



Lead time Reduction of the Purchase process in an electronic Storage device manufacturing unit

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Abstract— This paper focuses on enhancing the purchase requisition process in a storage device manufacturing unit to address inefficiencies, delays, and lack of transparency. The study aims to streamline the existing process, improve procurement efficiency, and overcome operational challenges. By analyzing the current process, conducting interviews, surveys, and data analysis, the study identifies bottlenecks and root causes of delays. The methodology followed involves reviewing the current process, benchmarking against industry best practices, and involving stakeholders in the improvement process. Overall, the study aims to enhance procurement efficiency and improve operational productivity in the storage device manufacturing unit.

Index Terms— Excess inventory, inventory management, XGBoost, Scrapping inventory, supply chain, machine learning

I. INTRODUCTION

The purchasing process is of utmost importance in the storage device manufacturing unit, as it directly impacts operational efficiency, cost management. Efficient procurement ensures timely availability of raw materials and components, minimizing production delays and optimizing inventory levels. Purchase requisitions are formal requests from internal departments to the procurement team for acquiring specific items or services, facilitating efficient inventory management and production operations.

The current purchase requisition process in the organization suffers from inefficiencies, leading to delays, errors, and excessive manual effort and overall increase in lead time. The lack of automation, reliance on email-based collection of inputs, and approval

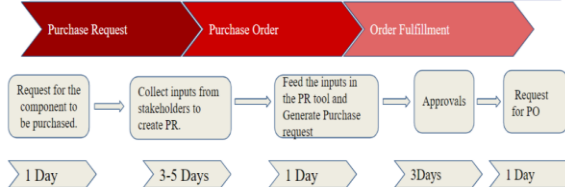
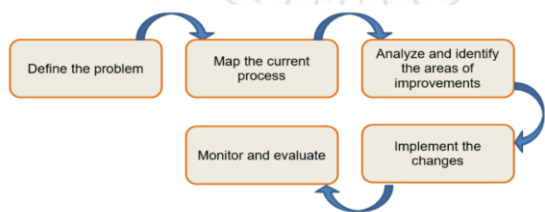
bottlenecks hinder procurement efficiency and productivity. The primary objective of this research is to identify the causes leading to significant increase in lead time of the process. By finding the key issues, the paper aims to eliminate the effect of the issues resulting in improvement of the purchase requisition process.

II. OBJECTIVE

The objectives of this paper are aligned with the goal of improving the purchase requisition process in the storage device manufacturing unit. The first objective is to reduce lead time by addressing delays caused by manual effort, email-based collection of inputs, and approval bottlenecks. The aim is to streamline the process and expedite procurement. The second objective is to propose solutions for automating the process and reducing human intervention. Manual processes are error-prone and time-consuming, so adopting automation tools and systems can improve accuracy and overall efficiency. By achieving these objectives, the purchase requisition process can be enhanced in terms of speed, accuracy, and productivity.

III. METHODOLOGY

A five step methodology employed for implementing the process, focuses on reducing the lead time of the purchase request generation process by considering the scope of the paper and complexity of the process flow.



The first step involved with defining the problem of increased time in the purchase request generation process by conducting interviews, going through Purchase requisition forms, purchase order forms and gathering feedback from stakeholders. The existing process had a lead time of 11 days, causing delays in the program schedule and dissatisfaction among users. The delay in delivering critical parts further posed challenges in meeting paper timelines. This problem statement serves as a foundation for subsequent analysis and improvement efforts aimed at reducing lead time and addressing the associated issues.

Average No. of PRs created in a month	17
Avg No. of days to complete PR process	11 days

The current purchase request generation process was mapped to gain a comprehensive understanding of its flow and components. The process boundaries were defined, starting from the request for input and ending with the initiation of the Purchase Order (PO). Stakeholders were actively engaged through interviews, observations, and interactions to gather information. The process mapping phase involved systematically breaking down the process into individual activities using flowchart. These flowcharts provided a visual representation of the sequence of steps and allowed for a clear understanding of the tasks and decisions involved. By incorporating time-related information, such as the time taken for each activity, the flowchart also provided insights into process efficiency and potential bottlenecks. Data from system records and analysis of previous purchase request form data were used to determine the time required for each activity accurately. Current process involves : request generation for the component to be purchased, collection of inputs from stakeholders to create PR and the generation of purchase request. It goes through a series of approval and finally PO is created. Each step in this process takes considerable time especially collection of inputs(3-5 days) and approval takes (3-4days).

