School of Management

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THE RELATIONSHIP BETWEEN LEADERSHIP STYLE AND SAFETY CLIMATE: A CASE STUDY OF GOLDFIELDS GHANA LIMITED, TARKWA-CIL PLANT

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Abstract

The management of efficient and effective work place safety in order to reduce occupational accidents is one of the paramount interests of stakeholders of the mining industry. Leadership behavior is an important factor in achieving safety performance in an organization. An organization's leadership style can be the cause of accidents and incidents at the workplace. The way in which safety and health is led and integrated into an organization can impact significantly on wellbeing at work, including addressing problems of worker absence through ill-health. The overall goal of the research is to identify different dimensions of leadership style that have influence on safety climate in general and be able to determine the relationship between the two. In this study, the research questions are addressed in order to study the relationship between leadership style and safety climate. Two questionnaires were used to gather data from employees at the Goldfields Ghana Limited, CIL Plant, comprising supervisors (leaders), technicians (subordinates). The study used the Multifactor Leadership Questionnaire (MLQ) formulated from Bass and Avolio's (1997) Full Range Leadership Development Theory to determine leadership style within the organization and the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) to determine the safety climate. The relationship indicated that Transformational Leadership styles correlated with a better safety climate than Transactional Leadership style. The study identified the leadership style that contribute to good safety environment thereby paving way to how safety performance can be improved at Goldfields Ghana Limited which may result in increase in revenue and maximization of shareholders value.

Key Words: Leadership, Leadership Style, Safety Climate, Transformational Leadership, Transactional Leadership, Supervisor, Subordinate.

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1. INTRODUCTION

One of the problems faced by the extractive industry is occupational injuries (Flin & Yule, 2004). Mining companies spend millions of dollars on safety equipment and training to avoid accidents at the workplace. The management of efficient and effective work place safety in order to reduce occupational accidents is one of the paramount interests of stakeholders of the mining industry, and leadership behavior is an important factor in achieving safety performance in organizations. Managing Occupational Safety and Health (OSH) effectively is a key element in running a successful business (Kaluza et al, 2012). Managers have a legal and moral duty to safeguard the health and safety of those who work for them, and the exercise of these duties needs to be seen as central to the role of leadership. Managers have a pivotal role in ensuring that OSH policies and practices are given sufficient weight within their organizations. Research shows that the way in which safety and health is led and integrated into an organization can impact significantly on well-being at work, and address problems of worker absence through ill-health.

A wealth of literature exists which suggests that management practices and leadership styles affect the health and wellbeing of workers. Judge & Piccolo (2007) reviewed eighty-seven studies to examine the impact of transformational leadership on various measures of performance. The path analysis results by Yang et al (2010) showed that leadership behavior affects safety culture and safety performance in the health care industry. Safety performance was affected and improved with contingency leadership and a positive work safety organization culture. The study suggests improving safety performance by providing a well-managed system that includes consideration of leadership, worker training courses, and a solid safety reporting system. Keeloway, Mullen & Francis (2006) analysis via structural equation modeling showed that both

transformational and passive leadership have opposite effects on safety climate and safety consciousness, and these variables, in turn, predict safety events and injuries with the conclusion that safety-specific passive leadership has direct negative and unique effects on safety climate and safety consciousness.

Other studies detected evidence of a relation between management practices and leadership styles on the safety of employees in various occupations and industries. For instance Duchon & Smith (1994) studied about the extended workdays in mining and other industries; Geldart, et al (2010) studied about organizational practices and workplace health and safety in manufacturing companies; Komacki, Barwick, & Scott (1978) examined the behavioral approach to occupational safety: pinpointing and reinforcing safe performance in a food manufacturing plant; Cox, Jones & Rycroft (2004) studied the behavioral approaches to safety management within UK reactor plants.

Several studies and research findings have concluded that bad management practices and leadership styles are potentially dangerous to workers' health. However, existing research is general and not specific to some occupations and industries. Moreover, few studies have examined the impact of management practices and leadership styles on safety performance at the workplace. Besides majority of these studies were conducted in the United States, Europe, Asia and Scandinavia and not much can be said about Africa in this case. In addition there is no thorough research about the effect of management practices and leadership styles on the safety of mine workers in Ghana.

This thesis asks: “To what extent does an organization’s leadership style (transactional or transformational) correlates with safety climate at the workplace?” The objective of this thesis is to study the relationship between leadership style and the safety climate at Goldfields Ghana Limited - CIL Plant.

1.1. The Case Company

Gold Fields Ghana Limited (GFGL) is a gold mining company which was incorporated in Ghana in 1993 as the legal entity holding the Tarkwa concession mining rights (www.goldfields.co.za). Gold Fields Ghana Holdings Limited now holds 90% of the issued shares of GFGL. The government of Ghana holds a 10% free carried interest, as required under the mining law of Ghana. Goldfields Ghana Limited is made up the Tarkwa mine (CIL Plant and Heap Leach Plant) and the Damang mine. The Tarkwa Gold Mine operates under seven mining leases covering a total area of approximately 20,825 hectares. The vision of Goldfields Ghana Limited is “To Be a Global Leader in Sustainable Gold Mining” and the core values of the company are the following: Safety, Responsibility, Honesty, Respect, Innovation and Delivery. To carry out its gold production, Goldfields Ghana Limited is divided into the following departments: Human Resource, Metallurgy, Engineering, Protection Services, Mineral Resource Management, Mining, Environmental, Safety, Finance, Information Technology, Community Affairs and Project. The CIL Plant is under the Metallurgy and Engineering Department. A general manager is responsible for the overall leadership of the company and each department is headed by a departmental manager who supervises unit managers of the various units within the department. The unit managers are also supervisors of the superintendents who are responsible for the direct supervision of various lower level staff. Thus there is a linked hierarchy of leadership that

ensures that the policies and leadership style encouraged by management is reflected in each department and subunit, however, individual leadership styles of leaders may play a role in influencing the safety climate perceptions of their subordinates. Thus it is hoped that when the leadership styles of the various leaders are compared to the safety climates as perceived by the subordinates, a relationship may be realized to determine the preferred leadership style(s) with regards to work safety climate.

1.2. Key definitions

Leadership - the ability to inspire confidence in and support among the people who are needed to achieve organizational goals

Leadership Style – the relatively consistent pattern of behavior that characterizes a leader.

