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Original Article

A Study of the Hazard and Risk Identification, Risk Assessment Process and Highest Risk Task of the Daily Practices in the Food Production Industry

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Abstract *- Everyone frequently assumes that the term "food safety" refers to the protections and procedures that must be followed while food is being processed. However, it also refers to promoting a culture of safety at work in all departments in coordination with the safety department in a business to prevent accidents. Historically, the food industry's occupational safety and health (OSH) concerns have not gotten as much attention as those of the manufacturing, transportation, mining, and construction industries. According to statistics from numerous countries, the least attention has been paid to OSH issues in the food business compared to other manufacturers. This study examines the methods used to teach personnel in the food industry's various divisions for safety. The expert claims unsafe working conditions, not human negligence, are to blame for at least 80% of industrial accidents. The human resources, research and development, production, and safety divisions are a few that come to mind. Finding occupational hazards is an important first step in figuring out what caused the accidents. By doing this, the risks will be eliminated, and a safe working environment for the staff will be established. The current work offers a summary of occupational risks together with suggestions for lowering those risks and using various techniques, such as the job with the highest risk for the day and integrated workplace activity, to identify and lower task risk by adhering to the layer of protection and other control measures.*

Keywords *- Hazard identification, Risk analysis, Occupational safety, Safety management, Food.*

1. Introduction

The food industry has a huge and varied reach. A commitment to health and safety is one of the most efficient ways for a food processing business to protect its most valuable resource, its employees[1], [2]. Such a commitment might improve the working atmosphere, help retain talented staff, increase employee participation in decision-making, and foster productivity [3], [4]. An effective workplace safety program could have a significant positive effect on the company. Food enterprises must create safety plans that describe their employee health and safety rules and procedures if they are to achieve their goals. Everyone participating in this work safety program is required to become familiar with, adhere to, and actively participate in it [5].

The food industry engages in a wide range of activities. While some problems and risks are widespread, others are more exclusive to certain sector segments [5]. High standards for health and cleanliness are the feature that all food company divisions have in common because their products may have an impact on consumers' health [4].

Workplace accidents can significantly harm injured employees, their coworkers, and their families in terms of pain and suffering, disability, stress, and loss or change of job [6], [7]. The financial catastrophe might result from mishaps in the small food industry. Property damage, the cost of employing and training temporary personnel, and production delays that result in losses are examples of indirect costs[8], [9]. Claim filing fees and higher insurance rates are examples of direct costs. It follows naturally that there is a greater probability of OHS events [5], [10].
For employers to meet the main objectives of social responsibility, it is necessary to protect employee health and help them perform their duties in a respectable, safe, and healthy manner [4], [5].

Since it plays a significant influence in workplace events, the human component should be fully considered in accident prevention strategies [11], [12]. Industrial health and safety must be included in all organizational decisions and actions if the goal of a safe and comfortable workplace is to be achieved [13].

To ensure that the organization has acceptable health and safety standards, the food business's specialized health and safety expert (Safety Engineer) may need the aid of many other professionals [14]. These professionals could be teachers, work planners, supervisors, and engineers (civil, mechanical, and electrical) [4], [5].
The current study's objective is to identify high-risk everyday activities and assess their potential to lower workplace risk [15].

2. Material and Methodology

We conducted observations on the food sector for this study to analyze safety systems, establish new tasks for the company, and implement them for better safety results [16]. The food industry as a whole is made up of several business types that create numerous food products, not just one. All aspects of agriculture are covered, including food production, processing, preservation, packing, delivery, retail, and catering. The food industry significantly impacts the production of food for human consumption. [32]. It complies with community standards for food availability, distribution, and quality [18].

2.1. Hazard Identification and Risk Assessment Process

2.1.1. Hazard and Risk Identification

Initial Status Review

Desk research, site visits, and risk assessment are the three elements that make up the technique for identifying the benchmark from which HSE performance may be improved. Before the site visit, desk research involves going over a list of health and safety prompts to help identify the main risks of the ongoing activity[5]. Other relevant information was also considered to include permits and licenses, material safety data sheets, monitoring reports, and other HSE records[19]. The site visit comprises an extensive risk identification exercise that considers the whole range of risks connected to the services and activities carried out on site[4].

