Quality Circle: A Case Study on Automatic Token Generation System for RIT Library

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Abstract : Quality Circle is one of the platform where group of people in the organization solves the problem exist in their workplace. This activity improves teamwork, creative ability within the employees of the organization along with the growth of the organization. This paper represents a case study on transformation from manual token generation to automatic token generation system for library to collect fine and photocopy fees. Library is a core component of any educational institution. Libraries give people the opportunity to find jobs, explore research, experience new ideas, get lost in wonderful stories, while at the same time providing a sense of place for gathering. It's never just a random collection of books. In our institute's central library, we were working with a traditional manual method of issuing token for photocopying facility and book fine collection. The current method uses paper and pen mode for the token generation. It consumes a lot of time to tally the accounts and generate report. We have taken this problem into consideration to make the system fully automatic by building a web application. The proposed system consists admin-user modules comprising mainly two modules for xerox utility and fine collection. The system also keeps the track of daily transactions. Additionally, the system has helped to reduce the paper work with human efforts and time, generating the reports on a click with easy tally of accounts.

Keywords: Quality Circle, teamwork, Library E-token generation System etc.

1. Introduction

Quality Circle [1][2][3] is a group employee from the organisation collaborate together, identify a problem faced by the organisation and try to find a solution to resolve it.

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We started our journey from Problem identification to collect real time problems exist in the organization. We used brainstorming and rating method to finalise the same.

The Institutes of Higher education have accurately been considered as the main foundation for development and progress of any country. Library is a core component of any educational institution. They are important cornerstones of a healthy community. Libraries give people the opportunity to find jobs, explore research, experience new ideas, get lost in wonderful stories, while at the same time providing a sense of place for gathering. It's never just a random collection of books. Library is kay component of students and faculties to upgrade the knowledge to rained technical staff, research scholars, students and teachers. Every educational institutes have some protocols to distribute and collect books from all users. In traditional system, students get the limited books from their account and they have to submit the book to library within deadline. Different user has different deadlines like students and outsiders can take benefit of issued book for fifteen days while faculties can take benefit of issued book for two months. If any user will not be able to return the books on time then they have to pay fine. On the other side, in Rajarambapu Institute of Technology photocopy facility is also available in the Library where students can take photocopy of required material. User has to pay fine or amount of photocopies which is time consuming because of manual token generation. .

2. Statement of the Problem

The Xerox centre and book fine system at Rajarambapu Institute of Technology's central library are currently using the conventional method of issuing a token for each transaction. This method requires the use of paper for the token, as well as a significant amount of time to tally the accounts and produce the report.

On a regular basis, students make use of the central library's Xerox facility. The traditional method of producing tokens takes a long time, and the library staff spends 2-3 working hours per day tallying accounts for the tokens.

The following are the limitations found in order to explore the gaps in the existing framework.

I. Token generation is a time-consuming manual process.
II. Creating tokens requires more paperwork.
III. Making a cumulative report requires additional effort.
IV. Tallying regular account data requires additional effort.
V. Late fee report, photocopy report, and other charges for students and outsiders are not tracked.

Based on study of existing system, we have applied Brainstorming with 5W-1H principles[4] to identify causes of problem.

- **Who** is facing this problem? Library Staff, Student, and outsiders
- **Which** problem library was facing? Time consuming token generation process
- **Why** time consuming? Token generation process is completely manual
- **When** problem occur? During issuing token
- **Where** problem was occurring? At photo copy point and fine collection including report generation
- **How** to solve this problem? Find a solution in such way that it will reduce human efforts and time by making it automate.

After finalizing the problem, we have again performed Brainstorming to identify severity of problem and impact of problem on student, department and institute by considering time as an important factor. We used rating method and then drawn Pareto diagram [5] shown in Figure 1 to represent the weightage of each identified problem. Xerox centre and book fine system at Rajarambapu Institute of Technology's central library are currently using the conventional method of issuing a token for each transaction. This method requires the use of paper for the token, as well as a significant amount of time to tally the accounts and produce the report.

