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Integration of DMAIC with Library Acquisition: A Phenomenal Approach

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Abstract

The quality becomes indispensable in all sectors as it is forced to improve and maintain the universal quality oriented standards in any institution / organization. The library is no mean to exception on it. One of the imperative departments / unit in the library is acquisition, because the library stands on its collection and development. Authors had an attempt the DMAIC application to improve and maintain the acquisition in academic libraries to maximize the highest level of satisfaction and minimize the grievances from its patrons. This paper aims to eliminate the gap between the documents and the users'. Authors applied Plan Do Check Act (PDCA) which is one of the concept of DMAIC.

Key words: DMAIC, Acquisition, Quality, Satisfaction, Collection Development, PDCA

Introduction

The library mean in academic sector is an indispensable companion to provide an excellent service to meet the prime objective of teaching, learning, and research. In this digital and modern era, libraries must provide accessible services anywhere and anytime. The library will be accessed only by its collections, but the other sources such as Information Communication Technologies (ICTs) are the tools to utilize the library effectively. Library speaks itself by it's the best and outstanding collection development. Apart from the applications of latest technologies provided in the library, the library must have the best collections to utilize the library very well.

Academic libraries are meant for its service to the patrons. In order to improve the library services and meet the needs of the library users, libraries must have quality oriented and achievable objectives to bring the highest level of satisfaction in all units of the library. In this competitive world, it is obligatory to the libraries to adopt and apply the quality based policy to improve and maintain overall services in the library. Acquisition is the base for the library as it plays a vital role to have a quality based library. Thus, quality should begin from the acquisition because the library will be getting utilized by its collections. The modern Information Communication Technologies (ICTs) meant to reach the library by all means.

Rising competition in the library sector, particularly in academic libraries is coerced to adopt the quality improvement systems and techniques to meet the patrons' demands for better quality service and also to reach the universal standards by increasing efficiency and decreasing the grievances. Quality improvement is the main key in the library (acquisition). This paper suggests to integrate / apply / gear the DMAIC concept to improve and maintain the acquisition service in the library.

1.1 Acquisition

Acquisition is an indispensable unit of any library which duty is to select the right materials with multiple of volumes based on the existing ratio / on demand of the users of the library. This department has to procure of materials or resources by opting vendors, haggling prices, placing books purchase order, continuous follow-up, and after receiving the materials or resources, this department must verify the received materials or resources against the given purchase order and bills physically.

It is one of the core departments in the library, which should be given prime priority and much more care in order to have the best collections in the library. This department should have highly skilled professional librarian who should have wide and depth knowledge in all disciplines and should have a good rapport with faculties and book publishers and suppliers. According to the ALA Glossary[1], the term Acquisition is to purchase of library materials such as purchase, exchange, or gift, including pre-order bibliographic searching, ordering and receiving materials, processing invoices, and the maintenance of the necessary records related to acquisitions for library use.

The responsibility is to choose and procure the right materials or resources to the right person and provide at the right time. Apart from this, it should have approved and selected vendor list, negotiate consortium prices, arrange for standing orders, and select individual titles or resources.[2]

1.2 DMAIC

Six Sigma is a methodology which is so precise, accurate and aimed for high and effective quality principles and techniques. It helps the organization to improve the quality as well the customer value in order to bring the highest level of satisfaction. Six Sigma focuses on improving quality by reducing waste. One of the major objectives is to provide the best and quality oriented services with faster and accurate to the customers.

Six Sigma has two different methodologies such as DMAIC and DMADV. The DMAIC stands for Define, Measure, Analyze, Improve and Control. The abbreviation DMADV is Define, Measure, Analyze, Design and Verify. The DMAIC methodology is used for the existing one and the DMADV is used for the new one. Thus, DMAIC will be best suitable for any existing institution / organization. DMAIC is recognized as one of the most significant and indispensable components of Six Sigma.

The DMAIC is an improvement phase, which is an indispensable tool used to drive Six Sigma projects. DMAIC is used to improve, optimize and stabilize the existing processes and designs. In this paper, the authors attempted the integration of DMAIC concept with the acquisition in academic libraries in order to get the effective and quality oriented results.