Safety Climate – workgroup members' shared perceptions of management and workgroup safet y related policies, procedures and practices

Transactional Leadership – an exchange relationship between leader and follower which is grounded in the social learning and social exchange theories, which recognize the reciprocal nature of leadership

Transformational Leadership – this is a leadership style where tools such as intellectual stimulation, inspiration, vision, developmental orientation, challenges, and determination are used by the leader to improve employee competency.

Supervisor - person in the first-line management who monitors and regulates employees in their performance of assigned or delegated tasks

Subordinate - an employee ranked below another employee in terms of seniority or office hierarchy

1.3. Research question

In this study, one research question (with two sub questions) is addressed in order to study the relationship between leadership style and safety climate. The research question asks:

1. To what extent does an organization's leadership style (transactional or transformational) correlates with safety climate at the workplace?

The first sub-question asks:

i. What leadership style (transactional or transformational) correlates with higher safety climate?

And the second sub-question asks:

ii. What leadership style correlates with lower safety climate

1.4. Research objective

The overall goal of the research is to identify the relationship between leadership style and safety climate. The study is based on the hypothesis that leadership style has a great deal of influence on safety climate at the workplace thereby contributing to safety performance of employees. The null hypothesis states that there is no statistical significant relationship between leadership style and safety climate in the company and the alternate hypothesis states that there is a statistically significant relationship between leadership style and safety climate in the company. The results of the research will pave way for safety performance to be improved at companies with similar characteristics as Goldfields Ghana Limited. The significance of the research is that it will contribute to the knowledge and understanding of the fields of transactional/transformational leadership and safety climate at the workplace and the relationship between the two. The outcomes of this study will help close the gap between leadership theories their applications as well as help organizational leaders to improve their influence on organizational conditions such

as the safety climate.

1.5. Thesis' Structure

The study is divided into six chapters. Chapter one is the introductory chapter in which the research problem is defined, the research motivation is provided and the case company is introduced. The relevant literature review is carried out in Chapter two. The review provides the background that guides the investigation of the relationship between leadership style and safety climate at the workplace. Chapter three talks about the research approach i.e. the qualitative and quantitative research approach, the case study method as well as sampling and data collection. Chapter four contains the result and descriptive statistics of the sample as well as the discussion and analysis of the case evidences. Analysis of the result is done in chapter five to determine the relationship between leadership style and safety climate. The main findings of the study as well as the implication of the results are discussed and conclusion drawn in Chapter Six. Limitations of the research are also identified and further research on the relationship between leadership style and safety climate are recommended.

2. THEORY

This chapter present the review of literature on leadership style and safety climate that serves as the theoretical framework for the study. The chapter begins with an introduction to leadership and leadership styles followed by the characteristics of both the transformational and transactional leadership styles. The Full Range Leadership theory is also reviewed to demonstrate how it is used to measure transformational and transactional leadership. The chapter continues with the review of organizational safety climate, factors affecting it, how it can be improved and ends with the role of leadership in safety climate.

2.1. Introduction to Leadership and Leadership Styles

According to Yukl (1989) researchers usually define leadership according to their individual perspectives and the aspects of the phenomenon of most interest to them. Burns (1978) for instance, explains leadership as a stream of evolving interrelationships in which leaders are continuously evoking motivational responses from followers and modifying their behavior as they meet responsiveness or resistance in a ceaseless process of flow and counter flow. DuBrin (2010) also defines leadership as the ability to inspire confidence and support among the people to achieve organizational goals and further explains that examining the roles carried out by leaders contributes to an understanding of the leadership function. Nine of such leadership roles are the figurehead, spokesperson, negotiator, coach and motivator, team builder, team player, technical problem solver, entrepreneur, and strategic planner.

Leadership style as explained by DuBrin (2010) is the relatively consistent pattern of behavior

that characterizes a leader. The study of leadership style is an extension of understanding behaviors and attitudes. Most classification of leadership styles are based on the dimensions of consideration and initiating structure. Burns (1978), in his book Leadership identified the two types of political leadership which are the transactional and the transformational. Transactional leadership occurs when one person takes the initiative in making contact with others for the purpose of an exchange of something valued; that is, "leaders approach followers with an eye toward exchanging" whiles transformational leadership is based on more than the compliance of followers; it involves shifts in the beliefs, the needs, and the values of followers (Kuhnert & Lewis, 1987). According to Bass & Avolio (1994), the impressive body of empirical research on leadership has extensively compared styles and models of leadership of which the most salient is the distinction between transformational and transactional leadership proposed by the full range model of leadership.

In this study, the full range leadership theory was used to determine leadership characteristics. There are so many leadership theories that have been studied by researchers throughout the years. According to Handsome (2005), leadership theories such as the McGregor's theory X and theory Y, Likert's democratic and autocratic styles, and Fiedler's contingency theory (Haakonsson et al., 2008; Kay, 2004) have be studied by researchers over the years but the transformational and transactional leadership theory are utilized most by several researchers because it represents a trend in leadership theory.

2.2. The Full Range Leadership Theory

Bass and Avolio (1994; 1997) created the Full Range Leadership approach which includes a

range of leadership behaviors. According to the model, a leader displays several leadership styles from transformational leadership to transactional leadership and even some elements of laissez-faire leadership style (Bass & Avolio, 1994).

Figure 1 illustrates the impact of each of the leadership styles discussed above as presented by Bass & Avolio (1994). For instance, transformational leaders are seen to have a strong influence on individuals and organizations by inspiring workers to perform beyond expectations whereas transactional leaders influence by ensuring that compliance to expectations are met with rewards. Thus the leadership styles can be differentiated from each other based on the fact that transformational leadership results in followers that are more motivated than followers of transactional leaders.