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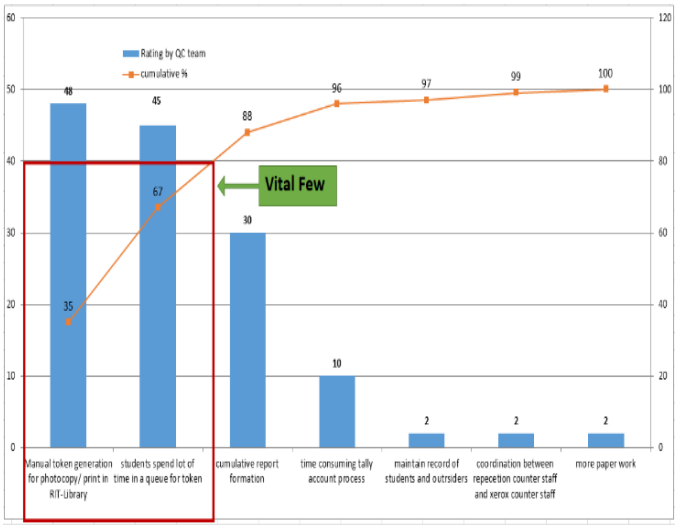

Fig. 1 Pareto diagram of shortlisted problem statements vs rating

It depicts that the problem **"Manual token generation for photocopy/ print in RIT-Library"** has maximum rating as compared to other problems. This diagram used useful to find vital few category problems to solve trivial many which is based on 80-20 rule.

In alignment to the above stated limitations and problem exist in the workplace, we have planned to design a full-fledged web based system for Central Library of RIT. The problem stated as:

"Web application to replace the traditional methodology of generating tokens for photo copy and library payment.

3. Methodology

The automated token generation library management system has been proposed and designed to solve the problems that library staff, students, and outsiders encounter. This framework is primarily intended for the Library section of Rajarambapu Institute of Technology. The basic root cause of the problem is first defined using a root cause analysis using two different methods Figure 2 shows fishbone diagram[6] where students,

library staff and outsiders are the main roots along with the causes associated with them.

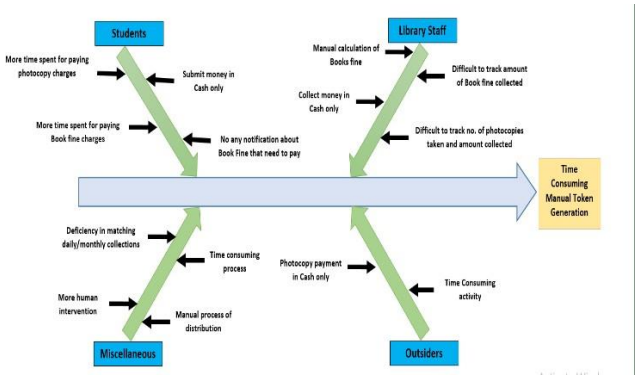

Fig. 2 Fishbone diagram

Figure 3 shows Why-Why Analysis to find main cause from where actual problem starts.

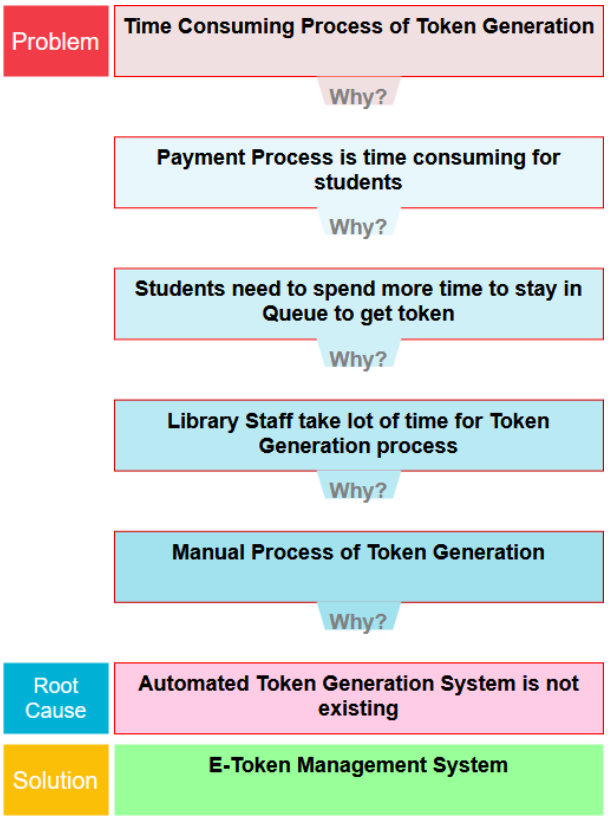

Fig. 3 Why-Why analysis

The need for the proposed system design is dependent on the time factor, as shown in Figure 2. The proposed system would automate all aspects of token creation, payment, and so on.

