THE INFLUENCE OF MANAGEMENT PRACTICES ON OCCUPATIONAL HEALTH AND SAFETY IN TANZANIAN'S SMALL-SCALE MINING FIRMS

[7]Dominic Nkolimwa

Abstract

This study analyzes the influence of management practices on occupational health and safety in small-scale mining firms. The implementation of occupational health and safety promotes security, hardworking and comfort of employees after being secured, which in turn has a positive impact on national development. The study examines the influence of management practices on occupational health and safety at workplace. The explanatory research design was used in this study whereby 297 questionnaires were used to collect data from three regions namely Geita, Shinyanga and Arusha. The Structural Equation Modelling (SEM) was used to analyze the data collected from 297 respondents. Three hypotheses were tested and results demonstrated that Safety Training (ST) and Employee Communication (EC) have a positive influence on both dimensions of the implementation of Organizational Safety Support (OSS) and Proactive Hazard Control (PHC)). These results imply that safety training and employee's communication should be enhanced to improve the implementation of health and safety at workplace.

INTRODUCTION

The implementation of Occupational Health and Safety (OHS) is mandatory in many nations due to its significant role in promoting security, hardworking and comfort to employees (Suparna, 2021*;* Yusuf, Eliyana, & Sari, 2012). It also acts as a catalyst for the economic, social and political stability. However, its implementation in many working organizations, especially in developing nations, is still questionable due to poor Management Practices (MP). Dwomoh *et al.*, (2013); Kessy and Raymond (2021) estimate that more than 2.3 million of fatalities occur every year all over the world following the poor implementation of OHS, which cause a loss of about 6300 employees in a day (ILO, 2024), something which draws an alert for the fast measures to the matter. Mahmudul *et al.*, (2017)*;* Katsuro, Taruwona, and Mupararano (2010) state that organizations that ignore health and safety automatically reduce their productivity due to absenteeism and loss of goodwill from the entire community, which drag behind the initiatives of enhancing suitable development at large.

Mining industry seems to be most affected by poor OHS following several reported cases especially in developing countries including Tanzania. Khairul (2017); Babatunde and Ayodele (2013) argue that employees at mining centers are suffering from unfavorable working environment. Miners are constantly at risk due to occupational hazards in mining sites, such as dust, extreme sound, heat, pitfalls, insufficient oxygen, poor lighting and being knocked by machines/tools (Elgstrand & Vingard, 2013). For instance, a gas explosion in a coal mine in Northern China in February 2009 left at least 74 miners dead and 114 hospitalized. Michelo (2009) states that at least 165 injuries and 20 fatalities were reported in Zambia copper mining. Small-scale mining employees are at more risk, especially in developing countries, including Tanzania. Related matters and deaths are reported, probably caused by organization management carelessness (Khdair & Wameedh, 2011). Small-scale mining is reported to be among the most risk and dangerous occupations in Tanzania due to several limitations, including involvement in severe accidents that count for the lives of individuals (Mrema, Ngowi & Mamuya 2015).

Keywords: *Occupational Health and Safety, Management Practices*

[4] Dominic Nkolimwa, Lecturer, Department of Human Resource. Management Institute of Social Work, dominic.mkolimwa@isw.ac.tz

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Poor MP and lack of technology caused by insufficient capital for the miners as well as lack of training might be catalysts for hazards at the workplace. The way workers are protected and compensated, after injuries and other ailments associated with exposure of the workforce to hazardous substances, is a major public concern that needs collective responsibility to stimulate all stakeholders to take acceptable measures and feel responsible to their workers. For example, some 22 workers suffocated to death following the fall of loose rocks in Simiyu region, in 2024, at least 19 miners were also reported to have died following the failure of the compressor used to pump clean air in Geita region in 2015 (URT,2015). In 2006, a miner was killed by falling loose rocks and in March 2007. Aside from that, three miners died in Same district, Kilimanjaro region and their death was attributed to collapsed pits. Furthermore, at least 65 miners died at Mererani in 2008 after floods swept through underground pits and tunnels (Maginga & Purefoy *et al*., 2013).