DMAIC is one of the concepts of Six Sigma, which is a move toward quality product and also the procedure of development. It has grown extensive recognition and advent great yield across countless industries worldwide.

The major aim of using DMAIC concept is to improve and maintain the quality particularly on acquisition to have the best collections in libraries. This paper aims to apply the concept of DMAIC in order to minimize the grievances from patrons and maximize the usage of the collections of the library.

According to Wikipedia[3], the DMAIC (an abbreviation for Define, Measure, Analyze, Improve and Control) refers to a data-driven improvement cycle used for improving, optimizing and stabilizing business processes and designs. The DMAIC improvement cycle is the core tool used to drive Six Sigma projects. However, DMAIC is not exclusive to Six Sigma and can be used as the framework for other improvement applications.

2. Significance of the study

Acquisition (procurement) has been one of the most difficult and challenges faced by many academic libraries around the world. As the prime duty of any academic library is to fulfill the needs of the users as it is just like demand and supply. Quality of collection plays major role in the acquisition department. However, the cost of the documents either print or e-print has increased, thus the cost and the quality of the collection is a complicated and multifarious concept.

Acquiring is a continuous process through the library can enrich its collection by means of obtaining right resources from publishers / vendors for the patrons of the library. Procuring is an important process by the Acquisition department where the quality will directly affect with the level of usage and demand by the patrons of the library. Obviously, the quality of procuring resources directly enriches and improves the level of the collection development in order to meet the demands of the patrons of the library. Hence, to reinforce the nature of procurement techniques and administration is an imperative measure to promise the quality of items in order to meet the needs of the users.

Hence, application of DMAIC concept will help to bring the quality on procurement and speed up the process simultaneously.

3. Review of Literature

Review of literature helps the researchers to have an in depth knowledge to know the past studies and to proceed further. Based on, authors of this article reviewed the following studies, which are as follows

Adrian Pavel Pugna et.al (2020)[4] applied DMAIC method which has a 5 phase scheme design to solve any kind of problem in a simple technique in order to get betterment, quality based and curtail the cost. In their case study, they narrated that DMAIC methodology helps to screen the constant improvement.

Zhiyi Zhuo (2019)[5] concluded in his research that Six Sigma helps to improve the process consistently and continuously by trimming down the deficiencies and attains excellent patron satisfaction by achieving customers in an excellent way.

Bikika Laloo and Chaphun Sumnyan (2017)[6] authors written an article entitled ' Collection development in Tawang Monastery Libraries, they applied the questionnaire method to fulfill the objectives such as to find out the types of collection available in the Tawang monastery libraries, to know the steps for collection development and to find out the problems faced in collection development. The authors suggested that appointing at least one professional library staff member, should adopt some stringent preservation methods and a small reading room could be included.

Stuart Hunt, (2017)[7] did a theoretical approach for collection development in order to highlight the collection development activity in UK higher education libraries and to place

it within both a conceptual and strategic context. Author suggested that implications for content development within academic libraries to re-focus at the strategic level are important ones. Author concluded that collection development should support and widely based on the education and research missions of their institution.

A. K. R. Pillai et al (2014)[8] suggested Six Sigma methodology to resolve problems such as reducing costs and improving quality. The authors also quoted in their article that the purpose of the implementation of Six Sigma is to evaluate the benefits and continual service improvement.

William H. Walters (2013)[9] entitled " E-books in Academic Libraries: Challenges for Acquisition and Collection Management" specified difficulties and challenges in acquiring library reading materials such as delayed in release of academic books, annual access and yearly renewal for e-resources.

She-I Chang et al., (2012)[10] pointed out that to improve the performance of the production planning procedure, information system can be integrated with DMAIC.

Rajashekar D Kumbar et al., (2011)[11] carried out the pilot study on DMAIC (Six Sigma) methodology to find the defects in the process of overall library services. The authors adopted Likert five-point scale to collect the data from the respondents. The conclusion of their study was DMAIC helps to improve the efficiency of library services.

Ahmad Ali Al-Zubi and Imtiaz Basha (2010)[12] suggested in their article that application of DMAIC (Six Sigma) in library services as it is indispensable to upgrade the library services. The authors describe that continues assessment and improvement leads to bring the quality based services in libraries.

