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A STUDY ON OUTBOUND CUSTOMER COMPLAINT DUE TO INVENTORY VARIANCES AT APOLLO TIRES NDC1

Mrs. J. Sofia Vincent Assistant Professor Department of Master of Business Administration Panimalar Engineering college.

Mr. Rahul. A, Student, Department of Master of Business Administration Panimalar Engineering college

ABSTRACT

This study defines into outbound customer complaints arising from inventory variances at Apollo Tyres NDC1, with the primary objective of understanding and addressing the underlying issues. Through a secondary objective, it aims to identify root causes, assess customer impact, apply the DMAIC methodology, and evaluate improvement measures. Using a structured approach, the study examines factors contributing to inventory variances and their implications on customer satisfaction and loyalty metrics. By implementing the DMAIC framework, inventory management processes are systematically analysed to identify areas for improvement. Improvement measures, including macro implementation, wall-to-wall audits, and the proposed Outbound Integrated Optimization and Navigation System (OIONS), show promising results in reducing inventory variances and mitigating customer complaint.

INTRODUCTION

In today's business world, keeping customers happy is really important for any company to succeed. One big challenge companies face is making sure they have the right amount of stuff in stock to give to customers when they want it. But sometimes, the number of things they have doesn't match what they think they have. This can cause problems, especially when customers get the wrong stuff or not enough of it. When customers complain about getting the wrong things or not enough of them, it's called outbound customer complaints. These complaints can make customers unhappy and hurt the company's reputation and profits. In today's competitive business landscape, efficient management of inventory is critical for ensuring customer satisfaction and operational excellence. Inventory discrepancies, often resulting from variances between recorded and actual inventory levels, can lead to outbound customer complaints, negatively impacting a company's reputation and financial performance. This study focuses on exploring the outbound customer complaints attributed

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to inventory variances at Apollo Tyres NDC1, aiming to identify root causes and propose solutions to mitigate their impact.

Apollo Tyres is a renowned multinational company operating in the tire manufacturing industry, with a strong emphasis on delivering high-quality products and exceptional customer service. The National Distribution Centre 1(NDC1) serves as a vital hub in Apollo Tyres' supply chain network, responsible for storing and distributing a diverse range of tires to customers across various regions. This study is important because it looks at how managing inventory and making customers happy connect, especially for Apollo Tyres. We're focusing on why customers complain when there are inventory issues at NDC1. By figuring this out, we can improve how we handle inventory, make things smoother, and make customers happier.

Inventory Management Systems

Business owners can create their own inventory systems from scratch. If it's a large business with a lot of inventory, that may not be realistic. Some opt to purchase established inventory management software to make the process easier. These systems usually include things like item descriptions, item numbers, units of measure, and item locations in the warehouse or storage facility. To make materials and products easy to find, numbers and descriptions must be clear and easy to understand, and their organization within the system must be as logical and intuitive as possible.

Purchase Planning

One goal of inventory management is to help business owners determine when to purchase new stock so they can stay ahead of demand. This is also known as a purchasing plan. Different businesses use different kinds of purchasing plans depending on the needs of their industry. For example, a small, online business might not have the storage space to keep a lot of stock on hand. In this case, they might opt for a 'just-in-time' purchasing plan, which ensures they receive the stock they need 'just-in-time' to meet demand.

Some businesses base their purchasing plan on past sales data, If they know what projected sales are likely to be, they can create a stock replenishment schedule to meet that predicted demand. Some businesses also keep a little extra stock on hand in case anything is defective and needs to be replaced

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Benefits of Inventory Management

In addition to helping a business stay organized, an effective inventory management system can also help:

- Keep the business profitable
- Reduce costs
- Achieve economies of scale
- Analyse sales patterns and predict future sales
- Analyse performance against competitors
- Prepare the business for the unexpected

With the right inventory management system in place, a business has a better chance for profitability and survival.

REVIEW OF LITERATURE

According to Adrian Pugna, Romeo Negrea, Serban Miclea (2016), the implementation of Six Sigma methodology provides breakthrough quality improvements within a reasonable timeframe. This paper explores a creative solution for improving the assembly process in an automotive company in Romania by utilizing Statistical Thinking and the DMAIC Six Sigma methodology. The study highlights the effectiveness of Six Sigma in enhancing process efficiency and quality outcomes, contributing to the company's competitiveness and customer satisfaction. Key tools and techniques employed include Xbar & R charts, Analytic Hierarchy Process (AHP), and Poka Yoke methods.

Application of Six Sigma DMAIC Methodology to Reduce Medication Errors in a Major Trauma Care Centre in India December 2018Indian Journal of Pharmacy Practice 11(4):182- According to the study conducted by the Indian Journal of Pharmacy Practice in December 2018, the application of Six Sigma DMAIC methodology significantly reduced medication errors in a major trauma care centre in India. The study analyzed the effect of Six Sigma methodology on medication errors at Ganga Medical College Hospital, Coimbatore, Tamil Nadu, during the period of February 2017 to July 2017. Results showed a reduction in prescribing, transcribing, dispensing,

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administering, and monitoring errors from 62, 19, 6, 47, and 14 cases respectively in the measure phase to 12, 10, 2, 7, and 4 cases in the improve phase.

