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Increasing the Stock Taking Process Accuracy for ISO 9001 Quality Management System Fulfilment at 2W EV Manufacturer, Cikarang, West Java

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ABSTRACT

The two-wheeled EV (2W EV) manufacturer at the centre of this study prioritizes efficiency, innovation, and adherence to ISO 9001:2015 quality requirements. However, the company encountered issues with its Supply Chain Management procedures during the ISO Surveillance 1 period, where one of the implementations was an internal audit in line with BPMS. Specifically, the results showed that the physical stock that matched the system was only 80%, which was very far from the KPI target of 95%. It hindered operations and impacted customer satisfaction. Business Process Improvement (BPI) was applied to examine the current stocking system. Comparing current processes with the best practices specified in BPMS and ISO 9001:2015 criteria was the first step in performing a thorough gap analysis. The results showed that human mistakes, machine calibration problems, a lack of standard operating procedures, inconsistent counting techniques, mixed scrap materials, and an unmanaged warehouse environment were causes of stock variations. The company made strategic changes, such as standardizing material labelling to avoid recording errors, substituting material loan for the interdepartmental purchasing system to increase accountability, and updating and enlarging SOPs to guarantee process uniformity. The business also installed an ERP system to enhance stock accuracy, facilitate real-time monitoring, and combine warehouse operations with digital tracking. As a result, by September 2024, the efficiency of stock control had increased by almost 86%. The increased stock control not only improves compliance with ISO 9001 standards, but it also increases overall operational efficiency by reducing production problems and increasing customer satisfaction.
Keyword: Business Process Improvement, ISO 9001 Standards, Operational Efficiency, Stock Differences, Two-Wheeled Electric Vehicles.

ABSTRAK

Produsen kendaraan listrik roda dua (2W EV) yang menjadi pusat penelitian ini memprioritaskan efisiensi, inovasi, dan kepatuhan terhadap persyaratan kualitas ISO 9001:2015. Namun, perusahaan mengalami masalah dengan prosedur Manajemen Rantai Pasokannya selama periode ISO Surveillance 1, di mana salah satu implementasinya adalah audit internal yang sejalan dengan BPMS. Secara spesifik, hasil audit menunjukkan bahwa stok fisik yang sesuai dengan sistem hanya 80%, sangat jauh dari target KPI sebesar 95%. Ketidaksesuaian ini menghambat operasional dan berdampak pada kepuasan pelanggan. Penelitian ini menerapkan Business Process Improvement (BPI) untuk menganalisis permasalahan. sasaran. Langkah pertama yang dilakukan adalah melakukan analisis kesenjangan yang terperinci dengan membandingkan praktik saat ini dengan praktik terbaik yang diuraikan dalam persyaratan BPMS dan ISO 9001:2015. Temuan tersebut menyoroti enam masalah utama yang menyebabkan ketidakkonsistenan stok: kesalahan manusia, masalah kalibrasi mesin, kurangnya SOP, metode penghitungan yang tidak konsisten, bahan bekas yang tercampur, dan lingkungan gudang yang tidak terkendali. Berdasarkan hasil tersebut, perusahaan melakukan perubahan strategis, seperti menstandarisasi pelabelan material untuk menghindari kesalahan pencatatan, mengganti peminjaman

material dengan sistem pembelian antar departemen untuk meningkatkan akuntabilitas, serta memperbarui dan memperbesar SOP untuk menjamin keseragaman proses. Bisnis ini juga memasang sistem ERP untuk meningkatkan akurasi stok, memfasilitasi pemantauan waktu nyata, dan menggabungkan operasi gudang dengan pelacakan digital. Sebagai hasil dari peningkatan sistemik ini, pada September 2024, efisiensi kontrol stok telah meningkat hampir 86%. Peningkatan kontrol stok tidak hanya meningkatkan kepatuhan terhadap standar ISO 9001, tetapi juga meningkatkan efisiensi operasional secara keseluruhan dengan mengurangi masalah produksi dan meningkatkan kepuasan pelanggan.
Kata Kunci: Peningkatan Proses Bisnis, Standar ISO 9001, Efisiensi Operasional Perbedaan Stok, Kendaraan Listrik Roda Dua.

1. Introduction

Automation and digitization are two examples of how quickly technology is developing and how they have altered the manufacturing sector. The modern era's electric motorcycles (EVs) manufacture a rapidly expanding industry with a significant competitive advantage, propelled by worries about the environmental impact of traditional fossil fuel vehicles and supported demand for eco-friendly mobility [1]. According to research on electric vehicles titled An Electric Revolution: The Rise of Indonesia's E-Motorcycles, which was carried out by Deloitte Indonesia and Foundry, the country has seen a 15-fold increase in the use of electric motors in the last two years, from 2020 to 2022 [2]. Consequently, a great deal of new companies has joined the market for producing electric motorcycles, both domestically and internationally.

The research was conducted at a company that manufactures two-wheeled electric motorcycle (2W EVs), offering electric mobility options to satisfy consumer demand for affordable, eco-friendly, and stylish vehicles. The company prioritizes innovation, efficiency, and sustainability in this very competitive industry while adhering to global quality standards. With a strong focus on quality management, particularly in the Supply Chain Management process, which involves counting physical inventory in its warehouses [3], the company's production is aligned with international standards to improve customer satisfaction and operational efficiency [4].

The ongoing discrepancy between the computer inventory system and the real stock quantity is one of the issues that frequently arise in the warehouse[5] . The accuracy rating of the company's stock-taking procedure has only achieved 80% during the past year. This issue indicates a discrepancy between the quantities of items recorded in the inventory system and the real amount of physical goods in the warehouse. It impacts the company's SCM department's primary Key Performance Index (KPI), which guarantees that 95% of the actual stock in the warehouse corresponds with the system records. Such discrepancies can cause operations to be disrupted, expenses to rise, and customer satisfaction to drop [6].

The company's difficulties in matching its inventory records with actual stock are not unique; rather, they reflect a larger problem in the worldwide electric vehicle (EV) production sector. Manufacturers throughout the world are battling complicated supply chain dynamics that can result in inventory inconsistencies as the EV industry grows quickly[7]. These difficulties are exacerbated by elements like the incorporation of cutting-edge technology, the requirement for accurate component tracking, and the dependence on a wide range of suppliers. To increase inventory accuracy and operational efficiency in the global EV manufacturing landscape, it is imperative to implement standardized processes, improve digital tracking systems, and cultivate greater engagement with suppliers[8][9].

