International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 10 | Oct 2020 www.irjet.net p-ISSN: 2395-0072

Ethical Ways to Reduce Cost and Eliminate Waste in Automated Library Management System (ALMS) using TDABC

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Abstract - *The purpose of Automated Library Management System (ALMS) is to automate the existing manual system by the help of computerized equipments and full-fledged computer software, fulfilling their requirements so that their valuable data/ information can be stored for a longer period with easy accessing and manipulation of the same. The required software and hardware are easily available and easy to work with.*

ALMS, as described above, can lead to error free, secure, reliable and fast management system. It can assist the user to concentrate on their activities rather to concentrate on the record keeping. Thus it will help organization in better utilization of resources. The organization can maintain computerized records without redundant entries. That means the one need not be distracted by information that is not relevant, while being able to reach the information.

The aim is to automate its existing manual system by the help of a computerized equipments and full-fledged computer software, fulfilling their requirements, so that their valuable data/ information can be stored for a longer period with easy accessing and manipulation of the same. Basically the project describes how to manage for good performance and better services for the authorized libraries as clients.

Also, this research based project report deals with reduction of cost involved in the ALMS project by a technique named Time Driven Activity Based Costing (TDABC), described in two main activities, namely, original and copy cataloguing. These processes were selected because they are considered to be a part of the core activities of a library to manage its collection, but are also resource intensive. TDABC is a quicker and easier way of calculating cataloguing savings. In fact, TDABC is a useful method to perform cost analysis in cataloguing processes, and consequently provides valuable data for managerial decisions. The TDABC implementation provided project managers with important information about cataloguing costs and performance measurements; and guided decisions concerning resource allocation and process improvements. For example, based on the obtained results, the project manager decided to delegate certain activities and define a set of batch activities. It, therefore, shows significant contributions to the literature on the implementation of advanced cost models for library processes, and more precisely for cataloguing activities.

***Key Words*: Project management, Time Driven Activity Based Costing (TDABC), Requirement Analysis, library processes**

1. INTRODUCTION

The research study deals with the overall end to end approach to a software project as done in a service based IT industry. Consider an authorized library which approaches to a service based IT industry to automate its day to day functions and work on the effectiveness of making its functions automated.

Now, once the IT industry has received this project, it will start to delegate its work to various departments. It starts with the introduction, and then goes to requirement analysis wherein the major requirements and configuration is made in configuration management. Then, the problem background is also analyzed for which a proposed solution is given.

Now, the resource management for man power, service, and technology is also made. Then, the software development team works on developing system module, integration of System module, performing initial testing and so does development gets finished. Next, the software developed for ALMS goes to the software testing department where system testing is performed, issues/ bugs found are documented, issues/bugs found are corrected and so does the testing gets completed. Now, it is sent to the Quality Management Department where the Process Improvement is done, its quality planning, Quality assurance and Quality control parameters are simultaneously worked upon.

Meanwhile, in accordance with the above tasks being performed by various departments, the ALMS software's Project Management aspect gets continuously monitored. The timely phases i.e., Project Initiation, Project Planning, Project Estimation are also given priority and is monitored. Then the Software size estimation, effort estimation and time estimation is also done. The Scope Management, Cost Management, Cost estimating, Cost budgeting, Cost control parameters are thoroughly reviewed and monitored. Next, Project Scheduling, Project Execution, Project Monitoring and control is also continuously done by the management.

Also the Sales management team is responsible for the successful Sales Operations by strategizing the sales and defining the various sales processes. The Sales Analysis is

carried out by Sales final Reporting. The project is also concerned with the Risk Management parameters such as its Design and Implementation issues, Maintenance Problems, High work load issues, Application Complexity, any Software corruption, Hardware failure and the Operating environment.

Once the project goes live to the end user i.e. to the authorized library, the industry will start to work on the Disaster Recovery and Business Continuity, another major department.

The project also accounts for the Maintenance and Support Services such as new development and upgrades, Technical Improvement, Monitoring of Existing Solutions, New Functionality Implementation, Performance Optimization and Application Documenting.

One of the major functions provided by Operations department in an IT industry accounts for the overall operations right from acquiring the ALMS project from the client to the final delivery to the client/end user characterized as Inward Logistics and Outward Logistics. The operations involved in software development are often dispersed throughout the organization and various development tools and TQM tools and practices can be applied and who should be in charge of their implementation. The operations involved in development process of software are influenced by the degree of variety of the offering and of variability of the delivery process.

Lastly, the overall documentation of the project build is done by the data operator supervised by the designated Project Supervisor so as to have an idea about the project ALMS and its operations.

In my research I have also worked on the ALMS's ethical ways to reduce cost and waste using Time Driven Activity Based Costing (TDABC) approach.

