Impact of occupational health and safety policies on employees' performance in the Ghana's timber industry: Evidence from Lumber and Logs Limited

Dr. Gabriel Dwomoh* Eric Edwin Owusu Mabel Addo

Director – IEED HOD – IEED University of Education

Kumasi Polytechnic Kumasi Polytechnic Kumasi Ghana Ghana Ghana

Abstract

The research was carried out to examine the impact of health and safety policies on employees' performance in the Ghana's timber industry and a case study approach was adopted for the study. The main data collection instruments used were interviews and questionnaires as well as statistical tools such as Pearson correlation was adopted to assess the relationship between investment in health and safety and employees performance. The data collected with these instruments as well as the calculated r=0.42 showed that health and safety measures put up by the company positively correlates with employees' performance despite that the correlation is weak. There is also inverse relationship between reducing the number of accidents and injuries through health and safety promotions and employees performance. From the findings, it was concluded that organizations need to pay much attention to their health and safety measures since apart from the fact that in other jurisdictions it is backed by law and is mandatory, it is classified as an existence need for which other motivational factors meant to improve employees' performance revolves.

Keywords: occupational health and safety, performance, employee, accidents, injuries.

Introduction

Industrialisation has been the engine of growth for most developing countries like Ghana and because of that many successive governments since independence strive to find ways and means for developing their industrial sector. It was upon such industrialised perception and zeal by many of these governments which Ghana is of no exception that Tawiah and Baah(2011) estimated the annual number of industrialised fatal job-related accidents and illness to be more than two million in the year 2012. To them, this number will continue to rise because of continues industrialisation. One should not forget that the fundamental human right according to natural justice is the right to life and to live in peace irrespective of injury or accident or chronic sickness. This means that live is very important and it must be managed and protected well in all endeavours. Though human life is important, yet every year about 2.2 million men and women are deprived of that right by occupational accidents and work related diseases and injuries. Recent accidents and injuries in galamsey sites and mining activities, in transport business and timber operating firms, farming and heavy cutting machines, milling industries and constructions, fire outbreak in market centers and few others in Ghana are close demonstrations of man depriving of their life and natural right. From

^{*}Email of corresponding author

the words of Kofi Annan (former UN General Secretary) which is cited in Tawiah and Baah (2011) Health and Safety is not only a sound socioeconomic and political policy; rather a basic human right. At the workplace all activities and arrangements must be in the right position to protect and safeguard human lives from work- related accidents and illness. The Ghana's timber industry is one of the industries that use huge and sophisticated machines in their operations. It is also an industry which the environment is prone to accidents and injuries looking at the movements of machines and other heavy equipments. This means that it is necessary for these timber companies to put in place health and safety policies in place that will safeguard their workers from work- related accidents and illness. Though most of these measures put in place by these companies are mandated by law, yet others are based on the fact that the employer wants to increase productivity by limiting man hours lost due to accidents and injuries that occur at the workplace. If man hours lost continue to increase despite the fact that these timber companies are spending huge sums of money promoting health and safety, then the impact of these measures can be seen in the negative direction and targets set cannot be achieved since employees performance will be affected based on man hours lost. The opposite is the case in a situation where health and safety policies put in place by these timber companies is impacting positively on employees performance based on reducing fatalities and helping them to achieve their targets based on increase number of employees contact hours with the organization. Since occupational health and safety policies put in place by companies involves cost, it is necessary for one to assess the real impact on occupational health and safety policies on employees' performance. In doing this, the researchers decided to use Lumber and Logs Limited which is one of the biggest timber companies in Ghana as the study area. The choice of this company is also based on the fact that it is one of the timber companies that received red rating from Environmental Protection Agency with regard to the company's effort in promoting occupational health and safety as well as conforming to environmental standards yet it is still classified as the fourth largest exporter of lumber (klin dried) and first exporter of processed lumber/moulding (TIDD,2013); an achievement which one may attribute it to the performance of its employees.