Dong Suk Kim (2010)[13] given conclude in their research paper that libraries implanting quality management techniques to improve and maintain the library services and library environment. Authors aim was to explain the implement the Six Sigma in University library to determine its achievement.

Yong Kim, Eun Jeong Kim, Min Gyo Chung (2010)[14] authors discuss the DMAIC (Six Sigma) methodology to identify and remove ineffective components and unnecessary steps in library works and services. The authors pointed the purpose of their article was to describe Six Sigma to redesign library and information services with the awesome significance of the material procurement procedure

Susan Kumi and John Morrow (2006)[15] adopted DMAIC (Six Sigma) methodology to improve the self-service Newcastle University Library. The outcome of the research that the library profited by getting improvement with the help of six sigma
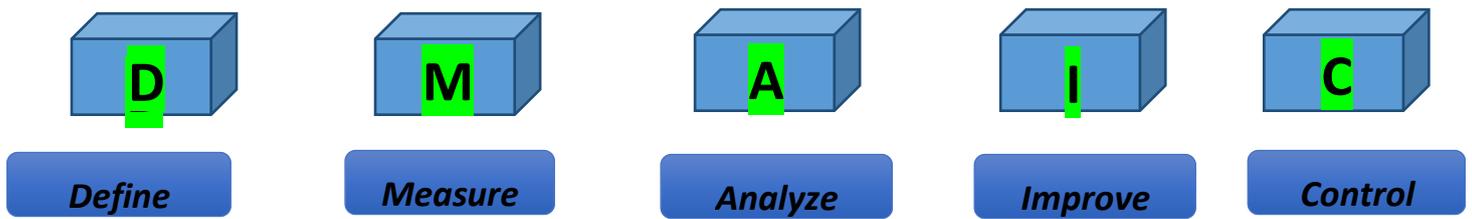
Behnam Nakhai and Joao S. Neves (2009)[16] stated in their article that six sigma methodology which helps to improve the service quality.

Kerstin V. Siakas et al., (2006)[17] attempted to integrate the CMMI and Six Sigma to improve the extraordinary quality in order to reduce the rate of failure and improve the quality.

3. Objectives

1. To initiate and maintain the DMAIC methodology
2. To obtain the right material within the stipulated period
3. To monitor and improve the acquisition process
4. To minimize the gap between the reader and the document
5. To maintain the high level of accuracy in all work procedures
6. To keep the work processes simple, in order to achieve the lowest possible unit cost
7. To develop and maintain cordial relationship with faculties, all library units and vendors

4. Methodology of DMAIC

The Waterfall Diagram

Define
- Objectives
- User group and their needs
- Acquisition procedures
- The budget
- The genuine suppliers
- Problems
- Promote

Measure
- Facilities / Sources
- Skills
- Market
- Problems
- Usage
- Satisfaction

Analyze
- Usage of budget
- Existing procedures
- Usage of library
- Facilities / sources
- Problems
- Satisfaction

Improve
- Communications media
- Coordination
- Skills
- Usability
- Process
- Sources
- Satisfaction