Due to the recent COVID-19 economic crisis, the high cost of information, and the rising demand of services and information resources, libraries have been required to shift budgeting and spending priorities. As a consequence, several decisions have been made, such as cutting collection budgets, eliminating budgets for travel or conferences, freezing salaries, finding new ways to fund programs, and moving from physical to digital collections. This evolution has forced libraries to prioritize their spending and minimize their costs, concentrating on key success factors such as cost efficiency, quality and innovations.

The managers in these difficult circumstances are required to increase their understanding of library activities and their related costs in order to justify resource requirements and the creation of new services or face budget reductions. And to do so, they must rely on valid information about the library processes and cost estimations, as well as differentiate the kind of products and services libraries provide to customers. For instance, there are no tangible products in libraries except for scanning and photocopying and the primary products are a wide range of services.

By implementing TDABC in management, key benefits are provided, such as the possibility of disaggregating values per activity to identify non-value added activities; benchmarking different scenarios to adapt best practices for performance improvement; and justifying decisions and choices such as staff recruitment, training and new service development.

Because of the current economic conditions of our times and because of limited resources, academic libraries are called to search for efficient methods to balance their limited budgets with the services provided. Hence, the costs and time consumed by activities, processes and resources are extremely important and of high interest to project managers in identifying non-value-added activities, finding and adapting best practices, and justifying decisions and choices.

Objectives:

1. To understand the end to end functionalities of how a software project (ALMS Software) is acquired, how its development is carried out, how the operations work and how the final delivery occurs in an IT industry.
2. To reduce cost and eliminate waste in ALMS software development using TDABC approach.

2. RESEARCH METHODOLOGY

The objective of the research is to understand the end to end functionalities of how ALMS Software is developed and acquired, how the operations work and how the final delivery occurs in an IT industry and also to reduce cost and eliminate waste in ALMS software development using TDABC approach. So, for this purpose research was conducted and secondary data on this topic was found. The secondary data found is both quantitative as well as qualitative. The qualitative data was collected from various research papers and journals, research articles and reliable news portals. The quantitative data collected was collected from the various organizations' website. Secondary data was used to solve this research problem because in-depth information was needed and at a global scale. Primary data collection was not an option as the sample size required was quite large i.e. more than 500 participants that are associated with global IT organizations. The need was satisfied by the secondary survey data.

3. PRELIMINARY STAGE

At first, when the client approaches the organization for getting the desired product developed, it comes up with a rough idea about what all functions the software must perform and which all features are expected from the software.
Referencing to this information, the business analysts perform a detailed study about whether the desired system and its functionality are feasible to develop.

This project indulges with the development of ALMS software by ensuring effectiveness in reduction of cost and elimination of maximum waste.

In the development of software at first the required amount of resources is finalized to ensure effectiveness in the complete software development and delivery.

4. REQUIREMENT GATHERING

The process to gather the software requirements from client, analyze, and document them is known as requirement gathering.
Analysts and engineers communicate with the client and end-users to know their ideas on what the software should provide and which features they want the software to include.
Software Requirement Specification (SRS) is a document created by system analyst after the requirements are collected from various stakeholders.

Technique chosen for data gathering for ALMS
The technique for data gathering chosen for ALMS Software is **questionnaire** using Google forms because of following reasons:

- Can contact a large number of people at a relatively low cost.
- Potentially information can be collected from a large portion of a group.
- The results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package.

5. RESOURCE MANAGEMENT

Resources	Description	Availability	Allocation
1.Man Power	No. of members involved in the project.		
2.Material	It includes the material which we require to create our system efficiently	CD, hardware, software	CD,software, hardware
3.Service	Internet for the feedback from users	Internet, Books	Internet, Books
4.Equipments	The equipments which we required to create the system.	Printer, computer	Printer, pen computer
5.Time	It contains the time taken to complete the system.		
6.Money	It is total amount of money we required to make the system		

Fig. 01- ALMS Resource management

6. SOFTWARE DEVELOPMENT METHODOLOGY

As an innovative approach, the agile software development methodology is used for articulating a well-organized project management procedure allowing for recurrent alterations. Certainly, such type of a methodology is one theoretical outline for undertaking several software engineering projects.

This approach is used by creating software in short time boxes, known as iterations, which happen to last from one week to one month.

- Adaptive approach that responds to changes favorably
- Allows for direct communication to maintain transparency
- Improved quality by finding and fixing defects quickly and identifying expectation mismatches early.

Focus has been made on the following set of library requirements while designing the software modules:

- Any member should be able to search books by their title, author, and subject category as well by the publication date.
- Each book will have a unique identification number and other details including a rack number which will help to physically locate the book.
- There could be more than one copy of a book, and library members should be able to check-out and reserve any copy.
- The system should be able to retrieve information like who took a particular book or what are the books checked-out by a specific library member.
- There should be a maximum limit 5 on how many books a member can check-out.
- There should be a maximum limit 10 on how many days a member can keep a book.
- The system should be able to send notifications whenever the reserved books become available, as well as when the book is not returned within the due date.
- Each book and member card will have a unique barcode. The system will be able to read barcodes from books and members library cards.