Work Activities Classification

Locations inside and outside the building, phases of production or service delivery, scheduled and unscheduled activities, particular tasks, and a combination of the aforementioned [20]. The list of jobs to be accomplished contains information about the frequency and duration of the task, its location, the people involved, its training, and its existing risk management procedures [5], [22].

Process of Hazard and Risk Identification

Three inquiries were made in the risk identification process:

1. Is the source hazardous?
2. Who or what might be harmed?
3. How could harm occur?

The hazards are acknowledged for both ordinary and unusual jobs, as well as for activities involving all personnel, including contractors and visitors, with access to the workplace, due to the infrastructure, equipment, and materials at the workspace, whether provided by the organization or others [23]. Even external risks that could endanger the health and safety of those under the organization's responsibility while at work are acknowledged[24]. Detection of risks coming from human capacity, conduct, and other human factors is carefully taken into account [5], [20].

2.1.2. Identification of Risk

Desk Study

The desk study comprises a review of the health and safety triggered list before the site visit to help identify the major hazards of the current operations[25]. We also looked at more relevant data, such as permits and licenses, monitoring results, and other HSE records [5], [26, p.].

Site Visit

The following duties are accomplished during site visits: Written instructions, a system of work or a permit-to-work technique, information on the environment in which work is done, what employees do while performing their jobs, whether activities are dangerous, preparation for dangerous chores, Activities such as the use of safety precautions, environmental elements that affect how well they work, information on how to access and determine the suitability of emergency procedures, escape plans, and equipment, as well as emergency exits and emergency communications networks[5], [27].

2.2. Risk Assessment

The levels of importance for the discovered risks are based on the severity and likelihood of each risk, and the levels of residue risk are established based on the likelihood of the occurrence is decreased by the presence of existing controls. The guideline assigns a score of 0 to 10 for the identification of the present limits[5].

Parameters of Risk Assessment

The evaluation is based on the level of risk that can be accepted. The degree of risk is evaluated by estimating the likelihood and potential severity of the damage. While evaluating hazards and risks, it is important to take into account how well the current risk-control methods are working. When determining the severity of the injury, the number of employees who are at risk and the wounded body part or parts must be taken into account[4], [5].

Severity Matrix

When estimating the likelihood of injury, it is important to take into account the number of personnel exposed, the frequency and length of exposure, potential apparatus, equipment, and safety equipment failures, weather exposure,

the use of personal protective equipment, and dangerous behavior[5], [28].

Recognizing Baseline, Acceptable, and Significant Risks

The risk level is established by considering both an event's severity and frequency. The score was determined by multiplying the severity by the frequency.

Based on assessments for probability and severity, the baseline risk is established before accounting for the present controls. The acceptable risk is evaluated and then taken into account along with the existing controls. The score of tolerable risk is used to evaluate the significant hazards following the implementation of the control measures [4], [5], [18].

2.3. High-Risk Task of the Day

What it is, what you should know, and what you should do[19], [25].

- Giving us all the Proper FOCUS is the aim of this.
- Focusing appropriately, at the appropriate moment, and on the appropriate topics.
- Let's be direct and decide on a crucial subject right now;
- This affects everything we do daily. Agreed?
- In actuality, by keeping our focus, we, our friends, and our family may all remain secure at home or work.

Safety is a life issue, not a work issue.