Control
- Duplication
- Overflow
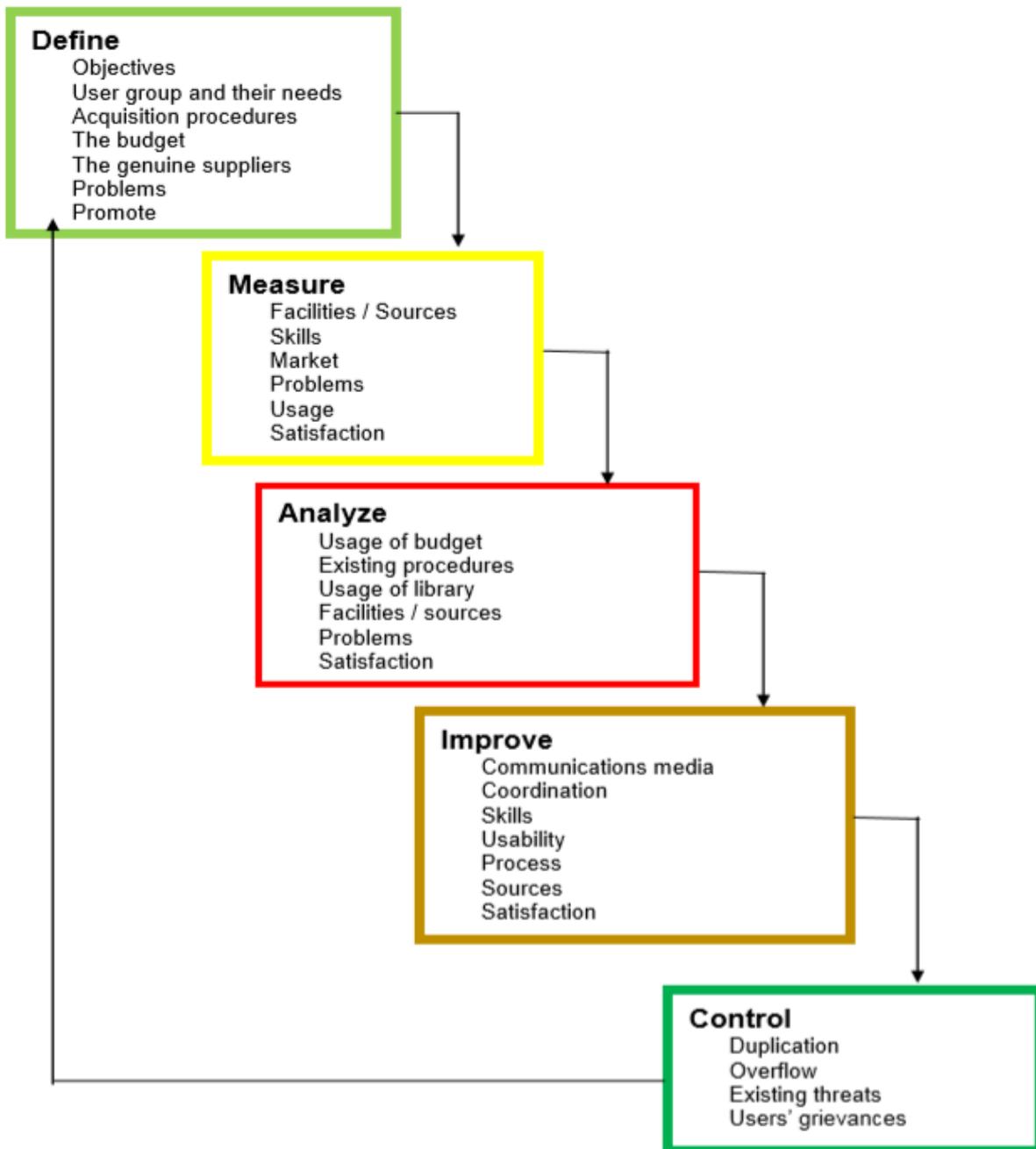- Existing threats
- Users' grievances

Fig – 1: Waterfall Diagram

4.1 Explanation of DMAIC

The above waterfall diagram of a DMAIC cycle method explained as follows

Define: The first and foremost phase of DMAIC is Define. In this phase, the acquisition department should have to define the

1. Library objectives which can be achievable and measurable
2. User group and their needs
3. The clear and concise acquisition procedures
4. The budget
5. The genuine vendors and terms and conditions
6. Existing problems on Acquisition
7. The best way to promote collection development to the end users

The first and foremost phase of DMAIC is Define.

- Define the objectives
  This Define phase facilitates to define the library objectives which should be achievable and measurable to help to focus all aspects of library services towards achieving the goals and to improve the quality particularly in acquisition.

- Define the user group and their needs
  In an academic library, users are classified into four categories likely faculties, researchers, students, and other staff. Each category needs different needs of the library. Hence, the library should define the user group and their needs.

- Define the acquisition procedure
  The acquisition department should have clear and concise procedure in order to acquire / procure the right material to the right person at the right time.

- Define the budget
  In general, budget allotment for the academic libraries is less compared to other departments in the academic sectors. To exploit and make use of the getting budget is indispensable. It is mandatory to define the budget to meet all the needs of the acquisition.

- Define the genuine vendors and terms and conditions
  Define the authentic suppliers with terms and conditions, who can be trusted and should supply the defined reading materials according to the given purchase order. Moreover, suppliers must make the bill as per publishers' price and deliver the goods on time.