7. SOFTWARE TESTING APPROACH

Software Testing is evaluation of the software against requirements gathered from users and system specifications. Testing is conducted at the phase level in software development life cycle or at module level in program code.

Interface	Approach
Login	Unit Testing
Add	Unit Testing
Search	Unit Testing
Update	Unit Testing
Delete	Unit Testing
Issue	Unit Testing
Return	Unit Testing

Table 01- Perform initial testing

8. TOTAL QUALITY MANAGEMENT (TQM)

According to ISO, quality management is that aspect of the overall management function that determines and implements quality policy and as such is the responsibility of top management.

It is a managerial responsibility and relates to control of all activities for future success of the organization.

It is management of quality, totally and fully in all respects, small areas and all activities of organization, right from top to bottom. In ALMS, below are the quality activities taken into consideration:

- Check that assumptions and criteria for the selection of data and the different factors related to data are documented.
- Check for transcription errors in data input and reference.
- Check the integrity of database files.
- Check for consistency in data.
- Check that the movement of inventory data among processing steps is correct.
- Check for uncertainties in data, database files etc.
- Undertake review of internal documentation.
- Check methodological and data changes resulting in recalculations.
- Undertake completeness checks.
- Compare Results to previous Results.

9. PROJECT MANAGEMENT

9.1 Scope Management

It defines scope of the project; this includes all the activities, process need to be done in order to make a deliverable software product. Scope management is essential because it creates boundaries of the project by clearly defining what would be done in the project and what would not be done. During Project Scope management, it is necessary to –

1) Define the scope
2) Decide its verification and control
3) Divide the project into various smaller parts for ease of management.
4) Verify the scope
5) Control the scope by incorporating changes to the scope

9.2. Project Estimation

Project estimation involves the following:

9.2.1 Software size estimation

Software size may be estimated either in terms of KLOC (Kilo Line of Code) or by calculating number of function points in the software. Lines of code depend upon coding practices. Function points vary according to the user or software requirement.

9.2.2 Effort estimation

The manager estimates efforts in terms of personnel requirement and man-hour required to produce the software. For effort estimation software size should be known. This can either be derived by manager's experience, historical data of organization, or software size can be converted into efforts by using some standard formulae.

9.2.3 Time estimation

Once size and efforts are estimated, the time required to produce the software can be estimated. Effort required is segregated into sub categories as per the requirement specifications and interdependency of various components of software. Software tasks are divided into smaller tasks, activities or events by Work Breakthrough Structure (WBS). The tasks are scheduled on day-to-day basis or in calendar months.

The sum of time required to complete all tasks in hours or days is the total time invested to complete the project.

9.2.4 Cost estimation

This might be considered as the most difficult of all because it depends on more elements than any of the previous ones. For estimating project cost, it is required to consider:

- Size of the software
- Software quality
- Hardware, additional software or tools, licenses.
- Skilled personnel with task-specific skills
- Travel involved
- Communication
- Training and support

9.3 Project Scheduling

Project Scheduling in a project refers to roadmap of all activities to be done with specified order and within time slot allotted to each activity. Project managers tend to define various tasks and project milestones and then arrange them keeping various factors in mind. They look for tasks like in critical path in the schedule, which are necessary to complete in specific manner and strictly within the time allocated.

For scheduling a project, it is necessary to -

- Break down the project tasks into smaller, manageable form

- Find out various tasks and correlate them
- Estimate time frame required for each task
- Divide time into work-units
- Assign adequate number of work-units for each task
- Calculate total time required for the project from start to finish

9.3.1 Cost estimating: Software Price= Cost + Profit

9.3.2 Cost budgeting

Budgeting is a sub-process within estimating used for allocating the estimated cost of resources into cost accounts against which cost performance will be measured and assessed. This forms the baseline for cost control.

9.3.3 Cost control

Cost control is concerned with measuring variances from the cost baseline and taking effective corrective action to achieve minimum costs. Procedures are applied to monitor expenditures and performance against the progress of a project.

Once the project gets completed, the feedback process will be in place.

9.4 Project Management Tool

9.4.1 Gantt Chart

Gantt chart can help in planning and managing projects by breaking a large project into a series of smaller tasks in an organized way.