Internal audit is a crucial component of business process papping since it guarantees smooth operations and adherence to set standards like ISO 9001[10]. Internal audit helps organizations achieve their objectives by introducing a systematic and disciplined approach to evaluate and improve the effectiveness of risk management, control, and management processes [11][12]. A significant factor that internal audits can assess is the outcome of the June 2024 stock-taking process, which concerns the correctness of the system's stock and the real stock [13][3]. [14] state that to guarantee correct installation and upkeep of the system, ISO 9001 offers systematic evaluation procedures. Businesses must also create clear protocols for every phase of the Quality Management System, from planning to reporting [15] .

However, the internal audit results revealed discrepancies between actual stock and stock recorded in the system. These inaccuracies indicate problems in inventory management, especially regarding accuracy,

highlighting the important role played by internal audits in assisting management in ensuring that internal inventory controls are adequate [16]. [17] notes that an internal audit can identify potential risks and weaknesses and provide useful recommendations for improvement. Internal audit can also provide guidance and advice for risk management in the business [10].

Business processes need to be assessed and improved considering the issues described. Business Process Improvement (BPI) is a technique that may be used to suggest improved business process modifications to obtain a more effective and efficient business process [18]. It has become only one of the crucial business processes. The stock-taking procedure has been improved to address the discrepancy between the records maintained by the computer inventory system and the actual stock in the warehouse and increase its accuracy. The primary goal is to use the improvement offered methodologies to identify solutions for business process issues in the form of suggested or suggested business processes. Based on the internal audit results during the ISO 1 Surveillance period, it is essential to investigate the reasons behind the differences in stock-taking data to minimize errors and choose the best course of action to maximize accuracy.

2. Method

To comprehend the actual conditions in the warehouse, the study started with field observations collected during the stock-taking procedure. Next, it identified the main problems pertaining to the discrepancy between the data in the system and the actual stock. Following data collection, an analysis was performed, which included a review of Business Process Mapping in the context of ISO 9001, the development of audit findings, and the results of a stock taking.

To find areas for stock accuracy improvement, a business process evaluation was carried out based on this research. The investigation next concentrated on determining the reasons behind stock discrepancies after the first stage examined a more thorough grasp of the stock-taking procedure. This analysis led to the development of a plan for increasing stock accuracy that included the use of check sheets to guarantee improved control and the 5W+1H Analysis approach. A comparative analysis was the next phase, which assessed the degree of ISO 9001 compliance by comparing the STO outcomes following the improvement strategy's execution with the pre-improvement conditions.

The comparison's findings were then used to inform decisions, with a particular emphasis on stock accuracy outcomes to meet the company's KPI goals. Figure 1 provides a clearer illustration of the steps of the investigation.

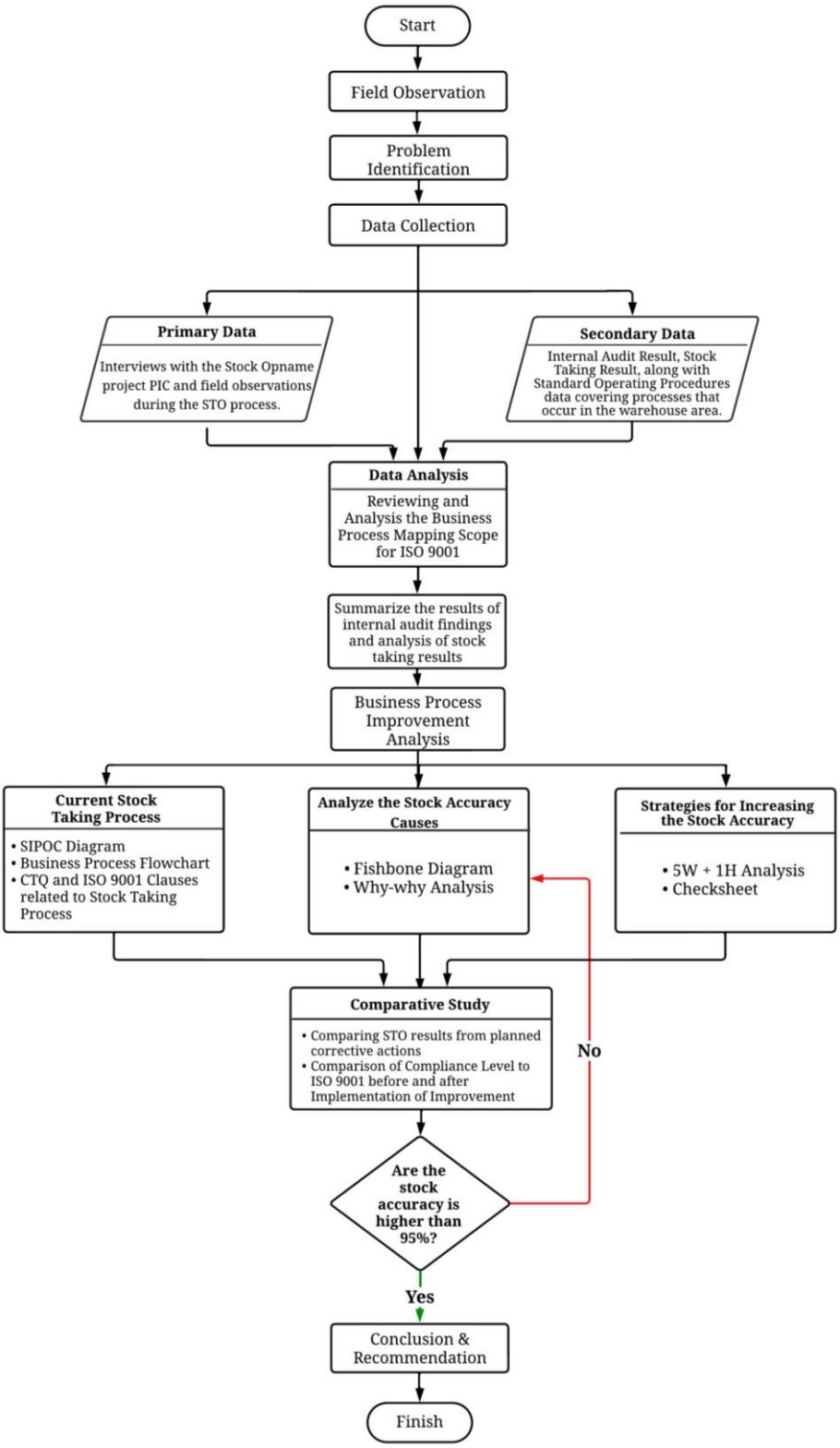

Figure 1. Flowchart of Research

3. Result and Discussion

3.1. Business Process Mapping Scope for ISO 9001

By identifying crucial tasks and auxiliary procedures that affect quality, process mapping in ISO 9001 guarantees that every business process satisfies quality criteria. To preserve the efficacy of the quality management system, as described in Table 1, this study focuses on mapping processes in the supply chain management department, especially the stock-taking process.

