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Improving Warehouse Operations

"Case Study on Improving Parts Storage"

(Automotive Industry)

Thesis submitted to the European International University

to partially fulfill the requirements for the **Degree of M.Sc.**

By

Hussam Abdullah Qusti

(2024)

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Abstract

This study aims to improve warehouse operations by introducing an idea that will have a positive impact on the company. The focus of the enhancement was on the storage method of bumpers in the warehouse. Approximately 14% of all damaged parts in the year 2021 were identified as damaged bumpers. In Saudi Arabia, a new storage technique was introduced in warehouse management to reduce damage to bumpers, which are one of the most commonly sold parts. The emphasis was on the bumpers due to their large size, making it challenging to transfer excess material to the centers in comparison to smaller parts like brake pads. Returning a damaged bumper to the customer will impact on their satisfaction and incur costs to send it back to the warehouse. The DMAIC method was used to identify the causes of bumper damage. The issue was resolved by implementing a specialized storing rack for bumpers and providing training sessions to workers on handling bumpers during various stages of the process. This methodology was only applied to a specific section of the bumper storage area, not the entire area. This method greatly enhanced the conditions within the warehouse. The damage decreased significantly from 7.4% to 2.5%, resulting in a cost savings of SAR 19,343 for the company. If the same procedure has been extended to fully cover the storage area of the bumpers, the study has yielded anticipated results. Replacing the current storage racks entirely is expected to incur a substantial cost. Conversely, there will be a favorable outcome, including improved customer satisfaction and less bumper bumpers.

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1.1 Introduction

The automotive spare parts industry is crucial in Saudi Arabia due to the high rate of vehicle ownership in every household. The Saudi Industrial Development Fund estimates that the spare parts business in Saudi Arabia was valued at nearly 12 billion riyals in 2019. Spare parts companies are encountering challenges in managing damaged parts among their branches. This study focuses on an SP company with approximately 100 stores in Saudi Arabia. The SP company operates a primary warehouse for the collection, storage, and management of parts predominantly sourced from Japan. The primary warehouse of the SP company is located in Jeddah. Figure 1 illustrates the current process flow for the spare parts route in the SP company.

Figure 1 Flow Diagram of How parts are transferred from manufacturer to KSA

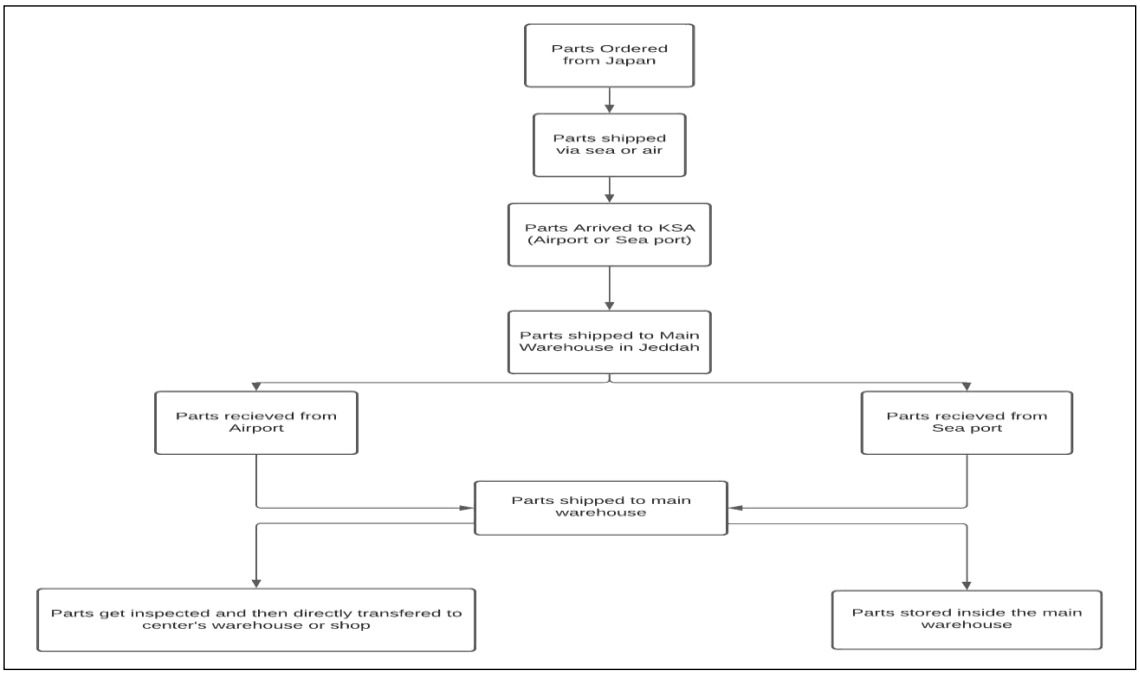
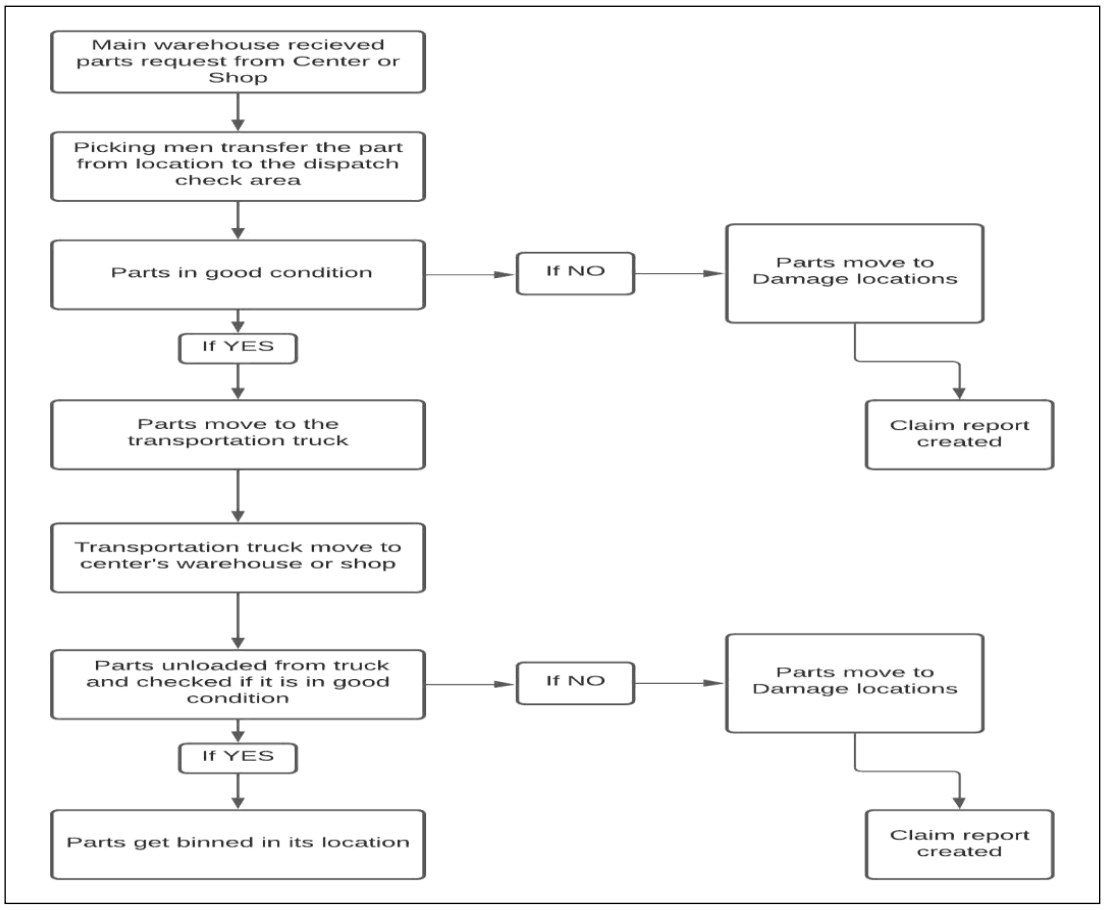


