



Assessment of Safety Culture and Accident Risk Control: Perception of Machinists in Workshop

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Abstract

Workshop accident or injuries continue to be a challenge worldwide and their impacts are so great that consequences in high-risk industries may be catastrophic, their effects are seen in loss of equipment, lives, productive hours, raw materials, capital, as well as high compensational cost and emotional losses. Research on safety culture and accident risk control among machinists in different environment revealed that there is no statistical significant difference in their perception but according to observations there were difference in their safety culture which was due to supervision. Machinists only know safety rules but do not adhere strictly to these safety rules when on job. Data were collected through questionnaires and analyzed using ANOVA. The collected data were used to estimate and compare the following between the machinists: safety culture and accident risk control.

Keywords: Assessment; safety culture; accident risk control; machinists; workshop.

Introduction

The prevention of work-related injury and illness is of crucial importance to employees, industry and the wider society (Smith and Wadsworth, 2009). Safety culture is the set of enduring values and attitudes regarding safety issues, shared by every member of every level of an organization (Okon, 2011), safety culture determines the accepted norms and behaviors (Vincent, 2005). According to Nair and Siddiqui (2013) supported the assessment and management of Safety Culture, the six main components (called Characteristics) of Safety culture, which are: awareness, information, commitment, adaptability, behavior, justness.

The increase in accident rate in the machine work shop during the various operations calls for more advanced instructions on accidents prevention that emphasizes more on safety (Okon, 2011). Workshop accident or injuries continue to be a challenge worldwide and their impacts are so great that consequences in high-risk industries may be catastrophic, their effects are seen in loss of equipment, lives, productive hours, raw materials, capital, as well as high compensational cost and emotional losses (Adebiyi and Ajayeoba, 2015).

According to Adebiyi and Ajayeoba, 2015, workplace safety can be improve through

various approaches which are; Equipments (PPE), Training, Incentives/Motivation, Guarding, Accident Investigation and Awareness Creation Despite all the research on workplace safety, there is no study on safety culture amongst machinists in different environments, which is why this study aimed at the perception of machinists towards safety culture and accident risk control in machine workshop.

Methodology

The research focused on machinists based on where they operate and 50 questionnaires each were collected from these areas which are machinists in Industrial Environment, machinists in Academic Environment and Local Machinists. The areas of research for Industrial environment were: Nigeria Machine Tools Limited, Osogbo, Osun state; Rom Oil Mills Limited, Ibadan, Oyo state.

Academic Environment were Adeseun Ogundoyin Polytechnic, Department of Mechanical Engineering machine Workshop, Eruwa, Oyo State; Oyo state College of Agriculture and Technology, Mechanical Engineering machine workshop, Igboora, Oyo state. Local Environment were K.A Moliki and Sons engineering Construction Company, opposite Moll filling Station, Igboora and Almajud and Sons opposite Methodist Grammar School, Igboora.

Data were collected through questionnaires and analyzed using ANOVA. The collected data were used to estimate and compare the following between the machinists: safety culture and accident risk control using;

H0: $N_1 = N_2 = N_3 = \dots = N_k$

H1: $N_1 \neq N_2 \neq N_3 \neq \dots \neq N_k$

$$SS_{treatment} = \frac{1}{r} \sum y_i^2 - \frac{(\sum \sum y_{ij})^2}{N}$$

$$SST = \sum \sum y_{ij}^2 - \frac{(\sum \sum y_{ij})^2}{N}$$

$$SS_{error} = SST - SS_{treatment}$$

Ten questions from the questionnaire were used to estimate the machinists' perception towards safety control and accident risk control.

Discussion of Results

The successful analysis run at 0.05 level of significance and 10 ten questions were subjected to analysis. 150 respondents were involved in this study.

3.1 Socio-demographic profile of respondents

In table 3.1 which is the socio-demographic profile of respondents, 80.3% were male while 19.7% were female. Machinists in industrial environment have the highest percentage of female machinists (41.4%) because employment is based on little or solid educational background, that give opportunity to female and the local environment has highest percentage of male machinists (37.3%). Thirty respondents (20.0%) were aged between 16-25 years, 36 (24.0%) were between 26-35 years, 43 (28.7%) were aged between 36-45 years and 41 (27.3%) were above 45 years. The age bracket "36 years and above" has the highest percentage of machinists in machine workshop because it is believed that "the older the experience" and it was observed that the machinists age 16 to 35 years leave the job at a younger age for another job because the job is believed to be tedious/dangerous and comes with so many health issues. The local environment has the highest number of "above 45years" machinists because they have at one time or the other work in industries or schools and later set up their own machine workshops.

3.2 Safety culture and Accident risk control

From table 3.2 below, the statistic shows that machinists in these three areas (Academic, Local, Industrial environment) agreed to almost all the questions because they believed the survey are basic/fundamental things a machinist should know or practice irrespective of the area he/she operates except for "natural occurrence of accident" which higher (51.3%) percentage of respondent believed that accidents in workshop naturally happened because of the cultural and religious believe in Nigeria which makes almost everyone believe in supreme beings higher than human beings and anything that will happened has been destined to happen, the other 48.7% agreed that accidents are caused due to the carelessness of the operator and not because a supreme being has destined it. "the use of muster point" which 72.0% believed it's unnecessary in case of accident because many forget where muster point are due to panic and fear for their lives and some of the machinists even didn't know what a muster point is.