Literatures on OHS suggest that to protect employees from occupational accidents and create a safety culture, MP such as safety training, employee involvement, and employee communication are important and need to be put in place to prevent accidents and injuries in the organization (Ali et *al.,* 2009 & Vredenburgh, 2002). Implementing MP on OHS is contingent on priority since it depends on environmental situations for the management to make decisions. Laursen and Foss (2013), Tan and Nasurdin (2011), Khdair and Wameedh (2013) and Demo, Neiva and Rozzett (2012) conducted studies on OHS and identified leadership style, employees attitude, and hiring practices as important elements of management practices for safety culture. At the same time, other researchers like Desa, Habidin and Fuzi *et al.*. (2013) listed rewards, employee involvement, safety training, employee communication and management commitment as MPs which play important roles towards improving the working conditions of employees.

However, based on the discussion of various studies on OHS, it can be inferred that researchers have different views on the factors influencing health and safety in the organization. Therefore, this study uses Employee involvement, safety training and employee communication as factors that influence OHS to the employees, an argument which has been supported by Khdair and Wameedh (2013); Nursyazwani and Zamri (2013), Gupta and Upadhyay (2012). The researcher selected the mentioned variables because of their role in the implementation of OHS. Such variables have been barely used in a study like this and in the context of Tanzania in particular.

Tanzanians have been observing occupational health standards even before and after independence under the Factories Ordinance Cap 297 of 1950. However, its implementation was centered in factories alone. There were no proper programmes to stimulate the OHS in other workplaces. The Nationalization in 1967 was not a relief to employees because enforcement of OHS was not effective because the government was playing the role of the employer, enforcer and at the same time as a regulator. As a result, weaknesses in the implementation of OHS were not well handled since the government became the owner of factories.

The privatization process in the 1990s added challenges to employees' OHS because managers of industries ignored the Health and Safety issues of employees (OSHA Policy, 2009). In view of this shortcoming, the Tanzania government has been taking measures to protect its employees by establishing the Occupational Safety and Health Authority (OSHA) in 1997, endorsement of Occupational Health and Safety (OHS.) Act No. 5 of 2003, Occupation Health and Safety Policy of 2009, Compensation Act No. 20 of 2008, ratification of ILO Convention

No. 170 of 1993 and safety in the use of chemicals at work and Mineral Policy of 2009. These measures aim at enhancing the best practices of health and safety as an initiative to solve occupational hazards.

Despite the above measures, the mining industry in Tanzania is still associated with fatal injuries, accidents and deaths. Most of those accidents are associated with rock falls, fire explosions, automobile equipment accidents, falls from great heights, entrapment, and flooding of underground workings as well as suffocation (Museru & Munthali, 2013). For example, in 2017, 14 miners were trapped for four days (URT, 2017), while in 2015, at least 20 miners died, and another six were trapped underground for 41 days before being rescued at Bulyanhulu Gold mines (URT, 2017 & Reuters, 2015).

However, the managers in charge of H&S activities have not been able to reduce occurrences of accidents, especially in small-scale mining firms (Surienty, 2012; Mills and Lin, 2001). This is due to persistent occupational injuries, death, illness and accidents (Museru & Munthali, 2013). The seriousness and accountability of management practices' commitment towards solving safety issues is questionable. There is lack of understanding of MP as an internal factor and an effective OHS in Tanzania that may play a significance role in the security of employees at workplaces. Therefore, there is a need to consider the relationship between MP and OHS in small-scale mining firms. However, based on the foregoing discussion, the available literature does not consider the relationship between management practices and occupational health and safety implementation in small-scale mining firms. To fill this knowledge gap, this paper examines the influence of MP on OHS in Tanzania's small-scale mining firms.

LITERATURE AND HYPOTHESES DEVELOPMENT

This study used two theories, namely the Contingency Theory of leadership and the ERG Theory. The Contingency Theory of leadership focuses on the multivariate nature of organizations and it attempts to interpret and understand how they operate under varying conditions (Lawrence, 1967). Contingency Theory considers the influence of environment, technology, structure and strategies on decision-making of organizational decisions. The employee's involvement, training and communication are vital towards influencing structural, technological and strategic protection of the employee's safety. This theory is used to explain the implementation of health and safety at the workplace, which depends on several factors on its implementation by the management. On the other hand, the ERG Theory proposed by Alderfer (1969) expands Maslow's basic needs by refining five stages into three, which are existence needs, relatedness needs, and growth needs. This theory (ERG) has become popular and predominant in explaining different concepts of organizational management with new methods of considering human behavior and attitude (Yang & Chen, 2011). It has been used to explain and predict workplace issues and it has contributed to human behavior, which directly connects to health and safety in the workplace. Therefore, this theory is significant because it explains safety issues in the organization. This theory does not assume that the satisfaction of lower-order needs is required before pursuing higher-order needs (Caulton, 2012). It advocates that satisfaction can happen in any stage of needs not necessary following the hierarchy. Generally, ERG explains or predicts workplace issues, relationships and personal development. The existence of needs explains safety as one among the basic needs of a human being. It is thus set to make human beings protected from fear, anxiety, threat, danger and tension at work environment. It makes employees in the organization feel free from threats or harm. Therefore, it is important to analyze the influence of management practices in implementing occupational health and safety at the workplace.