Table 1. Stock Taking Business Process Mapping Scope

Sub Process	Process Owner	ISO 9001 Clauses	Proses Objectives	Input Process	Output Process	Start of Process	End of Process	Objective Measured	Evaluation Method
Stock Taking	SCM	8.5.2, 8.5.3, 8.5.4, 8.5.6	Maintain stock accuracy between data in the system and the actual 100% match	- Actual count data - Stock data in the system	Results of actual vs system stock comparison	Calculating actual stock	Comparing actual stock data vs. system	Gap between actual stock data vs. system	Internal Audit

The Supply Chain Management (SCM) department's stock check procedure is described in the above table, which highlights how crucial it is to ensure 100% stock accuracy. Because differences between system data and actual inventory can result in operational inefficiencies like incorrect order fulfilment, production delays, and financial losses, this accuracy is crucial. The research employs systematic processes to guarantee that stock records are regularly updated and validated to get this high degree of accuracy. By identifying discrepancies early on and reducing the risks related to inventory mismanagement, the internal audit exercise is crucial in evaluating the efficacy of these processes. Customers may become unhappy if orders are delayed or cancelled because of discrepancies between recorded and real stock levels. Financial ramifications also result from the expenses of keeping excess stock or from last-minute purchases made when stock is in low supply. As a result, the effectiveness of the stock checking procedure is a strategic component in enhancing the performance of the supply chain as well as an internal operational issue.

3.2. Current Stock Taking Process

This phase aimed to identify the cause of the stock-taking discrepancy in the warehouse of 2W EVs. This stage required filling out a Supplier, Input, Process, Output, and Customer (SIPOC) diagram to comprehend the links and process flow between the several components of the company procurement and inventory management systems. Figure 2 describes the procurement flow to help with the presentation.

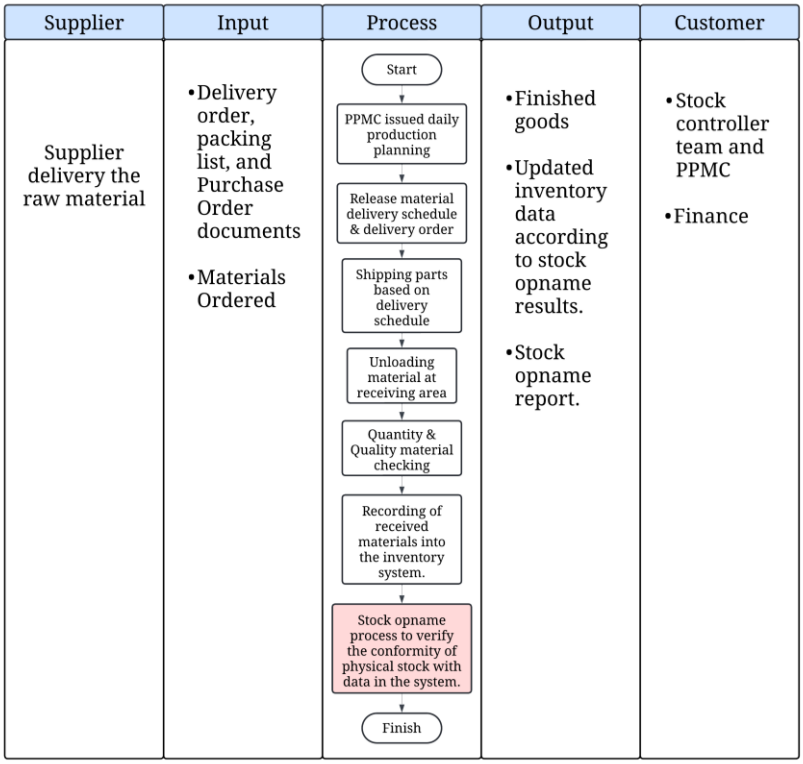

Figure 2. SIPOC Diagram

Starting with placing orders with suppliers and storing the goods in a warehouse where stock is routinely inspected and entered the inventory system, the SIPOC flow depicts the 2W-EV company's procurement and inventory management procedure. The raw components required to produce electric motors are supplied by vendors PT. ABC, along with paperwork like purchase orders, delivery orders, and packing lists that are subsequently input into the system. In order to minimize storage expenses and shortages, the PPMC team sets daily production schedules that match material delivery with production requirements. To ensure correct stock data, raw materials are subjected to quality and quantity tests upon arrival at Hall B before being entered into the inventory system. Stock-taking reports and inventory updates mark the end of the process, guaranteeing data integrity and avoiding inconsistencies that can affect production efficiency. This methodical approach enhances operational performance, minimizes waste, and maximizes supply chain dependability.

Additionally, Figure 3 shows the steps involved in the stock taking process, which is one of the activities shown in the SIPOC diagram above. This process includes the preparation stage all the way up to the final stock preparation, using the stock taking results as a reference to synchronizing the stock inventory with the system.