Literature Review

Occupational health can from the literature of Abddllah et al (2009) can be described as a sound state of the body and mind of people from illness resulting from the materials, processes or procedures used in the workplace, whiles occupational safety is the protection of people from physical injury. In the views of Mathis and Jackson (2004), occupational health refers to a general state of physical, mental, and emotional well-being of a worker. Looking from the views of these writers, it presupposes they all share the same view that a healthy worker is the one who is free from illness, injury, mental and emotional problems that may impair his normal work activity or Premier Occupational Healthcare (2010) adding their voice to what is meant by Occupational Health and Safety (OHS) see it as activities, processes, or procedural strategies to protect and promote the health and safety of workers. That is, to eliminate all factors, behaviours and conditions hazardous to human health and safety at work. OHS enhances the physical, mental and social well-being of workers, and supports the development and maintenance of their working capacity, as well as professionalism and social development at work. The term occupational health and safety has not been a new terminology as it was used by OHSAS 18001 (2008), to describe all the factors and conditions that affect health and safety in the workplace, or could affect health and safety in the workplace. Organizations that are committed to health and safety have policies that guide both management and employees in ensuring that the working environment is injury free for their workers. In order for the policies to be fully implemented and proven successful, from the

literature of Armstrong (2006) it is necessary for the organization to involve its employees in the development. According to a published report in 2001 by the UK Health and Safety Commission (HSC) and the Health and Safety Executive (HSE), an increase in employee involvement with health and safety issues actually helped to reduce accident rates from 1.2 to 0.1 per 100,000 manhours. It also revealed that when employees are evaluated for their safety performance, they are included to seek and implement practical safety improvement ideas. Occupational health and safety policy is not only needed within the timber industry but as said by Alli (2001), all government institutions should be committed to developing one in order to minimize government expenditure on compensation paid to workers as a result of injuries and accidents at the workplace. This view of Alli (2001) is also shared by Lamm, Massey and Perry (2007) who are of the view that a clear occupational health and safety policy plays an important role in reducing accidents and injuries at work. A good practice of OHS management in an organization should demonstrate better task performance and citizenship behaviour which at the end of the day increases productivity. The use of OHS management systems for every department in an organization can offer employees with a clear accepted code system of rules or procedures about the safe operation of machinery, various devices and appropriate behaviours. Looking at the effect on occupational health and safety policy on employees' performance, Lim (2012) in his literature added that when workers understand the health and safety rules and procedures of their job and the tools use for working, it helps them to work effectively and efficiently resulting in better performance of employees. Again the literature provided by the Australian National Commission for Health and Safety (2002) on the benefit of promoting health and safety in organizations indicated that when employees are provided with safe working environment through the use of effective occupational health and safety management systems, it reduces employees absenteeism and this has direct effect on increase in productivity which the end result will be increase in profitability for the organization. Looking at a report by Safe Work Victoria (2006) on health and safety of various organizations, they share similar view of the literature provided by Australian National Commission for Health and Safety. To them, in organizations where health and safety policies are highly promoted, employees feel valued because they are kept from danger at work. This provides opportunities for employees to perform very well on the job to achieve organizational success. Hudson (2012) also sees health and safety promotion at the workplace having direct positive impact on employees' performance. To the writer, good occupational health and safety management practices would help to build a positive workplace culture and this enhance performance of all employees. To him, it also gives room for high employee performance that encourages creativity and innovation. A research provided by Ward et.al. (2008), support the many writers who see organizations enjoying direct benefit in promoting occupational health and safety. To them in an organization where employees within feel that management 'cares' for them, there is an indication of positive management of occupational health and safety system and as such results in safer working practices and also have positive impact on employee outcomes (example, job motivation, job involvement, safety climate, organizational commitment, job satisfaction, mental health and wellbeing). Positive or greater records of these outcomes support the ability of the employee to perform very well on the job for the organization to achieve its goals. From the literature of the various writers on the effect of occupational health and safety, one can develop a conceptual model for the study as:

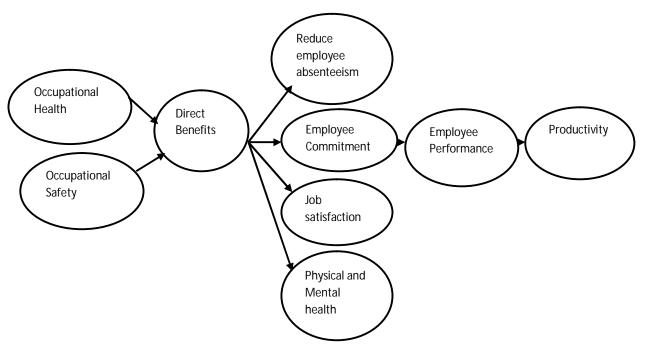


Figure 1. Conceptual model of research

Methodology

The main objective underlying the study is to assess the impact of occupational health and safety on employees' performance. In order to achieve this objective, the researchers adopted a method of collecting data for the study. The target population for the study was 239 and this comprises of all the employees in the departments of the company shown below:

Table 1: Target population and sample size of the study

| Departments | No. of staff | Sample size(n) |
|------------------------|--------------|----------------|
| Electrical engineering | 10 | 6 |
| Mechanical engineering | 40 | 24 |
| Logyard | 7 | 4 |
| Sawmill | 58 | 34 |
| Moulding | 42 | 25 |
| Human Resource | 20 | 12 |
| Plymill- slicer | 60 | 35 |
| Total employees | 239 | 140 |

From the target population, a sample was drawn with a size of 140. The choice of sample size of 140 was in line with the comment given by Fisher (2007) was of the view that if one has a population range between 200 - 250 and wants an error of about 5% in the survey results, then the sample size to be used for the estimated range of population should be between 132- 151. In this study, the researchers accepted 5% margin of error and as such sampling 140 out of the population of 239 made the work in conformity with Fisher's argument. Fisher's argument is also in line with the comment given by Saunders et al (2002) who are also of the view that using 5 percent margin of error in a study means 95% of the researcher's results of data are certainly true; however there is a

5% chance that the true value would be outside of the range. The sample size (n) of each department shown in Table 1 above was obtained through the calculation of:

$$\frac{total\ no.\ of employees\ in\ each\ dept.}{total\ no.\ of population\ (N)}\times 100 = \frac{k}{100}\times sample\ size$$

The sampling technique adopted by the researchers to obtain the sample size from each department (stratum) is simple random sampling. In doing this, the total population of each department was obtained from the Human Resource Department and in a lottery form, employees were drawn from each department up to the number that corresponds to the sample size (n) allocated to that department. The study did not only solicit information from employees, but from various Heads of Department of the company. For the Heads of Department, the target population which is all the 7 heads were used for the study. Talking about the instrument used for collecting data, the researchers used questionnaires and this was directed to the employees sampled for the study. The questionnaire centres on their awareness of health and safety measures put up by the company, how valuable such measures are in the day to day performance of their work and their expectation in terms of the performance of the company in promoting health and safety. For the Heads of Department, interviews were used and this also centres on measures put in place by their department in promoting health and safety, the objective for putting up such measures and how effective they are in achieving the objective. Though the researchers conducted interviews with all the 7 heads of department, it emerged that those who provided information relevant to the study were the head of human resource that provided data for accidents/injuries occurring between 1997 – 2012 as well as the company's investment in health and safety under the same period. The other head of department whose information was seen important to the study was the head of sawmill and almost all the remaining 5 heads of department directed the researchers to this head since he is the right person to provide most of the information that will help achieve objective of the study.

Apart from primary data, the researchers used secondary data and this assisted the researchers in terms of looking at the impact of the organization's health and safety policies on its employees' performance through the calculation of Pearson correlation. In doing this, the researchers obtained the performance of employees' in terms of the number of 'lumber air dried' produced between the years 1997 to 2012. Though the company had not documented the exact investment made into promoting health and safety in the company, the researchers through interview with the Head of Human Resource gave estimates for such investment. Further information on the various accidents and injuries that occurred during the same period (1997 – 2012) was also obtained from the Head. From this information, correlation analysis was done to look at the effect of investment on health and safety on reducing fatalities at the workplace. Scatter diagram was also adopted to check the relationship that exists between the two variables. Again, correlation analysis was also done to examine if the organization's investment in health and safety has any effect on employees' performance in terms of productivity (number of lumber air dried produced). Scatter diagram again was used to check the relationship between the two variables.

