



IMPACT OF WORKPLACE HEALTH AND SAFETY ON PRODUCTIVITY IN THE MANUFACTURING INDUSTRY

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ABSTRACT

The health, safety, and welfare measures are promoting the efficiency of the workers in the manufacturing industry. Those measures will have an immediate impact on the health, physical and mental efficiency alertness, morale, and overall efficiency of the worker and there are by contributing to higher productivity. The measures are under the Factories Act, 1948 (Act No. 63 of 1948), as amended by the Factories (Amendment) Act, 1987 (Act 20 of 1987)), which serves to assist in formulating national policies in India and also it's one of the legislation under the occupational health and safety in the manufacturing industries. This research aims at the manufacturing industry to maximize productivity and minimize accidents through the effective implementation of workplace health, safety, and welfare measures for employees in the manufacturing industries. The average score out of 5 overall healths is a score of 4.1 for satisfied an overall safety score of 4.1 for satisfied and an overall welfare score of 2.9 for neither satisfied nor dissatisfied among 100 respondents who respond in the manufacturing industry. Most of the workers are satisfied with the health and safety measures adopted by the company. A suitable idea was suggested to maximize productivity through the effective implementation of workplace health, safety, and welfare to promote worker efficiency from 81.1% up to 85%, and a majority of the workers feel secure while working in the manufacturing industry. Minimize the accident through the effective implementation of the factory act, of 1948 to avoid unsafe conditions at the workplace and it helps to reduce the severity of accidents.

Keywords: Factory Act 1948, health, safety, welfare, productivity, accidents, workplace

INTRODUCTION

Health, Safety, and welfare are measures for promoting the efficiency of the employee. Health is generally being defined as “a state of complete physical, mental and social happiness and not merely the absence of disease or illness”.

Safety is an important management function, that management creates and maintains a workplace to work safely, without risk to their physical, and psychological health and welfare, and personal protective equipment to avoid accidents in the workplace environment to the employees. Welfare includes anything that is done for the comfort and improvement of employees and is provided over and above wages. Welfare helps in keeping the morale and motivation of the employees high. The welfare measures need not be in monetary terms only but in any kind or form. Therefore, Employee welfare necessitates all those activities of the employer which are directed towards providing the employees with certain facilities and services in addition to wages or salaries as concerned with the safety, health, efficiency, and well-being of the employees at the workplace. The concept of employee health, safety, and welfare are flexible and widely differ concerning the time, region, industry, country, social value, customs, and degree of industrialization the general socio-economic development of the



people.

1.1 Occupational Safety and Health:

Occupational safety and health [1] are a cross-disciplinary area concerned with protecting the safety, health, and welfare of people engaged in work or employment. The goal of all occupational health and safety programs is to foster a safe work environment.

1.2 Factory Act in India:

In India, the first factory act has passed in the year of 1881. The act is designed to protect children and a few measures for safety, health, and welfare of the workers. This act only applies to 100 or more workers in the industry. In 1891 another factory act was passed which is extended 50 or more workers at the industries. According to the Factories Act, of 1948 [2]. The Act is administered by the Ministry of Labor and Employment in India through its Directorate General Factory Advice Service & Labor Institutes (DGFASLI) and by the State Governments through their factory inspectorates. DGFASLI advises the Central and State Governments on the administration of the Factories Act and coordinating is equal to the factory inspection services in the States.

1.2.1 Provisions Regarding the Health of Workers

Summary of the Provisions of the factories act relating to the health of workers are as Follows from sections 11 to 20.

Cleanliness, Disposal of wastes and effluents, Ventilation and temperature, Dust and fume, Artificial humidification, Overcrowding, Lighting, Drinking water, Latrines and urinals, and Spittoons.

1.2.2 Provisions Regarding the Safety of Workers

Summary of the Provisions of the factories act regarding the safety of the Workers are stated below: (sections 21 to 41).

Fencing of machinery, Work on or near machinery in motion, Employment of young persons on dangerous machines, Striking gear and devices for cutting off the power, Self-acting machines, The casing of new machinery, Women and children near cotton Openers, Hoist, lifts, and chains, Revolving machinery, Pressure plant, Floor, stairs, and means of access, Excessive weights, Protection of eyes, Precautions against dangerous fumes, Specifications of defectives(Section 37,38&39), Maintenance of Buildings, Safety Officers

1.2.3 Provisions Regarding the Welfare of Workers:

Summary of the Provisions of the Factories Act regarding the welfare of workers are stated below (sections 42 to 49).

Washing, Sitting, First Aid, Canteens, Shelters, Crèches, Welfare officers

1.3 Productivity:

The Productivity [3] is the ratio between the output into input within a period with due consideration for quality. They are several kinds of inputs, such as labor, materials, and capital (or) 5M's (Material, Machine, Method, Man, and Measurement). It can be expressed as follows:

$$\text{Productivity} = \frac{OUTPUT}{INPUT}$$

The formula indicates that productivity can be improved by

1. Increasing outputs with the same inputs,
2. Decreasing inputs but maintain the same outputs, or
3. Increasing outputs and decreasing inputs to change the ratio favorably.

The productivity also describes as the various measures of the efficiency of the production often; a productivity measure is expressed as the ratio of aggregate output to a single input or an aggregate input used in a production process. Efficiency is the achievement of the ends with the least amount of resources.