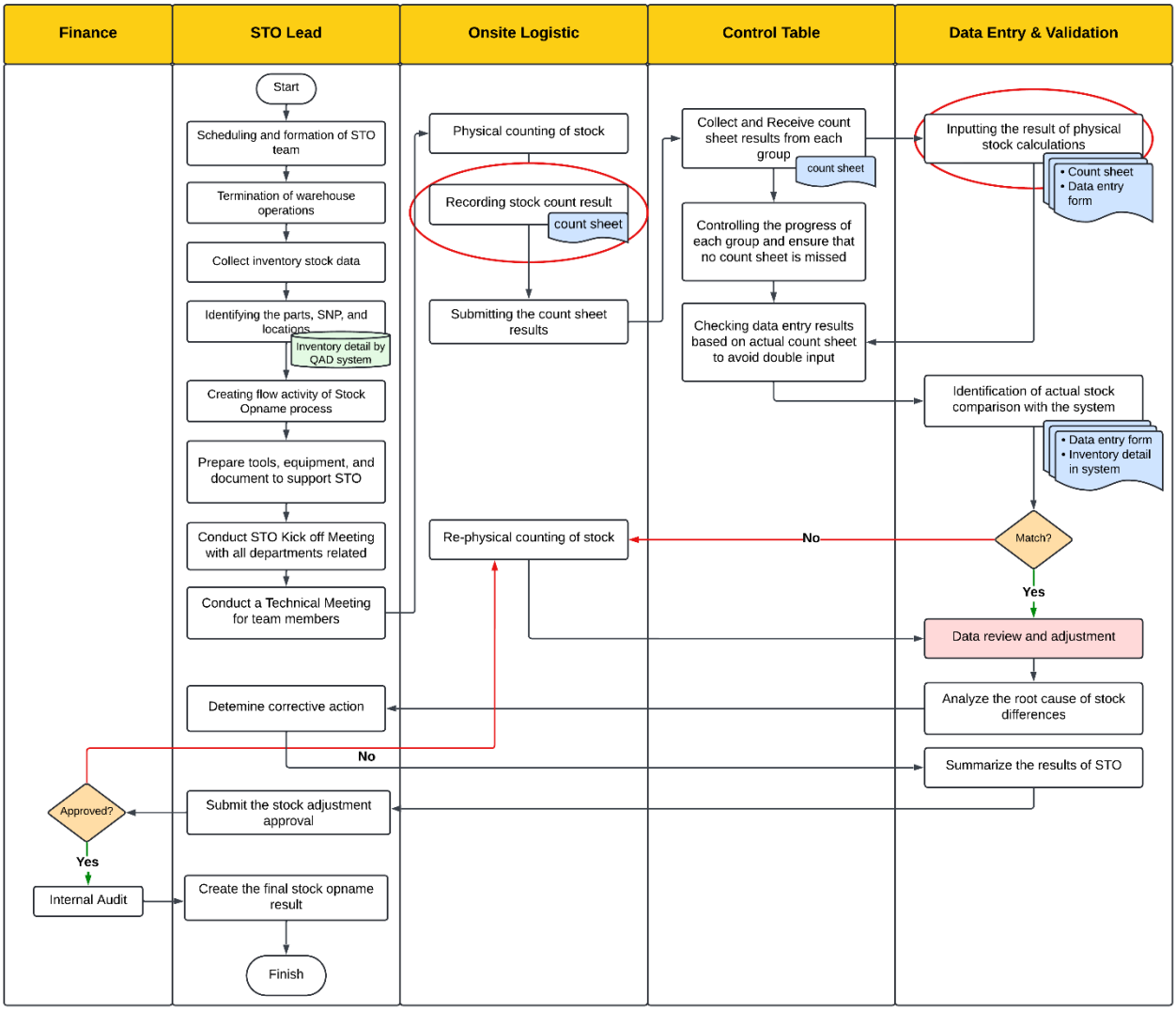

Figure 3. Stock Taking Business Process Flowchart

To emphasize the significance of this procedure, the company's warehouse stock-taking procedure is highlighted in the red. Furthermore, although the pink process is crucial in ensuring inventory correctness and coordinating physical goods with system records, it is often overlooked during the stock-taking procedure. Data review and adjustment are critical in stock-taking to guarantee that inventory data is correct and that

actual stock counts correspond with system entries. This procedure enhances inventory management, lowers expenses, and promotes compliance.

Additionally, by establishing the Critical to Quality aspect—highlighting the crucial elements that impact quality—businesses may assess how effective stock-taking is. To guarantee that stock-taking is carried out as precisely as possible and in compliance with established protocols, the objective is to create criteria for crucial elements that must be monitored and measured at every stage of the process. Table 2 lists the CTQ components essential for gauging accuracy and accomplishing the goals of stock-taking, including ISO 9001 international standards that cover several crucial facets of quality management, including the stock-taking procedure.

Table 2. CTQ and ISO 9001 Clauses Related to Stock Taking Process

CTQ	***ISO 9001 Clauses***	***Goals***	***Implementation in the Company***
Stock Count Accuracy	8.5.1 Control of Production and Service Provision	Ensure accurate inventory data to support decision-making and logistics operations.	Although there are controls in place to guarantee that the stock-taking procedure is carried out according to established guidelines, the process's results demonstrate accuracy that falls short of the SCM Department's KPI targets.
Compliance with Procedures	8.1 Operational Planning and Control	Ensures consistent processes and reduces the risk of errors.	The company's stock-taking methods don't fully explain every step that the team needs to complete, which leads to several mistakes in the process.
Team Training and Competency	7.2 Competence	All team members have attended relevant training and certification prior to stock taking.	The company does not hold training for operators and teams, so they do not understand the SOP and WI related to the stock-taking process.

Some of the clauses pertaining to CTQ throughout the inventory process are highlighted in Table 2 above. Clause 8.5.1 on Production and Service Provision Control focuses on ensuring inventory accuracy by defining controls to maintain correct stock records, which are essential for meeting production and service standards. Accurate stock records impact inventory levels, decision-making, and supply chain management efficiency. Discrepancies between actual stock and system entries can lead to delays or financial losses, emphasizing the need for alignment. However, the stock-taking procedure in June 2024, as shown in Figure 4, highlighted a substantial gap between the physical inventory and system records, underscoring the importance of effective controls to prevent such inaccuracies.

The stock-taking results show notable differences between real stock and system records, especially in "Fastener" supplies, which present operational difficulties for the business. This imbalance impacts operational effectiveness and stock accuracy.

In line with Clause 8.1 on Operational Planning and Control, which emphasizes the significance of meticulous planning to minimize errors and guarantee consistency, the Critical to Quality (CTQ) discussion strongly emphasizes Process Compliance and Efficiency. Following operational procedures reduces risks and

maximizes resource consumption while improving process efficiency and aligning with quality requirements. However, as **Appendix A** illustrates, the existing stock-taking system lacks specific steps, leading to implementation problems and operator misunderstandings.