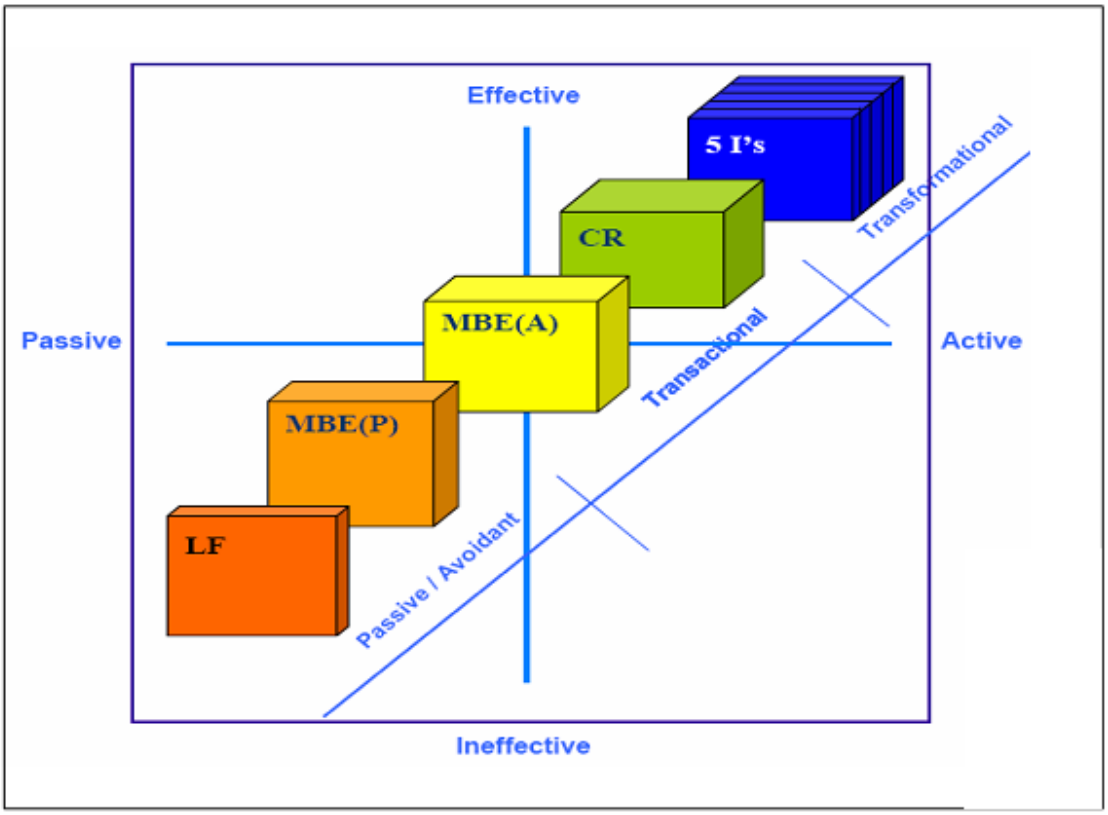

Figure 1 A Model of the Full Range Leadership Development Theory (Bass and Avolio, 1994)

2.3. Transformational Leadership

Transformational leadership is regarded by DuBrin (2010) as the leadership style that brings about positive improvements in an organization. A transformational leader focusses on making accomplishments through a good relationship with group members. To bring about change, the transformational leader attempts to overhaul the organizational culture or subculture. Specific change techniques include raising people's awareness of the importance of certain rewards and getting people to look beyond their self-interests for the sake of the team and the organization. Both Bass (1985) and Burns (1978) explains that transformational leaders operate out of deeply held personal value systems that include such values as justice and integrity. By expressing their personal standards, transformational leaders are able both to unite followers and to change followers' goals and beliefs (Kuhnert & Lewis, 1987). This form of leadership according to Bass (1985) results in achievement of higher levels of performance among individuals than previously thought possible.

A transformational leader helps people reach for self-fulfillment and understands the need for change. As a result, this type of leader commits to greatness, adopts a long-range perspective, builds trust, concentrates resources where change is needed the most and can arouse followers to a higher level of thinking and to engage in more constructive behavior. In addition, transformational leaders are likely to be strong on moral reasoning and always place emphasis on empowerment, innovative thinking and leading by example. They are charismatic, extraverted, visionaries, encourage personal development of the staff and give supportive leadership (DuBrin, 2010)

2.4. Transactional leadership

Transactional leadership represents those exchanges in which both the superior and the subordinate influence one another reciprocally so that each derives something of value (Yukl, 1981). Further explanation on Transactional leadership describes it as a relationship between leader and subordinates which is based on the social learning and social exchange theories. These theories recognize the reciprocal nature of leadership and thus the transactional leader focuses on more routine transactions, rewarding group members for meeting standards (contingent reinforcement) (DuBrin 2010, Bass 1990).

According to Pastor & Mayo (2006), there are two main dimensions in a transactional leadership relationship. The first dimension is contingent reward which refers to the aspects of the relationship in which leaders clarify goals, talk about expected behaviors and accomplishments and reward subordinates for expected levels of performance. In this case, the leaders see their relationship as an exchange process in which their role is to assign and get agreement from followers by clarifying the rewards that will likely be obtained in exchange for satisfactory performance. The second dimension is management by exception which refers to the behaviors of leaders who often engage in corrective transactions with followers. In this case, the leaders arrange to monitor subordinates performance and look out for errors in order to correct them. This process of searching for mistakes can either be passive, waiting for errors to occur, or active when leaders closely examine work processes so that mistakes can be prevented and corrected.

2.5. Organizational Safety Climate

Kines et al, (2011), defines Safety climate as workgroup members' shared perceptions of

manager as well as workgroup safety related policies, procedures and practices. And further explains that safety climate reflects workers' perception of the true value of safety in an organization - as a contributing factor towards the reduction of accidental injuries. Wiegman et al. (2002) also defines Safety climate as the temporal state measure of safety culture, subject to commonalities among individual perceptions of the organization. As a result, safety climate is situational based, refers to the perceived state of safety at a particular place at a particular time, is relatively unstable, and subject to change depending on the features of the current environment or prevailing conditions. Neal et al. (2000) define safety climate as a specific form of organizational climate that describes the individual perceptions of the value of safety in the work environment. This shared perception indicates that the psychological climate perceptions of safety in the particular work environment are shared among the employees, which then allow the climate to be able to be defined at the group or organizational level (Neal & Griffin, 2004). Safety Climate in an organization may be classified as positive (good or high), neutral (medium) or poor (bad, weak or low).