Figure (1) shows the route of the SP parts when it's ordered from abroad, arrived the main warehouse, allocated inside the main warehouse, and finally transferred to the centers' warehouse. Those centers receive parts at least three times a week. The SP company faces issues with damaged parts, which affect customer satisfaction and reputation. The study aims to investigate the causes of these issues, focusing on bumpers, which are commonly sold parts after brake pads, AC filters, and oil. The study will analyze factors contributing to the damage of these bumpers and propose a solution to decrease the rate of receiving damaged items. The centers receive parts at least three times per week, but some parts are damaged during storage and dispatch, affecting the company's reputation.

Figure 2 shows the route of SP parts that are shipped to shops.



1.2 Contribution of the study

The DMAIC approach, combined with Value Stream Mapping (VSP), is being utilized to streamline Spare Part's processes, thereby reducing the likelihood of damaged bumpers, and addressing core issues.

1.3 Problem statements

The company prioritizes customer satisfaction but may face delays in order delivery due to damaged parts. Warehouses at the centers receive damaged parts, causing customers to demand refunds or seek alternative dealers. The handling of bumpers from the main warehouse to the final location is inadequate, with some damage at the quality check gate. Bumpers account for 13.9% of all damaged parts each month in 2021. Mishandling of components is a primary cause of damage, with an estimated cost of 750,000 Saudi Riyals and 500,000 Saudi Riyals. The handling damage type refers to the negligence of workers handling certain parts in the warehouse, resulting in damage. Addressing these issues is crucial for the company's financial stability.

1.4 Study Questions

1. What are the contributors to the damaged parts that are delivered to the warehouses of the centers?
2. When the part is broken, how much does it cost the SP business to repair it?
3. Which places or locations are the most likely to incur harm to the components?
4. In order to increase the proportion of parts that are damaged, what are the preventative measures that need to be implemented?

2.1 Introduction

Warehousing is a crucial component of supply chain and logistics activities. It involves a structured area within an organization designed for the purpose of managing and storing materials. Storage occurs at several stages, ranging from manufacturing to distribution. Effective warehouse management is crucial for maintaining equilibrium between demand and output. A warehouse is a facility used to store finished items, semi-finished goods, or raw materials for different durations, according to logistic perspectives (Dza and Evans 1). Warehousing fundamentally minimizes the effects associated with supply inefficiencies, enhances inventory management and logistical precision, and facilitates product customization, consolidation, and accumulation. Vehicle parts often sustain damage within the warehouse due to different factors.

2.1.1 Storage of Automotive Spare Parts

Automotive spare parts are stored using vehicle vertical storage systems (AVSS) and Carousels storage systems. AVSS utilizes vertical space, minimizing horizontal space and reducing retrieval time. It uses automated guided methods, while Carousels has ninety racks for lightweight, frequently used spare parts materials, further reducing space utilization.

