

Safety Behaviour Assessment Among Workers at Ink Manufacturing Industry

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Abstract

Manufacturing industry is recorded as the highest accident and fatality case in Malaysia. Most of the accident cause based unsafe behaviour among workers. The aim of this study was to assess the state of safety in ink manufacturing industry. In order to achieve the first objective, the researcher using survey questionnaire the data were analysed by using Statistical Package for the Social Science (SPSS) software. The survey was distributed to 59 staff of plant 1 selected area. For the second objective of study are collected by checklist observation and percent safe was made to analyse the data. Based on the result, it was found that safety implementation is high meanwhile the safety behaviour of employees are range 40% to 50% of percent safe. It shows that the safety behaviour among workers in this manufacturing company was moderate.

1. Introduction

The manufacturing industry is often working with heavy equipment and machinery can pose risks to the safety of employees, which can be dangerous if proper safety precautions are not taken. Therefore, it's important for employees to follow safety protocols, be aware of potential hazards, and report any safety concerns to their supervisors. By implementing safety programs, companies can help to reduce the number of accidents and injuries in the workplace. This study attempts to investigate the state of safety and behavior of employers in an ink manufacturing located in Seelong, Johor.

The first research objective is to assess the state of safety in the ink manufacturing industry, the data collected are through questionnaire [1] and validated by third parties. Secondly is to analyze the safety behavior among workers on occupational safety and health in the workplace data collected through observation and working inspection for production process. The survey checklist was used in another study [2] and it was validated by expert person, his was a safety officer and has working experience for 7 years. The survey is distributed to a total 59 of people according to Krejcie Morgan [3] sampling method and the area that will be taken at Plant 1 that will be emphasized right in the area where they do work. This study gives a clear picture to employers for increasing the better practices of safety in employees.

2. Methodology

2.1 Research design

The methodology in this research through questionnaire and observation. To complete the method, survey done through google form that help to identify, collect, and analyze data. Therefore, data collected through quantitative method and applied to employers in survey questionnaire then analyze through SPSS and field observation through workplace inspection by checklist when worker doing their work for production process. The result will be analyzed through percent safe. To achieve data collection several studies on a similar industry were implemented.

2.2 Data collection method

Primary data was collected through survey questionnaire. For the safety implementation, the survey was validated through third parties and was tested through pilot study and also used in study J.M.Stewart, 2002. The survey is distributed to all workers at Plant 1 through an online platform or in-person distribution method. While for safety observation, the checklist was built followed by T.I.Meem, 2022 and validated by expert (safety officer), the result was taken by observer when employees doing their work for production process. The findings analyzed are supported by secondary data such as reports, statistics, previous research, articles, news, online database, and academic journal.

2.3 Safety at workplace

In this study the first objective is using quantitative by distributed survey in “Google Form” that are taken from J.M.Stewart and have validated by third parties its consist of 13 questions to employers. The questionnaire have 2 Section which are section A and section B. Section A in this question consist about respondent demographic background and variable are age, gender, job position, nationality, education level and working experience. For section B, is about the state of safety at selected company [1]. The question is prepared in English and Malay.

A total of 70 population of workers in the area must take 59 sample total of employees as refer to the Table 1 sample size determination using Krejcie and Morgan [3].

Table 1 Sample size

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	26	140	103	340	181	1000	276	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is Population Size
"S" is Sample Size

2.4 Safety behavior observation

The BBS observation indicators were separated into five categories, each with a total of 22 indicators as referred to Table 2 checklist of observer that is also used in T.I.Meem study [2] and validated by expert. The sampling method for this physical survey was done by day-to-day monitoring.

Table 2 Safety behavior checklist

1. Personal Protective Equipment (PPE)	2. Body movements	3. Tools and equipment	4. Working factor	5. Housekeeping
Personal Protective Equipment (PPE) is defined as the worker's work uniform, safety shoes, gloves, mask, earplugs and quality of PPE.	Uncomfortable work positions can cause ergonomic hazards and can pile up accidents to workers if not careful (unsafe act)	The tools and equipment are something that can affect the safety of an employee.	The category of work procedures is used to assess whether employees are correct in performing work in accordance with the SOP (Standard Operation Procedure) that has been prepared.	Housekeeping in the workplace is important because it enhances safety, productivity, health, professionalism, maintenance and regulatory compliance.

