



Determinants of Compliance with Occupational and Safety Regulations in the Vehicle Body Manufacturing Industry in Kenya

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Abstract

The vehicle body manufacturing industry plays an important role in Kenya economic development because the majority of buses are supplied in chassis frame form and the bodies are manufactured in this sector locally. However, this particular sector is faced with occupational safety and health hazards without preventive measures. Therefore, the purpose of this paper is to identify the socioeconomic and work-related factors influencing compliance with occupational and safety regulations (OSR) in the vehicle body manufacturing industry in Nairobi City, Kenya. A cross-sectional survey design was adopted with qualitative and quantitative data collected using a structured questionnaire from 260 firms. Descriptive, inferential and binomial logistic regression analysis was used to analyze the data. The results showed that compliance with occupational and safety regulations was positively influenced by sex, education level, presence of a hazard, involvement in accidents and availability of prevention measures. However, compliance with OSR was negatively influenced by employment experience. The empirical results will be useful for employers, employees and policymakers in developing efficient capacity building models that incorporate occupational safety and health, awareness, supervision, training, inspection and verifications to improve the overall occupational safety and health situation of workers in the vehicle body manufacturing industry in Kenya.

Subject Areas

Law

Keywords

Binary Logistic Regression, Compliance, Occupational and Safety Regulations,

1. Introduction

Every workplace is required to have safety and health of workers prioritized by ensuring OSH rules and regulations are practiced to avoid incidences of work related diseases, accidents, injuries and even death [1]. In Kenya, the Occupational Safety and Health Act of 2007 provides rules and regulations which are also applied in Motor vehicle manufacturing plants and workshops [2]. According to the act, the following are some of the regulations: Health General Provisions, Machinery Safety, Safety General Provisions, Welfare General Provisions and Health Safety and Welfare Special Provision.

Workplace hazards are huge and workers are exposed to a variety of them every day and for vehicle body manufacturing they are not an exception. These hazards threaten the health and safety of workers and may have immediate harmful effects and others may be hidden and uneasy to detect due to the time lag between the exposure to the hazard and the onset of the effects [3]. In large automated vehicle manufacturing plants, the hazards are minimal compared to labour-intensive ones, auto shops and garages especially in the informal parts of developing countries [4] [5].

Several studies have found that motor vehicle body repair workers are exposed to toxic substances which have negative effects on their health [6] [7] [8]. The effects may be short term (acute) like contact dermatitis, burns to the skin and eyes, vomiting and diarrhea, irritation to the nose/lungs/throat, headache and occupational asthma or long term (Chronic) like lung cancer, chronic dermatitis, chronic obstructive airway disease, and damage to the reproductive system, kidneys and liver [9].

Despite the availability of the regulations to protect workers from occupational hazards [2], workers are still not safe since full implementation is not yet realized. According to [10], OSH performance in Asian and African countries is poor compared to developed countries. The detrimental effects of these hazards on the health of workers can be preventable if OSH regulations are implemented and complied with [11]. Despite these facts, the rate at which workers are affected is high and increasing. This simply means there are factors contributing to noncompliance with OSH regulations.

Most studies have been done on challenges faced in implementing OSH regulations. For example, [12] [13] found that adequate training increases consciousness of work related hazards especially in the automotive industry. Another study by [14] also found that the lack of information and awareness of OSH hazards and Laws is an obstacle to compliance with OSH regulations. According to [15], it is found that unregulated practices of workers at the workplace result in increased incidences of work related diseases, injuries and acci-

dents. Most auto mechanics are aware and have good knowledge of workplace hazards and choose to ignore the negative effects of those hazards by failing to comply with OSH regulations [16].

It is clear that studies have been conducted on challenges that the automobile industry faces in compliance with OSH regulations. However, the studies are not specific to vehicle body manufacturing which is carried out in Kenya. Hence, a study in this specialized field may bring out unique situations and occupational safety and health issues peculiar to this industry. Such new knowledge may help in mitigating the challenges and also be useful in developing new policies. The study focused on occupational and safety regulations compliance in Nairobi City, in order to identify specific intervention measures that would interest the stakeholders in this industry. Finally, the study attempted to determine the socioeconomic and work-related factors influencing workers' compliance with occupational and safety regulations.