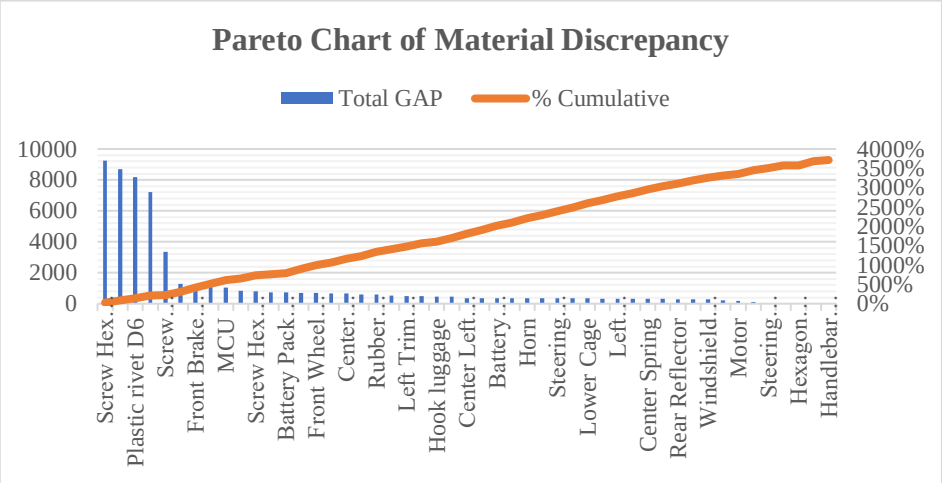

Figure 4. Pareto Chart of Material Discrepancy

Clause 7.2 on competence highlights how crucial it is for employees to receive training and certification before beginning stock-taking tasks to guarantee they possess the requisite abilities. One operator, however, acknowledged that they had not received any training, pointing to a weakness that might cause mistakes, lower output, and affect the process' efficacy. Accurate inventory management by competent employees aligns more with CTQ goals for data consistency.

Because of the misalignment between physical and system data, the imbalance affects the company's operational effectiveness and ISO 9001 audit performance. This misalignment raises the danger of understock and overstock, which impacts profits through possible supply disruptions, delivery delays, and increased storage expenses. It also results in erroneous inventory data, decision-making difficulties, and logistics challenges. Resolving these CTQ non-conformities is essential to preserving ISO 9001 compliance, operational effectiveness, and inventory correctness.

3.3. Analyse of Stock Accuracy Causes

This step seeks to ascertain the process's stability and pinpoint the underlying reason for the stock-taking process's accuracy issue. Figure 5 provides a clearer illustration of the fishbone diagram used to determine and examine the components that substantially impact stock-taking disparities [19]. The 5Whys Analysis method explores each component further and help identify the root cause of the problem indicated in the Fish Bone Diagram. Table 3 explains the findings of the 5 Whys method analysis based on factors from each fishbone component that has been found so that the solution applied is more successful and can target the root cause of the problem.

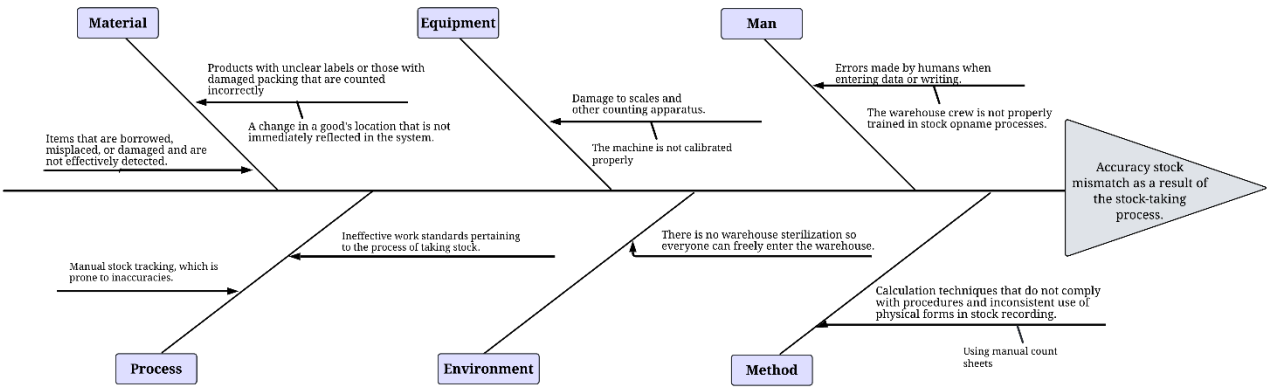

Figure 5. Fishbone Diagram Analysis

Table 3. 5 Whys Analysis

Factor	Problem	Why 1	Why 2	Why 3	Why 4	Why 5
Man	Errors made by humans when entering data or writing.	The operator is not properly trained in stock-taking processes.	There isn't an organized training curriculum or refresher course available for taking stock.	The company doesn't have a standard stock taking process.	Taking stock is viewed as less important than other operational tasks.	The management is ignorant of the long-term effects of stock-taking mistakes on the performance of the company.
Equipment	Damage to scales and other counting apparatus.	The machine is not calibrated properly.	There isn't a timetable in place for routine maintenance or calibration.	There isn't a set protocol in place at the company for maintaining its equipment.	Maintenance tasks are not clearly delegated to specific persons or teams.	Staff members are not sufficiently trained or informed about the significance of routine maintenance and calibration for equipment accuracy.
Material	Items that are borrowed, misplaced, or damaged and are not effectively detected.	A change in a good's location that is not immediately reflected in the system.	No procedures for borrowing and returning items.	Due to human error and delays associated with manual data entry, the organization relies on this method.	Inadequate training or disregard for protocols prevents timely updates of stock movements in the system.	The company lacks clear accountability or monitoring procedures to guarantee that stock changes are consistently reported and updated.
Method	Parts with unclear labels or those with damaged packing that are counted incorrectly.	Because the packaging is damaged, or the labels are unclear.	There can be inconsistent labelling practices or improper handling during packaging.	Because the labelling equipment or processes may not be regularly maintained, or staff might not follow proper handling procedures.	Because there might not be adequate staff training or a lack of regular maintenance schedules.	Due to possible resource limitations or a lack of a strong system for process oversight and quality control inside the company.
	Calculation techniques that do not comply with procedures and inconsistent use of physical forms in stock recording.	Using manual count sheets.	Human error and inconsistent data capture are common with manual count sheets.	The digital system is unreliable when it comes to stock recording, or the personnel is not educated to use it.	The digital system is unreliable when it comes to stock recording, or the personnel is not educated to use it.	Because management has not made installing a digital system a priority and it is seen to be expensive.
Environment	There is no warehouse sterilization so everyone can freely enter the warehouse.	Because the warehouse does not have well-defined access control protocols in place.	Because the management has not made putting security or access control rules into practice a top priority.	Because they are unaware of the possible dangers of unfettered access, such contamination or inconsistencies in supply.	The internal audits and risk assessments pertaining to warehouse operations have not received enough attention.	There is a dearth of knowledge or insufficient funding devoted to enhancing security and operational control in the warehouse setting.
Process	Ineffective SOP pertaining to the process of stock taking.	Inconsistent adherence to work standards compromises the efficiency of the stock recording procedure.	Workers are unaware of how crucial it is to adhere to current work requirements.	No thorough or regular training has been provided about work standards.	The management is not as concerned about raising staff proficiency in the stock recording procedure	There is no integrated monitoring and evaluation system in place to guarantee performance and work standard implementation in the stock recording process.