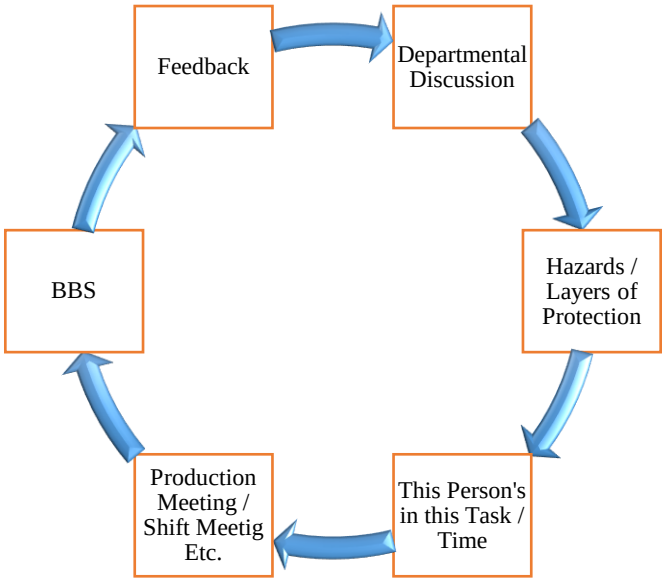


Fig. 1 Highest Risk Task of the Day = "Engagement & Control"

High-Risk Task of the Day working method

1. During the first hour of the shift, the team leader discusses the selected High-Risk Task of the Day for the region with the team.
2. Filled BBS form listing all dangers that pose a risk
3. Team leaders and the management have a meeting to discuss which of the day's submitted jobs poses the most danger.
4. The shift manager brings the day's high-risk tasks to the morning meeting, which may be public or private.
5. A manager is assigned to observe as the management team discusses the High-Risk Work of the Day.
6. The task is observed, and a relationship is built with the individual doing the observing, who makes encouraging or dangerous comments.
7. The following day's management meeting will cover the High-Risk Work of the Day—added engagement metrics to the tracker update.

The above method uses to identify High-Risk Tasks of the Day[5], [18], [23].

2.4. Hierarchy of Control

Trying to find corrective actions to prevent an accident from happening again should be one of your goals while doing incident inspections or occupational safety investigations. When deciding what repairs should be made, the Hierarchy of Controls can provide a framework for picking the most effective corrective measures to perform[30], [36].

This is the hierarchy's organizational structure, with the most effective interventions at the top and the least successful ones at the bottom.

2.5. Elimination / Substitution

By preventing exposure to dangerous substances before it even occurs, the best way to tackle a safety issue is to remove it entirely. Replacement seeks to permanently lessen the risk by switching out a hazardous substance for it or cutting the system's energy. These principles for process development demand a long-term change in how work is done [31].

2.6. Engineering Controls

Changing the workspace layout to reduce exposure by putting in safety devices or barriers is possible. An example would be constructing a wire fence around a dangerous place to prevent entry [31].

2.7. Administrative & Work Practice Controls

Establish regulations that require employees to take steps to reduce their risk exposure. An administrative control strategy would be a lockout/ tag-out system. Make it plain to workers what safe work practices are. The use of alarms, sirens, and warning signs is another example[33], [34].

2.8. Personal Protective Equipment (PPE)

Make sure those workers are provided with the proper safety equipment, such as gloves, goggles, and eyewear. Examples include fall protection, safety glasses, respirators, and hearing protection. Focusing on the use of PPE and organizational controls is normal while completing Work Safety Assessments or Incident Reporting Documents because these are typically the simplest to monitor and implement[35]. Nevertheless, these are not the best courses of action because they rely on how others act. Safety professionals should concentrate on higher cognitive, technical solutions and risk elimination strategies that may prevent a risk exposure from occurring and minimize the risk without relying on deviant human behavior [5], [33], [35].

2.9. Layers of Protection

To evaluate high-consequence scenarios and decide whether the likelihood of occurrence and severity of the consequences are within an organization's risk tolerance, a method known as Layers of Protection Analysis (LOPA) is utilized [34].