2.1.2 Single Tier Modular Shelving System:

The technique is utilized for storing small spare parts. It offers many layouts that may be tailored to fit even the most compact automotive tools. This modular system provides a flexible and cost-effective option for bulk storage needs. The medium-sized components are subsequently placed on shelves. Furthermore, shelf containers come in

various sizes and depths to improve storage capacity. The shelf containers are separated into multiple small pieces to ensure secure storage of tiny parts in clearly defined compartments.

2.1.3 Cabinets and Drawers for Spare Parts Inventory Management System:

Cabinets and drawers are alternative options for storage based on drawers. They excel in keeping small pieces rather than heavy, massive, and bulky ones. This storage system provides systematic and tidy storage for spare parts. It also provides a tidy setting for merchandise. When items need to be housed away from the primary areas of the warehouse, this form of storage is optimal.

2.1.4 Mobile Shelving:

The mobile shelving system in a warehouse allows for compact storage of spare components, eliminating the need for aisle space and increasing warehouse capacity. It is ideal for emergency and long-term storage. However, improper shipping standards can cause damage to automotive parts, including unauthorized packaging, unauthorized cardboard containers, and improper packaging. Poor packing, inadequate packaging, and heavy components can also cause container splitting and collapse. Forklift truck operations can also cause harm to vehicles. Coombes (2022) highlights various factors causing damage to vehicle parts during transit, emphasizing the need for firms to understand these factors to develop effective protection methods. The primary cause of damage is significant shock or impact, which can result in irreversible damage to equipment, items, or instruments. The extent of damage depends on the relative velocity of the collision. The warehouse machine malfunctioned, causing damage to spare parts. Despite comprehensive training, staff may operate machinery incorrectly, leading to

mishaps and damage. Inexperienced staff may be required to operate machines during emergencies. Neglecting preventive maintenance increases spare parts damage. Prioritizing maintenance is crucial in short-staffed or high workload environments. Even experienced workers may overlook issues until equipment breaks down, causing equipment failure and shelf damage.

2.1.5 Damage Control:

According to Wade (2012), improving the quality of equipment used for handling and packaging can help in managing damage management of automotive replacement parts. Furthermore, packing rules must be followed. Efficient means and incentives should be established to ensure compliance and monitor standards effectively (Ward 2). Responsibility for any damage to motor vehicle parts supplied to the warehouse lies with those who handle them. Optimizing the usage of long-lasting packaging enhances protection and quality while providing economic and environmental benefits. Damage occurs due to insufficient durable packaging materials in suitable containers at appropriate locations to meet warehousing chain requirements. Therefore, it temporarily compels suppliers to move to disposable alternatives (Ward 3). Warehousing regulations should require vendors to include disposable options that adhere to recognized part protection standards. Warehouse management plays a crucial role in preventing damage to vehicle parts and spare parts. By implementing discipline and implementing software, companies can minimize the distance traveled within the warehouse and reduce the time spent handling automotive parts. To reduce damage to windshields, manufacturers can use high-density foam and specialized shrink wrap to protect spare parts. Additionally, adding an additional layer of durable paper to bumpers can reduce damage. Returnable containers should be used more frequently for delivering car parts to dealers. Highly specialized equipment should be packaged in

foam cushioning for shipping. Spare parts management is crucial for enhancing damage control and equipment lifespan. Lean management involves maintaining inventories, implementing scientific inventory control, and incorporating data resource management systems. Regular maintenance and trained personnel minimize operational errors and damage.

2.2 DMAIC Approach

Renault Company is implementing the DMAIC technique to improve efficiency and effectiveness in their logistics department. They train operators to correctly package and select package parts, analyze transportation flow, and request suppliers to create action plans. This approach helps identify core causes of problems, reducing broken parts and introducing new methods of distributing parts.

2.3 Value Stream Mapping (VSM)

VSM is a highly effective tool for removing redundant processes. Toyota Manufacturing Company was the first to utilize this technology. The initiative was implemented to enhance employee performance and product quality by removing any processes that do not contribute value to the organization or its goods. The process of moving parts from manufacture to centers or customers can be lengthy and may include needless processes that might be eliminated to achieve two goals. The primary objective is to decrease lead time in order to expedite the delivery of parts. The second purpose is to limit the likelihood of harming parts at unintended locations by removing certain operations. Applying the VSM to the status will result in the creation of a new flow, leading to the implementation of an action plan to achieve this new flow.

2.4 Methodology

This chapter will detail the methodology used in conducting the study. The data collection process will be presented in full. The report will display the quantity of defective components from SP firm gathered in the year 2021. This procedure will primarily focus on comparing the amount of damaged bumpers with the new bumpers storage and handling plan to minimize damage percentages. Secondly, the current issue of how the SP company receives its parts, specifically bumpers, at the inbound gate. The whole flow chart will be depicted to address a study question on the locations where parts are most commonly damaged. This phase of the investigation will evaluate the primary cause of the problem. A new storage and handling plan for bumpers was implemented to enhance the current process, based on the collected data and identified root cause. A pilot study was conducted on specific types of bumpers to introduce the new storage and handling procedure. The results data of the executed plan will be reviewed to demonstrate the outcomes. The upcoming chapter will analyze the results data to propose a new plan for all bumpers in the future and project the expected outcomes.

2.5 Data Collection

This study collects data on damage parts in 2021, including landing cost and quantity, with the damage control department's cooperation. It focuses on handling damages, not transportation-related, to gain a precise picture of the controlling situation.

