Developing Safety Leadership in Indonesian Power Plant

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Abstract

One of the vital performance measures in a power plant company is work safety. A leader in a power plant company must be able to control various problems, especially related to safety under company performance targets. The characters that makeup safety leadership include credibility, action orientation, vision, accountability, communication, collaboration, feedback, and recognition. This study aims to determine the effect of leader character in implementing safety leadership. The results of this study indicate that accountability is a dominant indicator in safety leadership while action feedback and recognition are less dominant indicators in safety leadership. The safety leadership increase in safety performance ultimately contributes positively to the performance of companies, especially power plant companies.

Keywords
safety leadership, work safety, leadership character, power plant.

1. Introduction

As a workplace, power plants are included in the high potential hazard category. Workers in power plants always face many potential dangers that can cause workplace accidents and diseases such as, high voltage electricity, hot steam, spinning machines, chemicals, and dust (coal, fly ash and bottom ash as a material left over from coal combustion) . Work accidents as much as 80 - 90% are caused by human behavior, while the rest are caused by equipment and facilities at work. In essence, power plants are a high risk place for work accidents so companies must ensure that potential hazards can be minimized [1]. Occupational accidents occur because the organization cannot control potential hazards in the workplace including equipment, facilities, procedures and labor. In controlling potential hazards that exist in the workplace, the leadership function is very important. However, the facts show that many leaders fail to control hazards, as well as frontline employees who also do not understand potential hazards [2]. Thus, companies need leaders through safety leadership who are able to concretely understand hazards and how to control them and continue to focus on safety performance issues in addition to other company performance targets. The leader will provide direction, anticipate, control, and others in the context of controlling potential hazards in the workplace.

Safety leadership is now a popular term and is often used by OHS (Occupattional Health and Safety) practitioners, even in various industrial sectors [3][4][5][6] including in the power plant industry. Ineffective safety leadership conditions can trigger work accidents [7]. Good safety performance in an organization is often associated with good leadership performance. A leader must have a vision and be able to inspire the application of safety in the organization. The leader must be able to influence and invite all workers to be involved in achieving his vision through the development of skills, knowledge and abilities so that the worker is able to be actively involved in implementing work safety norms and standards. Safety leadership can increase the role of responsibility, compliance, participation & safe

behavior of workers [8]. A leader with safety is reflected in every word and action, and is able to inspire and engage all individuals in the organization to achieve the vision of organizational safety [7]. Safety Leadership is highly correlated to the realization of a safe environment and improving safety performance in organizations [9]. Companies with good safety performance can reduce the number of work accidents, improve working conditions and employee motivation and have a positive influence on company productivity and profits, in other words that good "safety leadership" can grow a company's operational profitability. The importance of efforts to improve safety leadership performance will lead to better safety performance and reduce the occurrence of work accidents [5]. The study aims to determine the effect of leader characters in shaping safety leadership. Safety leadership is a subsystem of organizational leadership [10]. Safety leadership is as an interaction relationship between leaders and subordinates [11], where a leader then influences subordinates to achieve organizational safety goals. There are seven indicators to develop in making safety leadership in a company [2].

2. Method

The stages in this research include: 1) literature study; 2) formulation of the problem and research objectives; 3) data collection; 4) research instrument testing; 5) data processing; 6) interpretation of results; 7) recommendations. The literature study and research objectives described in the initial stages have been explained in the introduction. Data collection methods in this study were carried out by taking samples from the population using questionnaires and direct interviews with management at the Steam Power Station (PLTU) in Java. The location of this research is sorted because the plant has a high enough maintenance frequency so that the risk of work accidents is also high. This power plant had a work accident that resulted in 1 person died; in its business activities also involve outsourced workforce with a pattern of safety performance that cannot be said to be in accordance with the correct standard. The population in this study were all employees and workers with a minimum service period of 1 year, aged between 20-50 years, minimum education was high school / vocational school. These criteria are to limit respondents to be able to reflect employees who are targets of safety and have the ability to interpret questionnaire questions appropriately. Based on these criteria, the population in this study uses a sampling method with probability sampling and the technique of determining the sample units (respondents) used in this study is simple random sampling. The testing of this research instrument includes a validity test and a reliability test carried out in order to test whether the instruments used in this study meet the requirements of a good measuring instrument or in accordance with the standards of the research method. An instrument is said to be good if it meets three main requirements, namely: (1) valid or valid; (2) reliable or reliable; and (3) practical. At the data processing stage using PLS-SEM (Part Least Square-Structural Equation Modeling) analysis. The results of data analysis are done by interpreting the assessment of indicators that influence safety leadership. The recommendations in this study are the result of the discussion of the SEM data analysis interpretation.