Table 1. Identify the highest risk task of the day as per the committee decision

HIGHEST RISK TASK OF THE DAY		
Day	**Description**	**Activity**
1	Packing Machine Maintenance	Maintenance
2	Cylinder replacement on Line	Mechanical
3	Heavy Weight Packing roll fixed on packing machine	Lifting/Loading/Unloading
4	Handling of RM with the use of stacker	Lifting/Loading/Unloading
5	Potato chips line fryer cleaning activity	Hazardous Substance
6	Line Extruder die replacement	Lifting/Loading/Unloading
7	TFH Maintenance	Maintenance
8	Masala Mixing seasoning	Hazardous Substance
9	Confined space work in Line	Confined Space
10	Plant Area walls and ceiling cleaning activity	Hazardous Substance
11	Surrounding plant Fumigation by the pest control team	Hazardous Substance
12	Material unloading at the silo area	Lifting/Loading/Unloading
13	TFH Unloading	Lifting/Loading/Unloading
14	Welding Activity in the fabrication area	Hazardous Substance
15	New Operators in the CP packing area	Others
16	Bundling breakdown	Mechanical
17	Potato truck unloading at silo area	Lifting/Loading/Unloading
18	plastic roll changing at the CP Packing area	Lifting/Loading/Unloading
19	Packing machine Maintenance	Maintenance
20	Line 1 Maintenance	Mechanical
21	Potato chips line fryer cleaning activity	Height Work
22	Noise hazard in the packing area	Hazardous Substance
23	Fire Pump Battery Servicing	Electrical
24	noise hazard at the new chips line area	Hazardous Substance
25	Usage of compressed air in the packing area	Others
26	Plant ceiling cleaning work	Height Work
27	Silo cleaning work	Hazardous Substance
28	New DG Installation	Electrical
29	Space Constraint	Lifting/Loading/Unloading
30	Gas pipeline leakage repair at FG warehouse	Mechanical
31	Masala area cleaning work	Hazardous Substances

3. Result and Discussion

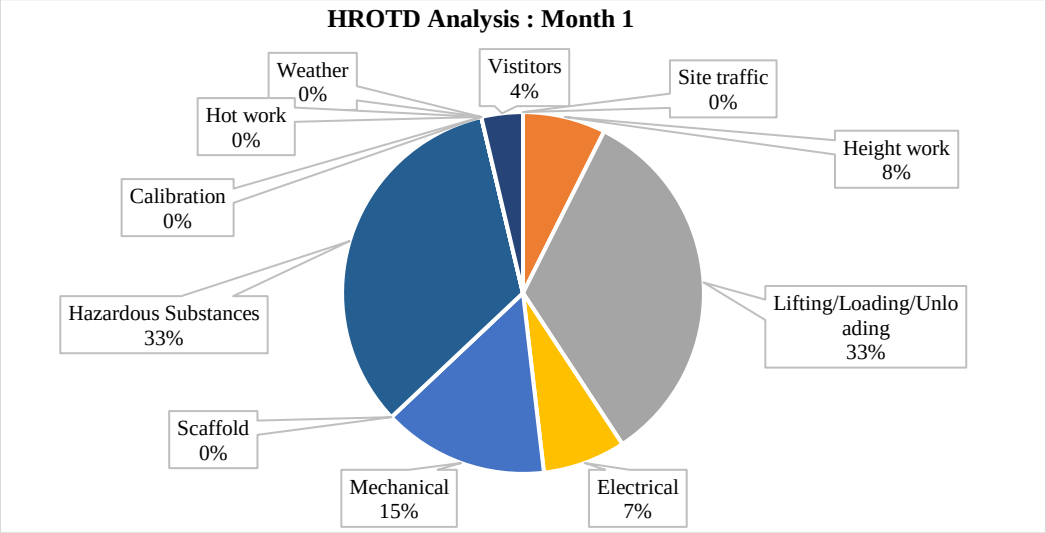
The study found that ineffective occupational health and safety (OHS) practices in the food industry affect worker performance and productivity [5].