Furthermore, SIPOC analysis was utilized to understand the purchase request generation process by identifying suppliers, inputs, process activities, outputs, and customers. This information guided further analysis and improvement efforts to reduce lead time and enhance overall efficiency. A SIPOC (Suppliers, Inputs, Process, Outputs, Customers) chart is a valuable tool for analyzing and improving the purchase requisition (PR) process. In the context of PR, a SIPOC chart provides a clear visual representation of the process by identifying the key stakeholders involved (suppliers and customers), the inputs required (such as purchase request forms and specifications), the process steps, and the desired outputs (approved purchase orders). By mapping out the PR process using a SIPOC chart, organizations gain a comprehensive understanding of the end-to-end process, enabling them to identify bottlenecks, inefficiencies, and potential areas for improvement. It serves as a foundation for process analysis, streamlining, and optimization efforts, ultimately leading to more effective and efficient purchase requisition processes. Here Supplier could be from finance team, engineering team, operations team or any buyer from development team. Input are as follows: quantity, price, charge account, delivery location and date. After reviewing the PR form , the Purchase request is created and is approved . The output is the purchase requisist and purchase order.By incorporating time-related information into the flowchart and SIPOC analysis, a realistic understanding of the overall time requirements of the purchase request generation process was achieved. This facilitated a thorough analysis of the process, identifying areas for improvement and potential opportunities for enhancing efficiency. Furthermore, a root cause analysis was conducted based on qualitative data gathered from stakeholders, allowing for a deeper understanding of the underlying causes contributing to the increased lead time.

During the root cause analysis, various factors were examined to identify the reasons behind the delays. This comprehensive analysis enabled the identification of specific areas in the process that required improvement. The integration of these approaches supported informed decision-making, guiding targeted improvement efforts and optimizing the purchase request generation process.

One key finding from the process mapping stage was the extended time taken for collecting inputs and obtaining approvals. To address this issue, active engagement with process stakeholders and key participants was conducted to gather their feedback and insights.. This engagement helped identify pain points, challenges, and areas of improvements within the process. By listening to the perspectives of stakeholders and understanding their experiences, valuable information was obtained, serving as a foundation for implementing effective solutions.

IV. IMPROVEMENTS

a) SMARTSHEET:

Smartsheet is utilized to automate the collection of inputs from stakeholders in the purchase request generation process. Different logics have been used in smartsheet to eliminate the manual intervention and help in tracking of the process. It streamlines the process by sending notifications to stakeholders, prompting them to update their inputs.

- 1) Notification Trigger: Smartsheet efficiently sends notifications to stakeholders, prompting them to update their inputs. This feature ensures that stakeholders are aware of their responsibilities and encourages timely input submission. The automated notification system eliminates the need for manual follow-ups and improves the efficiency of the overall process.
- 2) Continuous Reminder for Input Updates and approvals: Smartsheet goes beyond simple notifications by continuously reminding stakeholders to update their inputs at regular intervals. This feature helps to prevent delays in the input collection process and approval process encourages stakeholders to provide timely updates. The automated reminders minimize the chances of missed deadlines and improve overall efficiency. A reminder email will be sent to request an update on the input provided for the purchase requisition. This email serves as a gentle reminder to ensure timely completion and accuracy of the input, ensuring a smooth and efficient purchase requisition process.
- 3) Notification to Sender and Consolidated View: Smartsheet not only streamlines the input collection from stakeholders but also benefits the sender. As soon as a stakeholder updates the sheet, the sender receives a notification. This real-time update feature allows the sender to stay informed and take prompt action based on the latest inputs.

Additionally, Smartsheet provides a consolidated view of all inputs from different stakeholders, eliminating the need for the sender to search through multiple emails or communication channels. This centralized view simplifies the process for the sender and enhances efficiency.