Figure 1. Research Flowchart

3. Discussion

The instrument testing in this study was aimed at measuring the reflective indicators of safety leadership, then the evaluation of the measurement model was carried out by looking at the significance of outer loading, the significance value of outer loading with T-statistics> 1.96 and obtained through the PLS Algorithm procedure. This causes the construct validity and reliability tests not needed.

Table 1. Path Coefficients *Safety Leadership*

	Original Sample	Sample Mean (M)	STDEV	T Statistics	P Values
SAFETY LEADERSHIP -> Credibility	0,913	0,913	0,025	36,751	0,000
SAFETY LEADERSHIP -> Action Orientation	0,909	0,909	0,030	30,255	0,000
SAFETY LEADERSHIP -> Vision	0,922	0,922	0,033	27,622	0,000
SAFETY LEADERSHIP -> Accountability	1,007	1,007	0,013	79,119	0,000
SAFETY LEADERSHIP -> Communication	0,953	0,955	0,022	43,973	0,000
SAFETY LEADERSHIP -> Collaboration	0,970	0,970	0,021	46,983	0,000
SAFETY LEADERSHIP -> Feedback & Recognition	0,809	0,804	0,050	16,211	0,000

Table 1 shows the results of the path coefficient analysis that measures safety leadership by using 7 indicators namely credibility, action orientation, vision, accountability, collaboration, and feedback-recognition. Indicator credibility has the most dominant outer loading form of safety leadership with a value of 0.913 significant with CR = 36.751. Credibility explains everything related to the quality, capability, or strength of a good leader so that the confidence of his subordinates arises. This is related to the ability of leaders to provide correct information related to safety; consistent in the implementation of safety standards; always committed to safety; provide ideas for improving safety performance; and has the ability to act as a role model of safety [12]. Leaders who are consistent in implementing safety standards are very dominant reflecting the credibility of leaders in power plants. Leaders should always provide the idea of improving safety performance as something that needs to be the concern of the power plant management. Leaders develop a reputation for providing honest and accurate information to gain employee respect and credibility. When the leader also has detractors who do not accept his authority and doubt his abilities, he / she needs the strength of character by ignoring the detractor and showing the strength of character. A leader needs to have more than a basic understanding of safety to increase credibility with his staff, customers, and other companies in the industry. Leaders are expected to become experts in the field of safety with the ability to analyze situations and develop several potential solutions related to safety problems. A good leader focuses on the goals imposed on him and guides his team to achieve those goals. Leaders can lose credibility when they get off track and don't take the actions needed to help individual employees and the entire group achieve their goals. Credibility as a leader is obtained by staying loyal to subordinates and overseeing subordinates' best interests [13]. Delegating responsibilities and showing confidence in the abilities of employees are important factors in increasing credibility. The company must develop honesty and willingness to admit mistakes, which are then corrected. Companies must respect and support and care for workers related to the implementation of safety in the organization. Credibility is quality, capability, or strength to generate trust [14]. Credibility as a leader in its implications shows that subordinates view leaders as a reliable source for information and decision making. A leader with high credibility will get respect from his colleagues and staff members by showing positive attitudes and actions [15].