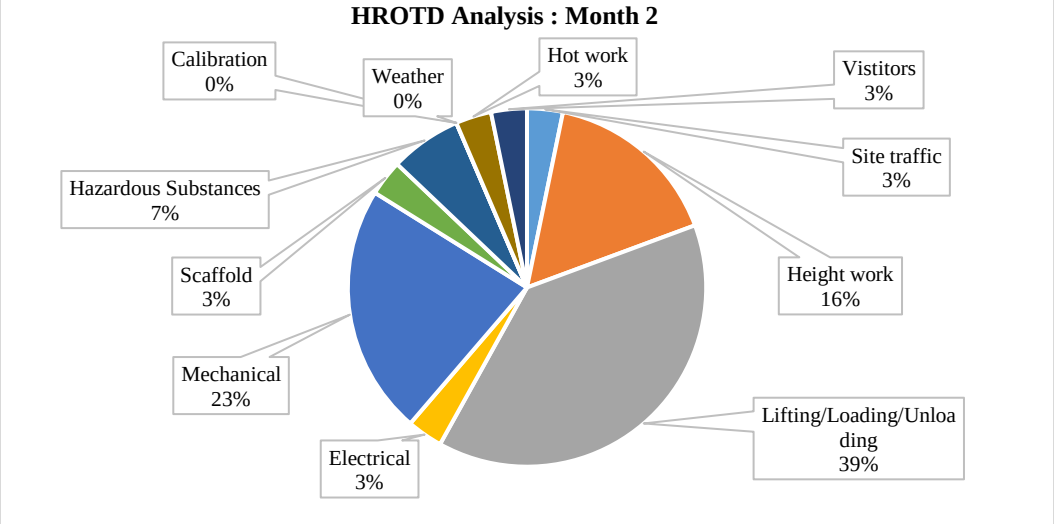
Most people assume that when discussing food safety, we're talking about the safety precautions and measures that must be implemented in the food industry. However, to prevent accidents, it also means developing a culture of safety throughout the organizations, across all departments, in coordination with the industry's safety department. This study examines how employees across the board are trained on safety in the food industry[4]. The method for assessing risks, risk identification, and control measures in the food business is suggested in this study to establish a safety management system effectively. Manufacturing companies have multiplied significantly as a result of the rapid economic expansion, but the industry's lax safety regulations put the lives of its workers in peril[33], [35].

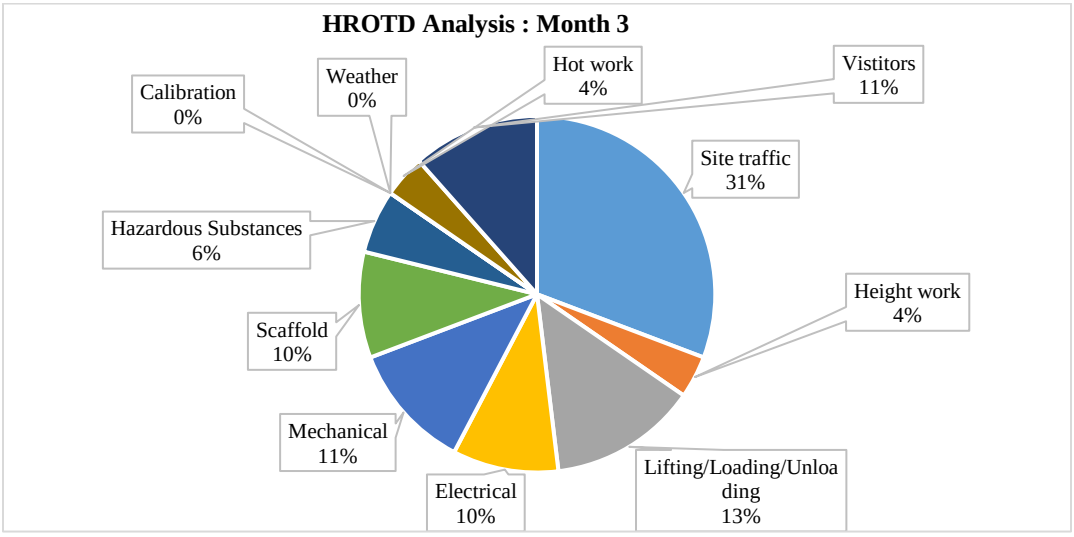
So, there must be a significant improvement in plant safety. Even though many businesses have systems in place to lower accident rates, statistics show that the industry has a significant risk of accidents and injuries. The safety management system employs several indicators to reduce accident rates. Indicators of a safe workplace include workplace safety culture, behavior safety, and performance safety[18].