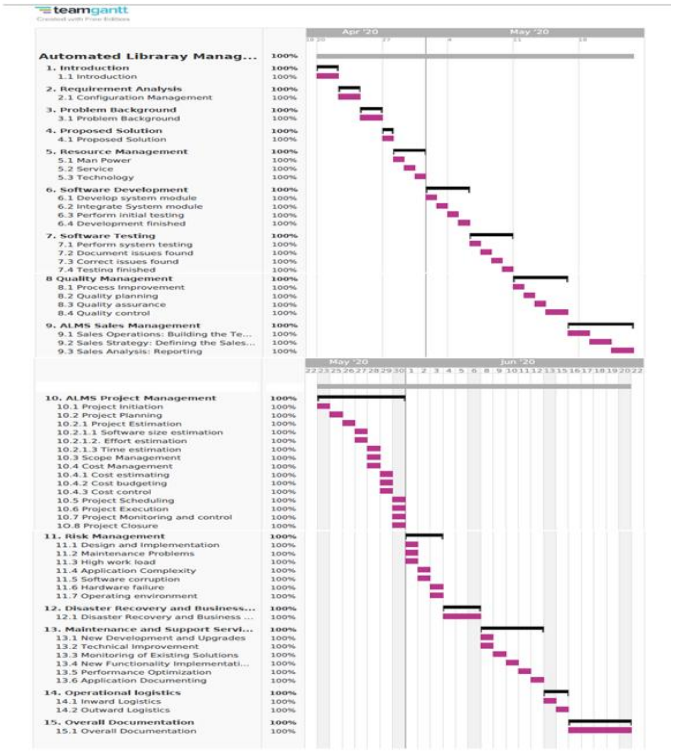

Fig 02: ALMS Gantt chart

10. SALES MANAGEMENT

Sales management is the process of hiring, training and motivating sales staff, coordinating operations across the sales department and implementing a cohesive sales strategy that drives business revenues.

In the process of sales management of ALMS:

- Here, we are concerned that the sales associates should be friendly, helpful, knowledgeable and willing to respond to customer's calls and emails in a timely manner.
- The associates are willing to go the extra mile and provide us with the resources to help us fully investigate the system.
- The associates should encourage their potential customers to speak to existing users, not only to endorse the product, but to provide an insight into the company itself.

11. RISK MANAGEMENT

Risk management involves all activities pertaining to identification, analyzing and making provision for predictable and non-predictable risks in the project.

RISK TYPE	POSSIBLE RISK	SOLUTION PROPOSED
Loss of data storage devices	It might be possible that the data stored might get lost due to damage of hard disk.	Work done should have at least two backups.
People	Fewer people than necessary are available. People with specific skills that a project might require are not available.	Training for critical areas of the project should provide
Schedule	The underestimation of schedule also happens due to inexperience or optimism.	Proper time management should be maintained.
Cost	The degree of uncertainty that the project budget will be maintained. Underestimating the cost drivers.	Proper cost estimation should be there.
Development Risk	Availability and quality of the tool used to make the project.	Make the software available and have proper training on it.
Data Communication	Communication gap between the developing members of the project.	Frequent meetings should be organized for better.

Table 02- Risk Management parameters in ALMS

12. DISASTER RECOVERY AND BUSINESS CONTINUITY

In ALMS, we have considered the following disaster recovery mitigations:

- Replace aging hardware before it fails
- Use power line filters and/or surge protectors, at least on the server
- Keep our Operating System up-to-date by installing Service Packs
- Use up-to-date virus protection software

- Use only commonly available backup media, software and drives
- Monitor the amount of free disk space on our database server to ensure that there is enough space for the backups and database growth
- Document the backup and recovery procedures
- Make sure that each action is assigned to a person
- Maintain and check backup procedures
- Rotate backup media so that we are not over-writing the most recent backup
- Keep off-site backups of the backup data and recovery software
- Check the backup logs: allow access for both Library and IT staff for this purpose
- Carry out a test recovery on to a set of the test databases at regular intervals
- At regular intervals, practice recovering library's databases from the most recent backups. Put these regular practices into plan.

13. SOFTWARE MAINTENANCE

In ALMS software maintenance, all the modifications and updations are done after the delivery of software product. The maintenance activities are described below:

- Ongoing Software Maintenance and Support (2nd and 3rd line support)
- New Development and Upgrades
- Enhancements
- Technical Improvement
- Monitoring of Existing Solutions
- New Functionality Implementation
- Performance Optimization
- Application Documenting

14. ROLE OF OPERATIONS

Logistics play a huge role in the smooth operations of a business. It is extremely difficult to run a flawless logistics division due to the sheer number of variables and demands that such a system is subject to.

In ALMS, Operations can be thought of as the business function responsible for getting the right item in the right quantity at the right time at the right place for the right price in the right condition to the right customer.

14.1 Inward Logistics

Inward logistics in software industry refers to the internal logistics tasks and activities that businesses need to complete in order to operate. It usually refers to the logistical operations that operate fairly upstream (B2B).
It involves the relationship with parties that operate further upstream than the given business. Depending on the business, the parties that operate upstream may vary dramatically in their respective operations.