Factor	Problem	Why 1	Why 2	Why 3	Why 4	Why 5
	Manual stock tracking, which is prone to inaccuracies.	Data input problems are frequently the result of manual recording techniques.	Errors could occur when reading product codes or numbers.	There isn't an automation solution that can expedite the procedure and lessen workload.	An automated inventory management system is neither a top priority for the organization nor a recent investment.	Insufficient funds or ignorance of the advantages of automation in enhancing precision and effectiveness.

3.4. Implementation for Increasing the Stock Accuracy

Improving the accuracy value of the stock-taking process is the primary goal of this stage, which is to generate and implement improvement ideas for the critical components identified in the analysis stage. The technique of this suggestion is based on the 5W+1H strategy. This strategy identifies the proper course of action for any reason that the actual stock deviates from the system [20]. The implementation of the improvement plan that has been determined is described in Table 4.

Table 4. Implementation for Man

Factor	Root-Cause	Analysis	Explanation
Man	Errors made by humans when entering data or writing	*What*	Errors in interpreting information/data.
		Where	On the computer system used to enter data.
		When	During the process of recording to the countsheet and inputting data to the system.
		Who	Recorder and Data Entry staff
		Why	The operator is not properly trained in stock-taking processes.
		How	• Socialization & Training: Educate employees on the value of precision in documenting and labeling things. • Creation of Work Instructions: Establish appropriate and comprehensive guidelines on how to fill out the tally sheet before socializing it to workers.
Equipment	Damage to scales and other counting apparatus.	*What*	Damage or malfunction of the scales as a calculation tool.
		Where	On the scales and counting devices used at the work site, especially in the material counting process.
		When	When using counting equipment for stock or item counting activities.
		Who	Operators who use the equipment.
		Why	The machine is not calibrated properly.
		How	Maintenance Schedule: Establish a regular maintenance and calibration schedule for all counting equipment and specify the PIC for calibration.
Material	Items that are borrowed, misplaced, or damaged and are not effectively detected.	*What*	No tracking for damaged and borrowed items.
		Where	In the warehouse area.
		When	When there is an urgent demand for goods.
		Who	Inventory controller.
		Why	A change in a good's location that is not immediately reflected in the system.
		How	• Elimination of Material Borrowing: Replace material request system with material purchase. • Location Segregation for NG parts: Separate materials that are already in “Scrap” status according to the historical use of the material.
	Products with unclear labels or those with damaged packing that are counted incorrectly.	*What*	Product labels are difficult to read or incomplete, making them difficult to identify.
		Where	In the warehouse area.
		When	During storage or material handling processes that involve moving or counting/errors from suppliers.
		Who	Supplier and inbound team.
		Why	Because the packaging is damaged, or the labels are unclear.
		How	Standardization of Label: Use clear and easy-to-read labels for all products

Factor	Root-Cause	Analysis	Explanation
Method	Calculation techniques that do not comply with procedures and inconsistent use of physical forms in stock recording.	*What*	The specified technique is not followed in the calculation of the stock.
		Where	When taking stock in the warehouse or stock management department.
		When	When stock is checked physically or at regular intervals and compared to system records.
		Who	Workers in the warehouse or those engaged in stock-taking, such as those in charge of tallying inventory and documenting the findings.
		Why	Because its using manual count sheets.
		How	Conducting a regular and small-scale stock taking or Daily Cycle Count on Non-Production Day (NPD).
Process	Ineffective work standards pertaining to the process of taking stock.	*What*	Varied people have varied views of the stocktaking process because there aren't quantifiable and explicit job requirements for each step of the process.
		Where	Throughout the whole stock recording process, from preparation to conclusion reporting.
		When	When inventory is recorded and reconciled with the system during the stock recording process.
		Who	Logistic Planner.
		Why	Inconsistent adherence to work standards compromises the efficiency of the stock recording procedure.
		How	Improved SOP: For every step of the stock-taking procedure, set precise, quantifiable work standards.
	Manual stock tracking, which is prone to inaccuracies.	*What*	The stock tracking process is done manually.
		Where	When manually entering data into the system, stock monitoring in the inventory management process can lead to issues.
		When	Human stock tracking is carried out in the absence of an automated system.
		Who	Logistic Planner and Inventrory Controller.
		Why	Data input problems are frequently the result of manual recording techniques.
		How	Automation: To improve stock tracking accuracy, create an Enterprise Resource Planning (ERP) system.
Environment	There is no warehouse sterilization so everyone can freely enter the warehouse.	*What*	Neither the access control system nor the warehouse sterilization system are sufficient.
		Where	In every section of the warehouse, including the zones designated for manufacturing, goods entry and exit, and products storage.
		When	It happens all the time when the warehouse is operating
		Who	Others going inside the warehouse without the required clearance or scrutiny.
		Why	Because the warehouse does not have well-defined access control protocols in place.
		How	Access Control: To guarantee adherence to defined operational standards, enforce stringent access control measures, such as the use of IDs and visitor lists, and carry out frequent internal audits.