Figure 1: Maximization of Labor Productivity

1.3.1 Labor Productivity:

Labor productivity is plays a major role in this research.

Labor Productivity = Total Output/Total labor hour

1.3.2 Managerial Functions in Manpower:

The personnel management [4] role is the procurement of employees in sufficient numbers to meet requirements like the right person at the right job for the firm from time to time. The main objective of manpower planning is to increase production and productivity in the firm by putting the right person in the right place and at the right time. Needs of manpower planning:

Manpower planning includes both time and energy tasks. From the record, data is the experienced person reaches 85% efficiency and fresher reach 60% efficiency. The workers work 6 days in a week for 8 hours in a day, machine efficiency is 90% and worker efficiency approximately 80% were taken:

$$278 \text{ days} * 8 * \frac{90}{100} * \frac{80}{100} = 1601.28 \text{ Hours}$$

Techniques of manpower planning are work measurement and work sampling

- i) Work measurement is used to measure the time required to do each detailed element of an industrial operation to obtain the standard time required to finish a job.
- ii) Work sampling also called activity sampling based on the principle that the percentage of observation recorded.

Man power requirement = Total output / Standard time

1.4 Manufacturing Sector in India:

The manufacturing sector [5] contributed 15% to the gross domestic product (GDP) of India. A large number of industries and occupations are involved. Prominent among these are textile and apparel, leather, paper, chemicals and petrochemicals, rubber, glass, metals, pharmaceuticals, tobacco, food and beverages, computers and electricals, motor vehicles and machinery, mining (coal, ores, petrol, and gas, etc.), etc.

1.4.1 Incidence of occupational injuries/accidents:

The Directorate General of Factory Advice Service (DGFASLI) [5] classifies accidents into fatal and total (i.e. fatal as well as nonfatal). The incidence of both categories has declined over the years from 65.59 per 1000 persons in 1980 to 2.41 in 2006 and 0.90 in 2011, but the proportion of fatal injuries has increased from 0.2% in 1980 to 5.4% in 2006 and 10% in 2011. The highest incidence has been reported in the manufacture of transport equipment (5.42/1000/year), with intermediate rates in the textile and related industries (3.57/1000/year), machinery manufacturing (3.26/1000/year), metal and alloy industries (3.16/1000/year). It was 2.64 to 2.79/1000/year among workers involved in the manufacture of metal products, electricity, and gas. The incidence rates were lower (1.63 to 1.97/1000/year) in industries involved in the manufacture of paper, chemicals, and non-metallic mineral products.

1.5 Sampling techniques:

The sampling technique [6] is a larger sample involves both cost and time, then that required is chosen. If the smaller sample is chosen is the result obtained will be relatively less accurate. The optimum sample may be defined as the size of the sample which fulfills the requirements of efficiency, representativeness, reliability, flexibility.

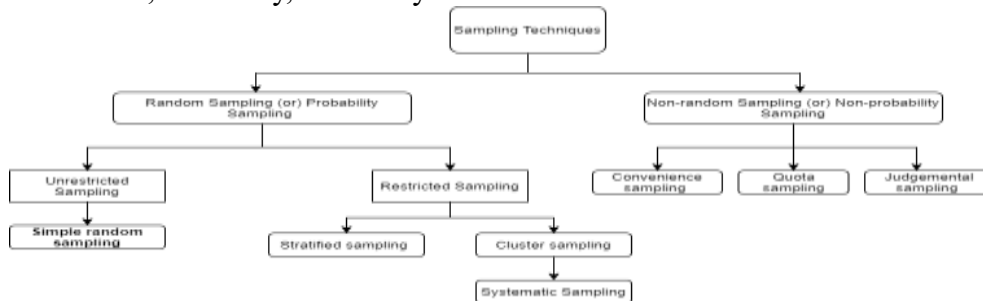


Figure 2: Sampling Techniques [6]

1.6 Company Profile:

A Equipment's manufacturing company is the [7], the pioneer in the field of manufacturing and supply of Shell and Tube Heat Exchangers since 1981 was established with a clear vision to provide end to end solutions to their customers in the process industry such as Oil & Gas, Petrochemicals, Fertilizers, Chemical, Power Plants, Energy & Nuclear. The company with employee strength of 400+ and an annual turnover of 25 Million USD has consistently grown with its rich experience in the process industry.

Since its inception, the company has designed and manufactured over 3000 Process Equipment's for Oil and Gas, Petrochemical, Fertilizers, and Energy Sector for its Customers in India and International Market.

2.1 LITERATURE REVIEW

Kamalinia et al. [1] discussed the performance of the Occupational Health and Safety Assessment Series 18001 specification in certified companies in Iran. The evaluation is based on a comparison of specific criteria and indicators related to occupational health and safety management practices.

Suri et al. [5] discussed the occupational health scenario of workers engaged in the manufacturing sector in India deserves attention for their safety and increasing productivity. From October 2014 to March 2015, review by a manual search of pre-identified journals, general electronic search.

Molnar et al. [8] discussed the evidence that leadership influences workplace safety,. Data were collected through a survey to which 269 employees in a paper mill company. A regression analysis was conducted to examine the relative roles of transformational, transactional (management-by-exception active; MBEA).