Antony, J., & Banuelas, R. (2002). Key ingredients for the effective implementation of Six Sigma program. Measuring Business Excellence, ix Sigma is a business strategy and a systematic methodology that drives breakthrough profitability by achieving quantum gains in product/service quality, customer satisfaction, and productivity. Originating at Motorola in the 1980s, its objective was to minimize defects to as low as 3.4 parts per million opportunities.

Selim Ahmed, Rafikul Islam, Dewan Mehrab Ashrafi, Ibrahim Alqasmi, Musfiq Mannan Choudhury, Mahfuzur Rahman & Bablu Kumar Dhar. (2023) Effects of lean and six sigma initiatives on continuous quality improvement of the accredited hospitals. International Journal of Healthcare Management. The main purpose of this study is to investigate the role of Lean and Six Sigma initiatives on continuous quality improvement in the Malaysian Society for Quality in Health (MSQH) accredited hospitals. In particular, it investigates the relationship between top management support and teamwork. It also examines the influence of teamwork on Lean and Six Sigma initiatives. In this study, 450 survey questionnaires were distributed to twelve MSQH-accredited hospitals' staff using the Stratified Random Sampling method and received 251 useable responses constituting a 55.78 per cent response rate. The reliability and validity of the research variables were tested based on internal consistency, construct validity and discriminant validity by applying the Smart PLS 3.3.4 software.

Hekmatpanah M, Sadroddin M, Shahbaz S, Mokhtari F, Fadavinia F (2008) Six Sigma process and its impact on the organizational productivity. World Acad Sci Eng Technol 43:2070–3740 The six-sigma method is a project-driven management approach to improve the organization's products, services, and processes by continually reducing defects in the organization. Understanding the key features, obstacles, and shortcomings of the six-sigma method allows organizations to better support their strategic directions, and increasing needs for coaching, mentoring, and training. It also provides opportunities to better implement six sigma projects.

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NEED FOR THE STUDY

- **Improve Inventory Accuracy:** The study aims to identify and address the factors contributing to inventory discrepancies at Apollo Tyres NDC1, ensuring that the actual stock levels match what is recorded in the system.
- **Enhance Picker Training:** By understanding the specific challenges faced by pickers in accurately fulfilling orders, the study seeks to develop targeted training programs to improve their performance and reduce errors.
- **Optimize Operational Efficiency:** Minimizing inventory variances and improving picker accuracy will lead to smoother operations and fewer disruptions in the order fulfilment process at Apollo Tyres NDC1.
- **Increase Customer Satisfaction:** Ultimately, the goal of the study is to enhance the overall customer experience by ensuring that orders are fulfilled accurately and efficiently, leading to higher levels of satisfaction among customers.

OBJECTIVES OF THE STUDY

Primary objective:

- A study on outbound customer complaint due inventory variances

Secondary Objective:

- **Identification of Root Causes:** Explore the underlying factors contributing to inventory variances and their implications for outbound customer complaints.
- **Assessment of Customer Impact:** Evaluate the impact of inventory discrepancies on customer satisfaction and loyalty metrics.
- **Application of DMAIC Methodology:** Implement the DMAIC framework to systematically analyse and improve inventory management processes.
- **Evaluation of Improvement Measures:** Assess the effectiveness of implemented improvement measures in reducing inventory variances and mitigating customer complaints.

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LIMITAION OF THE STUDY

- Limited access to specialized software, industry experts, and financial resources may hinder the depth and breadth of the research. This constraint could limit the ability to conduct comprehensive analyses and explore all potential factors contributing to inventory variances and customer complaints.
- Time limitations may restrict the extent of data collection, analysis, and implementation of improvement measures. This constraint could affect the thoroughness of the study and the ability to address all identified issues adequately within the allotted timeframe.

RESEARCH METHODOLOGY

Research methodology refers to the systematic process and techniques used to conduct research and gather data to answer research questions or test hypotheses. It outlines the procedures, tools, and strategies employed by researchers to design, carry out, and analyze their studies effectively. A robust research methodology is essential for ensuring the validity, reliability, and credibility of research findings.

Research design:

Research design is a framework or the blueprint for conducting the research report. Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Here the research is analytical research. Analytical data based on the collection of secondary data published by Apollo tyres.

Data collection:

Quantitative Approach: Utilize quantitative methods to analyze numerical data related to inventory variances and customer complaints. This may involve statistical analysis of inventory records, customer complaint logs, and other relevant quantitative data. Collect historical inventory data from Apollo Tyres NDC1, including records of incoming shipments, outgoing orders, and

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inventory counts. Gather customer complaint data from NDC1 logs or customer service records, focusing on complaints related to inventory issues such as incorrect orders, delays, or stockouts.

Descriptive:

A descriptive study aims to systematically collect, organize, and interpret data to provide a detailed account or portrayal of a particular phenomenon, event, or subject. Its primary objective is to describe the characteristics, features, or attributes of the topic under investigation without necessarily aiming to establish causal relationships or test hypotheses.

Descriptive statistics:

Total error	
Mean	28.1
Standard Error	7.983942218
Median	16
Mode	16
Standard Deviation	25.24744211
Sample Variance	637.4333333
Kurtosis	0.806087492
Skewness	1.235707443
Range	76
Minimum	6
Maximum	82
Sum	281
Count	10

The DMAIC Six Sigma methodology

The six-sigma approach utilizes a five-phased DMAIC methodology which is applied to tackle specific problems to reach six-sigma levels of performance (Breyfogle, 1999; Thomas et al., 2009). These phases are:

- Define – What is the problem? Does it exist?
- Measure – How is the process measured? How is it performing?
- Analyse – What are the most important causes of defects?
- Improve – How do we remove the causes of the defects?