The issue with material factors is that products are counted erroneously because of broken packaging or faulty labelling, which leads to inaccuracies in inventory recording and, eventually, discrepancies between physical counts and inventory records. Businesses may run out of stock or overstock certain products because of inaccurate inventory data, which also affects replenishment plans. Label standardisation is necessary to reduce warehouse management mistakes while handling products with unclear labels or whose packaging is damaged and counted erroneously. A consistent and uniform label makes it simple to identify each item, which lowers the possibility of mistakes like mis picking or improper delivery. This enhances control over the entire supply chain, minimizes operational disruptions, and always guarantees the proper stock level. Errors in material identification brought on by improper labeling and change implementation are depicted in Figure 6.

(a)

(b)

	Barcode		
Model Type			
Date			
Supplier Name			
Dimension			
Part Number	Part Name		
Packaging Type	DLOC	Min	
		Max	
		SNP	

Figure 6. (a) Current Condition of the Label; (b) Standardizing label

To control the improvements that have been made or are planned after the business creates or implements an improvement plan during the improvement phase to guarantee that advancements in the stock-taking procedure at 2W EV Manufacturer can be sustained and continue to function efficiently is to implement the check sheet tools. Check sheets are a very important tool for discovering any new problems or deviation trends that may emerge after changes are applied since they are straightforward yet effective instruments for methodically gathering data and recording process performance in real time [21].

As a methodical tool for gathering data, check sheets allow for real-time process performance monitoring and the identification of any new problems or trends in deviations following the implementation of improvements. Because of their ease of use and efficiency, they are crucial for preserving process uniformity and spotting persistent inefficiencies, enabling the business to move quickly to address them. Check sheets are also helpful for compliance verification, ongoing performance reviews, and internal and external audits since they offer an organized method of recording stock-taking performance. By using check sheets as a control mechanism, the business makes sure that improvements are sustained over time, strengthening data accuracy, accountability, and the effectiveness of inventory management. The check sheet that the business utilized to monitor the enhancements that were proposed during the earlier analysis phase is shown in **Appendix B**.

3.5 Comparison between Before and After Improvement

Corrective action has been conducted by the Supply Chain Management (SCM) department in compliance with the suggestions made by the outcomes of the previous evaluation. The SCM department carried out another stock-taking procedure as part of its continuous endeavor to increase inventory management's precision and effectiveness. This time, the inventory was taken on a smaller scale with a particular focus on the materials that showed the greatest disparities compared to the June 2024 inventory count findings. Figure 7 following then displays the findings of this small-scale inventory take.

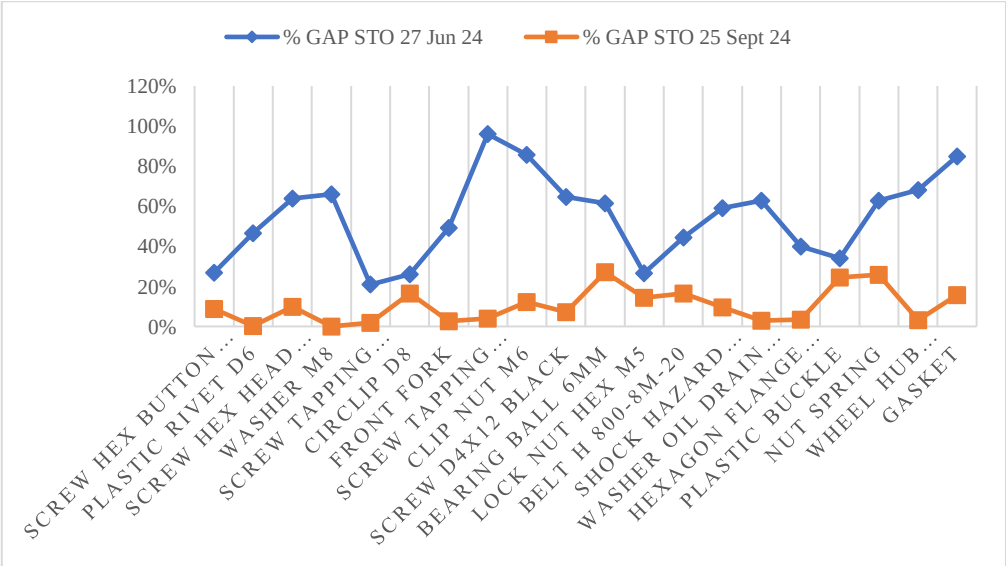

Figure 7. Comparison of Stock Taking Process in June and September 2024

A notable increase in inventory accuracy is indicated by the data in Figure 7, which shows a considerable decrease in stock-taking inconsistencies between June and September 2024. Improved human factor training is one of the main causes of this improvement, which has probably reduced data input errors by raising staff proficiency and attention to detail during the stock-taking procedure. Furthermore, the September change in emphasis to "fastener" materials made the adoption of calibrated weighing equipment necessary, which was essential in guaranteeing accurate measurements despite the large volume of materials. This equipment's calibration guarantees that systematic mistakes are reduced, producing stock data that is more trustworthy. With accuracy reaching 86%, the decrease in variation from prior stock-taking cycles points to an overall improvement in procedural efficiency. This enhancement emphasizes how crucial staff development and technology assistance are to improving stock management procedures, which in turn improves decision-making, cost containment, and supply chain stability.

Adding a better formula to 2W-EV's stock counting procedure the performance of the supply chain, personnel development, and operational efficiency were all significantly impacted by manufacturers. While calibrated weighing devices guarantee accurate inventory tracking, improved training lowers human error, which leads to better decision-making and fewer production delays. In addition to improving supplier relationships and customer satisfaction, accurate stock data reduces expenses related to inconsistencies and last-minute buying. Furthermore, data-driven KPIs and standardized processes promote a continual improvement culture, which increases the scalability and dependability of inventory management. Management guarantees long-term effectiveness, cost savings, and a more resilient and competitive supply chain by instituting these enhancements.