Summary

Damage Supplier and Transporter

Company	Dealer 1	Dealer 2	Dealer 3	Dealer 4	Dealer 5	G. Total	Landing Cost
Supplier A	0	0	186	0		186	337005.02
Supplier B			21			21	21623.22
Supplier C	9	5		8	1	23	22716.12
Supplier D			93			93	90659.28
Supplier E	3					3	2185.16
Supplier F	7	1		1		9	13806.88
Total	**12**	**5**	**300**	**8**	**1**	**326**	**487995.68**

Handling Damage

Company	Number of Item	Total Quantity	G. Total	Landing Cost
Jeddah Warehouse	1123	10547	1123	750161.3

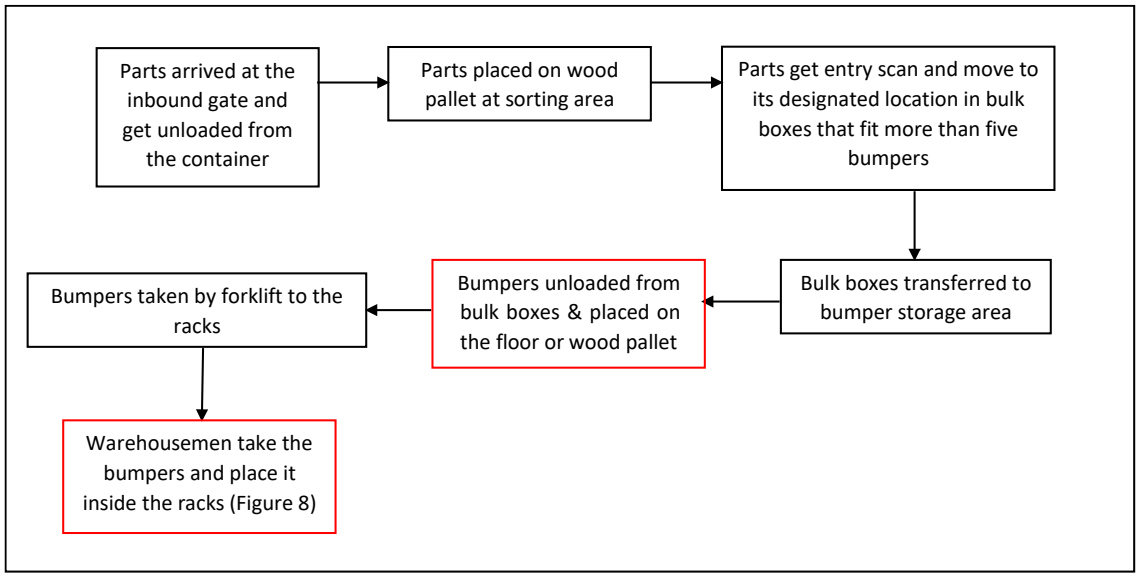
Table 1 Data collected from damaged control department

The table above shows the entire damaged parts in SP company in 2021 for both transporter damages and handling damages. Handling damages happen in a specific point during moving the parts from the container to its designated location and to the centers' warehouses. The landing cost of the entire handling damages in 2021 is 750,161.30 Saudi Riyals. The total damaged part were 1123 items. the bumpers portion of these items were around 156 bumpers which is almost 13.9% of entire damaged parts (104,272 Saudi Riyal).

2.6 Current situation (Analyze Phase)

As it was mentioned in the problem statements, the parts at first arrives to the main warehouse in Jeddah specifically at the inbound gate. As this study will concentrate on bumpers parts; therefore, we will show the flow of storing bumpers inside the main warehouse and then how it is transferred to the centers' warehouses. The below flow explains the process of storing the bumpers:

Figure 3 Flowchart of storing bumpers at main warehouse



While shifting the pieces, the warehouseman placed many parts together with little regard for preventing harm. The warehouse workers occasionally set the bumpers on the floor or on a damaged wooden pallet where nails are protruding and not easily seen. When the bumpers were installed on top of it, they cut into the bumper cover, causing damage to the part. The wood also damages the bumper cover. Occasionally, the warehouse workers overlook cuts or scratches on the bumpers until they reach the quality check gate for transfer to the centers.

Every component must pass the quality inspection checkpoint before being transferred to the transportation company. The quality check gate is responsible for verifying the correspondence between components and orders, as well as assessing the condition of the parts. If any damaged or incorrect parts are discovered by the picker, they are replaced with new ones that are in good condition or with the correct parts that fit the order. Here is the flow chart illustrating the process of transporting bumpers from the racks to the centers.