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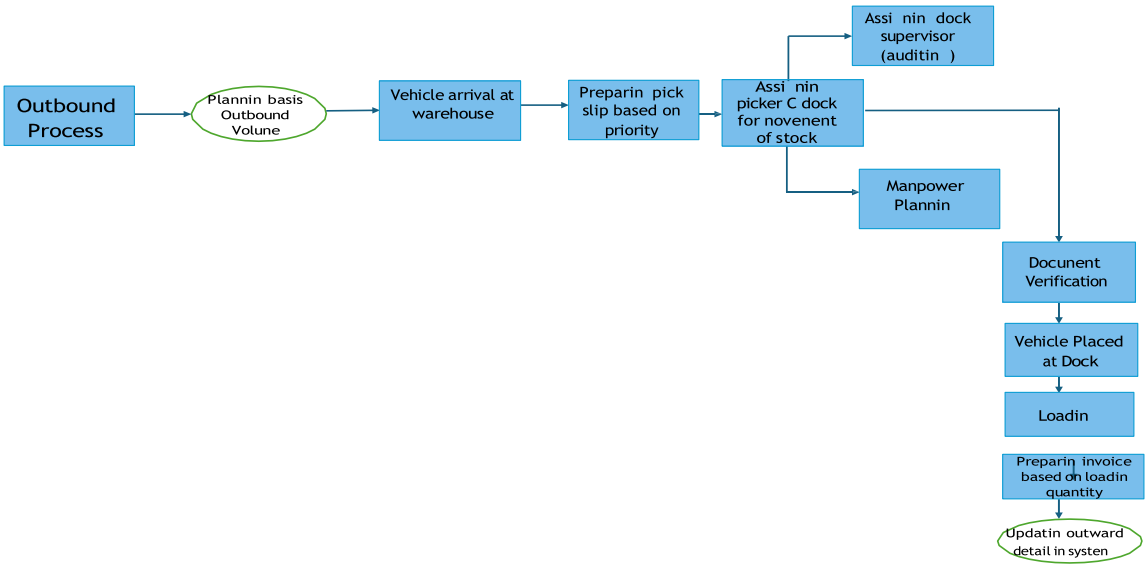
- Control – How can we maintain the improvements?

Define Phase:

The define phase is to make clear understanding of scope and objective. Also, the purpose of the project and scope will be defined during the phase. One of the key major success factors of Six Sigma project is that, it starts with understanding of what service processes are critical to achieve the objectives. The variance is mainly occurred due to low location accuracy and new picker allowed pick. The process flow chat of the warehouses has mentioned below



OUTBOUND PROCESS MAPPING

The current outbound process exhibits significant inventory discrepancies and customer dissatisfaction due to two primary issues**: picking errors** by warehouse personnel and inventory variances despite model checks by **audit personnel**. Picking errors result in incorrect tire selection as indicated on pick slips, leading to inventory inaccuracies and customer complaints. Additionally, despite model checks conducted by audit personnel before dispatch, inventory variances persist, causing discrepancies between the intended and actual inventory.

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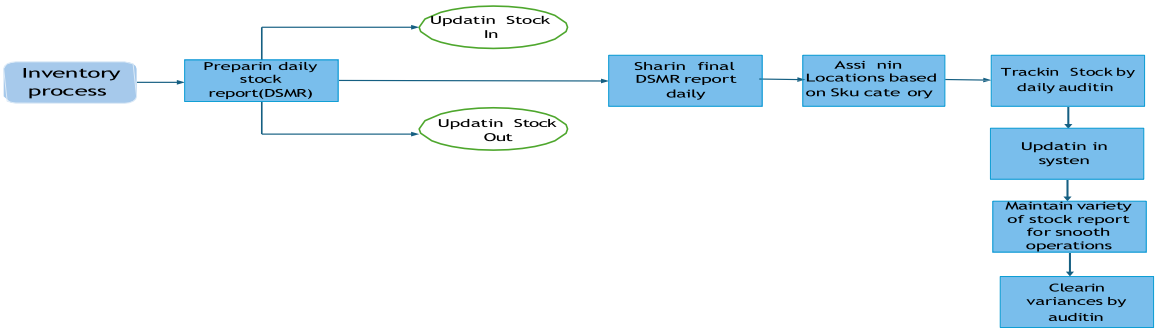

INVENTORY PROCESS MAPPING

The occurrence of inventory errors, specifically when the specified tire is not found in its designated location, is a critical issue within our operations. This problem appears to stem from discrepancies between the actual inventory and the data recorded in the Daily Stock Maintenance report. As such, it's imperative to address this issue promptly to ensure the accuracy and reliability of our inventory management system. The root cause of this problem likely lies in inaccuracies or delays in **updating the Daily Stock Maintenance report**.

Measure phase:

Factor that critical to the quality outbound error are -

Picker Picking Error: In a warehouse or distribution centre, pickers are responsible for selecting items from shelves or storage locations to fulfil customer orders. Picking errors occur when a picker selects the wrong item or the wrong quantity.

Location Inaccuracy: Location inaccuracy refers to discrepancies between the recorded location of items in a warehouse management system (WMS) or inventory management system and their actual physical location within the facility. This can lead to delays in finding items for picking, incorrect picks, or even lost inventory.