Verma et al. [9] discussed the area of safety has revealed that the majority of incidents in the hazardous industry take place because of human error, the control of which would enhance safety levels in working sites at mines to a considerable extent.

Krishnamurthy et al. [10] discussed the workers labouring in steel industries in tropical settings with high ambient temperatures are subjected to thermally stressful environments that can create well-known risks of heat-related illnesses and limit workers' productivity. A



Rajasekar et al. [11] discussed the labour welfare measure in private manufacturing companies. It is a compressive term and alludes to the physical mental, moral, and passionate prosperity of a person. A sample of 100 respondents was contacted for the study. Fringe benefits should be given to the workers to motivate them.

Abdullah et al. [12] discussed the effect of employee's attitude & subjective norm toward safety culture behavior in the organization. The sample size was 319. The tools used in this research are percentage analysis, chi-square, t-test, and factor analysis. A nominal variable is used to name or identify a particular characteristic such as gender, age, position, education level, department, and years of service. Nominal variables are used in behavioural research to indicate the condition that a person has been assigned to in experimental research design.

Kaare et al. [13] discussed the effect of employees' attitudes and subjective norms toward safety culture behaviour in the organization. The collected data enables to design of a human-centric employee performance measurement system comprising of various indices. As a result, management can make decisions based on quantitative information towards employee satisfaction, physical wellbeing, and attract the workforce to stay longer in the labour market.

OBSERVATION FROM LITERATURE REVIEW:

- ✓ Safety, health, and welfare measures in the manufacturing industry under the Factory Act 1948.
- ✓ The primary data was collected through questionnaires and secondary data was collected through reports, records, and other resources.
- ✓ The collected data to perform data analytics for the conclusion and forecast of the importance of health, safety, and welfare measures.
- ✓ Data analytics were performed such as data visualization, percentage analysis, chi-square, t-test, and factor analysis.
- ✓ Internal Consistency Reliability test performed most of them
- ✓ Finally, the performed data is used to determine the satisfaction levels, suggestions, or recommendations to improve safety, health, and welfare measures at the workplace.

3. PROBLEM DESCRIPTION

In the manufacturing industry, health and safety are the high priority because the workplace had most of the injuries and fatalities. On average ^[14], there 31 fatalities per year along with 4,500 cases of major injuries and 19,500 cases of injuries at the manufacturing workplace. So the productivity impacts while the safety, health, and welfare measures are not satisfied with the employees. This research aims at the manufacturing industry to find out the satisfaction level of employees and identify were it to improve and make suggestions or recommendations to satisfy the employees.

3.1 OBJECTIVE

To maximize productivity and minimize the accident through the effective implementation of the workplace health, safety, and welfare measures of employees in the manufacturing industries.

3.2 HYPOTHESIS

H1: There is no significance relationship between health measures and designation

4. METHODOLOGY

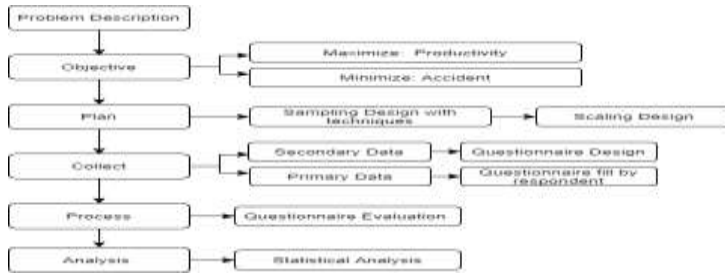


Figure 3: Methodology

4.1.1 Sampling Design with technique:

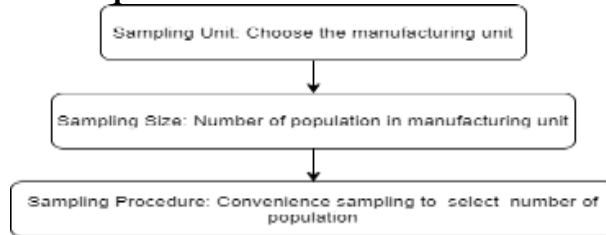


Figure 4: Sampling design with technique

4.1.2 Scaling Design:

The suitable scaling type for this research is the ordinal scaling. The Rank order represents ordinal scaling in this research, the Likert scale is one of the rank order scaling design of the ordinal scale measurements.

Table 1: Likert Scale

Highly Satisfied	Satisfied	Neither Satisfied nor dissatisfied	Dissatisfied	Highly Dissatisfied
5	4	3	2	1

4.2 Collect:

To collect the data from the two sources they are secondary and primary. From the secondary source is selected to prepare a questionnaire (Appendix) for this research.

4.3 Analysis:

A descriptive statistic is a summary statistic summarizes features from a collection of information, while descriptive statistics is the process of using and analyzing those statistics. In this research were perform frequencies table with the chart, cross tab in the descriptive statistics. The sample of this research would be organized and summarized using descriptive statistics and the participants' responses would be summarized by calculating the frequency table and chi-square of the data gathered.