Action Orientation indicator with outer loading value is 0.909 or significant with CR = 30.255. This indicator explains how the leader is always oriented towards concrete actions in terms of safety, namely in the form of work stoppage instructions for employees who work with unacceptable risks; and direct intervention on work that does not meet safety procedures [16]. Direct leadership intervention on work that does not meet safety procedures is something that is always done by the leadership of the power plant so that there is no danger of work accidents. Termination of work due to hazardous risks needs to be a major concern for power plant management so that work accidents can be avoided. A leader must be able to take joint action as well as orders to lead the organization. Leaders do not force subordinates to do anything, but try to set a good example of taking every opportunity by showing subordinates that leaders are willing to do whatever tasks are needed to succeed and achieve goals [10]. This type of management innovation as a form of non-technological innovation includes modifications including how and what the division head does. How and what the division head does in his job is setting direction, making decisions, coordinating activities, and leading people [17]. Leaders must not only direct and monitor work in accordance with applicable regulations and standards, but also provide encouragement and motivate workers by being directly involved in solving safety related problems.

The leader is the role of model in every safety application with direct intervention in each worker's activity [18]. This needs to be done so that when something happens there are several things, non-conformity especially related to safety can be corrected immediately.

Vision indicator with an outer loading value of 0.922 is significant with CR = 27.622. This explains the role of leaders in encouraging and conveying the vision of company safety to their subordinates, namely the invitation to achieve safety performance; explain the current safety vision; and also explains the vision of safety expected in the future (Skeepers & Mbohwa, 2015). Explanation of the safety vision that is expected in the future is always carried out by the power plant so that employees have high concern for the safety vision going forward and participate in the work safety program. The leader in power plant management must further enhance the invitation to his subordinates in order to achieve better safety performance. When leaders share a strong vision and organize and manage the workplace to achieve it, employee performance will be driven by strong dynamics. The vision of leadership manifested in the work of employees is a retention factor for people who share a vision [19]. This becomes the basics needed to make vision into something that excites and motivates people to follow the leader. The vision must be able to clearly set the direction and objectives of the organization; inspire loyalty and care through the involvement of all employees; display and reflect the unique strengths, culture, values, beliefs and direction of the organization; inspire enthusiasm, trust, commitment, and excitement in company members; helping employees believe that they are part of something bigger than themselves and their daily work. Vision must be communicated and shared regularly, not only through monthly announcements and reminders at company meetings. Vision must pervade communication thoroughly at every level of the organization every day and has a function as the reason why action programs are chosen, why people are employed, why markets are chosen, and why products are developed [20]. Vision should not just be a statement hanging on the wall. The leadership vision must have power because people undergoing the leadership vision are at work every day. Vision is a mental picture of the future; an idea of what could happen in the future but not yet realized. The vision embodies the hopes and ideals of the company and gives meaning and purpose to what will be done [9]. As a leader, this will help to see the final results of efforts that have been made. Vision gives a glimpse of what might happen. Vision becomes an important part of leadership, this is because the vision shows leaders how to go and continue to walk in any condition [16]. Vision helps a leader prepare for the future and is able to keep the leader on track during unexpected difficult times.The vision of a leader must be strong enough to bring him to the end of the goal and help him continue to move forward through various obstacles. If a leader has a strong vision, small obstacles and obstacles will seem insignificant [21]. Vision provides a focus on the leader so that he can see what is needed to achieve the goal by doing important parts to achieve the final result and not get caught up in insignificant matters. This helps leaders focus on the important 20% and the remaining 80% can be delegated and handled by other parts of the company.

Accountability with an outer loading value of 1.007 is significant with CR = 79.119. This indicator explains that the leader sets the system and principles of accountability effectively at every level of the company in terms of safety by ensuring the quality of safety support equipment; guarantee safety in the production system; conduct safety performance measurements regularly; conduct regular evaluations of safety performance; and increase employee awareness related to safety responsibilities. This indicator is also a dominant indicator that shapes the behavior of safety leadership because it has the second largest outer weight value after the credibility indicator [11]. Regular evaluations of safety performance at power plants are carried out on an ongoing basis in order to improve safety performance. The production process requires a safety guarantee from a power plant company. The production process is a vital part of a power plant that has a higher risk level than other parts of the process. Effective leaders create a culture of obligation by defining accountability as an act of making their own choices and being responsible for their own actions. Leaders create a sense of ownership with teammates after training subordinates to make better choices. Accountability for effective leadership is demonstrated through a consistent attitude towards what is said and done. The ability to self-discipline consistently sends a unified message and to remain consistent in attitudes, emotions, behavior and actions at all times. The leader must also be consistent between what is believed and how the leader applies what the leader believes is very important [6]. The regulation of the leader's emotional stability is also an important leadership foundation. A leader must be able to explain the definition and communicate the rules and safety standards in the company. Preparation of adequate resources and infrastructure to support safety performance in the organization and then at all times the safety performance is measured consistently and evaluated its effectiveness. The results of decisions and all actions taken based on evaluation must be accountable for a leader [22]. When a leader makes a mistake, he has the right to take the steps necessary to correct the mistake.