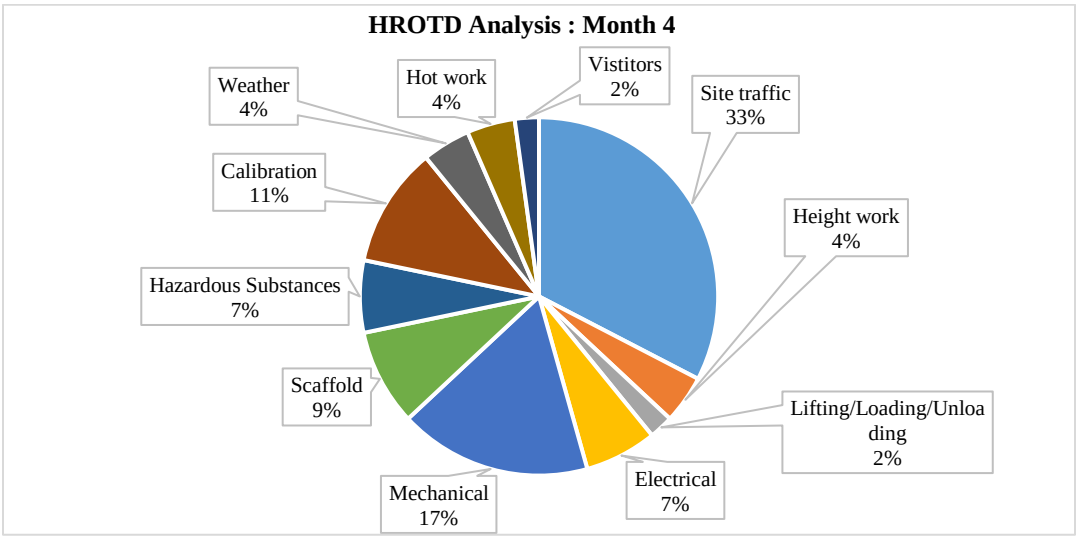
We endeavor to introduce new workplace safety initiatives to recognize risks and hazards that are constantly present so that we may apply controls to them and complete jobs in a safe manner. Practices for the day's highest-risk assignment produced the best results for any hazardous work that was taking place at the office.

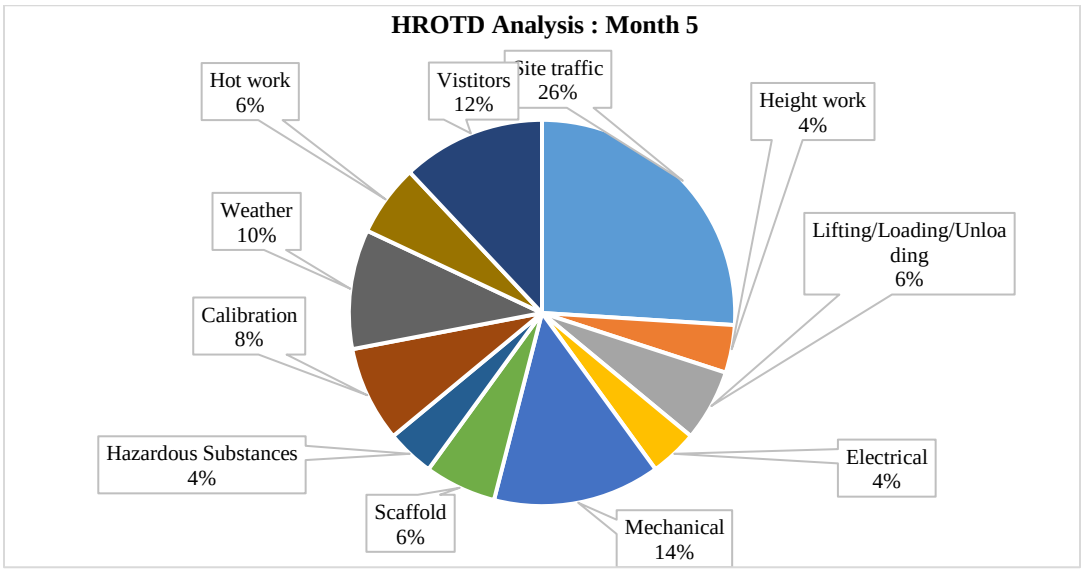
The team leader held a discussion regarding which task had the highest level of risk during the first hour of the shift.