4.3.1 Demographic Frequency Table:

Table 2 Demographic Frequency Table

Profile		Frequency	Percentage	Cumulative Percentage
Gender	Male	98	98.0	98.0
	Female	2	2.0	100.0
	Total	100	100.0%	
Age	Below 20 Years	1	1.0	1.0
	20-30 Years	42	42.0	43.0
	30-40 Years	42	42.0	85.0
	Above 40 Years	15	15.0	100.0



	Total	100	100.0%	
Qualification	Diploma / ITI	62	62.0	62.0
	Under Graduate	31	31.0	93.0
	Post Graduate	7	7.0	100.0
	Total	100	100.0%	
Designation	Worker	50	50.0	50.0
	Employee	25	25.0	75.0
	Supervisor	20	20.0	95.0
	Manager	5	5.0	100.0
	Total	100	100.0%	
Experience	Below 2 Years	14	14.0	14.0
	2-4 Years	25	25.0	39.0
	4-6 Years	23	23.0	62.0
	Above 6 Years	38	38.0	100.0
	Total	100	100.0	

Inference:

From the above table, it is inferred that 98% of the respondents were male and 2% of the respondents were female. It revealed that 42% of the respondents were in between (21 - 30 years) & also same for (30 – 40 years) age group, 15% of the respondents were between (Above 40 Years) and 1% of the respondents were between (below 20 years). It shows that 62% of the respondents were completed diploma \ ITI, 31% of the respondents were completed under graduation, and remains 7% of the respondents were completed post-graduation. It is observed that 50% of the respondents were workers, 25% of the respondents were employees, 20% of the respondents were supervisors, and 5% of the respondents were managers. It is evident that 38% of the respondents were having above 6 years of experience, 25% of the respondents were having 2-4 years of experience, 23% of the respondents were having 4-6 years of experience, and 14% of the respondents were having below 2 years of experience.

4.3.2 Health Provisions Frequency Table:

Table 2 Health Provisions Frequency

Frequency Table				
Health Provisions	No	Intermittently	Yes	Total
Does your company has provided cleanliness at your work place?	0	26	74	100
Percentage	0.0	26.0	74	100.0
Cumulative	0.0	26.0	100	
Does your factory provide arrangement for disposal of waste effluents?	0	19	81	100
Percentage	0.0	19.0	81	100.0
Cumulative	0.0	19.0	100	
Does your company provide sufficient Ventilation & temperature at work place?	0	13	87	100
Percentage	0.0	13.0	87	100.0
Cumulative	0.0	13.0	100	
Is there any exhaust system to release impure air from the factory workshop?	0	74	26	100



Percentage	0.0	74.0	26	100.0
Cumulative	0.0	74.0	100	
Does the company has put up the necessary machinery to control humidity?	0	78	12	100
Percentage	0.0	78.0	12	100.0
Cumulative	0.0	78.0	100	
Does the sufficient lighting provide at your workplace in your company?	0	8	92	100
Percentage	00	8.0	92	100.0
Cumulative	0.0	8.0	100	
Does the factory prevent from the overcrowding at your work place?	0	80	20	100
Percentage	0.0	80.0	20	100.0
Cumulative	0.0	80.0	100	
Is there sufficient supply of drinking water that has been provided at your factory?	0	9	91	100
Percentage	0	9.0	91	100.0
Cumulative	0.0	9.0	100	
Is there an adequate number of latrines & urinals in your factory?	0.0	9	91	100
Percentage	0.0	9.0	91	100.0
Cumulative	0.0	9.0	100	
Is there an adequate number of latrines & urinals in your factory?	0	78	22	100
Percentage	0.0	78.0	22	100.0
Cumulative	0.0	78.0	100	

Inference:

From the above table shows that the respondents respond for 74% yes & 26% intermittently for cleanliness, 81% yes & 19% intermittently for disposal of waste effluents, 87% yes & 13% intermittently for sufficient ventilation and temperature, 26% yes & 74% intermittently for the exhaust system to release impure air from the workshop, 12% yes & 78% intermittently for the necessary machine to control humidity, 92% yes & 8% intermittently for sufficient lighting provide by company, 20% yes & 80% intermittently for preventing from overcrowding, 91% yes & 9% intermittently for sufficient supply of pure drinking water, 95% yes & 5% intermittently for providing latrine and urinals, 78% yes & 22% no for an adequate number of latrine and urinals available, and 100% no for the sufficient number of spittoons available at the workplace.

Table 3: Satisfaction of Health Provisions table

Frequency Table						
The satisfaction of Health Provisions	HD	DS	NSD	SD	HS	Total



Cleanliness	0	0	17	53	30	100
Percentage	0.0	0	17.0	53.0	30.0	100.0
Cumulative	0.0	0	17.0	70.0	100.0	
Disposal of waste and effluent	0	1	10	57	32	100
Percentage	0.0	1.0	10.0	57.0	30.0	100.0
Cumulative	0.0	1.0	11.0	68.0	100.0	
Ventilation & temperature	0	2	8	31	59	100
Percentage	0.0	2.0	8.0	31.0	59.0	100.0
Cumulative	0.0	2.0	10.0	41.0	100.0	
Health Training	0	2	13	82	3	100
Percentage	0.0	2.0	13.0	82.0	100.0	100.0
Cumulative	0.0	2.0	15.0	97.0	100.0	
Lighting	0	0	6	28	66	100
Percentage	0.0	0.0	6.0	28.0	66.0	100.0
Cumulative	0.0	0.0	6.0	34.0	100.0	
Health Insurance	1	2	14	80	3	100
Percentage	0.0	0.0	14.0	80.0	3.0	100.0
Cumulative	1.0	3.0	17.0	97.0	100.0	
Overall Health Measures	0	0	11	66	23	100
Percentage	0.0	0.0	11.0	66.0	23.0	100.0
Cumulative	0.0	0.0	11.0	77.0	100.0	

