and reviewing library reports. Librarian has functions to add students. Maintain records of book as well as student and librarian controls the book transaction process.

Student will interact with system using chat – bot for searching the required book, send request to issue book. The system will share the common database for all three entities. The database has dynamic nature, dynamism is maintained by reflecting the changes back in database on the go.

Admin → Librarian → Students → Android App (Chat-bot)**Conclusion –**

Dr. S.R. Ranganathan gives a statement as the law of library science; “Library is a growing organism” and it grows in resource, services and users. RFID integrated library management system has partially solved the problem and as well as as give a lot of facilities, TQM also move towards Quality Management in the libraries can help them fully satisfy the users as well as increase the efficiency and work pleasure for the library staff. It can open such doors of possibilities, in the filed of library services that were never believed to exist. It turn out to be easier in accomplishing the services precisely, well – timed and getting success. Libraries can benefit by commencing the idea of TQM in subsequent manners and library management system using artificial intelligence which will benefit the sutdetns as well as as library staff. It makes entire process online where students can search book, request for book using chat-bot. AI should provide quality experience for stake holders.