Contra SKU: Contra SKU refers to situations where similar or identical products have different stock-keeping unit (SKU) numbers in the inventory system. This can lead to confusion during picking, packing, and shipping, resulting in incorrect orders being sent to customers.

Outbound Auditing Error: Outbound auditing errors occur when the process of verifying picked items against customer orders is not conducted accurately. This can result in incorrect items being shipped, missing items from orders, or incorrect quantities being sent out.

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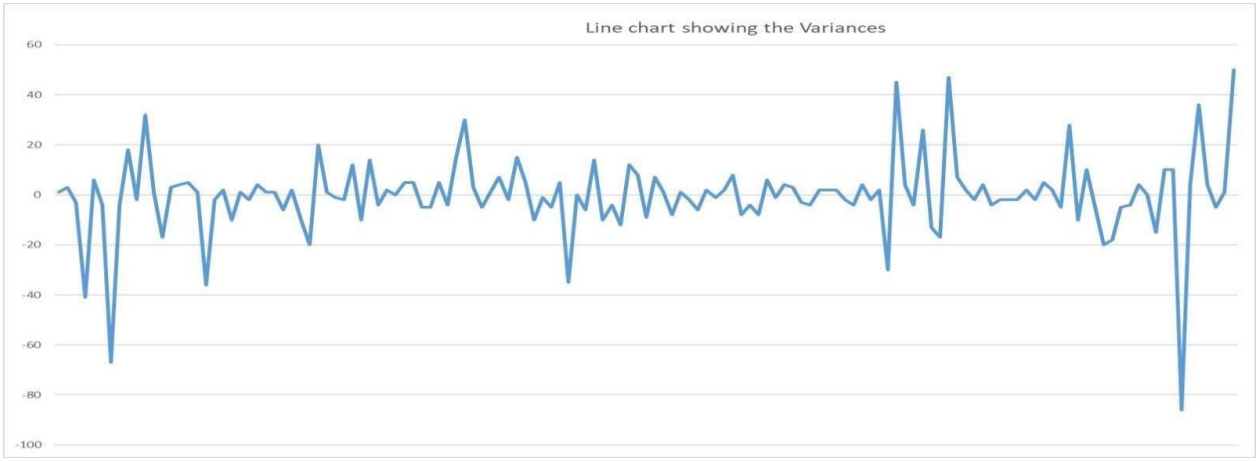

SHOWING OUTBOUND VARIANCES

The y-axis shows variance, ranging from -100 to 60. The x-axis label is cut off but appears to be abbreviated as "SKU's" which likely refers to Stock Keeping Units.

Here's what we can interpret from the chart:

Overall Negative Variance: The line trends downwards slightly, starting at close to 0 and ending around -40. This suggests that there is a negative variance across all SKUs. In other words, for all the stock keeping units, the actual values are consistently lower than the target values.

Variability in Variance: While negative across the board, the variance appears to fluctuate between SKUs. Some SKUs (represented by data points on the line) have a higher negative variance (closer to -100) than others.

Analyse phase:

The process to determine the root cause. Analyse is the process to determine root causes of variation, poor performance (defects).

CATEGORY ERROR DATA TABLE

CATEGORY	STATISTICS	MONTH

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		JANUARY	FEBRUARY	MARCH	APRIL	TOTAL ERROR
	TOTAL	5	31	53	202	
TBR	QUANTITY ERROR	0	IIII	𝍸 III	𝍸 𝍸 𝍸 𝍸 𝍸 IIII	51
	PERCENTAGE OF ERROR	0	12.90	24.54	16.83	
TBB	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	IIII	0	II	6
	PERCENTAGE OF ERROR	0	12.90	0	0.99	
PCR	TOTAL	5	31	53	202	
	QUANTITY ERROR	𝍸	𝍸 I	𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 I	82
	PERCENTAGE OF ERROR	100	19.35	37.73	25.24	
2WT	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	II	𝍸	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 II	49
	PERCENTAGE OF ERROR	0	6.45	9.43	20.79	
3WT	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	0	III	III	7
	PERCENTAGE OF ERROR	0	0	5.66	0.014	

CATEGORY	STATISTICS	MONTH

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		JANUARY	FEBRUARY	MARCH	APRIL	TOTAL ERROR
	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	0	IIII	𝍸 II	11
OHT	PERCENTAGE OF ERROR	0	0	7.54	3.46	
TRACTOR FRONT	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	0	IIII	𝍸 𝍸 I	16
	PERCENTAGE OF ERROR	0	0	7.54	5.44	
PKD TUBE	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	0	I	𝍸 IIII	10
	PERCENTAGE OF ERROR			1.88	4,45	
LCV	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	IIII	II	𝍸 𝍸 𝍸 𝍸 𝍸 II	33
	PERCENTAGE OF ERROR	0	9.67	3.77	13.36	
TREADS	TOTAL	5	31	53	202	
	QUANTITY ERROR	0	0	IIII	𝍸 𝍸 II	16
	PERCENTAGE OF ERROR	0	0	7.54	5.94	