Employee Involvement and Occupational Health and Safety at Workplace

Employee involvement influences the implementation of occupational health and safety at workplace. The reviewed literature by Kaynak,Toklu and Toklu (2016) maintains that the OHS practices: safety procedures and risk management, safety and health rules need the participation of employees. Employee involvement stimulates organizational commitment on health and safety matters through the provision of first aid support and training about safety issues. Yorio and Wachter (2014) state that employees tend to be incapable and cannot utilize their knowledge and skills if the organization does not involve them. Sumeng *et al.*. (2015) argue that employees are incapable of deploying their competencies unless the organization allows them to do so. The benefits of employee involvement practices increase attitudinal and behavioral adoption of various practices, greater satisfaction with decisions made and the results of those decisions, ownership and identification with the outcomes of relevant practices and decisions (Oakman & Bartram, 2017). Hence, the following hypothesis was developed:

$H_{1:}$ There is a positive relationship between the employee's involvement and the implementation of workplace occupational health and safety programs.

Safety Training and Occupational Health and Safety at Workplace

Safety training influences the implementation of Occupational Health and Safety at the Workplace. Various literatures reviewed on the topic proved that there is a significant influence of safety training on the proper implementation of health and safety programs at the Workplace. Yorio & Wachter (2014) state that safety knowledge, skills, and abilities are a function of education and training, that is vital for the organization to realize efficiency. Kaynak, Toklu and Toklu (2016) note that after organizational entry, training designed to enhance both the technical and interpersonal skills of employees can lead to more competent and reliable behavior which affects positively the implementation of OHS. Mashia, Subramaniam and Johari (2016) state that as employee's behavior becomes more reliable, trust on the collective workforce is also enhanced which, in turn, can lead to increased cooperation and information sharing. Safety training directly increases the safety-related knowledge corresponding to the occupational risks posed to workers in job tasks. Workers display that knowledge through their behaviors. It can create a work atmosphere characterized by trust and awareness of how an individual's safe behavior can impact collective behavior. Hence, in this vein, the following hypothesis was developed:

$H_{2:}$ There is a positive relationship between the employee's safety training and the implementation of workplace occupational health and safety activities.

Employee Communication and Occupational Health and Safety at Workplace

Employee communication influences the implementation of Occupational Health and Safety at the Workplace. The reviewed literature by Sembe and Ayuo (2017) point out that communication and information sharing is a safety management practice that uses mechanisms to emphasize safety knowledge. This also increases awareness, promotes individual and interdependent safe work, effective employee communication and safety performance. Yorio and Wachter (2014) suggest that organizations might use print media (e.g., posters, journals and newspapers) to increase cognitive awareness of safe work and emphasize its importance or hold formal meetings designed to convey information and exchange ideas with the workforce verbally. According to Mashia, Subramaniam and Johari (2016), communication and information-sharing practices have been formally linked to safety performance and have been hypothesized to enhance vertical and horizontal ties. Information sharing is characterized by mutual trust between parties where ideas surrounding the organizational safety program can be freely exchanged. Hence, the following hypothesis was developed:

$H_{3:}$ There is a positive relationship between the effect of communication and the implementation of occupational health and safety at Workplace.

MEASUREMENT OF IMPLEMENTATION OF OCCUPATIONAL HEALTH AND SAFETY

In this study, Occupational Health and Safety (OHS) was measured by two dimensions: Organization Safety Support (OSS) and Proactive Hazard Control (PHC). Safety rules and procedures as well as the use of first-Aid measure OSS and PHC (Kaynak, Toklu & Toklu, 2016). Various literatures used the same measurement to measure the accuracy of implementation of health and safety at Workplace, since the provision of OSS and PHC is the indicator for health and safety implementation in the organization (Villanuera & Nunez, 2010). Furthermore, management practices were measured by the implementation of Employees Involvement (EI), Safety Training (ST) and Employee Communication (EC). Desa, Habidin, Hibadullah, Fuzi,& Zamri (2013) suggested employee participation in identifying safety problems with a balanced H&S committee, safety training programs and adhering to instructions of management about health and safety at workplace. The verification of safety work practices controlling work-related injuries, availability of hazard warning signals and providing feedback to employees about unsafe behavior are very important factors to management practices (Khdair & Subramaniam, 2011).