- Define the existing problems on acquisition
  Defining the current and existing problems will help to find the solution and to avoid such difficulties in future days.

- Define the best way to promote the collection development of the library to its end users
  It is mandatory to define the possible and the best methods to reach the library collection to all library users in order to utilize an efficient way like sending new arrivals to their mobiles, display in library website and placing the new arrivals on the notice board of the library departments as well.

  Measure: The second phase of DMAIC is Measure. In this phase, the acquisition department ought to measure the

1. Library objectives in order to set the best and improved one
2. Level of the used and existing budget
3. Existing procedures for acquisition
4. Current usage on collection development
5. Present facilities / sources provided in the library for the users
6. Skills of the Acquisition Librarian
7. Procedures for promotion of collection development
8. Level of problems on collection development
9. Level of satisfaction with collection development

  The second phase of DMAIC is the Measure.

- Measuring the objectives
  This Measure phase facilitates to measure the level of library objectives to improve the quality in acquisition. In general, objectives should be measured periodically to get achieve the result.

- Measure the usage of budget
  It is advisable to measure the usage of budget, so that the acquisition librarian can utilize the existing funds for better procurement.

- Measure the existing procedure for acquisition
  It is an obligatory to measure the current procedures on acquisition so that acquisition section can be improved by providing needed documents to the needed users. This stage helps to minimize the cost, time, energy and also the gap between the readers and the documents

- Measure the current usage in collection development
  The collection development is the image of the library. The library speaks on its collection development, if it's used in a full swing. The library should conduct a periodical survey to know the level of the usage and the satisfaction level among library patrons.

- Present facilities / sources provided in the library for the users
  Periodical measurement should be done with the existing facilities and other sources of the library to enable users to utilize the collection development. Annual maintenance should be done on all equipment including software and hardware to keep the well-equipped library.

- Skills of the Acquisition Librarian
  The acquisition librarian should keep on updating her / his skills to cope up to handle the modern technologies such as computer, Internet; it is also indispensable to measure the IT skills and communication skills of the acquisition librarian.

- Procedures for promotion of collection development
  The library should have standard procedures to promote the collection development of the library to its community to reach the sources and services by conducting program such as Orientation, Outreach program, etc.

- Level of problems on collection development
  During the implementation of DMAIC, the library must measure the level of problem with collection development to enable to minimize the deficiency in all sides.

- Level of satisfaction in collection development
  The ultimate goal of the library is to satisfy the users with utmost care. The DMAIC helps to measure the level of satisfaction on collection development by knowing patrons' needs with the help of plan, do, check, act.

  Analyze: The third phase of DMAIC is Analyze. In this phase, the acquisition department should have to analyze the

1. Library objectives on Acquisition
2. Usage of budget
3. Existing procedures for acquisition
4. Current usage on collection development
5. Availability of the sources
6. Level of problems on collection development
7. Level of satisfaction with collection development

The third phase of DMAIC is Analyze.

- Library objectives on Acquisition
  Analyzing the impact of objectives, particularly on acquisition to improve the quality of work and bring the result oriented work.

- Usage of budget
  Budget usage should be analyzed periodically in order to utilize the existing budget for current and future needs of the users' in an efficient way.

- Existing procedures for acquisition
  The library should have clear and concise procedure for acquisition. The DMAIC concept helps to analyze the procedure to know the pros and cons. The analyzation methods help to improve and maintain the best procedure for acquisition.

- Current usage on collection development
  Analyzing current usage by knowing the pulses of the users on existing collection development in order to avoid unused and unwanted materials from the publishers / vendors.

  Availability of sources
  The analyzation section helps the acquisition librarian to analyze the existing sources in order to procure and promote the library materials to its patrons. So, the acquisition librarian should analyze the supply and demand of current sources.

  Acquisition Librarian should attend all book fairs to know the new publications from the publishers in order to abreast her / his knowledge towards new titles in all fields.

- Level of problems on collection development
  The acquisition librarian should analyze the existing problems on procuring library materials to minimize the duplication, time taken to receive the materials, to eradicate the unwanted expenses.