HROTD Analysis : Month 3
Hot work 4%
Vistitors 11%
Weather 0%
Calibration 0%
Site traffic 31%
Hazardous Substances 6%
Height work 4%
Scaffold 10%
Mechanical 11%
Lifting/Loading/Unloading 13%
Electrical 10%


HROTD Analysis : Month 4
Weather 4%
Hot work 4%
Vistitors 2%
Site traffic 33%
Calibration 11%
Height work 4%
Hazardous Substances 7%
Scaffold 9%
Lifting/Loading/Unloading 2%
Mechanical 17%
Electrical 7%


HROTD Analysis : Month 5
Hot work 6%
Vistitors 12%
Site traffic 26%
Height work 4%
Weather 10%
Lifting/Loading/Unloading 6%
Calibration 8%
Hazardous Substances 4%
Electrical 4%
Scaffold 6%
Mechanical 14%

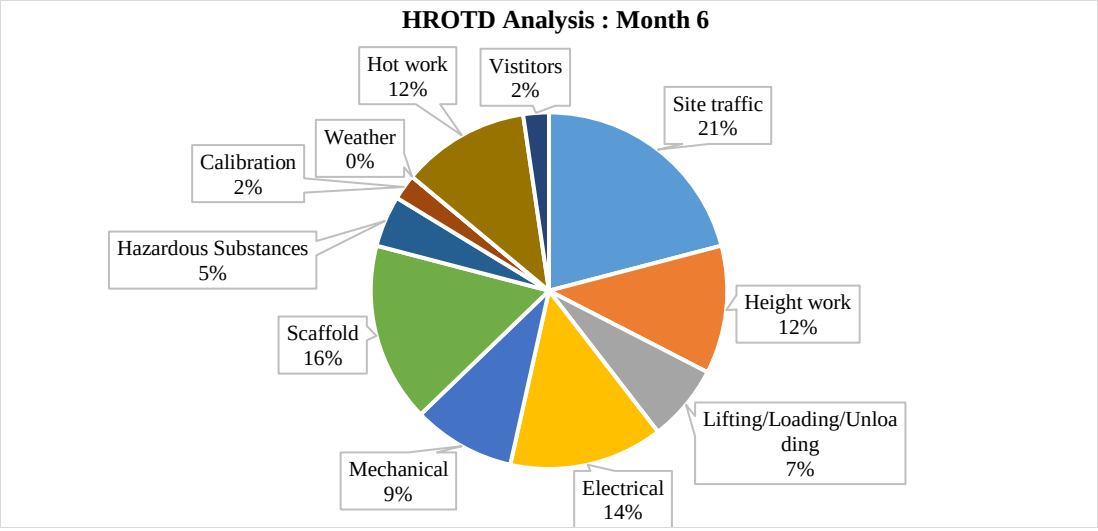


Fig. 2 Monthly Observation of Highest risk task

After that, also find out the monthly result to get which task contains more hazards and risks present in the task. So, we arrange and apply additional control measures for the respected task and get benefit from this task.