In ALMS, the inward logistics would entail the initial requirement gathering from the intended client (students, customers), necessary knowledge for the software development, right testers, how to invest in the software applications in preparation for and during the final process, and how to manage the flow of various processes during the delivery stage on the software.

14.2 Outward Logistics

Outward logistics refer to the tasks and activities involved with moving the software application to the end user. Such logistic duties usually apply to players that operate relatively downstream, which are usually the last party. The duties include the delivery of final product after the beta and alpha testing is performed to the point of sale, to the end user.

In ALMS, the operations manager would be in charge of coordinating with the delivery system and the marketing department to make the application go live in the production stage, as well as handling the operational issues, if any, faced by the end customers.

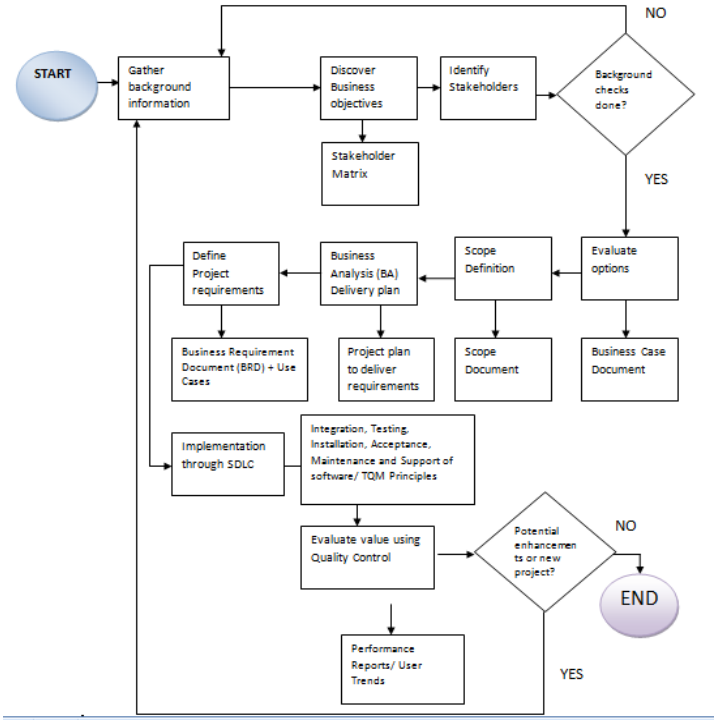

Fig. 03- Process Flow Diagram of ALMS Operations

15. SOFTWARE DOCUMENTATION

Software documentation is an important part of software process. A well written document provides a great tool and means of information repository necessary to know about software process. Software documentation also provides information about how to use the product.

15.1 Technical documentation

These documentations are maintained by the developers and actual coders. It makes debugging easy and traceable. There are various automated tools available and some comes with the programming language itself.

15.2 User documentation

This documentation includes software installation procedures, user-guides, uninstallation method and special references to get more information like license updating approach.

16. LEAN SOFTWARE DEVELOPMENT

Lean software development is an iteration methodology initially developed for the manufacturing industry to optimize production and avoid waste. It decreases cost, efforts, and waste.

16.1 Lean Artifacts

All the activities in any industry are divided into Value Add (VA) or Non-Value Add (NVA).

16.1.1 Value-Add activities – are all the activities that physically improve a product or a service for customers which adds value

16.1.2 Non-Value Add (NVA) activities - are the activities that do not add value but are performed. The Customer has to bear the cost of NVA, and since it is not value add, a customer doesn't want to pay for it.

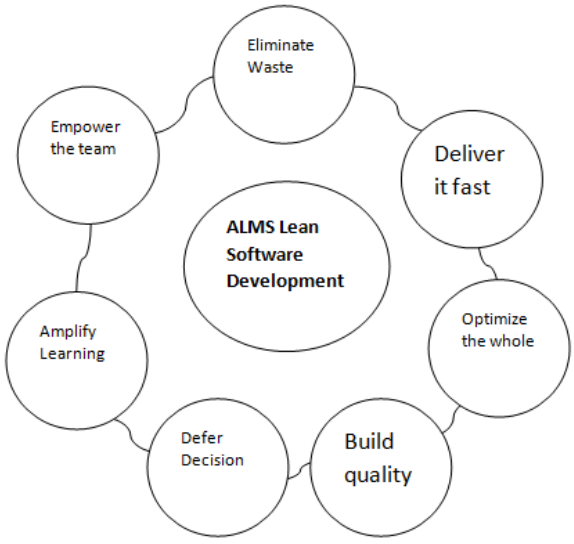

Fig 04- Lean Software Development in ALMS

16.2 Wastes and ways to reduce waste in ALMS

Any activity that absorbs resources but does not add any value, as perceived by the customer, is waste. In ALMS, I have described the following waste and its remediation.