2. Materials and Methods

2.1. Study Area

The study was carried out in Nairobi City which lies longitude 36°45' East and latitude 1°18' South. It lies at an altitude of 1798 metres above sea level. The county borders the Counties of Kiambu to the north and west, Kajiado to the south and Machakos to the east. Nairobi is the capital city of Kenya. The vehicle body manufacturing firms are located in the industrial area of Nairobi which is in the southeastern part of the capital city. It is the most populated town in Kenya thus enabling the availability of skilled labour that is required for the industry.

2.2. Data Collection and Analysis

The study employed a cross-sectional survey design. The field survey was carried out from April to June 2021 in the industrial area of Nairobi. The study population was workers from four major vehicle body manufacturing firms in Nairobi. Each company had approximately two hundred workers; hence the total population was about eight hundred workers. In order to determine a representative sample size of the workers in bus body building firms, this study adopted a formula by [17] for estimating a sample size, n , from a known population size, N .

$$n = \frac{z^2 NP(1-P)}{s^2 (N-1) + z^2 P(1-P)}$$

where:

n = required sample size;

N = the given population size of 800 employees;

P = population proportion, assumed to be 0.50;

σ^2 = the degree of accuracy whose value is 0.05;

z^2 = this is standard normal deviation (1.96) at 95% level of confidence, hence

1.96² is 3.841.

Substituting these values in the equation, estimated sample size (n) is:

$$n = \frac{3.841 \times 800 \times 0.50 \times (1 - 0.5)}{(0.05)^2 (800 - 1) + 3.841 \times 0.5 \times (1 - 0.5)}$$

$$n = 259.72$$

$$n \approx 260$$

The total sample size of 260 was further divided among the four firms to get a representative sample size of 65 respondents from each firm. Multi-stage sampling technique was used to select the sampled vehicle body manufacturing firms. Purposive selection of Nairobi City was the first stage since it is the capital city of Kenya and it has the highest number of vehicle body manufacturing firms in Kenya.

The second stage of sampling involved the selection of 65 employees from each of the four organizations in Kenya. Since the enterprises have four major sections, a further random sampling of 16 workers per section, mainly from framing, paneling, painting and finishing was carried out.

Using a structured questionnaire and interview schedule, cross-sectional primary data was collected from the 260 respondents. The questions were divided into two parts. The first part attempted to identify the socio-demographic characteristics of the respondents and the second part collected information on the type of technology, types of hazards, knowledge attitudes, and practices affecting mitigation at work, safety laws, regulations and policies, PPE, inherent hazards in the workplace, challenges in complying with occupational and safety requirements. Prior to data collection, permission to conduct research was formally sought from Egerton University Board of Post Graduate Study, Bio-Ethics Committee and National Commission for Science and Technology and Innovation (NACOSTI).

2.3. Data Analysis

Descriptive statistics were generated using SPSS statistical software for Windows, Version 20.0 (Armonk, NY: IBM Corp) for the demographic variables. Percentages and frequencies were reported in tables and graphical forms. Chi-square was performed to determine differences between compliers and non-compliers of occupational safety and health measures. Binomial logistic results for factors influence compliance with occupational and safety regulations at the workplaces.

3. Results and Discussion

3.1. Socio-Demographic Characteristics of Respondents

Regarding the socio-demographic characteristics of the respondents a great percentage of the workforce were male (92.7%) compared to females (**Table 1**). This is could be due to the nature of work which requires heavy manpower and risky

Table 1. Socio-demographic characteristics of respondents (Categorical variables).

Variable	Category	Frequency	Percentage (%)
Sex	Male	241	92.7
	Female	19	7.3
Marital status	Single	51	19.6
	Married	209	80.4
Education level	Primary	32	12.3
	Secondary	127	48.8
	Certificate	15	5.8
	Diploma	62	23.8
	Graduate	24	9.2

in nature. In Kenya generally most of the technical work and training are under taken by men and this is reflected in this study. Of all the respondents interviewed, 80.4% were married while the rest (19.6%) were single. This is attributed to the fact that, marriage comes with responsibilities which need to be catered for and thus, the only way to get resources to manage these responsibilities is through employment. Majority of the respondents had attained a secondary education level followed by diploma at 23.8%.