We have also used root cause analysis of the problem to design a complete flow of the system.

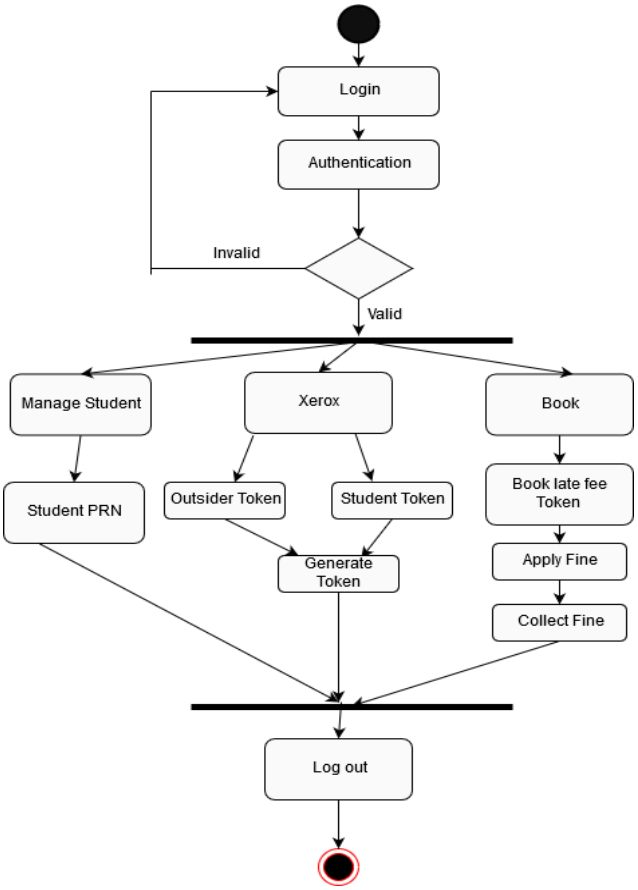

Fig. 4 Flowchart of the proposed architecture

The following are the key goals of the proposed system:
1. To minimise the amount of paper used to create tokens.
2. Use tally accounts to shorten the time it takes to generate tokens.
3. Using technology to increase the efficiency of the solution.
4. To ensure the security.

As shown in Figure 4, library staffs duties include manual token generation, photocopy charge collection, book fine collection, and manual record maintenance, among others. In this regard, the built architecture will assist library staff members and minimize the amount of effort needed on their part. This automated framework also helps students with their problems. The planned technique would make even outsiders feel at ease.

4. Implementation

We have used Asp.net Framework for developing this web application. For design of Dynamic master pages of web application we have used aspx as our front end pages. In this design HTML and CSS coding is implemented along with some animated effects of javascript. System is going to be used by the clerk at RIT Central Library. He/She has to login to the system using the credentials provided to him by us. In case of they

might forget the password or credentials of the account they can get their password on their registered Email account on request.

Now after successful access to the system to the system they are able to generate tokens for photo copy and also collect the Book Late fine as shown in Figure 5. Session handling is done properly for the security issues.

Student Tokens

Enter PRN here to disable | Disable

Token No.	PRN No.	Amount	Payment Mode	Date	Status	Edit
639	1602051	5	UPI	03, Feb 2021	issued	Update Cancel
638	1856023	63	UPI	03, Feb 2021	issued	Edit
637	1605047	4	UPI	03, Feb 2021	issued	Edit
636	1406063	0	UPI	03, Feb 2021	issued	Edit
635	1806010	7	UPI	03, Feb 2021	issued	Edit
634	1604045	4	UPI	02, Feb 2021	Expired	Edit
633	1706088	1	UPI	02, Feb 2021	Expired	Edit
632	1706088	1	UPI	02, Feb 2021	Expired	Edit
631	1704036	2	UPI	02, Feb 2021	Expired	Edit
630	1872052	2	UPI	02, Feb 2021	Expired	Edit
629	1872052	29	UPI	02, Feb 2021	Expired	Edit
628	1776023	2	UPI	01, Feb 2021	Expired	Edit
627	1701019	2	UPI	01, Feb 2021	Expired	Edit
626	1708014	1	UPI	01, Feb 2021	Expired	Edit