Table 2. Result of activity as per practice

Activity	HRTOTD Result
Site traffic	9
Height work	3
Lifting/Loading/Unloading	6
Electrical	3
Mechanical	6
Scaffold	3
Hazardous Substances	6
Calibration	2
Weather	1
Hot work	2
Visitors	3

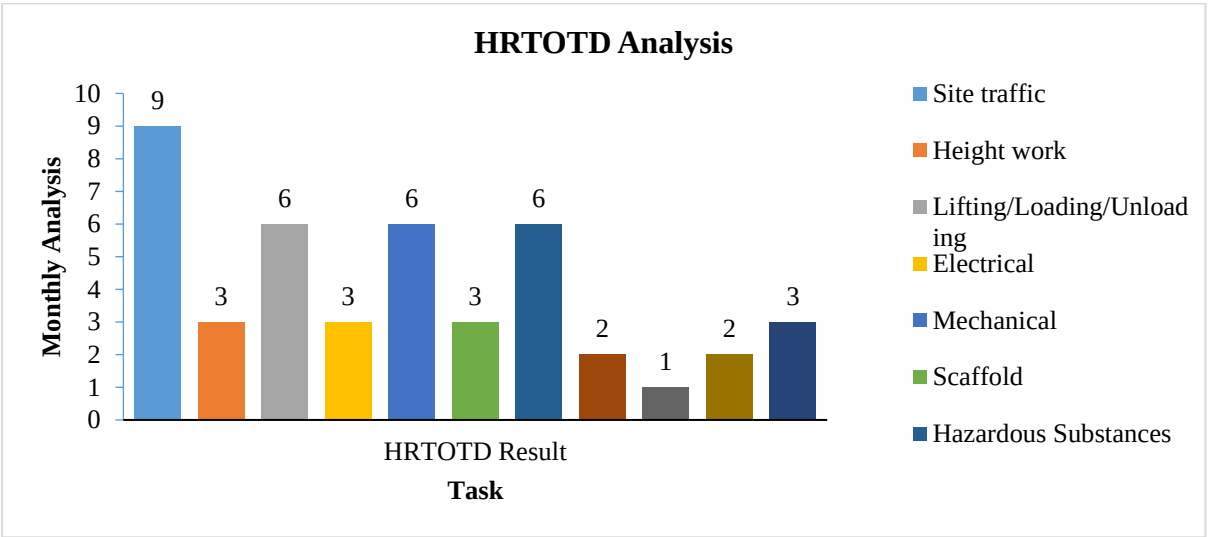


Fig. 3 Highest risk task of the day

4. Conclusion

As a result, occupational safety and health standards need to be applied with particular attention in the food business due to workplace dangers, and preventing mishaps by being aware of potential harm to employees is crucial. In this article, the ergonomic intervention viewpoint was briefly examined concerning OSH procedures in the food business. Knowing the OSH issues around food safety and the food industry will help you make better decisions.

In this work, we develop a tool technique for determining the task with the highest risk for the day and giving it more focus to finish it effectively. Because it incorporates components of fault-tree analysis and event-tree analysis, this safety management system and analysis is frequently used as a risk analysis approach in high-hazard industries. The fundamental benefit of this concept is that it creates a visual depiction of risk that shows not only all relevant elements but also how they relate to one another. In contrast to textual or tabular risk information, this link depiction enables many of the advantages of the concept. For instance, poorly managed Threats or Consequences might be quickly identified and subsequently given extra focus.

In this work, we develop a tool technique for determining the task with the highest risk for the day and giving it more focus to finish it effectively.

Understanding and learning about the hierarchy of power, including its benefits and drawbacks, is a crucial component of the entire strategy. Once the blind spots of management and employees are diminished, the window of opportunity will close. Lowering the potential occurrence of a life event in our activities. This is a great opportunity to emphasize the value of individual involvement and ownership to the audience.

Our experience has demonstrated that this is quite effective for organized risk assessment and communication, clearly demonstrating the relationship between control measures and management system configurations, and can be utilized to qualitatively analyze and display risk control for any type of risk.

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