Results in **Table 2** indicate that the mean age of the respondents was 35 years; this can be attributed to the nature of work that requires exertion and use of more energy than the youth are able to handle. The mean duration of employment was approximately 11 years; these years of experience is necessary for the good workmanship required in this industry. The mean working hours/day was found to be 8 hrs/day while working days/week was 6 days/week.

3.2. Practices of Occupational Safety and Health Measures

Table 3 shows that the majority of the compliers were aware of the presence of safety and health hazard (95%) and they had been involved in some accidents (46%) at the workplace. There were statistically significant differences among the compliers and non-compliers in relation to the two variables as indicated by the p-values of the chi-square.

In establishing the level of acceptance of occupational safety and health measures in the companies, results showed (**Table 4**) that most of the respondents (36.9%) often complied with hazard control measures at work. 34.2% rarely complied with reporting incidents and unsafe acts to their supervisors. Asking for OSH information by company workers (33.5%) was often practised in vehicle manufacturing companies while 33.8% sometimes complies with safety practices at work. Finally, 33.1% of the respondents always had their PPEs available.

Table 2. Socio-demographic characteristics of respondents (continuous variables).

Variable	Mean	Standard deviation
Age	35.0	0.39
Duration of employment	10.5	0.62
Working hours/day	8.0	0.04
Working days/week	6.0	0.00

Table 3. Presence of safety and health hazard and employee involvement in accident.

Presence of safety and health hazard	Compliers		Non-compliers		P-value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Yes	196	95	28	53	61.9698***
No	11	5	25	47	
Employee involvement in accident					
Yes	95	46	2	4	32.0066***
No	112	54	51	96	

Table 4. Level of acceptance to occupational safety and health measures.

Acceptance of OSH measures	Never	Rarely	Often	Sometimes	Always	Mean	SD
PPE for my job is always available	0	13.5	25.0	28.5	33.1	3.81	1.04
Always comply with safety practices at work	0.8	13.1	30.4	33.8	21.9	3.63	0.99
Always comply with hazard control measures at work	0	15.4	36.9	18.8	28.8	3.61	1.06
I always ask for OSH information	11.2	21.5	33.5	21.5	12.3	3.02	1.17
Always comply with reporting incidents and unsafe acts to my supervisor	1.9	34.2	22.3	15.0	25.5	3.30	1.24

*1 = Never, 2 = Rarely, 3 = Often, 4 = Sometimes, 5 = Always.

3.3. Level of Compliance with Occupational Safety and Health Measures

The study sought to find out the level of compliance with occupational safety and health measures in vehicle manufacturing companies (Table 5). From the responses gathered, the majority of the respondents confirmed that they sometimes comply with OSH measures by wearing personal protective clothing/equipment. Compliance with OSH measures at the workplace (37.7%) was always practised by the respondents. In addition, compliance with OSH measures that were always practised by following proper work procedures (39.2%), washing hands after work (31.9%) and reading all instructions before doing dangerous work (24.2%). Among the OSH measures that were sometimes carried out within the organization, taking special precautions while working with sharp objects/machines came second (40.4%) after wearing of PPEs while adherence to safety instructions came last at 36.5%. Using materials hazards sheet/manuals was a practise that was often practised by respondents (35.0%), reporting incidents to superiors was often practised by employees (33.8%) with avoiding unsafe acts at work also being practised often in the workplace.

3.4. Factors That Influence Compliance with Occupational and Safety Regulations in the Vehicle Body Manufacturing Industry

Several demographic, socioeconomic and work-related variables, which are believed to have an influence on the decision to comply with occupational and safety regulations at the workplace, were included in the binomial logistic regression model. The estimation model results are presented in Table 6. Logistic Regression was found to reasonably (43.6 percent) fit the pseudo R-squared.

Table 5. Level compliance with occupational safety and health measure.

Statements	Never	Rarely	Often	Sometimes	Always	Mean	SD
Comply with safety measures at work	0	9.6	29.2	23.5	37.7	3.89	1.02
Wear personal protective clothing/equipment	0	2.3	18.8	46.2	32.7	4.09	0.78
Report incidents to my superiors	0	19.6	33.8	23.5	23.1	3.50	1.05
Read all instructions before doing dangerous work	2.7	31.5	20.8	20.8	24.2	3.33	1.29
Avoid unsafe acts at work	1.2	8.1	32.3	27.7	30.8	3.32	1.23
Wash hands after work	0.4	11.05	26.5	29.6	31.9	3.79	1.01
Take special precautions while working with sharp objects/machines	0.4	4.6	20.8	40.4	33.8	3.81	1.02
Use materials hazards sheet/manuals	3.1	22.3	35.0	18.1	21.5	4.03	0.88
Adhere to safety instructions/rules	0	5.0	34.2	36.5	24.2	3.33	1.13
Follow proper work procedures	1.5	5.0	28.5	25.8	39.2	3.80	0.87

*1 = Never, 2 = Rarely, 3 = Often, 4 = Sometimes, 5 = Always.