16.2.1 Incomplete/Partial Work Done

Work doesn't add value to the customer until its complete, which, in turn, keeps the resources occupied. Until and unless it is not complete, we can't figure out whether it will work or not.

- Incomplete coding documentation
- Partial or incomplete code
- Unverified code

Ways to reduce

- Try not to leave things unfinished
- Limit and decide to complete work in progress

16.2.2 Extra or Not Needed Feature

A feature that has not been demanded by the customer, or is not suggested by the customer but comes as part of the package, is called Extra Feature.

In ALMS, the features such as Printing our own barcodes and Web based OPAC (Online Public Access Catalog) system might not be used by various users. Now comes the 80:20 rule in the software industry. It means 80% of the users, use only 20% of the features.

Ways to reduce

- Instead of worrying about how to develop stuff faster, it is far better to learn how to stop developing the things that are not important and focus on the things that will have the real impact.

16.2.3 Extra Processing or Extra Documentation

Extra processing is incompetent or unnecessary additional process steps that add no value to the development process.

- Very detailed documentation
- Extra management/planning activities

Ways to reduce:

- Minimize extra activities
- Plan as per requirement

16.2.4 Task Switching

Every time a person shuffles between tasks, there is a significant time that is required to gather the information, thoughts, and get into the new task. So, if a developer is interrupted two times a day, over half an hour of work is lost.

- One person working on two projects
- Developer interrupted for breaks for conversations over other projects.

Ways to reduce

- Minimize shuffling and assign resources to one project at a time
- Eliminate what is not important
- Minimize interruptions
- Prioritize the activities

16.2.5 Waiting/Delays

There are some activities for which we need approvals, or there is some action required by some other team. Then this waiting for approval or waiting for information leads to waste referred to as Waiting/Delay waste.

- Waiting for inputs/information
- Delays in approvals
- Delayed testing

Ways to reduce

- Sitting in the same location as the client, this helps in quick approvals.
- Face-to-face conversations
- Regular feedback

16.2.6 Hand-off

Knowledge lost each time a deliverable/artifact is handed-off to analyst, designer, developer, and tester. While handing over, we can't tell everything in detail no matter how much we try, some information would always be missing.

Ways to reduce

- Less switching preferred
- One person should be assigned one activity
- The activity should be handed over to someone experienced in the same field

16.2.7 Defect

Defect resolution takes a lot of time, first wait till it is recognized and then wait for the resolution. The expenses which are incurred on fixing a defect at an early stage are significantly lower than those identified after the product has been delivered.

Ways to reduce

- Testing as early as possible

17. ANALYSIS OF FINDINGS

Time-driven activity-based costing (TDABC) in ALMS Software

The traditional ABC system uses transaction cost drivers (e.g., number of invoices processed), while the time-driven ABC system uses duration cost drivers (e.g., minutes or hours). This is the major difference between the two systems.

The time-driven ABC system involves the following two steps:

Cost estimation of involved resources.

Unit times for activities which are to be assigned to customers or products.

$$Unit\ Cost = \frac{Cost\ of\ resources}{Resource\ Capacity}$$

The first step is similar to that of the traditional ABC system. The cost of resources grouped together in a logical way (e.g., related to an activity or set of related activities) is calculated. In addition, the ABC system designer also determines the practical capacity of the resources supplied.

The next step is to determine the time it takes to perform specific activities. This process does not typically exist in the traditional ABC system.

Time Equations have been performed as well as Final Invoice is also displayed.