Findings and Discussion

The findings and discussion of the research are based on the instruments described in the methodology as well as the statistical tools adopted for the study. The Pearson correlation (r = 0.42) calculated for investment in health and safety and employees performance in terms of lumber air dried produced in m^3 as can be seen from table 5 showed a positive weak correlation among the two

variables. This means that the organization's investment in health and safety has a link with employees' performance despite the fact that it is weak. This link with employees' performance can be attributed to minimizing the large volume of absenteeism which employees experience through accident and injury related illness, improving job satisfaction and improving the physical and mental health of the employee. Targets set for employees are based on man-hours that the company contracts the employee and all other things been equal any reduction in these man-hours through absenteeism resulting from accident or injuries will serve as impediment for the employee to achieve the target. Whilst there is a positive correlation existing between the two variables (investment in health and safety and employees' performance), a more realistic statistic which is r² probably will assist us to determine the proportion of the total variable in the dependent variable (employees performance), that is explained or accounted for by the variation in the independent variable (investment in health and safety). The r² (0.18) indicates that 18% of the variation in employees performance is being explained by the association with organization's investment in health and safety while the remaining 82% is explained by other factors. In terms of correlation between the two variables (number of accidents and injuries and employees performance), the Pearson correlation calculated from table 6 (r = -0.11) showed an inverse relationship. This means that as accidents and injuries reduce in the organization, it has a contrary relationship with employees' performance. This inverse relationship can also be attributed to the principle of nature that promotes or limits man activities in terms of performance depending on the man's fitness. The questionnaires that were distributed to employees to solicit their views on awareness of all health and safety measures put in place by the company indicated that majority of the respondents 62.9% are either partially aware or not aware of these measures as can be indicated in table 7. Judging from this, one can deduce that health and safety policy formulation and implementation without proper communication to the majority of the beneficiary will not make the company reap the full benefits for which the policy was made as most employees will not be following safety standards based on ignorant. From the data collected as can be seen from table 8, majority of the employees representing 96.3% either strongly agree or agree that health and safety measures are important to their performance. With this, most of the employees attributed the importance to the fact that it makes them committed to the work they are doing since they are assured that the organization has created a safe working environment that should boost any employee's confidence when working. For others, physical and mental trauma can easily result from accident and injuries and this affects their work and for a company to provide measures to eradicate this trauma through good health and safety measures is enough intrinsic motivation for workers to perform well. Whilst majority of these workers see health and safety measures as important to their performance, it is sadden as can be seen from table 9 that a significant number representing 40.1% either strongly disagree or disagree that their expectations had been met in terms of the organization's effort in promoting health and safety. As it has been indicated in the methodology, it was the head of sawmill that provided crucial information pertaining to the company's health and safety policies and in relation to this interviews conducted with the 'head' on the objective of putting up health and safety measures showed that the timber industry is one of the industries that is prone to accidents and injuries and if health and safety measures are not put in place, the organization cannot safeguard their intangible assets as people cannot fully apply their skills, knowledge and abilities when they are not physically sound. This means that the provision of these measures are to ensure that the organization get the maximum from their employees by eliminating fear resulting from unsafe working environment. Despite that health and safety measures are meant to provide safe working environment to get employees committed to their work, its provision should not be left to the discretion of the employer as the Ghana's Labour Act 2003, Act 651, Part XV, sections 118 to 120 makes it compulsory by apparently directing employers and employees in their roles and responsibilities in managing Occupational Health, Safety and Environment in the country. This shows that though having a clear objective on health and safety is important, yet employers should not see it as privilege for their employees but rather their right. Since objective cannot be achieved without backing them with action, data collected on measures put in place by the company to achieve their objective of safe working environment indicates the provision of protective equipment, gadgets and clothing; regular workshops on health and safety; strict compliance of Environmental Protection Agency standards; strict rules and regulations on health and safety for employees and making departments to compete with each other in the areas of health and safety. If companies need to achieve any objective, its needs to resource the action meant to achieve the objective. This means that health and safety measures such as those put in place by the company involves cost and this can only yield results for the company if they are impacting positively on employees' performance. Interviews conducted with head of sawmill of the company indicated that the company is benefiting a lot from these measures in terms of reducing Lost Time Injury Frequency Rate (LTIFR). To him wages and salaries are classified as one of the highest cost organizations incur and if employees as a result of accident or injury related illness are not working but are still paid because is their right, employers will not be getting value for money. This means that if reducing LTIFR has positive impact on employees performance, it is health and safety measures put up by a company that will bridge the gap between accidents/injuries and employees' performance.