RESEARCH METHODS

This study applied an explanatory research design and a quantitative method whereby 297 questionnaires were used to collect information from respondents to get statistical generalization of findings. This research design was selected because it gave the researcher greater control over the accuracy of findings. Data were collected from three regions (3): Shinyanga, Arusha and Geita. These regions have been selected because they are the main regions dealing with mining activities in Tanzania. These areas also have reported high rates of accidents associated with mining (Museru & Munthali, 2013). About 297 questionnaires were used to collect quantitative data. The Structural Equation Model (SEM) and percentage were used in the study.

RESEARCH RESULTS

Demographic Characteristics of the Respondents

This study comprised male and female respondents. The findings show that 214 (72%) were male and 83 (28%) were female. The study had more males than females due to the nature of the mining activities. More men are engaged in mining activities than women. The age of respondents in this study was distributed in four ranges as follows: 18-35 (40%), 36-45 (32%), 46-55 (13%) and 56-65 (04%). The young age which ranges from 18-45 (72%) seems to dominate the participants in this study, which implies positive impact on performance (Kotur & Anbazhagan, 2014). It is suggested that medium age workers tend to perform better in the organization than other age groups.

The marital status of the respondents is significant in the study. The following are the results of marital status of the respondents who participated in the study: 31(10%) were widows, 43 (15%) were divorced and about 88 (30%) were not married while about 135 (45%) of respondents were married. This implies that a big number of people who are working in the mining industry, especially small scale mining, are married.

Educational background of respondents was among the important components in the demographic characteristics of respondents. Findings showed that 06 (02%) completed postgraduate level of education, 15 (05%) were bachelor degree holders, 21 (07%) had completed diploma, 27 (9%) were Form Six leavers, 38 (13%) attended vocational technical training, 53 (18%) completed ordinary secondary education, 57 (19%) did not go for formal school and 80 (27%) of the respondents had primary school education. Generally, the small scale mining industry has been characterized by people who did not manage to go to school. This means workers in this sector are characterized by little education, especially in developing nations like Tanzania.

Organization Characteristics

The study was conducted in small-scale mining firms operating in Shinyanga, Arusha and Geita regions where 297 (94%) firms were involved. Small-scale mining firms are owned by small groups of individuals, families and young children. The main mining activities involve extracting and selling minerals. However, small-scale miners do not benefit much from the mining activities and one of the reasons being lack of education to understand what is required of them to be in the mining industry. Firms' activities are operated in dangerous workplaces and their practices seem to be driven by poverty and social problems.

Management Practices on Occupational Health and Safety in Small-scale Mining Firms

This study had four assumptions that were tested to justify the use of SEM. These assumptions include the normal distribution of the data, homoscedasticity and identification of outliers. Using the P-P Plot of regression, standardized residual data in all research variables were normally distributed. No multicollinearity problems were found since the Tolerance Value (TV) and Value Inflated Factor (VIF) in all variables used in this study were greater than 0.1 for TV and less than 10 for VIF respectively, as recommended by Williams (2015). The data screening process also revealed that there were no problems of heteroscedasticity since the scatter plot showed that the residuals were evenly distributed around the axis. In the case of an outlier, the outlier labeling methods were used, and about three outliers were omitted after being found in this study.

The Direct Relationship between Management Practices on Occupational Health and Safety in Small-Scale Mining Firms

There were three major hypotheses in this section namely, $H1_{,}$ H_2 and $H_{3.}$ H_1 states that E.I. influences the implementation of the OHS programme at workplace. H_1 was divided into two -sub hypotheses: H_{1a} and $H_{1b.}$ H_{1a} states that in identifying safety issues, E.I., has a positive influence in the implementation of OSS at workplace. H_{1b} hypothesized that in identifying safety issues, EI. has a positive influence in the implementation of PHC at workplace. H_2 was divided into two sub-hypotheses: H_{2a} and $H_{2b.}$ H_{2a} states that ST programmes have a positive influence in the implementation of OSS at workplace. H_{2b} hypothesized that the ST programme has a positive influence in the implementation of OSS and PHC at workplace. The last major hypothesis in this study, namely $H_{3,}$ was divided into two sub-hypotheses. H3a states that EC positively influences the implementation of OSS at workplace. H_{3b} states that EC positively influences the implementation of PHC at workplace.

