



# Warehouse Safety in Order Picking

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**Abstract.** Safety in warehouse becomes one of the important factors in manual order picking process. Workplace accidents can be caused by a variety of things, including the use of incorrect tools, a lack of work processes, inadequate equipment and safety equipment, and pickers' negligence. Picker safety must come first because any workplace accidents will affect the warehouse's productivity and the time it takes to complete the picking order. Safety aims to prevent, reduce and even eliminate the risk of work accidents (zero accident). Application of safety in the order picking system will certainly increase warehouse efficiency that impact to pickers productivity. Many businesses believe that implementing safety measures is simply a waste of money, but when all the risk variables are taken into account, safety is seen as a long-term investment that will pay off for the business, which will lower costs associated with workplace accidents and improve order fulfillment accuracy, both of which have an effect on consumer satisfaction.

**Keywords:** Order picking, Safety, Warehouse

## 1 Introduction

Picking, storing, scheduling, and routing are just a few of the procedures and operations that take place in a warehouse, which is a complex setting where safety and operational efficiency can be key management indicators [1]. Approximately 60% of all labor activities in the warehouse and 55% of operational expenditures are attributed to order picking, one of the most crucial processes that also consumes the most resources and costs [2]. Therefore, many businesses are attempting to boost efficiency while lowering warehouse expenses through effective order picking solutions [3]. Efficiency gains in order picking will indirectly improve warehouse operations, which will enhance performance across the entire supply chain [2]. Although order-taking robots were employed in a number of earlier studies to create order picking in order to boost efficiency, manual picking systems by pickers are still more prevalent in practice [4]. Despite the fact that worker congestion can be a major concern in picking locations with high pick densities, the effect of picker blockage on order picking efficiency is underappreciated in existing literature studying combinations of planning difficulties [4]. Picker blockage, or when two pickers collide in one aisle, can increase the likelihood of workplace accidents. To boost productivity in manual labor, there is

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a rising need to at least include the element of worker physical wellness. When minimizing factors that affect key performance indicators, it might be advantageous for processes that need a lot of time and effort, such manual order picking [5]. Picker safety must come first because any workplace accidents will have an impact on both the efficiency of the warehouse and the time it takes to finish the picking order. According to data from the US Bureau, there were 5190 work accidents in total in 2021, up 8.9% from 2020 and many accidents occur in the warehouse area. Compared to other sectors, the warehouse and transportation sector has the greatest accident rate with fatal injuries. One of the most important assets the company owns is its warehouse because it houses many items that must be well maintained in order for the efficiency of the business to remain at its peak [6]. OSHA states that common factors leading to warehouse incidents include errors made when using forklifts, incorrectly arranging and storing the products, the absence of personal protection equipment, improperly constructed EHS protocols, and Inappropriate manual handling methods can lead to harm. Nowadays, the majority of larger businesses in high-risk industries have established an Environment, Health and Safety (EHS) department, which is in charge of safeguarding and enhancing the organization's environmental, employee health, and safety efforts. Examples of these efforts include risk assessment, waste reduction, and the introduction of ergonomic workstations to improve working conditions for staff members [7]. The activities conducted in a warehouse have a significant impact on its safety. A few studies have concentrated on determining the factors that lead to warehouse accidents and offering remedies to enhance operational effectiveness, safety, and traffic flow [1].

In order to improve order picking productivity, this literature study will highlight the significance of safety in order picking system. Procedure errors, equipment, break periods, different product variants, and less than ideal picker settings can all contribute to risks in the order picking process itself. Improving picker productivity must therefore prioritize safety in order to reduce order fulfillment time.

## **2 Brief Literature Review**

### **2.1 Order Picking**

Order picking is a warehouse activity related to taking items out of the storage area. Because consumers place smaller purchases and goods arrive and enter the warehouse in large quantities, order picking is important [8]. An order picking system's primary goal is to increase service levels by optimizing available funds, assets, and machinery. This is done so that products can be picked up and delivered to customers more quickly [9].