Table 3

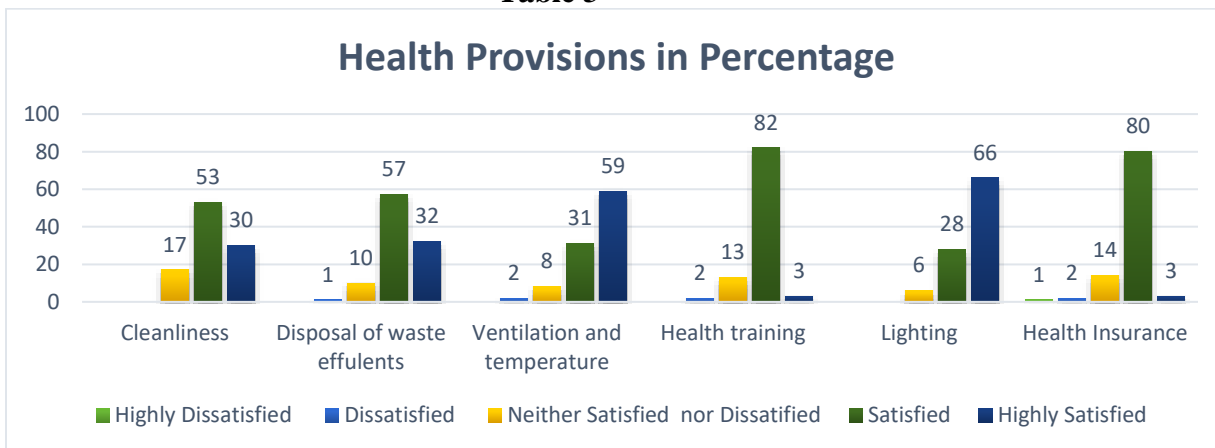


Figure 5: Overall Satisfaction of Health Provisions

Inference:

From the above table and chart shows that the respondents respond for 53% satisfied, 30% highly satisfied & 17% neither satisfied nor dissatisfied for cleanliness, 57% satisfied, 32% highly satisfied, 10% neither satisfied nor dissatisfied & 1% dissatisfied for disposal of waste effluents, 59% highly satisfied, 31% satisfied, 8% neither satisfied nor dissatisfied & 2% dissatisfied for ventilation and temperature, 82% satisfied, 13% neither satisfied nor dissatisfied, 3% highly satisfied & 2% dissatisfied for health training, 66% highly satisfied, 28% satisfied & 6% neither satisfied nor dissatisfied for sufficient lighting provide by company, 80% satisfied, 14% neither satisfied nor



dissatisfied, 3% highly satisfied, 2% dissatisfied & 1% highly dissatisfied for health insurance, 66% satisfied, 23% highly satisfied, 11% neither satisfied nor dissatisfied for overall health measures provided by the company.

4.3.3 Safety Provisions Frequency Table:

Table 4: Safety frequency Provisions table

Frequency Table				
Safety Provisions	No	Intermittently	Yes	Total
Are securely fenced for all dangerous machine?	0	49	51	100
Percentage	0	74.0	26	100.0
Cumulative	0	74.0	100	
Are suitable devices available for cutting off power in emergencies while machinery in motion?	0	23	77	100
Percentage	0.0	23.0	77	100.0
Cumulative	0.0	23.0	100	
Does the young persons without training are not allowed on dangerous machine?	0	9	91	100
Percentage	0	9.0	91	100.0
Cumulative	0	9.0	100	
Are the workers does not carry an excessive loads?	0	62	38	100
Percentage	0	62.0	38	100.0
Cumulative	0	62.0	100	
Does the organization exclude all sources of ignition?	0	70	30	100
Percentage	0.0	70.0	30	100.0
Cumulative	0.0	70.0	100	
Does the floor and stairs shall be sound constructed?	0	66	34	
Percentage	0.0	66.0	34	100.0
Cumulative	0.0	66.0	100	
Are defective machines can be made safe or prohibited by inspector?	0	73	27	
Percentage	0.0	73.0	27	100.0
Cumulative	0.0	73.0	100	

Inference:

From the above table and chart shows that the respondents respond for 51% yes & 51% intermittently for securely fenced on all dangerous machine, 77% yes & 23% intermittently for cutting off power in emergencies while machinery in motion, 91% yes & 9% intermittently for a young person without training are not allowed in all dangerous machine, 38% yes & 62% intermittently for workers does not carry as excessive loads, 30% yes & 70% intermittently for excluding all sources of ignition,



66% yes & 34% intermittently for floors and stairs are soundly constructed, 27% yes & 73% intermittently for defective machines have made safe or prohibited by the inspector.