2.5 Data analysis

The reliability test is run using SPSS Software version 29. Reliability value is according to Table 3 Cronbach's Alpha was used to examine and compare the reliability coefficient values derived from the pilot study with the main study results.

Table 3 Cronbach alpha

Cronbach's Alpha	Internal consistency
0.91 - 1	Excellent
0.81 - 0.9	Good
0.71 - 0.8	Acceptable
0.61 - 0.7	Questionable
0.51 - 0.6	Poor
0 - 0.5	Unacceptable

The data will be gathered by the researcher in order to calculate the mean score and provide an interpretation as shown in Table 4: Mean score.

Table 4 Mean score

Mean Score	Interpretation
1.00 - 1.80	Very Low
1.81 - 2.60	Low
2.61 - 3.20	Medium
3.21 - 4.20	High
4.21 - 5.00	Very High

2.6 Percent safe

To measure safety observation, data was collected through observation when Gemba Walk at the production process area. The checklist observation has 5 categories that is PPE, body movement, tools, and equipment, working factor and housekeeping the observation was done by their supervisor when they do their work. In that five categories 22 indicator was concluded and observation was made as safe, at-risk and not applicable [2]. From the observation taken, the overall safety behavior was measured as "percent safe" [4].

$$\text{Percent Safe} = \frac{\text{Totalsafe}}{\text{Totalat risk} + \text{Total safe}} \times 100$$

Fig. 1 Percent safe formula

3. Result and Discussion

There are 59 respondents required to answer the questionnaire, follows as Krejcie and Morgan sample size. The google form questionnaire has been distributed to Plant 1 area of selected company, and the rate of return was 100%. Table 5 shows the reliability testing value to overall factor, which is high, 0.939.

Table 5 Overall respondent reliability

Reliability Statistics	
Cronbach's Alpha	N of items
0.939	13

3.1 Demographic analysis

Referring to table 6 shows the distribution of respondents according to demographic data. Aged 20 to 30 years is the most significant number of employees serving in plant 1 selected area, which is 37 people workers (62.7%), followed by second higher age 31 to 40 years old that 22.0% for 13 people. While 7 workers (11.9%) are 41 years old to 50 years. While workers aged 51 and above only represent 2 people (3.4%). As for the distribution of respondents according to gender, the highest number represents to female 50.8% and male 49.2%. The job position that researcher get for management is 8.5%, professional is 27.1%, supervision is 13.6% and the highest data is working level 50.8%. For nationality many of staff at selected area are Malaysian that is 47 people (79.7%), followed by Indonesian 15.3%, and for Bangladesh, Nepali and others (Singapore) all are represent by 1 people (1.7%).

In education level, many of respondent graduate in collage or higher that is 69.5%, followed by secondary education that is 18.6% and for the primary school is 10.2% and lastly only 1.7% of employees are not attending school. For work experience, there is most of working experience is 1 – 2 years (49.2%). For 3- 4 Years are about 27.1%. For 6 years above are 13.6% more than 5- 6 years (13.6%).

Table 6 Demography of respondent

Characteristic	N	%
Age		
20 – 30 Years old	37	62.7
31 – 40 Years old	13	22.0
41 – 50 Years old	7	11.9
51 Years old above	2	3.4
Gender		
Male	29	49.2
Female	30	50.8

Job Position

Management	5	8.5
Professional	16	27.1
Supervision	8	13.6
Working level	30	50.8

Nationality

Malaysian	47	79.7
Indonesian	9	15.3
Bangladesh	1	1.7
Nepali	1	1.7
Others	1	1.7

Education

Collage or higher	41	69.5
Secondary	11	18.6
Primary	6	10.2
Not attending school	1	1.7

Work experience

1 – 2 Years	29	49.2
3 – 4 Years	16	27.1
5 – 6 Years	6	10.2
6 Years above	8	13.6

3.2 Descriptive analysis

Based on the analysis of the findings, the organization has well-established policies show that it has the highest level of compliance as shown in table 7. The table shows that the value of mean and standard deviation at a high level (H) with the average value of the overall mean is 4.80, while standard deviation is 0.61.