Careful design and control of the order picking system is required in order to reduce the throughput time of selecting an order while maximizing the use of available space, tools, and manpower as well as the accessibility to all products. The four most common tactical and operational decision difficulties faced by warehouse managers are routing policies, choosing policies, storage assignment policies, and layout design. Picking policies determine how orders are to be organized into picking tours; storage

assignment policies determine where items are to be stored in the warehouse; and routing policies specify the order in which items are to be picked during any tour. Layout design concerns both the layout of the facility containing the order-picking system and the layout within the order-picking system [10]. Despite the features of the client orders, this main factor can affect the efficiency of order picking. As shown at Fig 1, travel contributes to half of the total order picker's time to fulfill customer order then comes search, pick, setup, and other

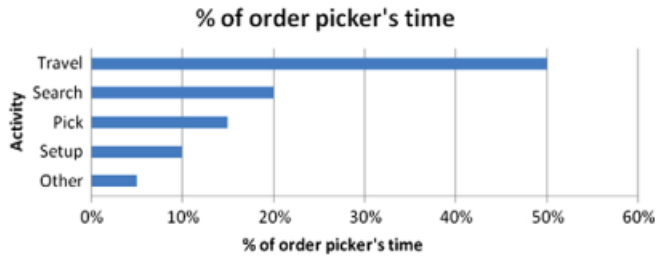


Fig. 1. Average time breakdown for pickers to complete an order [10]

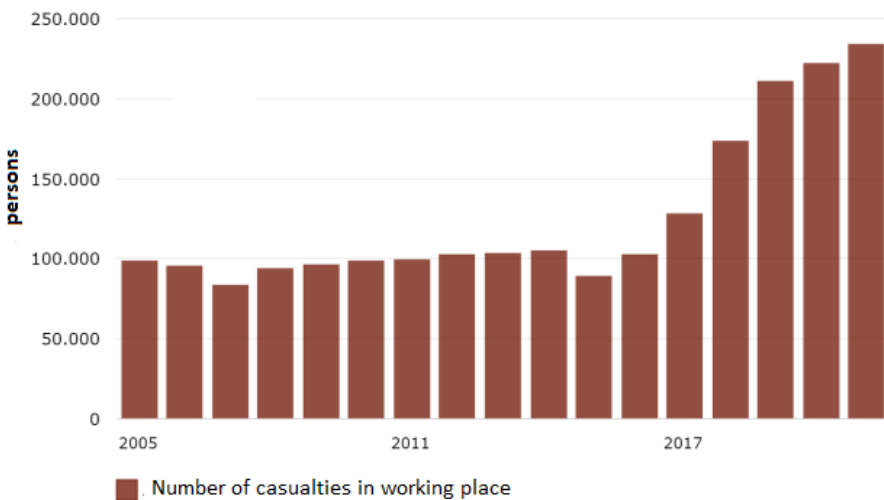
## 2.2 Warehouse Safety

One of the core responsibilities of a company's logistics management is to guarantee the dependability of the warehouse system. If the number and structure of qualitative errors are low, services are delivered on time, and customer orders may be sped up or cancelled without any possible errors developing, the warehouse's logistics services can be judged to be of sufficient quality. The employment of contemporary technology, which is intended to boost productivity and job quality, is intimately related to the reliability of warehousing operations. Modern warehouse technology allows a more efficient use of warehouse space, lower energy and labor consumption, enhanced management of warehousing procedures, and less manual handling operations, which reduces operating expenses and reduces work-related accidents [11].

Modern industrial enterprises now prioritize sustainability and the safety of goods and people. An increase in accidents in warehouses may be caused by a variety of causes, including heavy material movement, forklift use, and foot labor [12]. For both employees and businesses, workplace safety is crucial. Based on ISO 31000:2009 (2009), safety is described as the outcome of all actions, measures, mental models, etc. in an organization that increase performance and decrease (operations-related) losses. Making good safety instructions that outline proper employee conduct can be a relatively quick and inexpensive strategy to improve workplace safety in comparison to changing the structure, the machinery, or the equipment. One of the pillars of the risk management system are safety instructions, which translate top management pledges into concrete details [7]. By raising people's knowledge of safety issues, the concept of "safety consciousness" was established to ensure safety performance in warehouses and prevent the negative effects of accidents.