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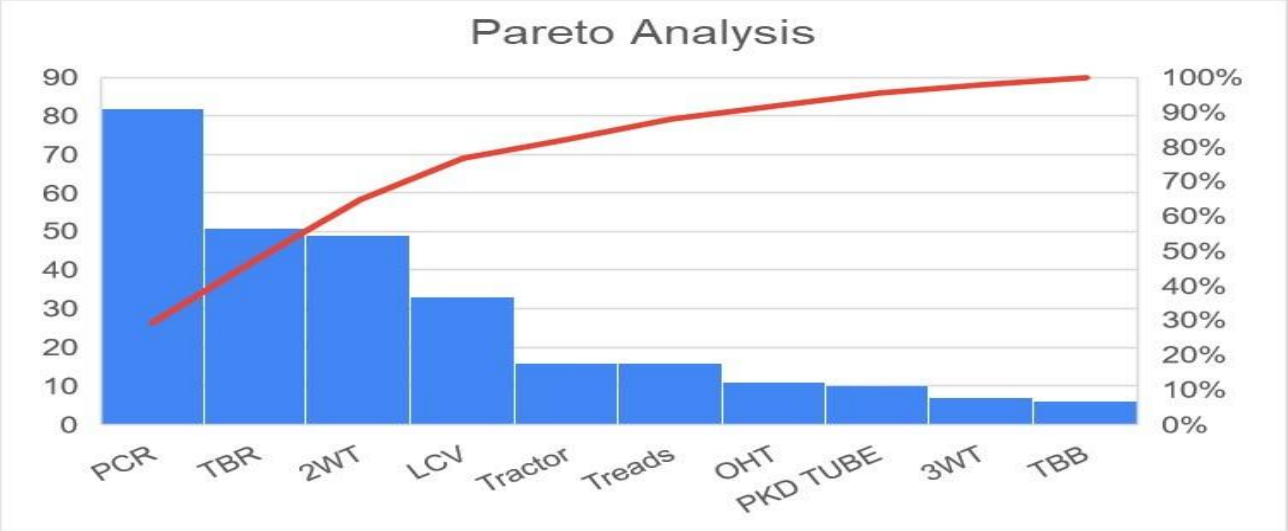

CATEGORY DEFECT CHART

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This is a chart showing a cumulative distribution of inventory variances for different categories of tires at a tire National Distribution Centre (NDC).

The y-axis shows the percentage of tractors (likely a typo for tire categories)

The x-axis shows different categories of tires, likely representing various tire types (e.g., TBR - Truck Bus Radial, TBB - Truck Bias Belted, PCR - Passenger Car Radial, etc.)

The red line shows a cumulative distribution, indicating the percentage of tire categories that account for a certain proportion of the total inventory variance.

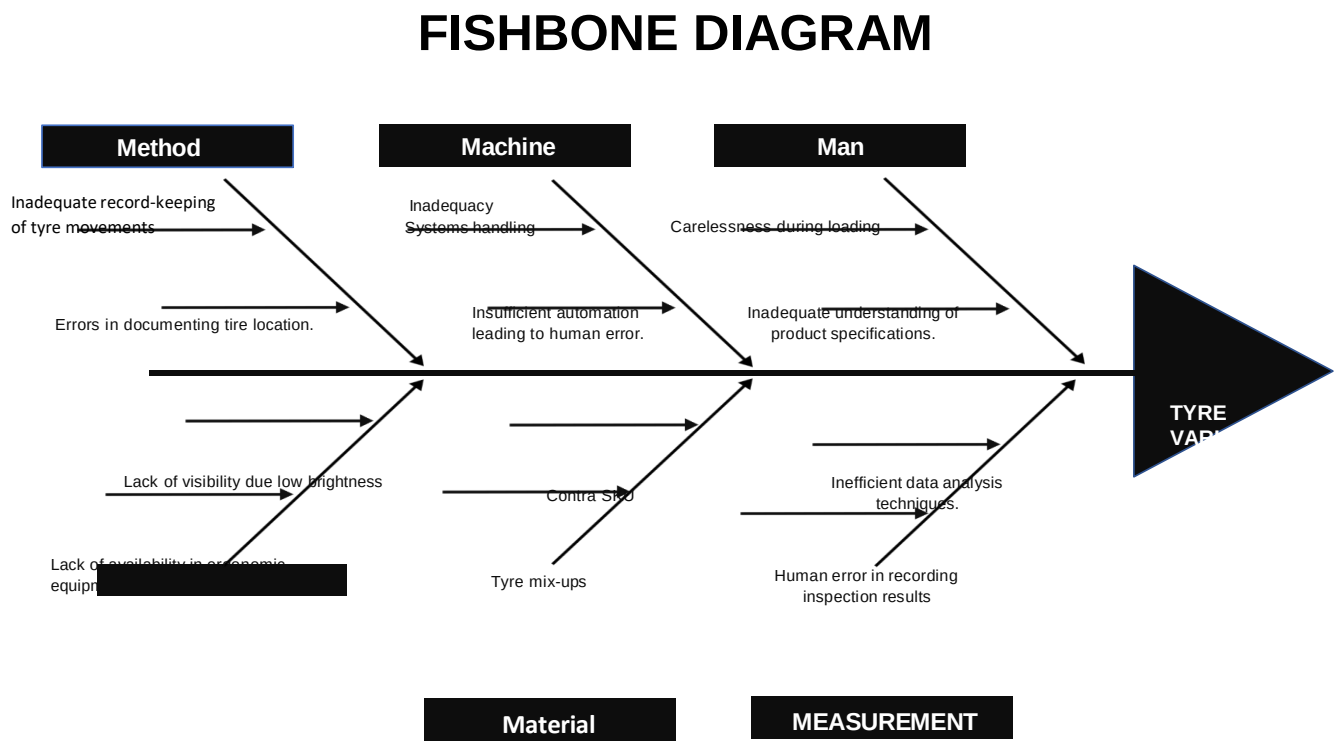
For instance, if the red line intersects the y-axis at 20% and the x-axis intersects that same point at "TBR", it would mean that the "TBR" category contributes to 20% of the total inventory variance.