Safety climate directly influence employees safety motivation and knowledge , which in turn directly influence safety performance behaviors, which then directly related to safety outcomes (accidents and injuries)(Neal and Griffin, 2004). Taylor (2005) explains that having a good safety climate in an organization can bring several benefits such as avoiding injuries which reduces downtime and eventually leads to the generation of substantial cost savings. The company also builds a good reputation for itself as well as creating job satisfaction for employees. However, Poor safety climate according to Probst & Estrada (2010) leads to higher accident some of which are under-reported. When the safety climate in an organization is perceived by employees to be

weak, it moderates the relationship between job insecurity and other factors resulting in lower levels of safety knowledge, less employee safety compliance, a greater number of employee accidents, more near-misses, a greater likelihood of workplace injury, and a greater incidence of repetitive motion injuries (Probst, Brubaker & Barsotti, 2008)

2.6. Factors Affecting Safety Climate

There are many factors which can affect the safety climate in an organization. These factors explained by Khdair, Shamsudin & Subramanim (2011) are human, behavioral, economic, psychological, organizational, individual, social and environmental factors. In manufacturing industries, examples of these factors according to (Zohar,2000;Varon, 2000; Hofman, 1999& Shanon, 1996) are the following:

- Supervisory systems and behaviors- this includes the individual supervisor's attitudes, actions, expectations, and communications
- The attitudes and behaviors of the workers as influenced by the system
- Inclusion of safety in the supervisor's position duties and responsibilities.
- Involvement of senior management and workers in safety issues.
- The organization's commitment to safety and its willingness to assume responsibility and solve safety problem

Neal et al. (2000) on the other hand explains that the important components of safety climate consist of management values (management's extent to place high priority on safety), safety communication (how open the exchange is regarding safety information), safety training (how accessible, relevant and comprehensive training is) and safety systems (how safety procedures are viewed in regard to being effective in preventing accidents).

2.7. Improving Safety Climate in an Organization

Rewards, Training, and Management commitment are found by studies to be the key components for improving safety climate (Vredenburgh, 2002). Implementing a systematic and comprehensive environmental, safety and health Training program in an organization provides the means for making accidents more predictable as employees become more aware of the hazards they are exposed to. Secondly, rewards and incentives motivate the employees to avoid hazardous practices in the workplace. Lastly good management practices such as management commitment help organizations to create positive safety climate that include management commitment help organizations to create safety culture. When these measures are undertaken, employees are motivated and they remain committed to perform a job in a safe manner.

2.8. The role of leadership in Safety Climate

Relating to behavioral outcomes high quality leader–subordinate exchange contributed to improved safety communication and safety commitment, which results in the reduction of incidence of accidents. Leadership styles have both direct and indirect effects on safety climate. The direct effects relate to managers' and supervisors' modelling of safe and unsafe behaviors, and to their reinforcement of subordinates' behavior through monitoring and control. The indirect effects of leadership styles relate to the establishment of norms relating to practices and procedures, thus creating a particular safety culture or climate. Both directly and indirectly these leader actions influence workers' expectations and motivation, thus influencing the likelihood of particular behaviors (Flin & Yule, 2004). The direct and indirect effects of leadership styles are presented in Table 1 below.

Table 1: Leadership Behaviors for Safety (source: Flin & Yule, 2004)

	Transactional Behaviors	Transformational Behaviors
Supervisors	Monitoring and reinforcing workers' safe behaviors Participating in workforce safety activities (can also be transformational)	Being supportive of safety initiatives Encouraging employee involvement in safety initiatives
Middle managers	Becoming involved in safety initiatives (can also be transformational)	Emphasizing safety over productivity Adopting a decentralized style Relaying the corporate vision for safety to supervisors
Senior managers	Ensuring compliance with regulatory requirements Providing resources for a comprehensive safety program	Demonstrating visible and consistent commitment to safety Showing concern for people Encouraging participatory styles in middle managers and supervisors Giving time for safety

3. METHOD

This chapter contains a description of the research methodology for testing the hypothesis, the population, the sampling methods, and a brief explanation of the statistical methods used.

To develop a research methodology, a research question must be clearly identified and defined. A Collection of data can then be carried out after a research design has been developed to address the specific question. There are key dimensions of any research design that determines its ability to address a given research question. The types of social research methods that are utilized in experimental studies are exploratory research, descriptive research and explanatory research (Babbie & Mouton, 2002). Since this research is the first of its kind that explores the relationship between leadership style and safety climate in GFGL, Tarkwa – CIL Plant, the nature of the study can be termed as an exploratory research.

3.1 Research Approach

Qualitative and Quantitative methods are used for this thesis because the problem statement aims at findings which are coded into numbers and others which are not coded into numbers but text. According to Axinn & Pearce (2006), the use of mixed methods affords opportunities to use the strength of one method to counterbalance the weakness of the other method. The objective of this research is to study the relationship between leadership styles and safety climate. Thus the nature of the research required that both quantitative and qualitative data from the target population are employed to answer the research questions. The research starts with an overview of leadership styles, safety climate and the role of leadership in safety climate. A review of a number of papers

written on the subject was also carried out with the objective of explaining the roles played by leadership in organizational safety climate. Two survey questionnaires were employed for gathering information during the study. The first questionnaire which was used to identify the leadership styles is the Multifactor Leadership Questionnaire (MLQ) developed by Bass and Avolio (1997). The second questionnaire which was used to measure the safety climate was derived from a questionnaire developed by a Nordic network of occupational safety researchers (NOSACQ-50), headed by the National Research Centre for the Working Environment, Denmark (Kines et al, 2011).

3.2 Questionnaire and measurements

The questionnaire used to determine organizational safety climate is the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) developed by a Nordic network of occupational safety researchers, headed by the National Research Centre for the Working Environment, Denmark. Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) is a tool for diagnosing occupational safety climate and evaluating safety climate interventions. It is based on organizational and safety climate theory, psychological theory, previous empirical research, and empirical results acquired through international studies and a continuous development process. (Kines et al, 2011). The questionnaire consists of 50 items across seven safety climate dimensions.

Participants were asked to state to what degree they agreed with questions which falls under the following seven safety climate dimensions (Management safety priority, commitment, and competence, Management safety empowerment, Management safety justice, Workers' safety

commitment, Workers' safety priority and risk non-acceptance, Safety communication, learning, and trust in co-workers safety competence and Trust in the efficacy of safety systems). The response categories were "Strongly Disagree", "Disagree", "Agree" and "Strongly Agree".

The measurement of leadership styles were done using the Multifactor Leadership Questionnaire (MLQ) developed by Bass and Avolio (1995). This questionnaire determines the degree to which leaders exhibited transformational and transactional leadership as well as the degree to which their followers were satisfied with their leader and their leader's effectiveness. The MLQ is provided in both self and rater forms. Both the Self form (which measures self-perception of leadership behaviors) and the Rater form (used to measure leadership) are used in this study. Participants were required to assess how frequently the behaviors described by each of the statements are exhibited by their leaders. The response ratings were from 0 to 4 with 0 for "Not at all"; 1 for "Once in a while"; 2 for "Sometimes"; 3 for "Fairly often" and 4 for "Frequently if not always".