### 2.3 Case Study on Warehouse Safety Issues

The concept of safety consciousness system was introduced in De Koster et al. (2011) with the aim of guaranteeing warehouses' safety performance and avoiding fatal accidents. An efficient product allocation in the warehouse, in terms of costs and safety, can reduce retrieval and storage times, while balancing different activities in warehouse. Organizational behavior, behavioral operations, and quality management are just a few of the disciplines that have studied occupational safety. The majority of this research is devoted to preventing mistakes in processes that lower safety hazards. Research in the field of operations management primarily examines the factors that influence safe behavior and workplace safety in various operational environments.

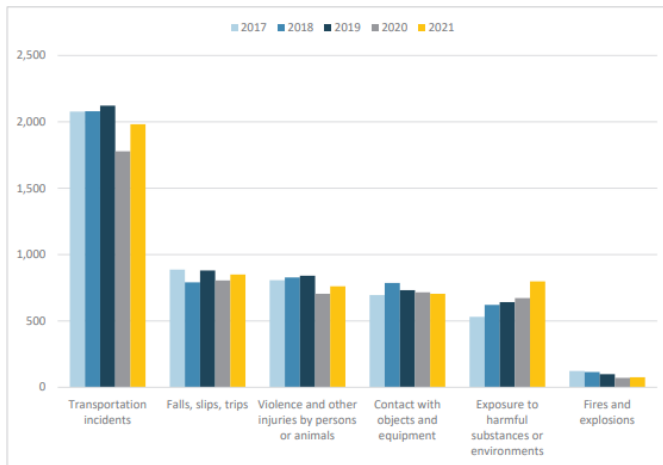


**Fig. 2.** Number of Work Accident Victims in Indonesia (2005-2021) based on accident insurance at Institution of Social Security employment claims

According to the information in Fig. 2, In recent years, the number of work accident victims in Indonesia has tended to rise, according to a report from the Ministry of Manpower (Kemnaker). Priority among the causes of workplace accidents is human factors, method factors, material factors, environmental factors, design factors, and equipment factors [13].

Traffic in warehouses is frequently heavy, forklifts and foot workers frequently operate close together, and deadlines must be met regardless of the volume of orders to be processed. These elements collectively raise the likelihood of accidents. Transportation incidents are still the leading contributor to non-fatal workplace injuries as shown at Fig 3. From CFOI data, despite experiencing an increase from 2020 to 2021, transportation incidents are still down 6.6 percent from 2019 when there were 2,122

fatalities. Fall, slip, and trips related workplace fatalities climbed by 5.6 percent in 2021, from 805 fatalities in 2020 to 850 in 2021. In 2021, 370 of these fatalities were caused by falls, slips, and trips in the construction and extraction industries, an increase of 7.2% from 2020 when there were 345 fatalities.



**Fig. 3.** Main causes of injuries in the warehouse Census of Fatal Occupational Injuries (CFOI)

Despite the increase, this is still 9.3 percent lower than in 2019, when this occurrence resulted in 408 fatalities in the construction and extraction industries. Along with the engagement of people, many types of equipment are used in warehouse operations. Therefore, it is essential that specific procedures be implemented to guarantee efficiency and the safety of both humans and machines. Transport equipment like forklifts and hand pallets have many advantages, such improving productivity or minimizing the need for manual handling, but they can also be a serious occupational hazard. In many industrial sectors, order pickers frequently work in close proximity to mobile equipment or similar vehicles. While accepting orders, these staff could move from the aisles [14].