The path analysis results showed a significant relationship between ST programs and the implementation of OSS at workplace ($\beta = 0.465$, Significant at 0.001). Also, the path analysis showed a significant relationship between ST and implementation of PHC at workplace ($\beta = 0.394$, Significant at 0.001). Hence, each hypothesis, that is, H_{2a} and H_{2b} were supported. However, H2 was fully supported.

The path analysis results also showed a significant positive relationship between EC at workplace (β = 0.530, Significant at 0.001). The path analysis showed a significant relationship between EC and the implementation of PHC at workplace (β = 0.622, Significant at 0.001). Hence, each hypothesis, that is, H3a and H3b were supported, and H_3 was fully supported. Both ST programs and EC significantly influence the implementation of OSS and PHC at workplace, but EC has a greater influence than ST due to the greater regression weight, i. e, β = 0.622 and β = 0.530 which is greater than what was found in ST.

According to the results, EI has negatively influenced the implementation of OSS and PHC at workplace (β = 0.091, P = 0.227 and β = .061, P = 0 .433. This hindered the proper and effective employees' involvement in health and safety issues at work. Table 1 provides the regression weights and the significance level.

Table 1: The Regression Weights for the Direct Relationship

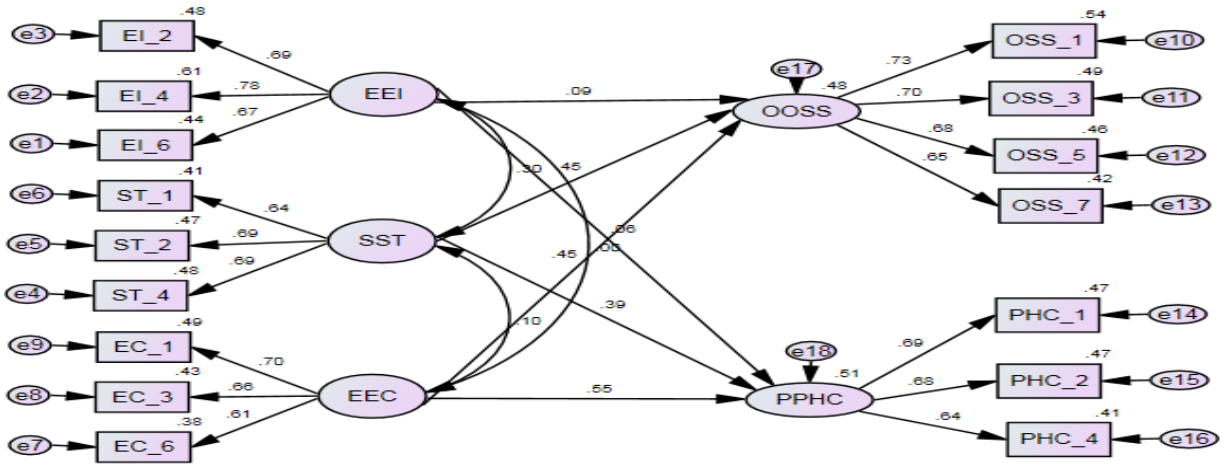
Path			Estimate	S.E.	C.R.	P	Label
PPHC	<---	EEI	.061	.078	.785	.433	p_1
OOSS	<---	SST	.465	.087	5.338	***	p_2
PPHC	<---	SST	.394	.088	4.501	***	p_3
OOSS	<---	EEC	.530	.096	5.542	***	p_4
PPHC	<---	EEC	.622	.106	5.858	***	p_5
OOSS	<---	EEI	.091	.075	1.208	.227	p_6

Source: Field Data (2024)

***** Means it is significant at 0.001**

The developed model shows the direct relationship between management practices and the implementation of occupational health and safety at workplace. In this analysis, the model demonstrates the influence of EI in identifying safety issues on the implementation of OSS and PHC at workplace. The model also shows the relationship between ST programs on OSS and PHC. Again, the model shows that EC has a direct influence on the implementation of OSS and PHC at workplace. Figure 2 presents the model of the direct relationship between management practices and implementing occupational health and safety at workplace.