Table 7 Overall mean distribution for the level of compliance

SECTION	MEAN	STANDARD DEVIATON	COMPLIANCE LEVEL
organization have well-establish policies	4.80	0.61	HIGH (H)

3.3 Safety behaviour observation

The result on table 8 shows that there is 30 total safe for PPE and 38 total is at risk that become the percent safe are 44.12%. For body movement, the percent safe is 45.74%, safe is 43 while at risk is 51. Tools and equipment show the higher number of percentage than other indicator that is 64.29%, the safe is 45 and the risk is 25. There is 58.97% for working factor and 52.88% are for housekeeping. As the result shows that the total of all categories percent safe shows employee's behavior are in medium (M) level.

Table 8 Total percent safe each category

Inductor	Safe	At Risk	Percentage safe (%)
PPE	30	38	44.12
Body movement	43	51	45.74
Tools and equipment	45	25	64.29
Working factor	46	32	58.97
Housekeeping	55	49	52.88

Total overall safety observation in Table 9 shows that total at risk are more than total safe, so that the total of percent safe are 46.03% below than half of percent. Based on the study shows that this result was higher than the study in Serdang [5].

Table 9 Total overall of safety observation

Total Safe	At Risk	Total percent safe (%)
174	204	46.03

The variations found in the pattern of workplace behavior may be attributed to several factors such as workforce quality, the effectiveness of occupational safety and health, task diversity, and complex working conditions. In addition, the study population's age, gender, nationality, level of education, and job experience may be related to the second factor.

4. Conclusion

Conclusion in these studies show that state of safety at workplace are but the safety observation is medium that is 46.03% below average. The company shows that all safety implementations are provided but employees behavior needs to change to prevent any accident occurring. Safety at the workplace needs to be done on par with the safety behavior of employees. This is because the behavior of workers is also one of the consequences of an accident. Based on the state of safety data and safety behavior data, we know that the selected company already have good in safety and all employees already well-known on it, but when the result of safety behavior data is low than expected.

According to that data management has to take several actions to overcome this problem such as to provide comprehensive safety training programs to employees, ensuring that they are aware of potential hazard, safety protocol and best practice. Regularly updating and reinforcing the training can get employees informed and engaged. Then management can regularly inspect and maintain the quality of equipment to ensure they are working in good condition.

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I would like give my biggest acknowledge to my main supervisor, Dr Zuritah Binti A. Kadir. The author also like to thank the Faculty of Engineering Technology, University Tun Hussein Onn Malaysia for its support.

Appendix A

Fig. 2 Safety Observation Checklist

Age			
Gender			
Working level			
Education level			
	SAFE	AT RISK	N/A
PPE			
○ Safety Goggles			
○ Safety Shoes			
○ Uniform			
○ Safety Gloves			
Body movements			
○ Carry things properly			
○ Pay attention to work path			
○ Keep out of danger zone			
○ Climb up/down			
Tools and Equipment			
○ Condition of tool/equipment			
○ Climb staircase			
○ Guards in place			
Working factor			
○ Cross shot cut			
○ Pay attention to the tools you'll be using			
○ Proper light			
Housekeeping			
○ Keep away from rubbish/waste			
○ Materials storing			
○ Slip Trip Hazard			
○ Access to the work area			

Appendix B

Fig. 3 Survey Questionnaire

Section A					
Age					
Gender					
Job Position					
Educational level					
Nationality					
Work Experience					
Section B					
	1	2	3	4	5
1. To what extent can injuries be prevented					
2. Indicate how you think that a long term effort for excellence in safety would affect the ability to achieve excellence in others areas, such as quality, productivity, costs and profits					
3. How much is safety "built in" to your organization's operational procedures and "designed in" to its facilities? "Built-in" refers to the idea that safety is not a secondary concern but rather is regarded as an essential component of the design of machinery, the creation of operating procedures, and work training.					
4. Does your organization have well-established policies					
5. Your organization does have written safety values:					
6. How actively have you been involved in safety activities in the last year? Involvement means not just attending meetings but participation in doing things in safety such as being on a committee, participating in an investigation.					
7. To what extent are you "empowered" to take action to ensure your own safety and that of others with whom you work? "Empowered" means that you are expected to take whatever action is required to avoid injuries to yourself or to others.					
8. Please consider the quality of the safety rules in your organization. High quality rules are up-to-date and clearly written. They are well understood by those doing the work and help them to do the job well and safely.					
9. To what extent are injuries, safety incidents, near misses and the like in your organization investigated, reported and action taken?					
10. Specify the way your organization celebrates good safety performance and recognizes safety achievements.					
11. How do you rate the safety of the physical facilities in your workplace such as machinery, equipment, etc.?					
12. How do you rate the effectiveness of the safety organization in your workplace?					
13. To what level are you personally satisfied with the safety performance of your organization?					