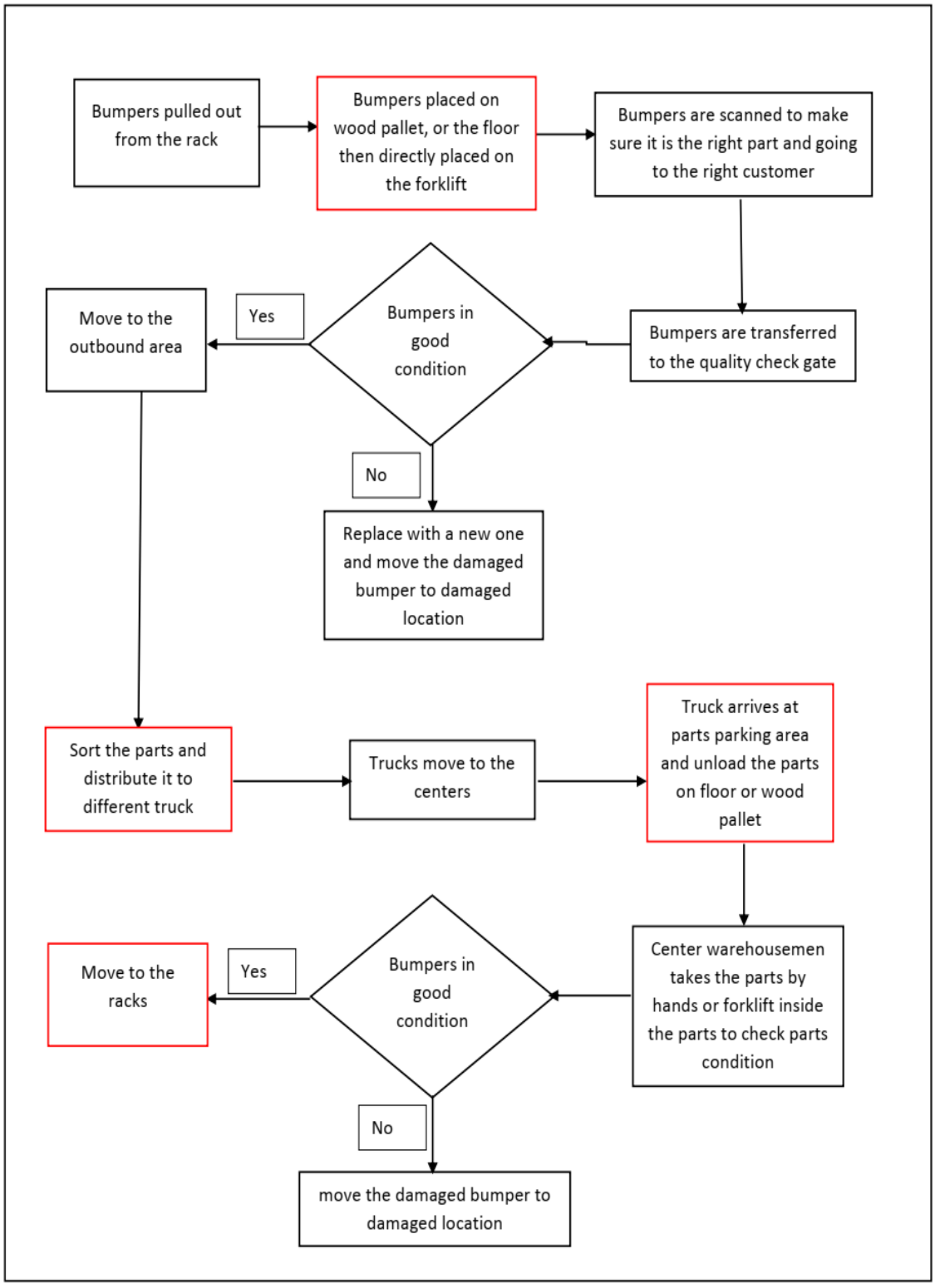


Figure 4 Flowchart of bumpers being transported to the centers

The red boxes in figures 3 and 4 show bumper damage during delivery, with most customers rejecting cuts or scratches, leading to bumper returns to the warehouse.

Figure 5 Parts at receiving area placed on top of each other

Figure 6 Bumper placed directly on floor

Figure 7 Wood Pallet with small broken edges that cut the bumper's cover

Figures 5, 6, and 7 depict that the bumpers at the warehouse are not handled and kept safely. Reports indicate that certain bumpers are damaged not just by broken components but also by scratches at the edges and when they are improperly removed from racks, causing the cover to break. The existing storage racks are causing warehouse workers to pull bumpers into a position that may damage or scrape them. Various events are causing harm to the bumpers in the current condition. We developed new standard operating processes using the DMAIC approach to decrease the rate of damaged bumpers and enhance customer satisfaction by ensuring timely delivery of their components as committed.

Figure 8 Current way of storing bumpers

2.7 Cause & Effect Diagram

The reasons for the broken bumpers were discussed after outlining the process of receiving, storing, and dispatching them from the main warehouse to the centers. In this section, we shall explain the causes of these reasons. These are the primary causes of the issue we encounter at the warehouse. The cause-and-effect diagram is a tool used for problem identification, analysis, and solution. Each reason depicted in the graphic below serves as a fundamental source of the problem that can be utilized to prevent its recurrence.

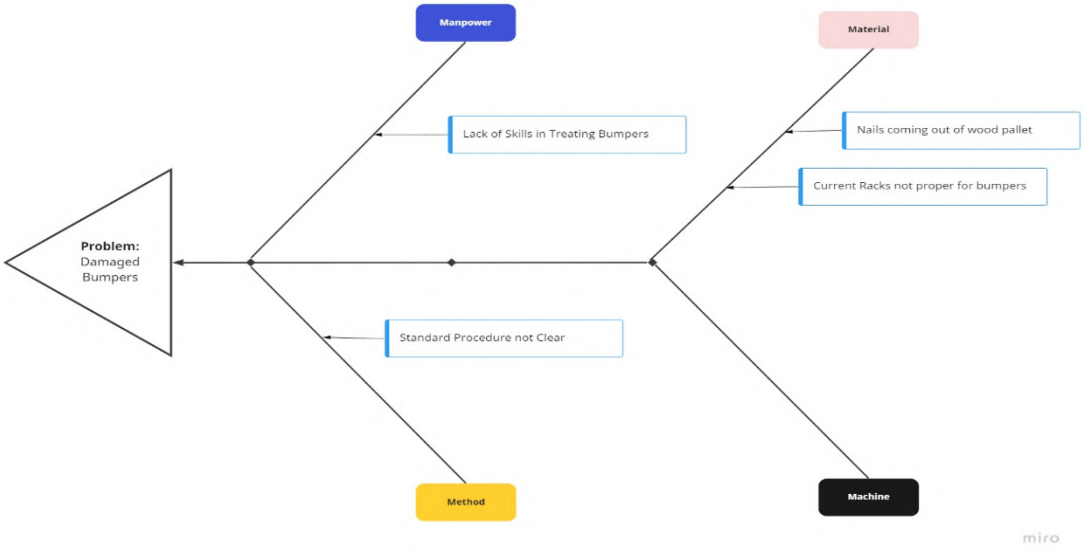


Figure 9 Cut appears on cover of bumper

Four primary causes are utilized to pinpoint the issues responsible for the broken bumpers:

1. **Manpower:** this root focuses on causes caused by human interactions. Current warehouse operations reveal a deficiency in the responsibilities and skills of warehouse personnel while moving bumpers across locations. Some laborers are not attentive when handling bumpers. They were observed throwing bumpers onto the wood pallet instead of carefully placing them to prevent damage. Impact from throwing the bumper onto a pallet or floor can result in scratches or cuts on the bumper cover or the bumper itself, as depicted in the illustration below.
2. **Method:** This root cause analysis examines whether the work technique being used at the warehouse is contributing to the problem. During the site visit, it was noted that warehouse workers do not adhere to a consistent method while moving parts in and out of the facility. This sub-cause is a component of the problem. For example, some workers set the bumper on a wooden pallet while others place it on the floor (Figures 5, 6, and 7). There is no defined protocol for them to follow.
3. **Material:** The materials refer to the tools utilized by the warehouse for storing and retrieving parts. During the visit, it was noted that the wooden pallet used for placing bumpers and other items is producing issues by cutting the bumper cover due to uneven nails or splintered wood.
4. **Machine:** The root cause will not be considered in this analysis because the procedure does not involve any relevant machine factors.

2.8 Countermeasures & Action Plan (Improve phase)

Based on the different reasons that led to damage the bumpers, solutions with handling and transporting the bumpers were studied. To improve the current situation that was explained in the analyze phase, we chose the fastest way to correct the situation by starting with points that can be improved free of charge. Looking at the cause-and-effect diagram, the manpower is a root cause of the problem. The warehouse workers lack skills in handling the bumpers. Therefore, training was given to them to reduce bumpers' damage as much as possible.

2.8.1 Training to Warehouse' workers:

Figures 3, 4, 5, 6, 7, and 8 depict workers placing bumpers on the floor. Another problem arises when they incorrectly handle the item by pulling it from the floor to the forklift or removing it from the rack without taking caution, perhaps causing damage to the bumpers. The training session covered the following areas to educate workers:

- ✓ Always place the bumpers on a pallet not directly on floor.
- ✓ Whentransferringthebumperfrominboundgatetotheracksbyforklift,make sureitisinaboxnotplaceddirectlyonthetines.
- ✓ When placing the bumper inside the rack, make sure it is stored safely not on the wrong side or opposite side of other bumpers which could damage the cover or scratch the bumper.
- ✓ When pulling a bumper from the rack, pull it out.

2.8.2 Replacing wooden pallet with plastic pallet:

Figure (6) displays a wooden pallet with nails that caused scratches on a bumper. To prevent this problem, it was recommended to acquire a certain quantity of plastic pallets designated solely for bumpers due to their delicate packaging. Two plastic pallets were utilized for testing the demonstration in this project.

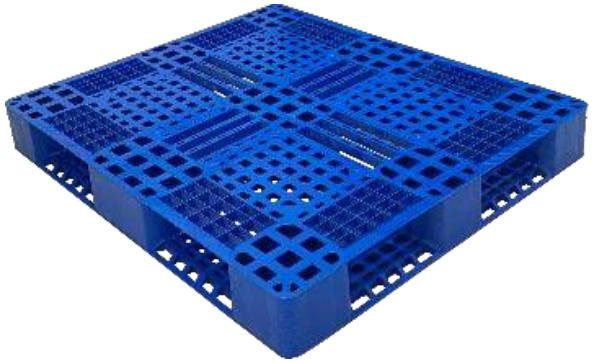


Figure10 Plastic Pallet

2.8.3 Using special bumpers' storage racks:

Figure11 New bumpers storage racks

A new steel storage rack design was developed to prevent damaging bumpers. The rack, made of four bases and two poles, can bear up to 12 bumpers and ensure sustainability. Tests were conducted on 48 bumpers from different vehicles to ensure the racks can store any bumper.

Size Comparison	New Bumpers Rack	Existed Bumpers Rack
Length	117 cm	**245 cm**
Width	70 cm	**100 cm**
Height	210 cm	**150 cm**
External sticks	35 cm	**Not applicable**
Gap between sticks	**50 cm**	**Not applicable**

Table 2 Comparison between the size of the new rack and the existed rack

The measurement of the storage rack was based on bumper's size to fit it in. The below figure shows the implementation of the new storage rack with bumpers on. It can be observed that each bumper is placed properly in order not to get scratched and not to cut other bumpers' cover when pulling out.

Figure12 New Bumpers Rack with Bumpers on

2.9 Implantation

The chart shows new procedure standards for warehousemen, who have been trained to execute the entire process from receiving parts at the inbound gate to storing bumpers at new racks.