3.3. Sampling and data collection

There are three common methods of data collection, namely, observation, interviews and questionnaires (Axinn & Pearce, 2006). Questionnaires are an efficient data collection mechanism provided the researcher knows exactly what is required and how to measure the variables of interest. Questionnaires can be administered personally, mailed to the respondents or even electronically distributed depending on the situation (Sekaran, 2003).

The group to which a research is generalized is referred to as the research population and the group selected to be in the study from the population is the sample (Axinn & Pearce, 2006).

The supervisors were given the self-assessment MLQ questionnaires, and subordinates under each supervisor were randomly selected and given the rater MLQ questionnaires. The NOSACQ-50 questionnaire was given to both the supervisors and the subordinates to fill. The two sets of questionnaires were administered in this way to obtain a holistic view of the type of leadership style and the pertaining safety climate in each unit. A sample of 120 subordinates was selected from a population of 180. On the part of the supervisors, a total sample of 28 were selected from a population of 28 supervisors. In all a total sample size selected was 148 (supervisors and their corresponding subordinates) representing 71.15% of the total population. The questionnaires were sent to the e-mails of some employees and others were hand delivered to employees with no access to internet.

3.4. Unit and level of analysis

The data analysis for this research was conducted using descriptive statistics including frequency, proportional comparison and correlation. Comparisons between groups were examined using qualitative analysis techniques such as graphical and statistical techniques. Chi Square test of independence was used to examine the association between leadership styles and work safety climate.

3.5. Validity, reliability and generalizability

The goodness of a measure is mainly evaluated in terms of validity and reliability. Lack of validity introduces systematic error while lack of reliability introduces random error. Validity is concerned with the measuring of the right concept while reliability is concerned with stability and consistency in measurement. Reliability indicates dependability, stability, predictability,

consistency and accuracy (Forza, 2002). In order to provide validity for this research, it was ensured that evidence provided in this research is confirmed by at least five respondents. To provide reliability, conformability was ensured as the survey and the review of documents on the subject all lead to similar conclusions.

The Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) used in this study has been pilot tested in various industries in all the Nordic countries, and the results confirm the reliability and validity of the questionnaire. (Kines et al, 2011). Also studies by Bass and Avolio (1997) has it that reliability of the Multifactor Leadership Questionnaire (MLQ) has been proven many times through test-retest, internal consistency methods and alternative methods.

4. RESULTS

Data collection for the study followed the methodology described in Chapter 3. This chapter describes the gathered data, methods used in the data collection, and the research and statistical tools used for statistical analysis. The purpose of the collected data was to determine a relationship between leadership style and safety climate.

4.1 Descriptive statistics of sample

The targeted population for this research were GFGL-CIL Plant employees comprising supervisors (leaders), technicians (subordinates). The means of distribution of the questionnaire was through the corporate email as well as hand distribution with each participant receiving either an email or a printed copy of the questionnaires.

Table 2: Population and Sample Size

	Supervisors	Subordinates
Population	28	180
Sample	28	120
Response	16	92

Due to the limited number of supervisors, all 28 supervisors were included in the study, but 120 of the 180 subordinates were randomly selected for the study using Excel random generator on the subordinate's unique numbers. As shown in Table 2, 16 supervisors successfully completed and submitted the questionnaires representing a proportion of 57.14% and 92 subordinates

representing 76.6%.

4.2 Research Tools

Two tools were used in the study and these tools were the Multifactor Leadership Questionnaire (MLQ), and the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50). The MLQ is used for determining and measuring leadership styles whereas the NOSACQ-50 is for measuring the perception of workers about the value management places on safety.

The MLQ measures the attributes of transformational, transactional, and laissez-faire leadership styles with a magnitude scale of 0,1,2,3, and 4. The scales are represented by 0 for not at all, 1 for once in a while, 2 for sometimes, 3 for fairly often, and 4 for frequently. The results were determined by averaging the scores for each item in each leadership style scale and a leadership style with higher scores indicating a strong tendency toward that leadership style. The NOSACQ-50 is made up of 50 questions requiring answers that are ratings 1, 2, 3, and 4 but the rating is dependent on the formulation of the question as shown in the Table 3 below.

Table 3: NOSACQ-50 Answer scale

	Strongly disagree	Disagree	Agree	Strongly agree
Score for positive items	1	2	3	4
Score for reversed items	4	3	2	1

The NOSACQ-50 covers seven dimensions, namely:

- Management safety priority and ability
- Management safety empowerment

- Management safety justice
- Worker's safety commitment
- Workers safety priority and risk non-acceptance
- Safety communication, learning, and trust in safety ability, and
- Workers' trust in the efficacy of safety systems.

To determine the results from NOSACQ-50, a true mean score is determined for each dimension for each respondent and the mean for all the respondents is then determined from the true means from each respondents.

4.3 Study of differences between different subgroups

In a study of the demography of the sample, it was determined from the responses to the questionnaires that 85 (92.4%) of the subordinates were male and 7 (7.6%) female but the leaders (supervisors) were all male. Information was also sought on the years spent working in the company by participants and these were classified into those who had been working under a leader for less than 5 years and those who had been working under a supervisor for more than 5 years. A proportion of 30 (32.6%) of the respondents have worked for less than 5 years under their supervisor and 62 (67.4%) have worked under their supervisors for more than 5 years.

4.4 Survey Results

To determine the MLQ scores for each leader, the scores from the respondents were averaged for each leadership style scale. For transformational leadership, the scales on idealized attributes,

idealized behaviors, inspirational motivation, intellectual stimulation, and individual consideration was used. Thus questions 2, 6, 8, 10, 13, 14, 15, 18, 19, 21, 23, 25, 26, 29, 30, 31, 32, 34, and 36 were identified as related to transformational leadership. The scale for transactional leadership consisted of contingent reward and management by exception active and are captured by questions 1, 4, 11, 16, 22, 24, 27, and 35. Laisseez-faire leadership is characterized by laissez-faire leadership and management by exception passive and comprised of questions 3, 5, 7, 12, 17, 20, and 28.

5. ANALYSIS

In this chapter, the data collected from the two sets of questionnaires are analyzed to determine any relationship between leadership style and workers safety climate. This analysis is carried out by determining the predominant leadership style of each leader and comparing it to the workers safety priority (sum of the average scores of items from survey for each leader). A Chi square test of independence is used to determine if there is a statistically significant relationship between the leadership style and workers safety priority.