Which means the factors included in the model influenced compliance by 43.6 percent while there are other factors that were not included in the model. This makes the model modestly good when considering the intricacy of research objectives and the abundant factors that influence workers' decision to comply with occupational and safety regulations at the workplace. Seven out of fourteen variables listed in the model were statistically significant. Of the seven significant variables, six were positively significant while one was found to be negatively significant.

The logistic estimation result revealed that the "sex" variable is statistically significant at 1 percent and has a positive influence on attention to occupational and safety regulations at the workplace. The results indicate that being a male increases the probability to comply with occupational and safety regulations at the workplace. Due to the physical nature of work in the vehicle manufacturing companies, men tend to be more cautious about their safety compared to women who are prone to get injured easily. Men were, therefore, more likely to be safer than women in the vehicle body manufacturing industry. This result is supported by [18], who argued that it is needful for companies to differentiate between the vulnerabilities to occupational safety and health of different sexes and specify job areas that need to be carried out by both men and women in order to avoid occurrences of safety and health hazards in companies.

Table 6. Binomial logistic results for factors that influence compliance with occupational and safety regulations.

Attention OHRSH	Coef.	Std. Err.	Z	P > z
Age	-0.0139	0.0357	0.39	0.697
Sex	2.0318***	0.7388	2.75	0.006
Marital status	0.1555	0.5698	0.79	0.785
Educ Level	0.6593***	0.2178	3.03	0.002
Experience	-0.0627***	0.0169	3.70	0.000
Work Hours	0.4315	0.4953	0.87	0.384
Hazard Present	3.6318***	0.7136	5.09	0.000
Training	1.2361**	0.5548	2.23	0.026
Involved Accident	2.7510***	1.0161	2.71	0.007
Off-duty	0.0562	0.8190	0.07	0.945
Off-days	0.0113	0.0925	0.12	0.903
PREVM	1.8037**	0.7802	2.31	0.021
USPPE	0.2231	0.7114	0.31	0.754
SOL	-0.0221	0.6009	0.04	0.971
_cons	2.2521	4.5235	0.50	0.619
Number of obs = 260	LR chi ² (14) = 114.710		Prob > chi ² = 0.0000	
Log likelihood = -74.124868	Pseudo R ² = 0.4362			

The coefficient for the education level was found to be positive and significant at a 1% level of probability. These results imply that as workers advance in his/her education, they gain more knowledge on OSH and the dangers that come with compliance with it. Following this, once they get into employment, they tend to be more careful when going about their jobs. Additionally, those staff who had undergone technical education prior to employment in fields such as welding, fabrication, mechanical engineering, plant and automotive engineering as well as panel beating and spray painting are provided with safety training that is required in these fields hence they are more likely to perform their duties safely minimizing accidents and injuries. This is expected since workers with access to training were positively influenced to comply with OSH measures due to information access. The results concurred with [19], who revealed that education plays a key role in human development which is marked through learning, discovering and differentiating what is right from wrong. They further argue that school education equips individuals with necessary skills that alert their thinking capability on how to effectively avoid hazards.

The “experience” variable which was duration worked in the vehicle body manufacturing industry was found to be negatively significant at 1%. This implies that the willingness to comply with occupational and safety regulations at the vehicle body manufacturing industry declined with increased years of work. This is especially true for workers who have worked for long whereby they tend to use their experience forgetting to adhere to safety practices presuming that they know everything. Arguably, being in the workplace for a longer period of time makes employees get used to the environment and are more likely not to be extra cautious on matters concerning their health and safety. This is unlike inexperienced workers who tend to be more cautious hence they follow strictly the occupational and safety regulations at the workplace. This result is in conformity with [20] [21], who stated that experienced workers are hard to convince into changing their work behaviours to suit occupational and safety regulations since they find their behaviours way correct and safe to use. Such workers underestimate the risks related to their tasks and they are overly resistant to altering their work behaviour.