Appendix C

Fig. 4 Validation form (State of safety at ink manufacturing industry)

RESEARCH TITLE:
SAFETY BEHAVIOR ASSESSEMENT AMONG WORKER AT INK MANUFACTURING PLANT.

Dear Dr Zuritah Binti A Kadir,

I am Wan Sofwa Najha Binti Wan Samsudin (CN200007), a student in Technology in Occupational and Health, Faculty of Technology Engineering (FTK), University Tun Hussein Onn, Malaysia (UTHM). Currently I involve in a research entitle Safety Behavior Assessment Among Worker At Ink Manufacturing Plant. The Objective of my research is to determine the safety implementation in ink manufacturing company, to evaluate safety behavior of worker and to determine the relationship between safety behavior occurrences of OSH related safety implementation in ink manufacturing company. This question is created to get survey about safety implementation at Research Company.

The population of my research are the staff that working at Celestica Seelong Company. For the purpose of data collection, I have created a few question to determine a few things such as background details and safety implementation at the company. The main objective of this validation is to ensure that these items match with respective operational definition. I would be grateful you could spend some time to read through the items and to access their content validity based on the format provided.

Best Regards,

WAN SOFWA NAJHA BINTI WAN SAMSUDIN,
Degree of Bachelor of Technology In Occupational Safety And Health With Honors,
Faculty of Engineering Technology,
University Tun Hussein Onn, Malaysia

Appendix D

Fig. 5 Validation Form (Safety behavior)

Research Tittle:
Safety Behaviour Assessment among Workers at Ink Manufacturing Industry

Dear Mohd Mustazza Bin Nazri


I am Wan Sofwa Najha Binti Wan Samsudin (CN200007), a student in Technology in Occupational and Health, Faculty of Technology Engineering (FTK), University Tun Hussein Onn, Malaysia (UTHM). Currently I involve in a research entitle Safety Behavior Assessment Among Workers At Ink Manufacturing Plant.

The Objective of my research is to assess the state of safety in ink manufacturing industry and to evaluate safety behavior of worker and to determine the relationship between safety behavior occurrences of OSH related safety implementation in ink manufacturing company. This question is created to do the observation for safety behaviour at Research Company. The population of my research are the staff that working as production process at Celestica Seelong Company.

For the purpose of data collection, I have created a few checklist to determine a few things such as background details and others five categories that is PPE, Working factor, Body movement, Tools and equipment and housekeeping at the work area. The main objective of this validation is to ensure that these items match with respective operational definition. I would be grateful you could spend some time to read through the items and to access their content validity based on the format provided.

Best Regards,
WAN SOFWA NAJHA BINTI WAN SAMSUDIN,
Degree of Bachelor of Technology in Occupational Safety And Health With Honors,
Faculty of Engineering Technology,
University Tun Hussein Onn, Malaysia

Signed over printed name of the validators,


Mohd Mustazza Bin Nazri
Designation: SENIOR EHS OFFICER

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Appendix E

Fig. 6 Gantt Chart

Items	Month											
	Mar	Apr	Mei	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	
Final Year Project 1												
Registration and selection of university supervisor												
Choosing the title												
Chapter 1: Introduction												
Chapter 2: Literature review												
Chapter 3: Methodology												
Chapter 4: Expected Result												
Chapter 5: Conclusion												
Submission to Main SV												
Prepared Slide												
Submission to panel												
Submission research proposal form												
FYP Presentation												
Final Year Project 2												
Draft and validate questionnaire												
Data collection												
Chapter 4: Result and discussion												
Chapter 5: Conclusion												
Technical paper												
Prepared slide presentation												
Submission to main SV												
Check for Correction												
Full Submission												
FYP Presentation												

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