2.9.1 In-bound Procedures:

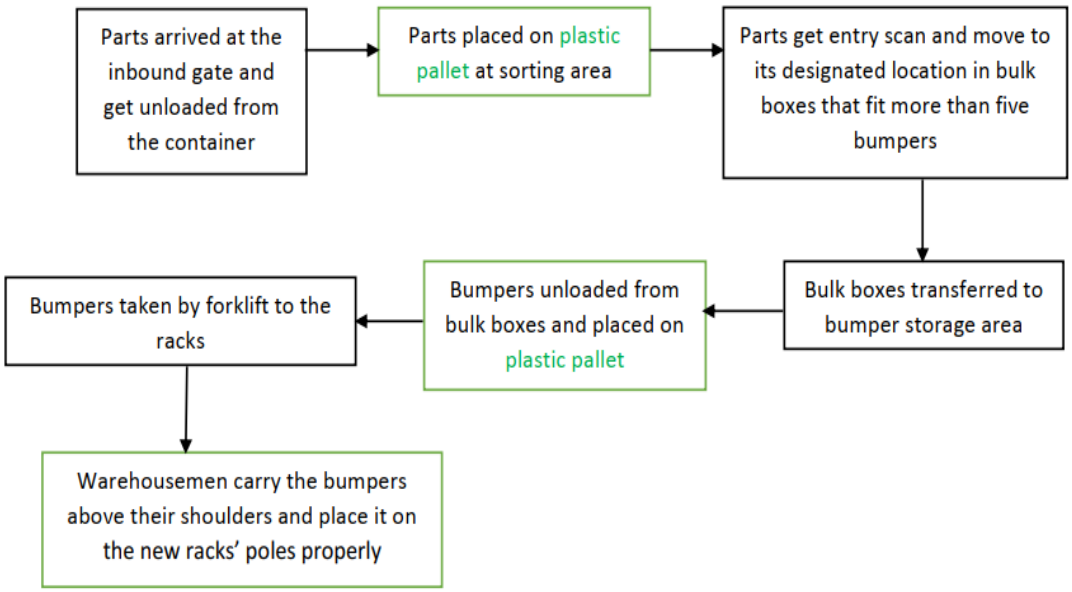


Figure 13 Flowchart of new procedures of storing bumpers at main warehouse

Figure 13 Bumpers placed onplastic pallet

Figure 14 Warehouse man placing bumpers on the new rack

Figure 15 Warehouse man insures bumpers stored properly

The above figures show how the bumpers are being placed on plastic pallets. Then, it shows how warehouseman is placing the bumper to the racks safely.

The following chart will show the outbound procedures when warehousemen pull out the bumpers from the new racks and transferring it to the quality check gate.

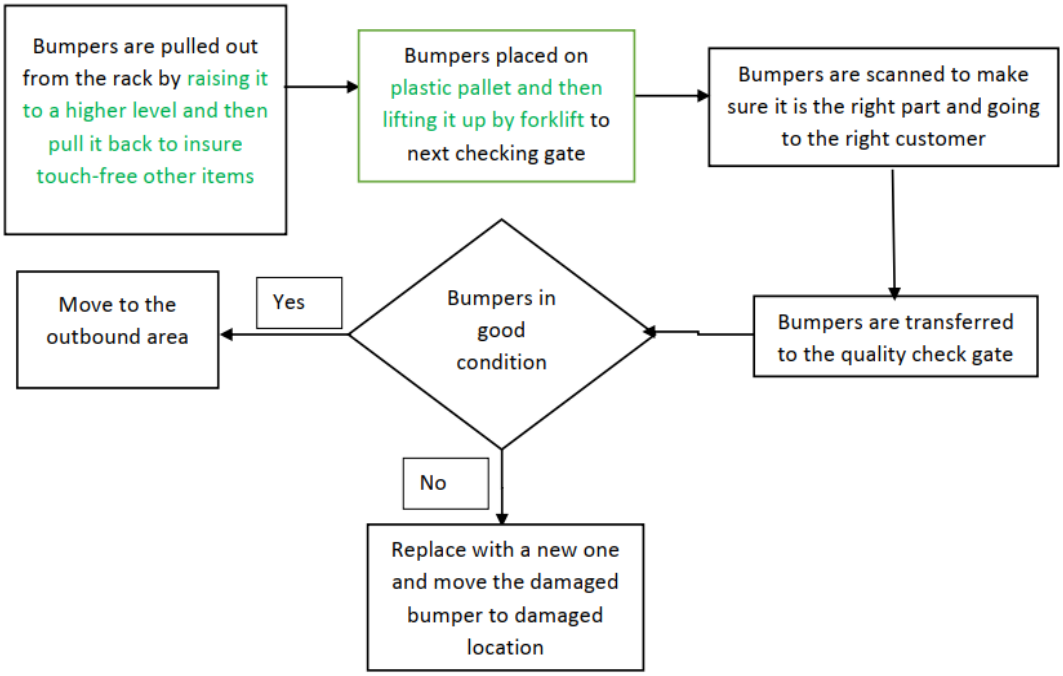


Figure 16 Flowchart of bumpers being transported to the centers

Figure 17 Warehouse man pulling bumpers out of the new rack

This figure demonstrates how the workers pull back the bumper from the rack stand properly.

2.9.2 Space utilization:

Figure 18 New storage racks with bumpers on

Figure 19 Current existed bumpers racks

The new four racks utilized 4.70 m while the existing single rack utilized 2.45 m. Therefore, the test has been applied between the four racks (4.70m) and two existed racks (2.45m * 2 racks = 4.90m) to get better comparison and precise results. The new racks bear up to 48 bumpers; on the other hand, the existing single rack can bear up to 30 bumpers (60 bumpers for two existing racks).