Conclusion

The study aims at assessing the impact of health and safety policies on employees' performance in the Ghana's timber industry and Lumber and Logs Limited was used as the study area. The calculated Pearson correlation and the co-efficient of determination of the two variables (investment in health and safety and employees performance) showed that the two variables are positively weak There is also inverse relationship between accidents/injuries and employees performance. This statistical calculations together with the data collected through questionnaires and interviews affirms the conceptual model (figure 1) developed from the literature that as accidents and injuries are reduced in organizations through investment in occupational health and safety, it brings certain direct benefits as employees get committed and satisfied to the work they are doing, lost time injury frequency rate per man hours through absenteeism is reduced and also the physical and mental trauma resulting from fear of unsafe working environment is reduced. All these direct benefits have positive impact on employees' performance which the end result is increase in productivity for the organization. As can be seen by Maslow Hierarchy of Needs theory and Alderfer's Modified theory, though 'safety' is one of the main driving force of employees performance, it needs to be augmented with other motivational factors as no single motivational factor can be a sole determiner of employees' total performance. This makes us to conclude that though our statistical calculation showed only 18% of employees' performance resulting from the provision of health and safety measures and others 82%, organizations need to pay much attention to these measures since apart from the fact that in other jurisdictions it is backed by law and is mandatory, it is classified as an existence need for which other motivational factors meant to improve employees' performance revolves.

Limitation and recommendations for further research

Despite the research provide insight into the benefits of occupational health and safety, the results cannot be generalized since it was based on a single case study. Again the primary data in this

study were obtained through self-administered questionnaires and interviews but depending on the mood of the respondents at the time these instruments were used, it can affect their responses to the questions asked by the researchers. It is therefore recommended that different timber companies need to be selected and investigations need to be conducted on the impact of their health and safety policies on the performance of their employees in order for us to get a wider coverage in terms of the study area for generalization to be made.

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Table 2: Employees performance in terms of lumber air dried produced between 1997-2012

| Year | Employees' Performance (Number of lumber air |
|------|---|
| | dried produced in M ³) (y) |
| 1997 | 3698 |
| 1998 | 2015 |
| 1999 | 3195 |
| 2000 | 2937 |
| 2001 | 2740 |
| 2002 | 3268 |
| 2003 | 1662 |
| 2004 | 1837 |
| 2005 | 2343 |
| 2006 | 2415 |
| 2007 | 1825 |
| 2008 | 2704 |
| 2009 | 914 |
| 2010 | 923 |
| 2011 | 1076 |
| 2012 | 368 |
| | |
| | |
| | |

Source: Forestry commission Publication 2013

Table 3: Investment in health and safety between 1997 - 2012

| Year | Investment in health and safety (GHS) |
|------|---------------------------------------|
| | (x) |
| 1997 | 8125 |
| 1998 | 6021 |
| 1999 | 7182 |
| 2000 | 7008 |
| 2001 | 9214 |
| 2002 | 5639 |
| 2003 | 7200 |
| 2004 | 8413 |
| 2005 | 6520 |
| 2006 | 4201 |
| 2007 | 1081 |
| 2008 | 9024 |
| 2009 | 6217 |
| 2010 | 7682 |
| 2011 | 4563 |
| 2012 | 2758 |
| | |
| | |
| | |

Source: Estimates from Head, Human Resource: 14th October 2013 Table 4: Number of accidents/injuries recorded between 1997 – 2012

| Year | Number of | | | |
|------|--------------------|--|--|--|
| | accidents/injuries | | | |
| 1997 | 122 | | | |
| 1998 | 103 | | | |
| 1999 | 51 | | | |
| 2000 | 97 | | | |
| 2001 | 86 | | | |
| 2002 | 62 | | | |
| 2003 | 138 | | | |
| 2004 | 141 | | | |
| 2005 | 86 | | | |
| 2006 | 109 | | | |
| 2007 | 99 | | | |
| 2008 | 146 | | | |
| 2009 | 142 | | | |
| 2010 | 117 | | | |
| 2011 | 106 | | | |
| 2012 | 43 | | | |