- Level of satisfaction in collection development
  The analyzation section helps the acquisition librarian to analyze the level of satisfaction of collection development through the surveys, demands, and grievances.

  Improve: The fourth phase of DMAIC is Improve. In this phase, the acquisition department ought to improve the

1. Goals and objectives of the library on Acquisition
2. Acquisition process
3. Communication media
4. Coordination
5. Improve the usability of the library collection
6. Library resources to enable users to utilize the collection development
7. Level of satisfaction with collection development

- Goals and objectives of the library on acquisition
  It is mandatory to the higher authorities of the library to keep an eye on objectives to improved one in order to bring the best results.

- Acquisition process
  It is obligatory to keep on improving the process of acquisition to meet the universal standards.

- Communication media
  Communication is the best tool to have mutual and cordial relationship with all related units of the library. The acquisition librarian should keep on improving the communication skills, both written and oral in order to bring the betterment in the department.

- Coordination

  It is essential to have good coordination and cooperation with all related units such as users of the library and enable vendors to procure the right document to the right user at the right time.

  Improve the usability of library resources

  It is mandatory to the authorities of the library to increase the usage of library collection by promoting library sources and services to the end users.

- Improve the level of satisfaction in collection development

  The DMAIC focuses on improvement of satisfaction and decline the grievances of the patrons. So, the acquisition librarian should provide needed materials based on supply and demand concept to her/his patrons.

  Control: The final phase of DMAIC is control. In this phase, the acquisition department ought to Control the

1. Duplication of documents
2. Overflow of budget
3. Existing threats
4. Users grievances and problems on collection development

- Duplication of documents

  The top most priority of any acquisition librarian is to control the duplication of documents. She / he should avoid the inappropriate document and procurement should be done centralized purchase.

- Overflow of budget

  The acquisition librarian must aware that the allotted budget should not exceed the estimated cost. The acquisition librarian can control the budget by avoiding the not required documents. She / he should beware about the cost, risk controlling and should do careful profiling to control the overflow of budget.
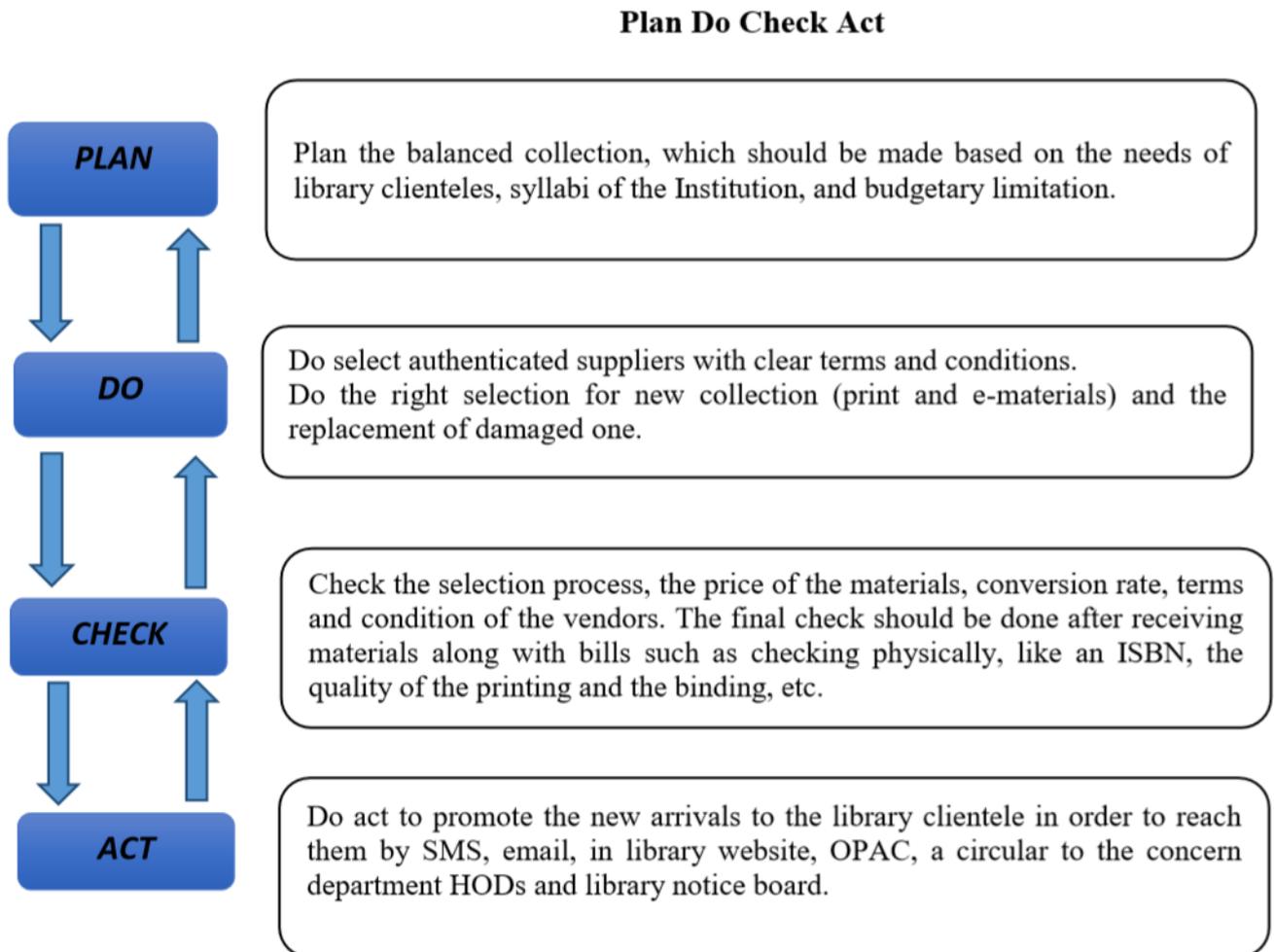
- Existing threats