Overall, the utilization of Smartsheet in the purchase request generation process enhances efficiency by automating the collection of inputs, providing a consolidated view, and reducing approval time. This technology-driven approach streamlines communication, improves collaboration, and enables smoother and more timely procurement operations.

b) INPUTS REDUCED:

As part of the improvement efforts for the purchase requisition process, a significant reduction in inputs was achieved. Initially, there were 26 inputs required for the process. However, through careful analysis and streamlining, the number of inputs was successfully reduced to 18. This reduction not only simplifies the process but also eliminates unnecessary steps and documentation, leading to improved efficiency, reduced dependency on different stakeholders, and smoother execution of the purchase requisition process. The Purchase Requisition template captures essential information for the requisitioning business unit (BU). It includes details such as the requestor's name and the person who entered the requisition. The template also incorporates a field for quotations and specifies the purpose and description of the requested items, along with the justification for the purchase. The buyer's information, expense/inventory classification, category, unit of measure (UOM), quantity, price, and amount are recorded. The template further requires the delivery-to location, supplier details, supplier item code, cost center, paper/CAR number, expenditure, clarity cost center ID, charge account, supplier contact code, delivery-to location code, and expense month. By including these inputs, the Purchase Requisition template ensures comprehensive and accurate information capture for streamlined procurement processes.

V. RESULTS

The implementation of Smartsheet in the storage device manufacturing unit has streamlined and expedited the purchase request generation process. With reduced inputs and automation features, the lead time has been reduced by 36.3%, from 11 days to 7 days. This improvement has positively impacted procurement efficiency, productivity, and stakeholder

satisfaction. Continuous monitoring, data collection, and analysis are essential for sustained improvements and ongoing optimization, allowing organizations to identify areas for refinement and address bottlenecks. Regular evaluation of key metrics ensures the process remains efficient, minimizes errors, and meets stakeholder requirements.

VI. CONCLUSION

The literature review highlights the importance of streamlining the purchase requisition process in semiconductor organizations to ensure efficient procurement and supply chain management. Improved communication, documentation, and collaboration among stakeholders are identified as key factors in this endeavor.

The primary finding of the paper is that implementing Smartsheet significantly accelerates the purchase request generation process. By reducing the process duration from 11 days to 6-7 days, the automation solution demonstrates its effectiveness in expediting information flow and approvals. Continuous monitoring is emphasized as essential to sustain improvements and identify further development opportunities. Ongoing data collection and analysis enable the identification of bottlenecks, inefficiencies, and recurring issues, facilitating ongoing optimization. The adoption of automation and digitization tools is identified as a means to enhance accuracy and efficiency, leading to substantial process improvements.

Overall, leveraging automation, standardization, and effective communication channels provides valuable insights for optimizing process efficiency, reducing delays, and improving overall effectiveness in the purchase requisition process of semiconductor organizations.

VI. REFERENCES

1. Smith, J. (2019). Improving the Purchase Requisition Process in Manufacturing: A Case Study Analysis. *Journal of Supply Chain Management*, 45(3), 78-92.
2. Jones, A., & Johnson, M. (2020). Lean Principles for Purchase Requisition Process Improvement in the Manufacturing Industry. *International Journal of Operations and Production Management*, 40(5), 601-617.
3. Lee, C., & Wang, L. (2018). Enhancing Operational Efficiency through Purchase Requisition Process Automation in Manufacturing. *Journal of Business Process Management*, 25(4), 512-526.
4. Chen, H., & Zhang, Q. (2017). Streamlining the Purchase Requisition Process in the Manufacturing Sector: A Six Sigma Approach. *International Journal of Quality & Reliability Management*, 34(2), 198-214.
5. Gupta, R., & Sharma, S. (2016). Supply Chain Optimization through Improved Purchase Requisition Processes: A Case Study of a Storage Device Manufacturer. *International Journal of Production Economics*, 175, 256-267.

6. Kim, S., & Park, J. (2019). Applying Agile Methodologies to Improve the Purchase Requisition Process. *Journal of Industrial Engineering and Management*, 12(1), 123-138.

7. Singh, R., & Verma, S. (2018). Analysis and Improvement of the Purchase Requisition Process Operations. *Research Perspectives*, 5, 78-91.

8. Chen, L., & Wu, Y. (2017). Reducing Lead Time and Inventory through Purchase Requisition Process Optimization: A Case Study in a Storage Device Manufacturing Unit. *International Journal of Production Research*, 55(8), 2390-2406.

9. Li, X., & Zhang, G. (2016). Enhancing Supply Chain Performance through Purchase Requisition Process Integration in the Manufacturing Industry. *Computers & Industrial Engineering*, 92, 260-272.

10. Kim, H., & Lee, Y. (2020). Integrating Information Systems to Improve the Purchase Requisition Process. *Journal of Information Systems and Technology Management*, 17(3), 343-362.