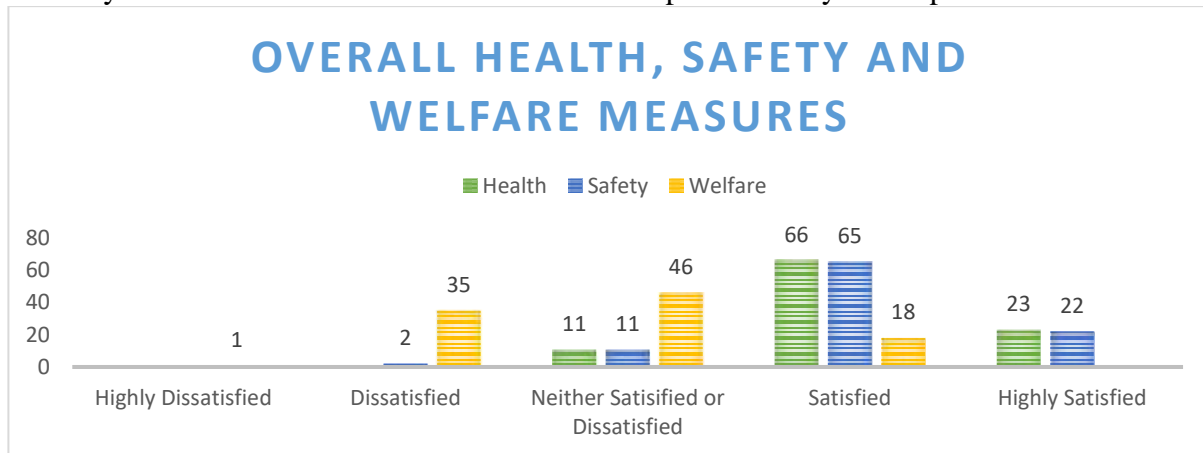


Figure 6: Overall Satisfaction of Health, safety Provisions

4.4.5 Chi-Square Method:

The chi-square statistic is a test that how expectations compare to actual observed data calculating a chi-square statistic must be random raw mutually exclusive drawn from large independent variables and drawn from a large enough space. The chi-square main purpose is to serve as a good to test, the goodness of fit, significance of the association between two attributes, homogeneity or the significance of population variance, symbolically represented as χ^2 , to test the null hypothesis and alternative hypothesis and also test the relationship between the level of satisfaction regarding the health, safety and welfare measures of the workers. The dimensions of the crosstab refer to the number of rows and columns in the table. (The "total" row/column is not included.) The table dimensions are reported as RxC, where R is the number of categories for the row variable, and C is the number of categories for the column variable.

Table 5: Crosstab

		Rank your satisfaction about providing			Total	
		NSD	SD	HS		
DESIGNATION	WORKER	Count	8	42	0	50
		Expected	5.5	33.0	11.5	50.0
	EMPLOYEE	Count	2	19	4	25
		Expected	2.8	16.5	5.8	25.0
	SUPERVISOR	Count	1	5	14	20
		Expected	2.2	13.2	4.6	20.0
	MANAGER	Count	0	0	5	5
		Expected	.6	3.3	1.2	5.0
Total		Count	11	66	23	100
		Expected	11.0	66.0	23.0	100.0

H1: There is no significance relationship between health measures and designation

Table 6 Crosstabs for overall Health and Designation



Crosstab							
			Rank your satisfaction about providing			Total	
			NSD	SD	HS		
DESIGNATION	WORKER	Count	8	42	0	50	
		Expected	5.5	33.0	11.5	50.0	
	EMPLOYEE	Count	2	19	4	25	
		Expected	2.8	16.5	5.8	25.0	
	SUPERVISOR	Count	1	5	14	20	
		Expected	2.2	13.2	4.6	20.0	
	MANAGER	Count	0	0	5	5	
		Expected	.6	3.3	1.2	5.0	
	Total		Count	11	66	23	100
			Expected	11.0	66.0	23.0	100.0

Table 7 Results for overall Health and Designation

Chi-Square Tests			
	Value	df	Asymptotic
Pearson Chi-Square	57.903 ^a	6	.000
Likelihood Ratio	62.013	6	.000
Linear-by-Linear	39.441	1	.000
N of Valid Cases	100		
a. 6 cells (50.0%) have expected count less than 5. The minimum			

Inference:

The chi-square value is 57.903 and the P-value is .000 is less than the confidence level 0.05. So the H1 is hypothesis rejected. There is a significance relationship between health measure and designation.

5. RESULTS

5.1 Calculation of Existing Labor Productivity:

Table 8 worth of Existing Productivity

Month	Equipment's	Worth of Goods in ₹
January	10	9,00,00,000
February	8	7,20,00,000
March	11	9,90,00,000
April	13	11,70,00,000
May	12	10,80,00,000
June	10	9,00,00,000
July	8	7,20,00,000
August	7	6,30,00,000
September	10	9,00,00,000
October	11	9,90,00,000



November	10	9,00,00,000
December	10	9,00,00,000
Total	120	108,00,00,000

5.1.1 Labor Productivity:

$$\frac{\text{Total Worth of Goods}}{\text{No of working Hours}} = \frac{108,00,00,000}{1601.28} = ₹674460.4317 \text{ per hour of work}$$

$$\frac{\text{Total Worth of Goods}}{\text{No of employees}} = \frac{108,00,00,000}{360} = ₹30,00,000 \text{ per employee a year}$$

5.1.2 Labor Efficiency:

$$\frac{\text{Standard Labour Hours}}{\text{No of hours actual worked}} = \frac{1300}{1601.28} * 100 = 81.1\%$$

Inference:

Thus, the existing labor productivity generates around ₹ 6, 75,000 per hour of work, ₹ 30, 00,000 per employee for a year and labor efficiency is 81.1%

5.2 Findings:

1. Findings of Demographic Profile:

- ✓ The majority of 98% of the respondents were male.
- ✓ 42% of the respondent were between the age group of 21-40 years.
- ✓ 62% of the respondents were Diploma / ITI.
- ✓ 50% of the respondents were a worker.
- ✓ 38% of the respondents were above 6 years of experience.