5.1. Leadership Style and Work Safety Climate Analysis

Figure 1 below shows the average values as recorded from the analysis of the results. The results indicate a mean rating of 3.41 (n = 108) with a standard deviation of 0.08 for idealized attributes (IA), a mean rating of 3.33 (n=108) with a standard deviation of 0.15 for idealized behavior (IB), a mean rating of 3.65 (n=108) with a standard deviation of 0.22 for Inspirational Motivation (IM), a mean rating of 3.25 (n=108) with a standard deviation of 0.15 for Intellectual Stimulation (IS), a mean rating of 3.27 (n=108) with a standard deviation of 0.39 for Individual Consideration (IC). Contingent Reward (CR) had a mean rating of 3.47 with a standard deviation of 0.27, management by exception active (MBEA) had a mean rating of 2.74 (n=108) with a standard deviation of 0.24, management by exception passive (MBEP) had a mean rating of 2.60 with a standard deviation of 0.40, laissez-faire (LF) had a mean rating of 2.15 (n=108) with a standard deviation of 0.22.

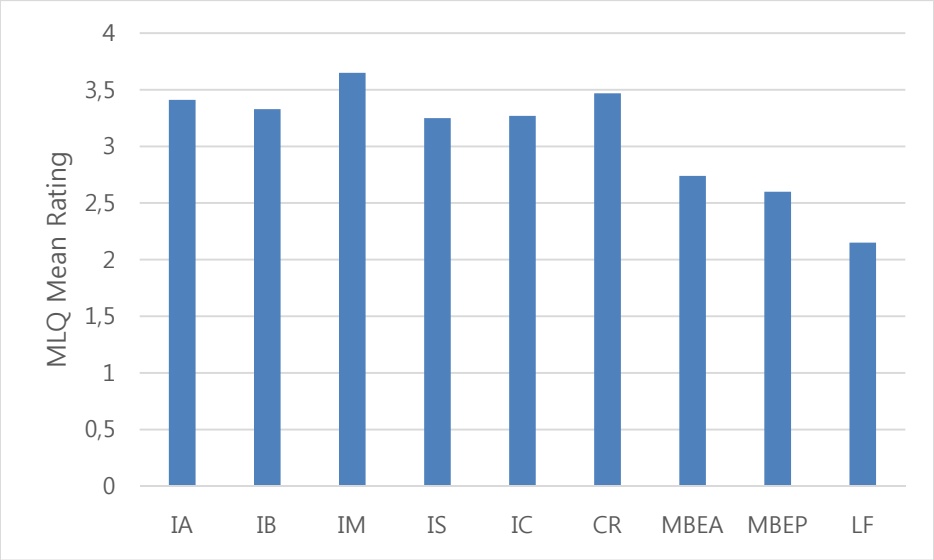

Figure 2: Leadership Measuring Scale

From the analysis, it is seen that transformational leadership is more prevalent with an average score of 3.38, followed by Transactional Leadership with an average score of 3.01, and then Laissez faire Leadership with an average score 2.38. The NOSACQ-50 responses indicated average scores as shown in Table 4 below.

Table 4: NOSACQ-50 Scores

	Management safety priority	Management safety empowerment	Management safety justice	Workers' safety commitment	Workers' safety priority & risk non-acceptance	Peer safety communication learning & trust in safety ability	Workers trust in safety systems
Sample (N=108)	3.21	2.95	3.42	3.40	3.24	3.39	2.80

The scores indicate a high score for management safety justice followed by workers safety commitment then peer safety communication learning and trust in safety ability, workers safety priority and risk non-acceptance, management safety empowerment, and workers trust in safety

systems.

A summary of the data obtained from the study is presented in the table below showing the predominant leadership trait of each leader and the corresponding average total score.

Table 5: Comparing Leadership Style and Safety Score

Leader	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Leadership style	T	T	R	T	R	R	R	T	T	R	T	T	R	T	T	T
Safety Score	25.1	23.3	17.6	22.8	18.7	15.9	21.6	26.3	18.2	17.0	27.4	20.1	15.7	26.3	27.0	20.2

In order to determine if the leadership style is associated with the safety climate score, the scoring is grouped into 3 ranges with the following categories:

15 to 19 – low safety

20 to 24 – medium safety

25 to 28 – high safety

The frequency for the various groups are presented in the table below.

Table 6: Frequency for the various groups

	Low safety	Medium safety	High Safety
Transformational	1	4	5
Transactional	5	1	0

Using the following hypothesis:

H_0 – there is no association between leadership and safety climate

H_a –there is an association between leadership and safety climate

A Chi square test of independence resulted in a Chi square value of 9.03 with a corresponding P value of 0.011. Since the p value is less than 0.05, H_0 is rejected and it is concluded that there is a strong evidence of an association of leadership style with safety climate with Transformational Leaders scoring higher in climate safety scores compared to transactional leaders.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The purpose of the study was to determine the relationship between leadership styles and safety climate in Goldfields Ghana Limited - CIL Plant. An analysis of results obtained from the MLQ and NOSACQ-50 questionnaires concluded that there is a statistically significant relationship between leadership style and work safety climate. The relationship indicated that Transformational Leadership styles correlated with a higher (better) safety climate than Transactional Leadership style.

This finding implies that it is more desirable to have leaders in the mining industry who are transformational leaders as this may encourage a safe climate for workers. The conclusion is also in agreement with other researches in other industries that also found a strong correlation between transformational leadership and work safety climate.

6.2 Limitation Regarding Participant Selection

A few limitations were encountered during this study. Possible limitations include the following:

- The sample size was relatively small.
- Subordinates were not always tied to a single leader and thus the interference of other leaders with different leadership styles could affect the responses of the respondent and may not precisely reflect the right safety climate under the targeted leader.
- Another limitation of the current study relates to the characteristics or demographics of the sample. The sample was gender bias with a female size of less than ten percent. This is reflective of the trend in a typical mine in Ghana but may not reflect the trend in the

future of in other countries.

6.3 Recommendations for Future Research

Based on the limitations of the study, it is recommended that further studies are carried out in the mining industry with bigger population sizes to produce results or conclusions that have higher reliability.

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APPENDIX

APPENDIX A: Multifactor Leadership Questionnaire (Rater)

Multifactor Leadership Questionnaire Rater Booklet (MLQM) by Bernard M. Bass and Bruce J. Avolio

DIRECTIONS: This questionnaire is to describe the leadership style of your manager/supervisor. Describe the leadership style as you perceive it. Please answer all items below by entering in the block a number from the rating scale that best reflects your perception. If an item is irrelevant, or if you are unsure or do not know the answer, leave the answer blank. Please answer this questionnaire anonymously.