The remaining 80% of the variance would be spread across the other tire categories

Root cause analysis:

The root cause is the core issue—the highest-level cause—that sets in motion the entire cause and effect reaction that ultimately leads to the problem(s). Root cause analysis (RCA) is defined as a collective term that describes a wide range of approaches, tools, and techniques used to uncover causes of problems.

Root analyses is been determined by using fish bone diagram



FISH BONE DIAGRAM

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Improve phase:

Improve process performance by addressing and eliminating the root causes. Develop and implement solutions to address the root causes identified in the analysis phase.

The company has unified the data updating process in one file. The company has streamlined data updating across all domains by consolidating them into a single Excel spreadsheet. This spreadsheet encompasses various components like Pick Plan, Opening Stock, Generate Picklist, Inventory, Published Picklist, Bin Out, Do Putaway, Putaway Done, Product Master, Audit, Bin to Bin, and Inventory Backup File.

By using macros, Apollo Tyres NDC1 can significantly improve their data updating processes. They ensure consistency, accuracy, and streamline operations across all domains. Additionally, maintaining a single Excel spreadsheet centralizes data management, making it easier to track inventory, generate reports, and conduct audits.

Pick Plan:

This section details the planned picks, including item codes, quantities, pick locations, and scheduled pick times. It helps organize the picking process by providing clear instructions to warehouse staff on which items to pick and where to find them.

Opening Stock:

Here, Apollo Tyres NDC1 records the initial inventory levels at the beginning of a specific period. It serves as a baseline for tracking stock movements and assessing inventory changes over time.

Generate Picklist:

This component involves creating picklists based on the pick plan. Picklists consolidate orders and optimize pick routes to improve warehouse efficiency, ensuring that items are picked and dispatched accurately and promptly.

Inventory:

The inventory section maintains an updated database of stock levels, locations, SKU details, and other relevant attributes. It provides real-time visibility into available inventory, enabling effective inventory management and order fulfillment.

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Published Picklist:

Once picklists are finalized, they are published or made available to warehouse operatives for picking tasks. This ensures that staff have access to accurate and up-to-date instructions for fulfilling customer orders.

Bin Out:

This section tracks items that have been picked from inventory bins. It includes details such as bin numbers, item codes, and quantities picked, providing visibility into inventory movements and reducing the risk of stockouts or overstock situations.

Do Putaway:

Records actions related to putting away picked items into designated storage locations within the warehouse. It ensures that inventory is properly stored and organized, facilitating efficient retrieval and order fulfillment processes.

Putaway Done:

Confirms or records completed putaway tasks, ensuring that inventory is accurately accounted for and stored in the appropriate locations. It helps maintain inventory accuracy and reduces the likelihood of misplaced or lost items.

Product Master:

Maintains a centralized repository of product information, including descriptions, specifications, pricing, and relevant attributes. It serves as a comprehensive reference for all products stocked by Apollo Tyres NDC1, facilitating efficient inventory management and order processing.

Audit:

Conducts regular audits of inventory to reconcile physical counts with system records and identify discrepancies or errors. Audits help ensure data accuracy, identify areas for improvement, and maintain compliance with regulatory requirements.

Bin to Bin:

Tracks movements of inventory items between different storage bins or locations within the warehouse. It provides visibility into inventory flow and helps optimize warehouse layout and storage space utilization.

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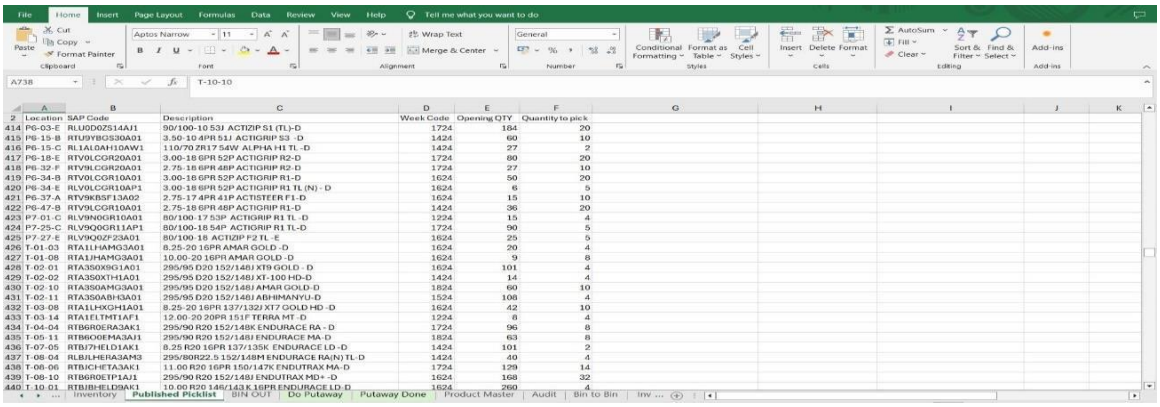
Inventory Backup File:

Maintains backup copies of inventory data to ensure data integrity and provide a recovery option in case of data loss or corruption. Backup files serve as a safeguard against unexpected events and help minimize disruptions to operations.