Figure 2: The Developed Structural Equation Model for the Direct Relationship



Source: Field Data (2024)

The model shows that the additional unit of the standard deviation of EI in identifying safety issues led to the 0.09 significant increases in the standard deviation of the implementation of OSS at workplace. It also shows that the additional unit in the standard deviation of EI in identifying safety issues led to the 0.06 significant decreases in PHC at workplace. On the other hand, the additional unit of the standard deviation of ST programs led to a 0.45 significant increase in the standard deviation of the implementation of OSS at workplace. Again, it shows that the additional unit in the standard deviation of ST programs led to the 0.39 significant decrease in PHC at workplace. On the other hand, the model shows that the additional unit of the standard deviation of EC led to the 0.45 significant increase in the standard deviation of the implementation of OSS at the workplace. Further to that, it shows that the additional unit in the standard deviation of EC led to the 0.55 significant increase in PHC at workplace. This means that management practices, namely EI, ST and EC implementation at the workplace had different contributions to PHC and PHC at workplace.

The model was assessed to see whether it fits the data well by examining the model fit indices. The model fit indices included C.M.I.N./df, G.F.I., A.G.F.I, CFI and R.M.S.E.A. The indices indicated that the model fits the data because they were all within the recommended values. The Chi-square value was 163.503, P-value of 000, while the degree of freedom was 95. The Chi-square value was insignificant, indicating no statistically significant difference between the default and saturated models. Table 2 presents the model fit indices with the recommended value.

Table 2: Goodness of Fit Indices for the Direct Model

Goodness of Fit Measure	Calculated Index *	Recommended value	Author
C.M.I.N./df	1.721	<5	Bollen (1989); Ullman (1996
GFI	0.937	$\geq$ 0.90	Byrne (2010)
AGFI	0.910	$\geq$ 0.80	Chau and Hu (2001
CFI	0.946	$\geq$ 0.90	Hair et al. (2010)
RMSEA	0.049	< 0.08	Hoe (2008); Steiger (2007) cited by Hooper, Coughlan & Mullen (2008)

Source: Field Data (2024)

DISCUSSION OF FINDINGS

The findings revealed that ST programs positively influence the implementation of OSS and PHC. The results have also been supported by Mashia, Subramaniam & Johari (2016) who argue that safety training is important risk prevention and control to guarantee every employee good workplace conditions. Keffane (2014) argues that safety training is a key factor in maintaining and changing workers' attitudes towards safety. It involves providing instructions about hazard recognition and control measures; learning safe work practices, protective equipment, and acquiring knowledge of emergency procedures and preventive actions to maintain safety at workplace (Yorio & Wachter, 2014).

The employee's communication is vital in assuring health and safety at workplace and it provides an alert to the risks (Oakman & Bartram, 2017). This argument aligns with other findings which reveal that EC had a positive influence on the implementation of OSS and PHC at workplaces. This has also been supported by Nordlof, Westerling, Hogberg & Wiitavaara (2017) who argue that if employees are well-communicated with management, the situation tends to reduce accidents and deaths at workplace.

Both ST and EC programs significantly influence the implementation of OSS and PHC at workplace but EC has a greater influence than ST. Oakman & Bartram (2017) support the findings by arguing that employees depend on communication to get feedback about safety issues in the organization. But, the study revealed that EI has negatively influenced the implementation of OSS and PHC at workplace.

CONCLUSION

The article has investigated the management practices in implementing health and safety in the small-scale mining industry. The article concludes that ST and EC programs significantly influence the implementation of OSS and PHC at workplace but EC has a greater influence than ST in the implementation of health and safety at workplace. However, the negative influence of EI on the implementation of OSS and PHC at workplace seems to be caused by the wrong employee strategy used by the management team in the organization.

RECOMMENDATIONS

The results have revealed that safety training programs and employee communication influence the proper implementation of health and safety at the workplace. Thus, if all organizations (private and public) emphasize on safety training and employee communication in health and safety matters, accidents, risks, injuries and deaths at workplace will be reduced at a high rate, and production will be improved.

LIMITATIONS OF THE STUDY

Safety training and employee communication may not have the same influence in all working industries. The study concentrated only on small-scale mining firms thus leaving aside large-scale mining firms. It did not consider the influence of safety training and employee communication on other working industries in Tanzania.

AREAS FOR FURTHER STUDY

Another study may focus on the influence of management practices on occupational health and safety in small-scale mining. The study may examine whether the influence of safety training and employee in communication differ from other working industries like banking, agriculture, and education.

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