3.1 Results

The study, conducted from April 2022 to December 2022, examined the adequacy of new bumper racks and existing racks. Workers were instructed not to exceed 60 bumpers in existing racks and 48 in new racks, resulting in a table showing the number of damaged bumpers.

Racks / Months	Damaged Bumpers in Existed Racks (60 Bumpers)	Damage Percentage	Damaged Bumpers in New Racks (48 Bumpers)	Damage Percentage
April	4	6.7%	1	2.1%
May	3	5.0%	0	0.0%
June	4	6.7%	2	4.2%
July	5	8.3%	2	4.2%
August	7	11.7%	1	2.1%
September	2	3.3%	0	0.0%
October	3	5.0%	1	2.1%
November	4	6.7%	1	2.1%
December	8	13.3%	3	6.3%
Total	**40**	**7.4%**	**11**	**2.5%**
Total in Saudi Riyal	**SAR 26,680**	**Bumpers Avg Price *667 SAR**	**SAR 7,337**	**Bumpers Avg Price *667 SAR**
if Q1 included Avg 13.3 for existed rack Avg 3.67 for new rack	**SAR 35,551**		**SAR 9,785**	
Expected Damaged in 10 years	**SAR 355,511**		**SAR 97,849**	
Total saved in 10 years	**SAR 257,662**			

Table 3 Comparison in damage value between Current Racks and New Bumpers Rack

In 2021, bumpers were damaged by 13.9%, costing 104,272 Saudi Riyal. However, using new bumper racks from Q2 to Q4, the company saved SAR 19,343, reducing the damaged percentage from 7.4% to 2.5%.

3.1.1 Expected Results:

After analyzing the data on damaged parts, it was determined that including Q1 would increase the cost of damaged bumpers to SAR 35,551 for the current rack and SAR 9785 for the new rack. The anticipated savings for that year will be approximately SAR 25,766. Hence, by using the innovative method of treating and storing bumpers only to the experimental region, an estimated total of SAR 257,662 will be saved during a 10-year period.

3.2 Conclusion

The study had two primary objectives. The initial objective was to identify the underlying reasons for why some bumpers were sustaining damage either before or after being transferred to customers or facilities. The second objective was to address these issues by creating an action plan to decrease the number of damaged bumpers and enhance customer satisfaction through timely delivery of orders.

The damaged bumpers were a result of inadequate handling methods by the warehouse staff. Removing bumpers from the existing rack led to significant bumper damage. Furthermore, the instruments used to install the bumpers, such as wooden pallets, were identified as additional causes of this problem.

A new bumper rack was introduced to replace the existing one. Warehousemen were trained on a new handling approach. Additionally, the wooden pallet was substituted with a plastic one. The changes led to increased productivity in the parts warehouse and saved around SAR 257,000 for the company.

There are more chances that can be effectively used to minimize damage in other areas besides only the bumpers. Expanding the improvement points mentioned in the recommendation chapter to other areas of the parts warehouse can reduce the percentage of broken parts and enhance customer satisfaction.

3.3 Recommendation:

Various solution options can be incorporated into this project to improve its operation and further decrease the number of damaged bumpers:

- As the data shows better results when using the new rack, expand this approach to allwarehousesinSaudiArabiawillevengeneratemoreprofitstothecompanyandreduceloses.
- It would be possible to dig more into the reasons why there are still some bumpers getting damaged with the new approach.
- Making a study to findwhichpartsmighthavebeendamagedbeforeenteringthemainwarehouse in Jeddah or during transferring the bumpers to the centers will narrow down the problem and will prevent more damage in the future.

References

1- Ward, Jonathan. “Damage Control.” Automotive Logistics, 1 Oct. 2012, https://www.automotivelogistics.media/damage-control/7895.article?adredir=1.

2- Noor, M. (2021, June 21). Car sales growth in Saudi Arabia is the highest in the world. Watanksa. Retrieved from https://www.alwatan.com.sa/article/1079298.

3- Coombes, R. (2021, August 31). Equipment damage: 8 causes of products breaking in transit. GWP Group. Retrieved from https://www.gwp.co.uk/guides/equipment-damage-8-main-causes/#damage.

4- Jakubiec, M., & Brodnicka, E. (n.d.). Kaizen concept in the process of a quality ... - zie.pg.edu.pl. Retrieved October 8, 2021, from https://zie.pg.edu.pl/documents/30328766/47109777/REME_16_%281-2016%29-Art8.pdf.

5- Fahmi, W. Almarj3.com. (2021, October 3). Retrieved from https://almrj3.com/how-many-cars-are-there-in-saudi-arabia/#i.

6- Gopal, Arunkumar, et al. "Design of automated vertical storage system for automotive applications." AIP Conference Proceedings. Vol. 2311. No. 1. AIP Publishing LLC, 2020.

7- Dza, Mawuko, and Evans Kyeremeh. “Warehousing and Material Handling Practices in Ghana: A Tale of Tradition and Modernity.” Public Administration Study, vol. 7, no. 2, Sept. 2018, p. 1. DOI.org (Crossref), https://doi.org/10.5539/par.v7n2p1.

8- Guo, Dongdong, and Xingwu Yu. “The Lean Management of Spare Parts in Automotive Manufacturing.” MATEC Web of Conferences, edited by G. Beydoun, vol. 214, 2018, p. 04005. DOI.org (Crossref), https://doi.org/10.1051/matecconf/201821404005.