There are a few potential accidents that could happen while people are walking close to transportation equipment like accidents between trucks and pedestrian workers, falling debris from forklift trucks striking workers, a truck turning over and trapping pedestrians, and run-ins with objects that are stationary. According to kompas.com, in May 2022 a cement factory forklift operator in Manokwari unintentionally drove over individuals because his perspective while operating the forklift was restricted by the items he was carrying. The same year, according to batampos.co.id, a pregnant employee at PT Jovan Technologies was murdered by a forklift

because there were no warning signs that indicated the location was unsafe for forklifts to travel through and the forklift area was relatively small. A worker was run over by a forklift at PT SDIC CONCH in a similar event because the forklift operator failed to see the victim in front of him while moving cement for export. At PT Riau Sakti United Plantations Industries in Riau, accidents at work also happened. According to sindonews.com, a worker was killed after he slipped and fell while climbing 2.6 meters without utilizing any safety equipment. In Situbondo, a worker died in a workplace accident after being struck by a vehicle that backed up while it was being fixed. The worker was loading and unloading goods from a warehouse. Using personal protection equipment, such as safety shoes and helmets, is frequently overlooked when working in warehouses. The lack of operator training and the unreliable EHS system both contribute to an increase in the incidence of workplace accidents.

### **3. Discussion**

Safety in the warehouse is a crucial problem for both industry and labor. Putting a priority on safety reduces accidents. Reducing accidents results in significant savings because many warehouses have significant direct (doctors, labor absence, and damages) and indirect (reputation, long-term loss of production) expenses associated with accidents. An environment that is safe for work is one where there are no hazards that could cause accidents for both employees and the general public and have an impact on the job that is done. The implementation of safety can enhance picking performance and increase productivity of picker. The company will often be affected if performance declines. When it comes to order picking, the impact can take the form of an increase in work accidents, inefficient goods picking trips, wasteful use of machines and working time, which will have an effect on long-term losses like increased order picking costs, slowed order fulfillment times, and gradually lower customer satisfaction.

Personnel who do not wear personal protective equipment, work in hazardous settings, lack of understanding about OHS, lack of concentration at work, and worker stress levels all have an impact on many elements causing work accidents, such as the human factor. The lack of a job risk analysis, incorrect placement of workers outside of their profession, a disjointed order of work processes, and many assignments for a single employee all have an impact on the method factor. Environmental factors are influenced by slippery work floors, dim light conditions, narrow work spaces, and scattered work equipment. Using personal protective equipment is one way to decrease the effects of work accidents even if they cannot be prevented. This is a work accident management method that can be applied to human factors. In addition, each employee's OHS knowledge needs to be developed and improved. Design can be used to prevent workplace accidents in terms of tools, processes, designs, and environmental elements. This seeks to engineer or change the workplace and other factors such that employees are exposed to dangers at a lower level.

There are some issues that faced in the case of warehouse safety awareness are problems that relate to heavy equipment, slips and trips, falls, fires, heavy material, harmful substances, ergonomics, moving parts, falling objects, and lack of education. Many businesses nowadays do not value safety as highly as they do output or quality. Despite the fact that safety is a critical factor in the business's operational procedures and one of the demands of its customers that must be fulfilled to ensure the quality of the goods supplied. As a result of their lack of conceptual understanding and familiarity with safety management systems, many firms still struggle to comprehend safety applications. The business continues to believe that putting safety into practice will raise costs. To predict the likelihood of work accidents and to establish work safety prevention and control, it is required to conduct risk assessments for each task. The identification of the risk, its impact, and the people and things it will affect is the first step in a risk assessment. The following phase is to establish the likelihood of the danger occurring, the frequency of these events, and their potential frequency. The last step is to carry out a risk assessment.

#### **4. Conclusion**

One of warehouse activity that devotes around 60% of its time to completing customer orders is order picking. Important warehouse tasks including travelling, search, pick, setup dan others. Since manual picking from the storage area is still the preferred method, safety applications must take precedence in the picking process in order to boost productivity. Because applying safety is still viewed as being expensive, the company's knowledge of adopting safety in the warehouse is still not ideal. In fact, implementing safety procedures during order picking will lower the possibility of workplace accidents and improve the efficiency of completing customer orders, which will have an impact on lowering accident-related costs and raising customer satisfaction, which will also improve industry performance. To increase work safety in the warehouse area, staff must urgently increase their OHS knowledge. Organizations must create OHS programs to reduce workplace accidents.

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