Fig. 5 Student token status

For the back end Development of web application, we have used C# as our primary programming language which works under Asp.net Framework. For the authentication of user who is using the system we have made the proper credentials match from the MySQL Database to the credentials he/she is entering in login page. In case of forget password, password can be recovered on his registered email account. After the Payment of photo copy token, students get notified by the system through SMS. After the Book fine Payment students get notified by Email. After entries of 800 tokens in the system Excel report is generated in the desired directory based on specified date range as shown in Figure 6.

Book fine report

Token NO.	PRN	Name	Email	Amount	Payment Mode	Date
66	1605035	TARALEKAR PRANATI DATTATRAY	Pranati1312@gmail.com	10	UPI	2/4/2021 12:00:00 AM
65	1406063			89	UPI	2/3/2021 12:00:00 AM
64	1745039	HULKE VAISHNAVI BHARATRAO	pratibha.jagtap@ritindia.edu	7	UPI	2/3/2021 12:00:00 AM
63	1776023	YADAV GANESH ANANDRAO	gy866384@gmail.com	178	UPI	2/1/2021 12:00:00 AM
62	1776023	YADAV GANESH ANANDRAO	gy866384@gmail.com	178	UPI	2/1/2021 12:00:00 AM
61	1701024			34	UPI	2/1/2021 12:00:00 AM
60	1854001	PATIL PRAJKTA HARESH	patilprajkta1000@gmail.com	38	UPI	2/1/2021 12:00:00 AM
59	1827010	KHOT SHRUTI SUDIP	shrutikhot3@gmail.com	31	UPI	2/1/2021 12:00:00 AM
58	1855009	KSHIRSAGAR PRATHMESH DILIP	kshirsagarprathmesh16@gmail.com	72	UPI	1/30/2021 12:00:00 AM
57	1802047	JADHAV ASHISH ASHOK	278skoda@gmail.com	8	UPI	1/30/2021 12:00:00 AM

Fig. 6 Report of fine/amount collection

5. Result Analysis

The Table 1 shows the time-consuming task present in the existing system. and comparison of time spent on manual task and automated task. We have taken inputs from library staff for manual time calculation. The calculation has been made by taking student count as 200.

Table 1. Result Analysis

Sr. No.	Task	Time Spent	200 Students Visit Every Day	Our System
1	Tally account	1.5 Hr/day	1.5 Hr/day	On a single Click
2	Manual token generation	1.30 min/student	1.30*200 =300 min	30 sec *200 = 150 Min
3	Cumulative Report	Approx.1hr/report	1hr/report	On a single Click
4.	Fine calculation	2 min/student	2*200 =600 min	On a single click
Total Time required			**14.16 Hrs/day**	**3 Hrs. Appx.**

Tangible Results:

- Reduced time required for Fine & Xeroxing charges collection and management. As shown in below Table
- Usage of automated process inline to recommended pattern
- Automation in report generation

Intangible Results:

- User Friendliness
- Reduce errors due to automation tool

6. Conclusion

The E-Token Management System has been designed and developed for RIT-Central Library. This web application software assists for easy, digitized token generation procedure for paying photocopy charges and book fines. It is also helpful in maintaining the entire record on a daily, monthly and yearly basis. The project is deployed at RIT-Central Library and currently used for routine works. The deployed project has reduced time requirement for fine & xeroxing charges collection by 45%. It has been able to automate process inline to recommended pattern and report generation. The feedback of library staff has recognised the user friendliness of software. Implicitly, the automated process has streamlined to error free context.

This project is further planned to extend by including the sloinkit_id for processing the entire task comprising e-payment process. Furthermore, the custom requirements of book requisition cum claim, book damage cost and other modules can be integrated in the same project.

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