2. Findings of workplace health, safety, and welfare

- ✓ 53% of the respondents were satisfied with the cleanliness provided by the PECPL Company.
- ✓ 57% of the respondents were satisfied with the disposal of waste effluent provided by the Company.
- ✓ 59% of the respondents were highly satisfied with the ventilation & temperature provided by the company.
- ✓ 82% of the respondents were satisfied with the health training program.
- ✓ 22% of the respondents were agreed that PECPL has put up the necessary machine to control humidity.
- ✓ 66% of the respondents were highly satisfied with the Provisions of lighting at the workplace.
- ✓ 20% of the respondents agreed that PECPL has taken preventive measures from overcrowding at the workplace.
- ✓ 80% of the respondents were satisfied with the health insurance policy provided by the company
- ✓ 91% of the respondents agreed that PECPL provides a sufficient supply of pure drinking water.
- ✓ 95% of the respondents agreed that PECPL provides latrine & urinal facility.
- ✓ 66% of the respondents were satisfied that PECPL provides overall health measures.
- ✓ 51% of the respondents agreed that securely fencing for all dangerous machines.
- ✓ 43% of the respondents agreed with young persons are not allowed in a dangerous machine without training.
- ✓ 61% of the respondents were satisfied with striking gear and device cutting off power facilities.
- ✓ 67% of the respondent were highly satisfied with the safeguard provided by the PECPL.
- ✓ 82% of the respondents were satisfied with lifts and hoists facilities provided by the company.
- ✓ 38% of the respondents agreed with workers do not carry an excessive load.
- ✓ 30% of the respondents were agreed that PECPL has excluded all sources of ignition.



- ✓ 34% of the respondents agreed with floors and stairs are soundly constructed.
- ✓ 64% of the respondent were highly satisfied with the equipment to prevent the fire provided by the PECPL.
- ✓ 66% of the respondents were highly satisfied with the precaution in case of fire provided by the PECPL.
- ✓ 27% of the respondents agreed with defective machines have made safe or prohibited by the inspector.
- ✓ 65% of the respondents were satisfied with the overall safety measure provided by the PECPL.
- ✓ 80% of the respondent were neither satisfied nor dissatisfied with the washing facility provided by their company.
- ✓ 55% of the respondent were neither satisfied nor dissatisfied with the cloth storing and drying facility provided by the company.
- ✓ 15% of the respondents agreed with shelter restrooms and lunchrooms provided by the company.
- ✓ 79% of the respondent was satisfied with the available first aid facilities provided by the company.
- ✓ 84% of the respondents were satisfied with the canteen facility provided by the company.
- ✓ 46% of the respondents were dissatisfied with the housing facility near the organization.
- ✓ 65% of the respondents were neither satisfied nor dissatisfied with the compensation or ESI facility.
- ✓ 46% of the respondents were neither satisfied nor dissatisfied with overall welfare measures provided by the PECPL. 30% of the respondents were agreed that PECPL has excluded all sources of ignition.
- ✓ 34% of the respondents agreed with floors and stairs are soundly constructed.
- ✓ 64% of the respondent were highly satisfied with the equipment to prevent the fire provided by the PECPL.
- ✓ 66% of the respondents were highly satisfied with the precaution in case of fire provided by the PECPL.
- ✓ 27% of the respondents agreed with defective machines have made safe or prohibited by the inspector.
- ✓ 65% of the respondents were satisfied with the overall safety measure provided by the PECPL.
- ✓ 80% of the respondent were neither satisfied nor dissatisfied with the washing facility provided by their company.
- ✓ 55% of the respondent were neither satisfied nor dissatisfied with the cloth storing and drying facility provided by the company.
- ✓ 15% of the respondents agreed with shelter restrooms and lunchrooms provided by the company.
- ✓ 79% of the respondent was satisfied with the available first aid facilities provided by the company.
- ✓ 84% of the respondents were satisfied with the canteen facility provided by the company.
- ✓ 46% of the respondents were dissatisfied with the housing facility near the organization.
- ✓ 65% of the respondents were neither satisfied nor dissatisfied with the compensation or ESI facility.

5.3 Suggestions:

- The company can take preventive measures from overcrowding at the workplace.
- The company can provide spittoons facilities for the worker.
- The company must consider the young persons without training are not allowed in a dangerous machine.
- The company can increase the number of shelter restrooms.



- The company must consider the opinion of their employee before deciding about the compensation or ESI facility.
- The responses of the employees regarding the level of satisfaction of workplace health and safety are clustered in the satisfactory region. Welfare is clustered in neither satisfied nor dissatisfied region. The management may take steps to convert these into highly satisfactory.