Source: Estimates from Head, Human Resource: 17th October 2013

Table 5: Calculation of Pearson correlation of investment in health and safety and employees performance in

terms of productivity

| Investment | Employees' | x - m | y -m | $(\mathbf{x} - \mathbf{m})^2$ | $(\mathbf{y} - \mathbf{m})^2$ | (x-m) (y -m) |
|------------|----------------|-------|-------|-------------------------------|-------------------------------|--------------|
| in health | Performance | | | | | |
| and safety | (Number of | | | | | |
| (GHS) | lumber air | | | | | |
| | dried produce) | | | | | |
| (x) | (y) | | | | | |
| 8125 | 3698 | 1822 | 1578 | 3319684 | 2490084 | 2875116 |
| 6021 | 2015 | -282 | -105 | 79524 | 11025 | 29610 |
| 7182 | 3195 | 879 | 1075 | 772641 | 1155625 | 944925 |
| 7008 | 2937 | 705 | 817 | 497025 | 667489 | 575985 |
| 9214 | 2740 | 2911 | 620 | 8473921 | 384400 | 1804820 |
| 5639 | 3268 | -664 | 1148 | 440896 | 1317904 | -762272 |
| 7200 | 1662 | 897 | -458 | 804609 | 209764 | -410826 |
| 8413 | 1837 | 2110 | -283 | 4452100 | 80089 | -597130 |
| 6520 | 2343 | 217 | 223 | 47089 | 49729 | 48391 |
| 4201 | 2415 | -2102 | 295 | 4418404 | 87025 | -620090 |
| 1081 | 1825 | -5222 | -295 | 27269284 | 87025 | 1540490 |
| 9024 | 2704 | 2721 | 584 | 7403841 | 341056 | 1589064 |
| 6217 | 914 | -86 | -1206 | 7396 | 1454436 | 103716 |
| 7682 | 923 | 1379 | -1197 | 1901641 | 1432809 | -1650663 |
| 4563 | 1076 | -1740 | -1044 | 3027600 | 1089936 | 1816560 |
| 2758 | 368 | -3545 | -1752 | 12567025 | 3069504 | 6210840 |
| | | | | | | |
| | | M: | M: | Sum: | Sum: | Sum: |
| | | 6303 | 2120 | 75482680 | 13927900 | 13498536 |
| | | | | | | |

Result Details & Calculation

 $X \ Values$ $\sum = 100848$ Mean = 6303 $\sum (X - M_x)^2 = SS_x = 75482680$

Y Values $\sum = 33920$ Mean = 2120 $\sum (Y - M_y)^2 = SS_y = 13927900$

 $\begin{aligned} X & and \ Y \ Combined \\ N &= 16 \\ \sum (X - M_x)(Y - M_y) &= 13498536 \end{aligned}$

$$\label{eq:rate} \begin{split} \textit{R Calculation} \\ r &= \sum ((X - M_y)(Y - M_x)) \: / \: \sqrt{((SS_x)(SS_y))} \end{split}$$

 $\begin{array}{l} r = 13498536 \ / \ \sqrt{((75482680)(13927900))} = 0.42 \\ Therefore \ r = 0.42 \end{array}$

Co-efficient of determination ($r^2 = 0.18$)

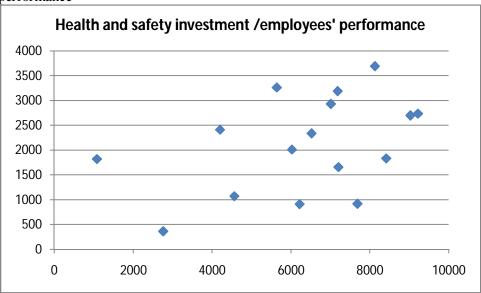


Figure 2: Scatter diagram showing the relationship between investment in health and safety and employees' performance