By effectively managing each of these components within their data updating process, Apollo Tyres NDC1 can optimize warehouse operations, improve inventory accuracy, and enhance overall efficiency in serving their customers.



	Location	SAP Code	Description	Week Code	Opening QTY	Quantity to pick
414	P6-03-E	RLU0D0ZS14AJ1	90/100-10 53J ACTIZIP S1 (TL)-D	1724	184	20
415	P6-15-B	RTU9YBGS30A01	3.50-10 4PR 51J ACTIGRIP S3 -D	1424	60	10
416	P6-15-C	RL1ALDAH10AW1	110/70 ZR17 54W ALPHA H1 TL -D	1424	27	2
417	P6-18-E	RTV0LCGR20A01	3.00-18 6PR 52P ACTIGRIP R2-D	1724	80	20
418	P6-32-F	RTV9LCGR20A01	2.75-18 6PR 48P ACTIGRIP R2-D	1724	27	10
419	P6-34-B	RTV0LCGR10A01	3.00-18 6PR 52P ACTIGRIP R1-D	1624	50	20
420	P6-34-E	RLV0LCGR10AP1	3.00-18 6PR 52P ACTIGRIP R1 TL (N) - D	1624	6	5
421	P6-37-A	RTV9KB5F13A02	2.75-17 4PR 41P ACTISTEER F1-D	1624	15	10
422	P6-47-B	RTV9LCGR10A01	2.75-18 6PR 48P ACTIGRIP R1-D	1424	36	20
423	P7-01-C	RLV9N0GR10A01	80/100-17 53P ACTIGRIP R1 TL -D	1224	15	4
424	P7-25-C	RLV9Q0GR11AP1	80/100-18 54P ACTIGRIP R1 TL-D	1724	90	5
425	P7-27-E	RLV9Q0ZF23A01	80/100-18 ACTIZIP F2 TL -E	1624	25	5
426	T-01-03	RTA1LHAMG3A01	8.25-20 16PR AMAR GOLD -D	1624	20	4
427	T-01-08	RTA1JHAMG3A01	10.00-20 16PR AMAR GOLD -D	1624	9	8
428	T-02-01	RTA3S0X9G1A01	295/95 D20 152/148J XT9 GOLD - D	1624	101	4
429	T-02-02	RTA3S0XTH1A01	295/95 D20 152/148J XT-100 HD-D	1424	14	4
430	T-02-10	RTA3S0AMG3A01	295/95 D20 152/148J AMAR GOLD-D	1824	60	10
431	T-02-11	RTA3S0ABHI3A01	295/95 D20 152/148J ABHIMANYU-D	1524	108	4
432	T-03-08	RTA1LHXGH1A01	8.25-20 16PR 137/132J XT7 GOLD HD -D	1624	42	10
433	T-03-14	RTA1ELTMT1AF1	12.00-20 20PR 151F TERRA MT -D	1224	8	4
434	T-04-04	RTB6R0ERA3AK1	295/90 R20 152/148K ENDURACE RA - D	1724	96	8
435	T-05-11	RTB6O0EMA3AI1	295/90 R20 152/148J ENDURACE MA -D	1824	63	8
436	T-07-05	RTBJ7HELD1AK1	8.25 R20 16PR 137/135K ENDURACE LD -D	1424	101	2
437	T-08-04	RLBJLHERA3AM3	295/80R22.5 152/148M ENDURACE RA(N) TL-D	1424	40	4
438	T-08-06	RTBJCHETA3AK1	11.00 R20 16PR 150/147K ENDUTRAX MA-D	1724	129	14
439	T-08-10	RTB6R0ETP1AJ1	295/90 R20 152/148J ENDUTRAX MD+ -D	1624	168	32
440	T-10-01	RTBJBHELD3AK1	10.00 R20 146/143 K 16PR ENDURACE LD -D	1624	260	4

MACRO FILE IMAGE

Control Phase:

Establish controls and measures to monitor the improved process to ensure that gains are Sustained over time.

After introducing the macro file, Apollo Tyres NDC1 successfully gained control over their data updating process, resolving the previous issues. Here's a brief explanation of how the macro file contributed to solving the problem:

The macro file automated repetitive tasks and enforced validation rules, significantly reducing error frequency. By streamlining data entry, checking for errors, and processing data efficiently, the macros ensured greater accuracy and consistency in the data updating process.

Furthermore, the macro file enhanced productivity by saving time and effort previously spent on manual data entry and validation. This allowed employees to focus on more value-added tasks, such as analysing data and making informed decisions to improve operations. Overall, the introduction of the macro file revolutionized Apollo Tyres NDC1's data updating process, leading to improved efficiency, accuracy, and control.