Use the following rating scale:

0	1	2	3	4
Not at all	**Once in a while**	**Sometimes**	**Fairly Often**	**Frequently if not always**

0 = Not at all, 1 = Once in a while, 2 = Sometimes, 3 = Fairly Often, 4 = Frequently if not always

THE PERSON I AM RATING...

1. Provides me with assistance in exchange for my efforts

2. Re-examines critical assumptions to question whether they are appropriate

3. Fails to interfere until problems become serious

4. Focuses attention on irregularities, mistakes, exceptions, and deviations from standards

5. Avoids getting involved when important issues arise

6. Talks about their most important values and beliefs

7. Is absent when needed

8. Seeks differing perspectives when solving problems

THE PERSON I AM RATING...

9. Talks optimistically about the future

10. Instills pride in me for being associated with him/her

11. Discusses in specific terms who is responsible for achieving performance targets

12. Waits for things to go wrong before taking action

13. Talks enthusiastically about what needs to be accomplished

14. Specifies the importance of having a strong sense of purpose

15. Spends time teaching and coaching

16. Makes clear what one can expect to receive when performance goals are achieved

17. Shows that he/she is a firm believer in 'if it ain't broke, don't fix it:'

18. Goes beyond self-interest for the good of the group

19. Treats me as an individual rather than just as a member of a group

20. Demonstrates that problems must become chronic before taking action

21. Acts in ways that builds my respect

22. Concentrates his/her full attention on dealing with mistakes, complaints, and failures

23. Considers the moral and ethical consequences of decisions

24. Keeps track of all mistakes

25. Displays a sense of power and confidence

26. Articulates a compelling vision of the future

27. Directs my attention toward failures to meet standards

28. Avoids making decisions

THE PERSON I AM RATING...

29. Considers me as having different needs, abilities, and aspirations from others

30. Gets me to look at problems from many different angles

31. Helps me to develop my strengths

32. Suggests new ways of looking at how to complete assignments

33. Delays responding to urgent questions

34. Emphasizes the importance of having a collective sense of mission

35. Expresses satisfaction when I meet expectations

36. Expresses confidence that goals will be achieved

37. Is effective in meeting my job-related needs

38. Uses methods of leadership that are satisfying

39. Gets me to do more than I expected to do

40. Is effective in representing me to higher authority

41. Works with me in a satisfactory way

42. Heightens my desire to succeed

43. Is effective in meeting organizational requirements

44. Increases my willingness to try harder

45. Leads a group that is effective

APPENDIX B: Multifactor Leadership Questionnaire (Leader)

Multifactor Leadership Questionnaire Leader Booklet (MLQM) by Bernard M . Bass and Bruce J. Avolio

DIRECTIONS: This questionnaire is designed to help you describe your leadership style as you perceive it. Please answer all items below by entering in the block a number from the rating scale that best reflects your perception. Judge how frequently each statement fits you. The word "othe rs" may mean your peers, clients, direct reports, supervisors, and/or all of these individuals.

Use the following rating scale:

0 Not at all	1 Once in a while	2 Sometimes	3 Fairly Often	4 Frequently if not always

I provide others with assistance in exchange for their efforts

2. I re-examine critical assumptions to question whether they are appropriate

3. I fail to interfere until problems become serious

4. I focus attention on irregularities, mistakes, exceptions, and deviations from standards

5. I avoid getting involved when important issues arise

6. I talk about my most important values and beliefs

7. I am absent when needed

8. I seek differing perspectives when solving problems

9. I talk optimistically about the future

10. I instill pride in others for being associated with me

11. I discuss in specific terms who is responsible for achieving performance targets 146

12. I wait for things to go wrong before taking action

13. I talk enthusiastically about what needs to be accomplished

14. I specify the importance of having a strong sense of purpose

15. I spend time teaching and coaching

16. I make clear what one can expect to receive when performance goals are achieved

17. I show that I am a firm believer in 'If it ain't broke, don't fix it."

18. I go beyond self-interest for the good of the group

19. I treat others as individuals rather than just as a member of a group

20. I demonstrate that problems must become chronic before I take action

21. I act in ways that build others' respect for me

22. I concentrate my full attention on dealing with mistakes, complaints, and failures

23. I consider the moral and ethical consequences of decisions

24. I keep track of all mistakes

25. I display a sense of power and confidence

26. I articulate a compelling vision of the future

27. I direct my attention toward failures to meet standards

28. I avoid making decisions

29. I consider an individual as having different needs, abilities, and aspirations from others

30. I get others to look at problems from many different angles

31. I help others to develop their strengths 147

32. I suggest new ways of looking at how to complete assignments

33. I delay responding to urgent questions

34. I emphasize the importance of having a collective sense of mission

35. I express satisfaction when others meet expectations

36. I express confidence that goals will be achieved

37. I am effective in meeting others' job-related needs

38. I use methods of leadership that are satisfying

39. I get others to do more than they expected to do

40. I am effective in representing others to higher authority

41. I work with others in a satisfactory way

42. I heighten others' desire to succeed

43. I am effective in meeting organizational requirements

44. I increase others' willingness to try harder

45. I lead a group that is effective

APPENDIX C: Multifactor Leadership Questionnaire Scoring Key

Description	**Leadership Factors**	**Raw Factors**	#	#	#	#
	Transformational	Idealized Influence (Attributes)	10	18	21	25
	Transformational	Idealized Influence (Behaviors)	6	14	23	34
	Transformational	Inspirational Motivation	9	13	26	36
	Transformational	Intellectual Stimulation	2	8	30	32
	Transformational	Individualized Consideration	15	19	29	31
Constructive Transaction	Transactional	Contingent Reward	1	11	16	35
Corrective Transaction	Transactional	Management by Excerption (Active)	4	22	24	27
Corrective Transaction	Transactional	Management by Excerption (Passive)	3	12	17	20
	Non-Transactional	Laissez-Fair	5	7	28	33
	Outcome 1	Extra Effort	39	42	44	45
	Outcome 2	Effectiveness	37	40	43	
	Outcome 3	Satisfaction	38	41		

APPENDIX D: Nordic Occupational Safety Climate Questionnaire (NOSACQ-50)

Developed by a Nordic working group of work environment specialists

The purpose of this questionnaire is to get your view on safety at this workplace. Your answers will be processed on a computer and will be dealt with confidentially. No individual results will be presented in any way. Although we want you to answer each and every question, you have the right to refrain from answering any one particular question, a group of questions, or the entire questionnaire

I have read the above introduction to the questionnaire and agree to complete t he questionnaire under the stated conditions	Yes ☐

Background Information

A Year of Birth? 19 ☐☐

B Are you ☐ Male ☐ Female

C Do you have a managerial position e.g. manager, supervisor? ☐ No ☐ Yes Which? _____

In the following section please describe how you perceive that the managers and supervisors at this workplace deal with safety. Although some questions may appear very similar, please answer each one of them.