WBS	Tasks allocated	Earliest Start Date	End Date	Total Days (in days)	Per day Expected (in Hours)	Time Taken	Percent Complete	TDABC CALCULATION -->	Resource Quantity	Estimated Unit Time	Total Time	Cost Driver Rate (Rs)	Total Assigned Cost
	ALMS Tasks	4/20/2020	6/20/2020				100						
1	Introduction	4/20/2020	4/21/2020	2	9	18	100		2	9	18	2500	5000
						0					0		0
2	Requirement Analysis	4/22/2020	4/23/2020	2	9	18			1	9	9	2500	2500
2.1	Configuration Management					0					0		0
3	Problem Background	4/24/2020	4/25/2020	2	9	18	100		1	9	9	2000	2000
						0					0		0
4	Proposed Solution	4/26/2020	4/27/2020	2	9	18	100		1	9	9	2500	2500
						0					0		0
5	Resource management	4/28/2020	4/30/2020	3	9	27	100				0		0
5.1	ManPower					0			1	9	9	2500	2500
5.2	Service					0							0
5.3	Technology					0							0
						0							0
6	Software Development	5/1/2020	5/5/2020	5	9	45	100		3	9	27	4000	12000
6.1	Develop system module					0							0
6.2	Integrate System module					0							0
6.3	Perform initial testing					0							0
6.4	Development finished					0							0
						0							0
7	Software Testing	5/8/2020	5/10/2020	5	9	45	100		2	9	18	4000	8000
7.1	Perform system testing					0							0
7.2	Document issues found					0							0
7.3	Correct issues found					0							0
7.4	Testing finished					0							0
						0							0
8	Quality Management	5/11/2020	5/15/2020	5	9	45	100		3	9	27	2500	7500
8.1	Process Improvement					0							0
8.2	Quality planning					0							0
8.3	Quality assurance					0							0
8.4	Quality control					0							0
						0							0
9	ALMS Project Management	5/16/2020	5/21/2020	6	9	54	100		4	9	36	4000	16000
9.1	Project Initiation					0							0
9.2	Project Planning					0							0
9.2.1	Project Estimation					0							0
9.2.1.1	Software size estimation					0							0
9.2.1.2	Effort estimation					0							0
9.2.1.3	Time estimation					0							0
9.3	Scope Management					0							0
9.4	Cost Management					0							0
9.4.1	Cost estimating					0							0
9.4.2	Cost budgeting					0							0
9.4.3	Cost control					0							0
9.5	Project Scheduling					0							0
9.6	Project Execution					0							0
9.7	Project Monitoring and control					0							0
9.8	Project Closure					0							0
						0							0
10	ALMS Sales management	5/22/2020	5/26/2020	7	9	63	100		3	9	27	2500	7500
10.1	Sales Operations: Building the Team					0							0
10.2	Sales Strategy: Defining the Sales Process					0							0
10.3	Sales Analysis: Reporting					0							0
						0							0
11	Risk Management	5/27/2020	6/2/2020	7	9	63	100		2	9	18	3000	6000
11.1	Design and Implementation					0							0
11.2	Maintenance Problems					0							0
11.3	High work load					0							0
11.4	Application Complexity					0							0
11.5	Software corruption					0							0
11.6	Hardware failure					0							0
11.7	Operating environment					0							0
						0							0
12	Disaster Recovery and Business Continuity	6/3/2020	6/7/2020	5	9	45	100		2	9	18	3000	6000
						0							0
13	Maintenance and Support Services	6/8/2020	6/12/2020	5	9	45	100						0
13.1	New Development and Upgrades					0			3	9	27	3000	9000
13.2	Technical Improvement					0							0
13.3	Monitoring of Existing Solutions					0							0
13.4	New Functionality Implementation					0							0
13.5	Performance Optimization					0							0
13.6	Application Documenting					0							0
						0							0
14	Operational logistics	6/13/2020	6/15/2020	3	9	27	100		3	9	27	4000	12000
14.1	Inward Logistics					0							0
14.2	Outward Logistics					0							0
						0							0
15	Overall Documentation	6/16/2020	6/20/2020	5	9	45	100		2	9	18	3000	6000
	Totals					576		Total Cost Invested 150000	33		297	45000	104500
								Total Time (in hours) 300					
								Cost per hour 500					
								Cost of unused resources 150000					
								Unutilized Hours 300					

For 100% profit, Selling Price = Rs 209000

Fig 05- TDABC Calculations in ALMS

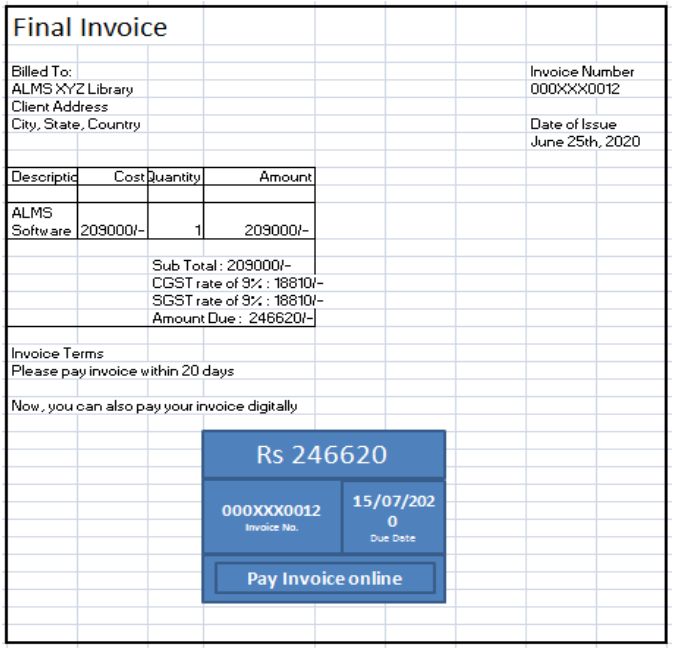

Fig 06- Final Invoice

18. CONCLUSIONS

In this research based project report, we can conclude that TDABC is a quicker and easier way of calculating cataloguing savings. In fact, TDABC is a useful method to perform cost analysis in cataloguing processes, and consequently provides valuable data for managerial decisions. The TDABC implementation provided the project managers with important information about cataloguing costs and performance measurements; and guided decisions concerning resource allocation and process improvements. For example, based on the obtained results, the project manager decided to delegate certain activities and define a set of batch activities. This project report shows significant contributions to the literature on the implementation of advanced cost models for library processes, and more precisely for cataloguing activities.