Presence of hazards in the workplace had a significant positive correlation with attention to occupational health and safety hazards at 1 percent. Employees will always be more cautious of their well-being if they are aware of any dangers directly or indirectly linked to their health and safety in their workplace. Knowledge of the existing hazards as observed motivated the workers to use suitable PPE while welding, cutting metals, grinding and spray painting. Due to this awareness, the employers also put in place safety measures being aware of the high cost that could follow in cases of accidents and injuries and the likely hood of tarnishing the firm’s reputation. Presence of hazards in the workplace awakens employees’ consciousness and they are expected to try and avoid any work or carry out their duties in areas where they suspect they can endanger their own lives. According to [22], they found those employees who did not receive stress

reduction intervention had significantly lower job satisfaction. This made other employees receive stress reduction interventions through training in order to overcome the hazard effects hence concurring with the findings of this study.

Offering employee training in the workplace was found to have a positive correlation with attention to occupational health and safety hazards in the workplace at 5%. Training helps to equip employees/workers with knowledge on occupational safety and health hazards making them informed on the laws surrounding their own safety and health at the workplace. Opportunities to train help to identify additional underlying hazards and provides the employees with opportunities to give their opinion regarding any difficulties they may have in implementing OSH requirements. Also, through training, employees will pay more attention to occupational health and safety hazards in their workstations. Besides, employee perceptions of safety training will increase their recognition of potential risks thus increasing their ability to identify OSH hazards [23]. Therefore, the lack of training in OSH regulations makes workers more susceptible to more injuries particularly of the psychological nature which jeopardized their safety. Overall, the level of knowledge mainly due to education and training was the most important variable influencing occupational safety and health practices of workers in vehicle body manufacturing industry. This finding is similar to past studies [10] [12] [16] [19], which established a positive relationship between offering employee training and attention to occupational health and safety hazards in workplaces.

The variable “Involvement in an accident” due to health and safety hazards had a positive correlation with attention to occupational health and safety hazards by employees at 1 percent. This meant that an increase in accidents in the workplace leads to attention to occupational safety and health hazards. The plausible justification for this is, once an employee has suffered an accident from either one of the hazards in the workplace, they are likely to be more attentive and careful the next time they carry out their tasks. If it was a physical injury that was caused by machine operation, an employee who suffered the injury will try and avoid the accident by getting knowledge on how well the machine operates so that he/she avoids the injury. According to [24], they also found similar results that there was a significant relationship between the number of work accidents and the level of compliance with OSH implementation. According to them, the number of accidents in the workplace decreases with compliance with OSH implementation in workplaces.

Prevention measures put in place by the companies were positively correlated with attention to occupational health and safety hazards by employees. Possibly, having prevention measures in place such as presence of PPEs in the workplace and training in place increases the likelihood of employees paying more attention to OSH hazards present in their lines of duties. It was noted that most of the companies surveyed had personal protective equipment for the workers. A study by [25], found that the availability of preventive measures in the workplace made employees be more keen and attentive when carrying out their work. On

the contrary, however, [26] argued that as much as preventive measures proved effective in mitigating work-related hazards, they also made employees lazy and non-compliant since they are aware that preventive measures are already in place to mitigate such hazardous incidents.

4. Conclusion

The main objective of this study was to identify and assess the socioeconomic and work-related factors influencing compliance with occupational and safety regulations in the vehicle body manufacturing industry in Kenya. The results of this study suggest that in order for vehicle body manufacturing companies to increase compliance with occupational and safety regulations, education level, reduction of hazards, training of employees, reduced employee involvement in accidents and implementation of preventive measures through the use of PPEs have to be improved. Men were found to be more compliant with occupational and safety regulations and are more likely to be safer than women in the vehicle body manufacturing industry. Finally, more experienced employees should have retooling training on occupational and safety regulations since they had low compliance compared to inexperienced workers. The vehicle body manufacturing industry should also provide safe work practices and promote the use of personal protective equipment, to enhance safety. The private sector in collaboration with the government should develop suitable capacity-building models that incorporate occupational safety and health, awareness, supervision, training, inspection and verifications to improve the overall occupational safety and health situation of workers in the vehicle body manufacturing industry in Kenya.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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