Strongly disagree	Disagree	Agree	Strongly agree

Put only one X for each question

1. Management encourages employees here to work in accordance with safety rules - even when the work schedule is tight	☐	☐	☐	☐
2. Management ensures that everyone receives the necessary information on safety	☐	☐	☐	☐
3. Management looks the other way when someone is careless with safety	☐	☐	☐	☐
4. Management places safety before Production	☐	☐	☐	☐
5. Management accepts employees here taking risks when the work schedule is tight	☐	☐	☐	☐
6. We who work here have confidence in the management's ability to deal with safety	☐	☐	☐	☐

7. Management ensures that safety problems discovered during safety rounds/evaluations are corrected immediately

8. When a risk is detected, management ignores it without action

9. Management lacks the ability to deal with safety properly

10. Management strives to design safety routines that are meaningful and actually work

11. Management makes sure that everyone can influence safety in their work environment

12. Management encourages employees here to participate in decisions which affect their safety

13. Management never considers employees' suggestions regarding safety

14. Management strives for everybody at the worksite to have high competence concerning safety and risks ☐ ☐ ☐ ☐

15. Management never asks employees for their opinions before making decisions regarding safety ☐ ☐ ☐ ☐

16. Management involves employees in decisions regarding safety ☐ ☐ ☐ ☐

17. Management collects accurate information in accident investigations ☐ ☐ ☐ ☐

18. Fear of sanctions (negative consequences) from management discourages employees here from reporting near-miss accidents ☐ ☐ ☐ ☐

19. Management listens carefully to all who have been involved in an accident ☐ ☐ ☐ ☐

20. Management looks for causes, not guilty persons, when an accident occurs ☐ ☐ ☐ ☐

21. Management always blames employees for accidents ☐ ☐ ☐ ☐

22. Management treats employees involved in an accident fairly ☐ ☐ ☐ ☐

In the following section please describe how you perceive that employees at this workplace deal with safety

23. We who work here try hard together to achieve a high level of safety ☐ ☐ ☐ ☐

24. We who work here take joint responsibility to ensure that the workplace is always kept tidy ☐ ☐ ☐ ☐

25. We who work here do not care about each others' safety ☐ ☐ ☐ ☐

26. We who work here avoid tackling risks that are discovered ☐ ☐ ☐ ☐

27. We who work here help each other to work safely ☐ ☐ ☐ ☐

28. We who work here take no responsibility for each others' safety ☐ ☐ ☐ ☐

29. We who work here regard risks as Unavoidable ☐ ☐ ☐ ☐

30. We who work here consider minor accidents to be a normal part of our daily work ☐ ☐ ☐ ☐

31. We who work here accept dangerous behaviour as long as there are no accidents ☐ ☐ ☐ ☐

32. We who work here break safety rules in order to complete work on time ☐ ☐ ☐ ☐

33. We who work here never accept risktaking even if the work schedule is tight ☐ ☐ ☐ ☐

34. We who work here consider that our work is unsuitable for cowards ☐ ☐ ☐ ☐

35. We who work here accept risk-taking at Work ☐ ☐ ☐ ☐

36. We who work here try to find a solution if someone points out a safety problem ☐ ☐ ☐ ☐

37. We who work here feel safe when working together ☐ ☐ ☐ ☐

38. We who work here have great trust in each others' ability to ensure safety ☐ ☐ ☐ ☐

39. We who work here learn from our experiences to prevent accidents ☐ ☐ ☐ ☐

40. We who work here take each others' opinions and suggestions concerning safety seriously ☐ ☐ ☐ ☐

41. We who work here seldom talk about Safety ☐ ☐ ☐ ☐

42. We who work here always discuss safety issues when such issues come up ☐ ☐ ☐ ☐

43. We who work here can talk freely and openly about safety ☐ ☐ ☐ ☐

44. We who work here consider that a good safety representative plays an important role in preventing accidents ☐ ☐ ☐ ☐

45. We who work here consider that safety rounds/evaluations have no effect on safety ☐ ☐ ☐ ☐

46. We who work here consider that safety training to be good for preventing accidents ☐ ☐ ☐ ☐

47. We who work here consider early planning for safety as meaningless ☐ ☐ ☐ ☐

48. We who work here consider that safety rounds/evaluations help find serious hazards ☐ ☐ ☐ ☐

49. We who work here consider safety training to be meaningless ☐ ☐ ☐ ☐

50. We who work here consider it important to have clear-cut goals for safety ☐ ☐ ☐ ☐

If you wish to elaborate on some of your answers, or if you have any comments regarding the study, you are welcome to write them here.

Comments:

_____

_____

_____

Thank you for filling in the questionnaire. Please ensure you have checked off

the box on the front page showing that you have given your informed consent to participate in the study

APPENDIX E: Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) Scoring Key

	Positively Formulated Items	**Reversed Formulated Items**
Dimension 1- management safety priority A 1, A2, A4, A6, A7 and ability (9 items):		A3, A5, A8, A9
Dimension 2 – management safety empower ment (7 items):	A10, A11, A12, A14, A16	A13, A15
Dimension 3 – management safety justice (6 items):	A17, A19, A20, A22	A18, A21
Dimension 4 – workers' safety commitment (6 items):	A23, A24, A27	A25, A26, A28
Dimension 5 - workers' safety priority and r isk non-acceptance (7 items):	A33	A29, A30, A31, A32, A34, A35
Dimension 6 – Peer safety communication l earning, and trust in safety ability (8 items):	A36, A37, A38, A39, A40, A42, A43	A41
Dimension 7 – workers' trust in efficacy of safety systems (7 items):	A44, A46, A48, A50	A45, A47, A49

APPENDIX F: Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) Answer Scale

	Strongly Disagree	Disagree	Agree	Strongly Agree
Score for Positive Items	1	2	3	4
Score for Negative Items	4	3	2	1