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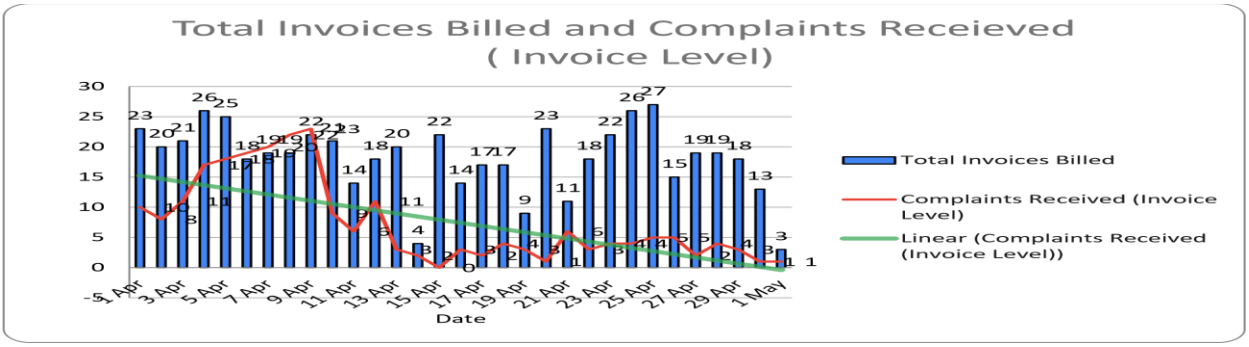

TOTAL INOVICES BILLED VS COMPLAINTS RECIVED

Total Invoices Billed:

- The number of invoices billed varies throughout the month, ranging from as low as 3 on May 1st to as high as 37 on May 7th.
- There are fluctuations in the number of invoices billed, with some days showing relatively high numbers (e.g., April 25th, 27th) and others showing lower numbers (e.g., April 14th, May 1st).

Complaints Received (Invoice Level):

- The number of complaints received also varies, with some days having no complaints (e.g., April 15th) and others having relatively higher numbers (e.g., April 6th, April 9th).
- There are instances where the number of complaints is higher than the number of invoices billed, indicating potential issues with some invoices leading to multiple complaints.

Inferences:

- There seems to be a general trend of higher complaint numbers when the total invoices billed are higher, but this is not always the case. For example, on May 5th, there are 34 invoices billed but only 3 complaints received.
- There are sporadic spikes in complaints on certain days, such as April 6th, April 9th, and May 7th, despite the total invoices billed not being exceptionally high on those days.
- Overall, while there is some correlation between the number of invoices billed and complaints received, other factors may also be contributing to customer complaints, such as invoice accuracy, delivery delays, or product quality issues.

Findings:

- The data highlights the importance of closely monitoring and analyzing customer complaints to identify underlying issues and areas for improvement in the billing and delivery process.

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- It may be beneficial for Apollo Tyres NDC1 to investigate the causes of complaints on days with higher-than-average complaint numbers and take corrective actions to address any recurring issues.
- Additionally, tracking the correlation between invoice accuracy and complaint frequency could help identify patterns and improve overall customer satisfaction.

- In May month the complaint has been reduced drastically compare to April month.

SUGESSTIONS

Macro Implementation Optimization: Continuously assess and optimize the macros implemented in Excel to ensure they remain effective and efficient. Regularly review macros for any potential errors or inefficiencies and update them as needed to accommodate changes in data structures or business requirements.

Enhanced Training Programs: Develop and implement comprehensive training programs to ensure all employees are proficient in utilizing the implemented macros and conducting wall-to-wall audits effectively. Training should cover not only the technical aspects but also emphasize the importance of data accuracy and attention to detail.

Continuous Monitoring and Evaluation: Establish a system for continuous monitoring and evaluation of implemented solutions, including macros, wall-to-wall audits, and OIONS. Set up key performance indicators (KPIs) to track improvements in data accuracy, operational efficiency, and customer satisfaction. Regularly review KPIs and gather feedback from stakeholders to identify areas for further optimization.

Stay Updated on Industry Trends: Stay abreast of industry trends, technological advancements, and best practices in warehouse management and optimization. Attend conferences, webinars, and training sessions to learn about emerging technologies and innovative solutions that could further enhance warehouse operations at Apollo Tyres NDC1.

CONCLUSION

The research at Apollo Tyres NDC1 demonstrates significant progress in optimizing warehouse operations through the adoption of technological solutions and systematic approaches. By

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implementing macros in Excel, conducting thorough wall-to-wall audits, and exploring the potential of the Outbound Integrated Optimization and Navigation System (OIONS), the company has improved efficiency, accuracy, and customer satisfaction. Macros in Excel have streamlined data entry and reduced errors, enhancing accuracy and efficiency in managing various data updating processes. Similarly, wall-to-wall audits have provided a structured approach to inventory accuracy, leading to improved operational efficiency. The proposed OIONS offers a comprehensive solution to further optimize outbound operations through QR codes, real-time navigation, and quality assurance checks. To sustain these improvements, continuous monitoring, evaluation, and optimization are essential.

ANNEXURE

BIBLIOGRAPHY:

Website referred:

- https://shodhganga.inflibnet.ac.in/
- https://scholar.google.com/
- https://www.researchgate.net/
- https://corporate.apollotyres.com/.

JOURNAL REFERRED:

Anand, R.B., Shukla, S.K., Ghorpade, A., Tiwari, M.K. and Shankar, R. (2007) 'Six Sigma-based approach to optimize deep drawing operation variables', International Journal of Production Research, Vol. 45, Nos. 10/15, pp.2365–2385.

Mast, J.D. and Lokkerbol, J. (2012) 'An analysis of the Six Sigma DMAIC method from the perspective of problem solving', International Journal of Production Economics, Vol. 139,No. 2, pp.604–614.