3.3 Perception of respondents towards safety culture and accidents risk control disaggregated by place of work

A likert scale which consists of ten items was used in measuring perception towards safety culture and accident controls among respondents. Scores on perception were obtained for each group (Academic, Local and Industrial). From table 4.3 below, there was no statistical significant difference in perception of machinists in workshop towards safety culture and accident risk control across place of work, $F = 0.437$, $p\text{-value} = 0.647$.

The statistics shows that there is no significant difference in the perception of machinists in machine workshop towards safety and accident risk control in the questionnaire because they all know the safety rules and believed it's the fundamental guide for every machinists but we observed that machinists in industrial environment were the only one who adhered strictly to these safety rules due to supervision by safety personnel followed by the machinists in academic environment which adhered to these safety rules because they must teach students, machinists in local environment performed poorly because there were no supervision from safety personnel and they were not involved in mass production.



Table 3.1: Socio-demographic profile of respondents

Variables	Populations			
	Academic n (%)	Local n (%)	Industrial n (%)	Total n (%)
Sex				
Male	40 (33.9)	44 (37.3)	34 (28.8)	118 (80.3)
Female	10 (34.5)	7 (24.1)	12 (41.4)	29 (19.7)
Age groups (years)				
16-25	5 (16.7)	14 (46.7)	11 (36.7)	30 (20.0)
26-35	13 (36.1)	8 (22.2)	15 (41.7)	36 (24.0)
36-45	18 (41.9)	11 (25.6)	14 (32.6)	43 (28.7)
Above 45	14 (34.1)	19 (46.3)	8 (19.5)	41 (27.3)
Level of Education				
No Education	2 (66.7)	0 (0.0)	1 (33.3)	3 (2.1)
Primary education	3 (37.5)	4 (50.0)	1 (12.5)	8 (5.5)
Secondary Education	18 (50.0)	7 (19.4)	11 (30.6)	36 (24.7)
Tertiary Education	25 (25.3)	41 (41.4)	33 (33.3)	99 (67.8)
Years of Experience				
1-10 years	27 (31.8)	24 (28.2)	34 (40.0)	85 (60.3)
11-20 years	20 (44.4)	18 (40.0)	7 (15.6)	45 (31.9)
21-30 years	0 (0.0)	7 (77.8)	2 (22.2)	9 (6.4)
Above 30 years	0 (0.0)	2 (100)	0 (0.0)	2 (100)
Operational unit				
Lathe	11 (31.4)	13 (37.1)	11 (31.4)	35 (23.3)
Milling	7 (24.1)	9 (31.0)	15 (51.7)	29 (19.3)
Drilling	10 (25.6)	11 (28.2)	18 (46.2)	39 (26)
Welding	21 (44.7)	13 (27.7)	13 (27.7)	47 (31.4)
Working level				
Management	11 (44.0)	5 (20.0)	9 (36.0)	25 (18.2)
Foreman	12 (27.3)	18 (40.9)	14 (31.8)	44 (32.1)
Technician	13 (23.6)	23 (41.8)	19 (34.5)	55 (40.1)
Apprentice	3 (25)	5 (38.5)	5 (41.7)	12 (8.8)

Table 3. 2: Perception of safety culture among respondents

Variables	Agree n (%)	Disagree n (%)
Use of PPE		
PPE are compulsory in machine operation?	150 (100)	0 (0.0)
Some PPE are important than others	147 (98.0)	3 (2.0)
PPE protects from injury	148 (98.7)	2 (1.3)
Training		
There should be training for machine operation	149 (99.3)	1 (0.7)
Safety Precautions		
Housekeeping should be done in workshop	145 (96.7)	5 (3.3)
Guard on machine enhances safety	149 (99.4)	1 (0.6)
Obstructed aisles and exit can bring about harm	144 (96.0)	6 (4.0)
Awareness		
Not obeying safety rules can cause accident in the workshop	148 (98.6)	2 (1.4)
Supervision is necessary to enhance safety	147 (98.0)	3 (2.0)
Accident investigation and risk control		
Accidents in the workshop naturally happened	77 (51.3%)	73 (48.7)
It's necessary to report any case of accident	148 (98.6)	2 (1.4)
Fire Alarm in case of emergency is necessary in the workshop	148 (98.6)	2 (1.4)
The use of muster point at the sound of alarm is unnecessary	108 (72.0)	42 (28.0)
Fire extinguisher is necessary in the workshop	148 (98.6)	2 (1.4)
The use of first aid is important in case of accidents	143 (95.3)	5 (4.7)

Table 3. 3: Scores on perception towards safety culture and accident risk control

	Academic Mean ± SError	Local Mean ± SError	Industrial Mean ± SError	F	p-value
Perception scores	17.84 ± 0.36	17.46 ± 0.36	17.39 ± 0.36	0.437	0.647

*p-value < 0.05 indicates significance



Conclusion

The result of this research has revealed that there is no significant difference between the perception of machinists towards safety culture and accident risk control in the three area of study (i.e. Academic, Industrial and Local). This has proven that irrespective of the environment the machinists work from, the general safety rule must be abided with to prevent accident and produce good work but with our observations it was only machinists in industrial environment that abided strictly to these safety rules due to supervision from safety personnel, machinists in local environments performed poorly in abiding with these safety rules because they were not involved in mass production and no supervision from any professional safety personnel and the elderly machinists were overconfident due to their numerous years of experience and machinists in academic environment adhered to the safety rules only when they are teaching their students.

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