6. CONCLUSION

Thus the impact of workplace health, safety, and welfare on productivity at the PECPL. The average score out of 5 the overall health is scored 4.1 for satisfied and overall safety scored 4.1 for satisfied and overall welfare scored 2.9 for neither satisfied nor dissatisfied among 100 respondents responds in the manufacturing industry. Most of the workers are satisfied with the health and safety measures adopted by the company. The suitable idea was suggested to maximize productivity through the effective implementation of workplace health, safety, and welfare to promote worker efficiency from 81.1% up to 85%, and a majority of the workers feel secured while working in the manufacturing industry. Minimize the accident through the effective implementation of the factory act, 1948 to avoid unsafe conditions at the workplace and it helps to reduce the severity of accidents.

APPENDIX

7. Questionnaire

A) PERSONAL INTRODUCTION

Name:

Gender: Male Female

Age: Below 20 years 21-30 years 31-40 years Above 40 years

Qualification: Higher Secondary Diploma / ITI UG PG

Designation: Worker Employee Supervisor Manager

Experience: Below 2 years 2-4 years 4-6 years Above 6 years

B) HEALTHY, SAFETY AND WELFARE MEASURES:

HEALTH:

1) Does your company has provided cleanliness (like dust free, clean trash can) at your work place?

Yes -5 Intermittently -3 No -1

2) Rank your satisfaction on present cleanliness in your factory.

Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3

Dissatisfied -2 Highly Dissatisfied -1

3) Does your factory provide arrangement for disposal of waste effluents?

Yes -5 Intermittently -3 No -1

4) Rank your satisfaction on present disposal of waste and effluent.

Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3

Dissatisfied -2 Highly Dissatisfied -1

5) Does your company provide sufficient Ventilation & temperature at work place?

Yes -5 Intermittently -3 No -5

6) Are you satisfied with present Ventilation & temperature at work place?

Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3

Dissatisfied -2 Highly Dissatisfied -1 55



- 7) Is there any exhaust system to release the impure air from the factory workshop?
 Yes -5 Intermittently -3 No -1
- 8) Rank your satisfaction on providing health training program at your workplace.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied 3
 Dissatisfied -2 Highly Dissatisfied -1
- 9) Does the company has put up the necessary machinery to control humidity?
 Yes -5 Intermittently -3 No -1
- 10) Does the sufficient lighting provide at your workplace in your company?
 Yes -5 Intermittently -3 No -1
- 11) Rank your satisfaction Provisions of lighting at your workplace.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 12) Does the factory prevent from the overcrowding at your work place?
 Yes -5 Intermittently -3 No -1
- 13) Rank your satisfaction on health insurance policy for doing work.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 14) Is there a sufficient supply of pure drinking water that has been provided at your factory?
 Yes -5 Intermittently -3 No -1
- 15) Are latrine & urinal facilities provided to you?
 Yes -5 Intermittently -3 No -1
- 16) Is there an adequate number of latrines & urinals in your factory?
 Yes -5 Intermittently -3 No -1
- 17) Is sufficient no of spittoons provided at your work place?
 Yes -5 Intermittently -3 No -1
- 18) Rank your satisfaction about providing overall health measures.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1

SAFETY:

- 19) Are securely fenced for all dangerous machine?
 Yes -5 Intermittently -3 No -1
- 20) Are suitable devices available for cutting off power in emergencies while machinery in motion?
 Yes -5 Intermittently -3 No -1
- 21) Does the young persons without training are not allowed on dangerous machine?
 Yes -5 Intermittently -3 No -1
- 22) Are you satisfied with the striking gear and device cutting off power facility in your company?
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 23) Are you satisfied from provided safeguard to prevent damage for workers?
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 24) Are you satisfied with lifts and hoist facilities provided by your factory?
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1



- 25) Are the workers does not carry an excessive loads?
 Yes -5 Intermittently -3 No -1
- 26) Does the organization exclude all sources of ignition?
 Yes -5 Intermittently -3 No -1
- 27) Does the floor and stairs shall be sound constructed?
 Yes -5 Intermittently -3 No -1
- 28) Rank your satisfaction with the provided equipment to prevent the fire.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 29) Rank your satisfaction with the precautions in case of fire.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 30) Are defective machines can be made safe or prohibited by inspector?
 Yes -5 Intermittently -3 No -1
- 31) Rank your satisfaction about providing overall safety measures.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied 3
 Dissatisfied -2 HighlyDissatisfied -1

WELFARE

- 32) Does factory has provided washing facilities to you?
 Yes -1 Intermittently -3 No –
- 33) Are you satisfied with this washing facility in your factory?
 Highly Satisfied -5
 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 34) Rank your satisfaction with this storing and drying clothing facility in the company.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 35) Does factory provide shelter restrooms and lunch rooms for workers?
 Yes -1 Intermittently -3 No -5
- 36) Rank your satisfaction with the first aid appliance available facility.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 37) Rank your satisfaction about the canteen facility.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 38) Rank your satisfaction about the housing facility near your organization.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 39) Rank your satisfaction about compensation or ESI facility.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1
- 40) Rank your satisfaction about providing overall welfare measures.
 Highly Satisfied -5 Satisfied -4 Neither Satisfied nor Dissatisfied -3
 Dissatisfied -2 Highly Dissatisfied -1



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