Table 6: Calculation of Pearson correlation of accidents /injuries and employees performance in terms of productivity

| Number of | Employees' | x - m | y -m | $(\mathbf{x} - \mathbf{m})^2$ | $(y-m)^2$ | (x-m) (y -m) |
|--------------------|--------------|--------|---------|-------------------------------|-----------|--------------|
| accidents/injuries | Performance | | | | | |
| | (Number of | | | | | |
| (x) | lumber air | | | | | |
| | dried | | | | | |
| | produce) | | | | | |
| | (y) | | | | | |
| 122 | 3698 | 19 | 1578 | 361 | 2490084 | 29982 |
| 103 | 2015 | 0 | -105 | 0 | 11025 | 0 |
| 51 | 3195 | -52 | 1075 | 2704 | 1155625 | -55900 |
| 97 | 2937 | -6 | 817 | 36 | 667489 | -4902 |
| 86 | 2740 | -17 | 620 | 289 | 384400 | -10540 |
| 62 | 3268 | -41 | 1148 | 1681 | 1317904 | -47068 |
| 138 | 1662 | 35 | -458 | 1225 | 209764 | -16030 |
| 141 | 1837 | 38 | -283 | 1444 | 80089 | -10754 |
| 86 | 2343 | -17 | 223 | 289 | 49729 | -3791 |
| 109 | 2415 | 6 | 295 | 36 | 87025 | 1770 |
| 99 | 1825 | -4 | -295 | 16 | 87025 | 1180 |
| 146 | 2704 | 43 | 584 | 1849 | 341056 | 25112 |
| 142 | 914 | 39 | -1206 | 1521 | 1454436 | -47034 |
| 117 | 923 | 14 | -1197 | 196 | 1432809 | -16758 |
| 106 | 1076 | 3 | -1044 | 9 | 1089936 | -3132 |
| 43 | 368 | -60 | -1752 | 3600 | 3069504 | 105120 |
| | | | | | | |
| | | M: 103 | M: 2120 | Sum: | Sum: | Sum: |
| | | | | 15256 | 13927900 | -52745 |
| | | | | | | |
| | | | | | | |

Result Details & Calculation

$$X \ Values$$

$$\sum = 1648$$

$$Mean = 103$$

$$\sum (X - M_x)^2 = SS_x = 15256$$

$$Y \ Values$$

$$\sum = 33920$$

$$Mean = 2120$$

$$\sum (Y - M_y)^2 = SS_y = 13927900$$

$$X \ and \ Y \ Combined$$

$$N = 16$$

$$\sum (X - M_x)(Y - M_y) = -52745$$

$$R \ Calculation$$

$$r = \sum ((X - M_y)(Y - M_x)) / \sqrt{((SS_x)(SS_y))}$$

$$r = -52745 / \sqrt{((15256)(13927900))} = -0.11$$
Therefore $r = -0.11$

Coefficient of determination ($r^2 = 0.01$)

Figure 3: Scatter diagram showing the relationship between accidents/injuries and employees' performance

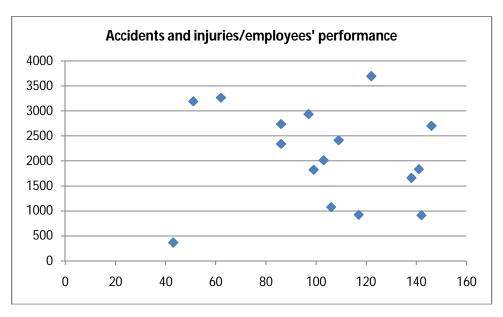


Table 7: Employee awareness of all health and safety measures by the company

| Awareness | Frequency | Percent |
|-----------|-----------|---------|
| Fully | 52 | 37.1 |
| Partially | 45 | 32.1 |
| Not aware | 43 | 30.8 |
| Total | 140 | 100 |

Table 8: Health and safety measures and employees' performance

| Importance | SA | A | U | SD | D | |
|-------------------------------------|------------|--------|-------|----|---|--|
| Occupational health and safety | | | | | | |
| measures are important to employees | 125(89.3%) | 10(7%) | 4(3%) | | | |
| performance | | | | | | |

SA = Strongly Agree; A = Agree; U = Neutral; SD = Strongly Disagree; D = Disagree

Table 9: Employees' expectation on health and safety measures

| Expectation | SA | A | U | SD | D |
|----------------------------------|-----------|-----------|---------|----------|----------|
| Employee expectations are met in | | | | | |
| terms of the health and safety | 45(32.1%) | 36(25.7%) | 2(1.4%) | 39(27.9) | 17(12.2) |
| measures of the company | | | | | |

SA = Strongly Agree; A = Agree; U = Neutral; SD = Strongly Disagree; D = Disagree

^{*1} person representing (0.7%) did not provide answer to the question.

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