A potential direction for future research is to expand this study to different cataloguing activities such as cooperative, contract, and outsourcing cataloguing. TDABC can also offer the possibility to discuss how these trends in cataloguing processes affect cataloguing units. TDABC will allow examining whether these trends really provide an opportunity for cataloguers to spend their time on other cataloguing activities, such as enhancing existing records.

Potential issues and suggestions with Time-driven ABC System

The time-driven ABC system provides a simplified way to apply the ABC concepts. In effect, the time-driven ABC system is a traditional ABC system with only one cost driver (i.e., time). This implies that the cost for labor components and non-labor components is driven by time. This assumption may not always be true especially in industries where non-labor components (e.g., hardware, equipment) dominate cost pools. A better approach may be to utilize the traditional ABC system to some areas and the time-driven ABC system to others.

Further, the time-driven ABC system does not allocate the total cost to cost objects. This may provide great information (e.g., management can assess unused capacity); however, on the other hand, the unused capacity still represents cost, so management may actually want to allocate it fully to cost objects to see how much it costs to develop a product or service a customer with supplied resources.

Some important benefits of TDABC are as follows:

(1) Better understanding of the costs' origins due to the disaggregated cost, time and resources per activity and of activities to be improved or discarded i.e., including alerts in the ALMS when a new request is available instead of printing requests.

(2) An improved alternative evaluation for comparing different scenarios i.e, manual activities vs. automated.

(3) Enhanced communication to analyze the cause of specific problems with stakeholders that can easily understand the methodology applied; at the same time, librarians can justify the increase of wages or the development of the new services based on their responsibilities and the time required performing them.

(4) Adaptability, when it is required to switch resources in busy periods, as when adding more staff to strengthen the user attention process is required to cope with the increased demand at the beginning of every semester; as demand increases customers require extra attention to get familiar with the library, a shift from other areas for a specific period of time can be made; activities that were relegated for this cause can be prioritized during periods of low demand e.g. when classes have ceased.

REFERENCES

1. Manaf, Z. A., & Rahman, R. A. (2006). Examining the quality of National Library of Malaysia (NLM) cataloguing in publication (CIP) records. Library Review, 55(6), 363–373. doi:10.1108/00242530610674776.
2. McCain, C., & Shorten, J. (2002). Cataloging efficiency and effectiveness. Library Resources & Technical Services, 46(1), 23–31. doi:10.5860/lrts.46n1.23.
3. Morris, D. E., Hobert, C. B., Osmus, L., & Wool, G. (2000). Cataloging staff costs revisited. Library Resources & Technical Services, 44(2), 70–83.
4. Novak, D. D., Paulos, A., & Clair, G. S. (2011). Data-driven budget reductions: A case study. The Bottom Line: Managing Library Finances, 24(1), 24–34. doi:10.1108/08880451111142015.
5. Siguenza-Guzman, L., Van den Abbeele, A., Vandewalle, J., Verhaaren, H., & Cattrysse, D. (2014). Using Time-Driven Activity-Based Costing to support library management decisions: A case study for lending and returning processes. Library Quarterly: Information, Community, Policy, 84(1), 76–98. doi:10.1086/674032.
6. Vazakidis, A., & Karagiannis, I. (2009). Activity-Based Management and traditional costing in tourist enterprises (A hotel implementation model). Operational Research, 11(2), 123–147. doi:10.1007/s12351-009-0049-3
7. Wegmann, G., & Nozile, S. (2009). The Activity-Based Costing method developments: State-of-the art and case study. The IUP Journal of Accounting Research and Audit Practices, 8(1), 7–22. doi:oai:halshs.archives-ouvertes.fr:halshs-00482137
8. Yilmaz, R. (2008). Creating the profit focused organization using Time-Driven Activity Based Costing. In EABR & TLC Conferences Proceedings (p. 8). Salzburg, Austria: Clute Institute for Academic Research
9. Kaplan, Robert S., and Robin Cooper. 1998. Cost & effect: using integrated cost systems to drive

profitability and performance. Boston, MA, USA: Harvard Business School Press.

10. McKendrick, Joseph 2011. "Funding and priorities: The library resource guide benchmark study on 2011 library spending plans." Chatham, NJ, USA: Unisphere Research, a division of Information Today, Inc