4. Conclusion

Based on the objectives of this study, the results that have been analyzed in the previous chapter can be concluded, including:

a. The causes of stock-taking discrepancies between actual stock and inventory systems in the 2W Electric Car Manufacturer's Warehouse are found to be sixfold after using the business process improvement analysis. These factors include human factors related to data entry errors, machine factors that have not been calibrated, process factors that are less effective because the SOP is not as detailed in explaining the process and requires manual tracking because there is no ERP system that can update data, material factors (many packages do not use labels in accordance with standards), Material factors include the fact that many packages lack standard labels, that data collection is hampered by the mixing of scrap materials across departments, and that many materials are borrowed by other departments but are never returned; operator lack of training contributes to inconsistent calculation technique methods; and finally, there is the environmental factor of the electric motor company's warehouse being open to the public and not sterile.

b. Some strategies that can be made to maximize the amount of accuracy between the actual stock and the inventory system for the stock-taking process at the 2W EV Manufacturer's Warehouse include:
    - Socialize the results of the SOP update for the stock-taking process and Work Instructions to all operators.
    - Proceed with the ERP system's development so that it may be put into use right away, ahead of Project Stock Taking's installation in the following batch.
    - Give the Warehouse Access Control SOP approval and ratification so that it can be put into effect right away.
    - Label every area of the warehouse with uniform labels and carry out audits to make sure everything is done in compliance with the regulations.
    - Remove interdepartmental material borrowing and segregate the storage location of used materials based on the material owner.

The accuracy rate for the stock taking process in September 2024 rose to 86% from the prior one because of the company's corrective activities. Ensuring compliance with ISO 9001 standards and bolstering the company's continuous improvement endeavors are the ultimate goals of rectifying errors in stock taking, as they ultimately impact operational efficiency and minimize Production Planning errors.

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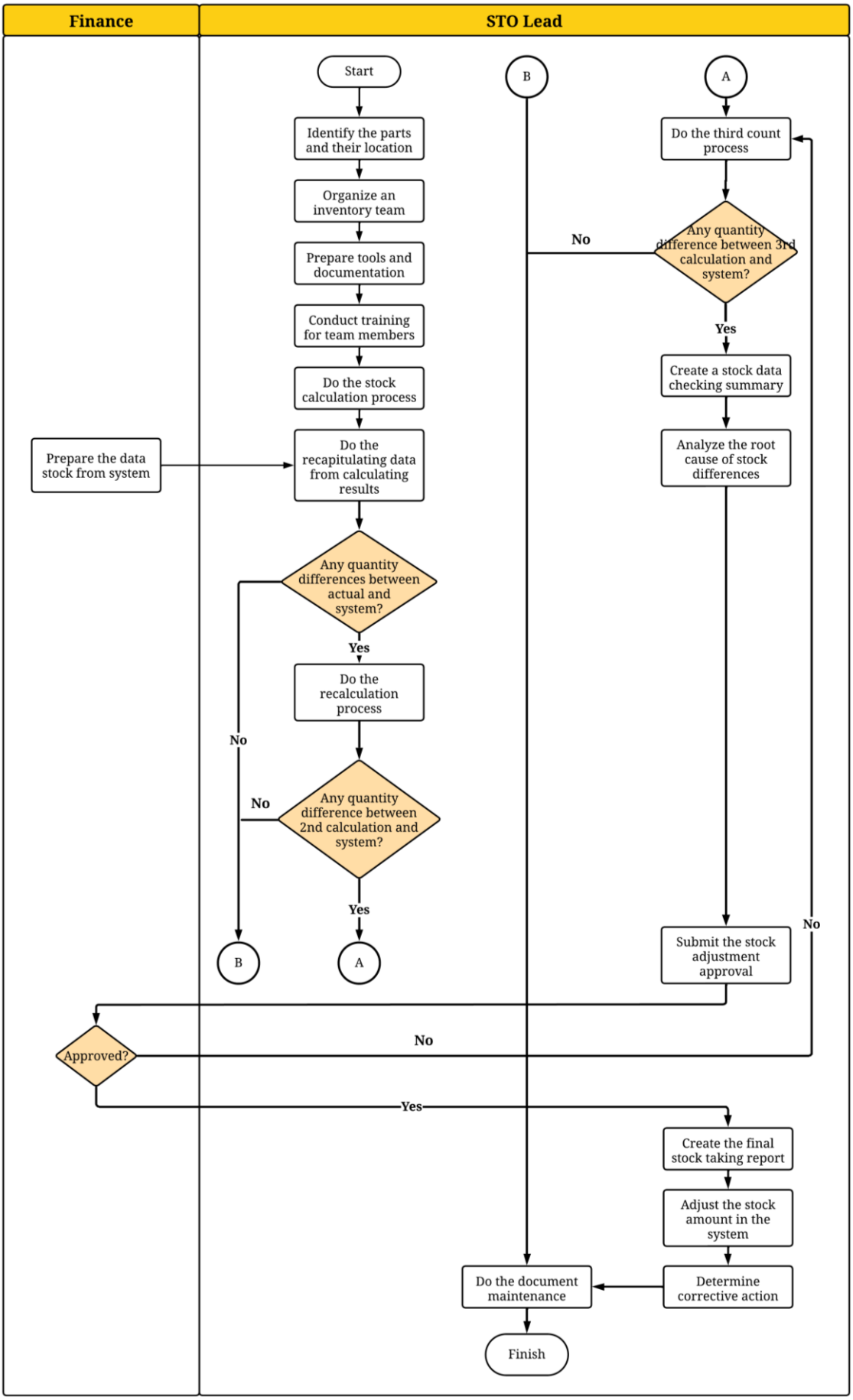
Appendix A. Current Stock Taking Procedure



Appendix B. Daily Check sheet

DAILY CHECKSHEET										
Department	:									
Name of Supervisor	:									
ID	:									
Date	:									
Start Working Hours	:									
End Shift	:									
No	**Things to check**	**Hall A**			**Hall B**			**Hall C**			**Remarks**
		√	X	-	√	X	-	√	X	-	**All (X) must have a solution explained**
A	**MAN**										
1	Errors made when entering data or writing on a countsheet										
2	Not labelling or attaching stickers to materials that have undergone counting.										
B	**EQUIPMENT**										
1	Is there any damage to the scales and other counting equipment?										
C	**METHOD**										
1	The Daily Cycle Count method follows the Work Instructions										
D	**PROCESS**										
1	Carry out the stock taking process in accordance with the updated SOP										
2	Aligning material locations in the ERP system with actual locations										
3	Perform 5S at the end of every working hour										
E	**MATERIALS**										
1	Items that are borrowed, misplaced, or damaged and are not effectively detected.										
2	Recording of scrap materials or if there is a loan of materials										
3	Record incoming and outgoing goods										
F	**ENVIRONMENT**										
1	Ensure that everyone who enters the Warehouse follows the SOP										