  The Control phase of DMAIC helps to identify the existing threats on acquisition such as shortage of budget, time taken to reach documents from the suppliers, error-proof of the price of the documents and the quality of work.

- Users grievances and problems on collection development

  The frequent complaints should be controlled by giving prime attention towards the users' needs. The user complaints shall be collected through well-structured surveys. Evaluate the actual problems being faced by the patrons of the library and eradicate their difficulties by providing needed materials within the stipulated time to them.

Acquisition is an ongoing and never ending process. Hence, the authors applied Plan Do Check Act method.

Plan Do Check Act

PLAN	Plan the balanced collection, which should be made based on the needs of library clienteles, syllabi of the Institution, and budgetary limitation.
DO	Do select authenticated suppliers with clear terms and conditions. Do the right selection for new collection (print and e-materials) and the replacement of damaged one.
CHECK	Check the selection process, the price of the materials, conversion rate, terms and condition of the vendors. The final check should be done after receiving materials along with bills such as checking physically, like an ISBN, the quality of the printing and the binding, etc.
ACT	Do act to promote the new arrivals to the library clientele in order to reach them by SMS, email, in library website, OPAC, a circular to the concern department HODs and library notice board.

Fig – 2: Plan Do Check Act

5. Benefits of DMAIC

1. Decrease the series of time, thus trim down expenses and saves time of library members, consequently finding more time to serve library patrons'
2. Accomplish precision in development by minimizing deficiency
3. Makes you to work smarter than hard work
4. Facilitates to have a prompt decision making capacity
5. Brings the best outstanding quality and high level of patrons' satisfaction

6. Demerits of DMAIC

1. Implementation will be much costlier, particularly on training.
2. Six Sigma really focuses on a rigorous and rigid method
3. Difficult to bring the awareness and the importance DMAIC

7. Conclusion

DMAIC is one of the methods of Six Sigma to improve the quality by minimizing errors that result in quality service with decreasing expenses. The DMAIC phase helps the academic libraries to eliminate the duplication of procuring materials and minimizing the allotted budget for the library of the University. Thus, the DMAIC concept will get rid of the grievances of the patrons and maximizing their satisfaction by improving the service quality of the acquisition department. Eventually, it helps to steadily assess and develop services to improve customer satisfaction.

The DMAIC phase of Six Sigma is meant to accomplish the speediest rate of perfection in cost, quality and customer satisfaction. The methodology of DMAIC helps to minimize the blemishes and improve the quality of service.

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