Communication indicator with outer loading value of 0.953 is significant with CR = 43.973. This indicator explains the role of leaders in influencing their subordinates through effective communication so as to create and maintain a safety culture within the company, namely by communicating the company's safety goals; and communicating safety value to subordinates [15]. Leaders in power plant management always communicate the company's safety goals in order to improve safety performance so that subordinates have a high concern for work safety. Effective leadership requires knowledge of communicating with various groups in an organization, including employees, managers, customers and investors. Each group may need a different style of communication and leadership, and although leaders must be able to adapt based on the group they are communicating at the time, there are key principles of effective leadership communication that universally fosters collaboration and success. The leader's role is to communicate effectively to each individual in the organization how their role is in achieving the vision and goals of safety in the company. Routinely providing feedback and appreciation of each individual's performance in an organization related to safety, providing an understanding of the importance of safety being part of the organization, and always providing opportunities for individuals and teams to be involved in solving company safety problems [23].

Indicator Collaboration with an outer loading value of 0.970 is significant with CR = 46.983. This indicator explains how the leader actively encourages the participation of all team members in all fields of the company and together creates a safe working atmosphere, namely by being open to his subordinates regarding safety performance; honest about delivering safety performance; consistent in encouraging teamwork related to safety conditions; and open in correcting each other among employees related to all matters concerning safety [1]. Leaders in power generation companies need to always encourage teamwork in order to improve safety performance in their respective units. Furthermore, leaders must always be open to their subordinates regarding safety performance so that subordinates know the current condition of safety performance. This openness in safety performance is expected to increase the involvement of leaders and subordinates to always improve safety performance. The leader's behavior must influence the team in order to collaborate effectively and in line with company values. This style does not only focus on the company's short-term performance; focuses on the company's plans, but is based on management socialization as well as compensation from highly collaborative managers. Low collaboration at work does not always have a negative financial impact but it will make the workforce lose motivation, creativity, excitement and increase productivity, all of which are present in a collaborative environment [13]. Effective leadership will empower the team to achieve excellent results. Balancing diversity in the workplace, it would be futile to try to standardize all group members. Narrowness in the differences between members of a group will limit or even shut down creativity and innovation. The leader encourages the active participation of all team members actively in all areas of the organization by asking, hearing, and conveying each field's views related to safety [3]. Leaders must be transparent and truthful, support, and encourage each employee and each team's performance to work together to achieve the vision and goal of safety. Leaders are the primary driver of collaboration within the company. A leader's collaborative leadership style must be based on engagement and openness between employees [24].

Feedback and recognition indicators with an outer loading value of 0.809 are significant with CR = 16.211. This indicator explains the role of the leader in providing feedback and recognition to each of his subordinates so as to encourage safety behavior, which is to make it easy to meet employee needs related to safety; rewarding safety performance; and provide employee input for safety improvement [25]. This indicator is an indicator that is less dominant in forming safety leadership behavior because it has the smallest outer loading value than other indicators. Input from power plant employees dominates in the process of improving safety performance. The importance of rewarding safety performance needs to be the main concern of power plant management as motivation for subordinates to always provide the best safety performance for the company. The key dimension to effective leadership involves strengthening and motivating others to drive superior performance. Employee recognition as an effective leadership tool is important. Employees demonstrate that they value highly personal recognition for work well done as an important dimension of their reward system. Employee recognition must be given more attention by leaders when they try to meet the retention and productivity challenges faced by companies today [24]. The leader's role is essential in providing feedback and recognition of each subordinate's behavior in the company regarding safety. It can explain the possible impact on each individual and team in the company [4]. Feedback and recognition have given focus only on safety behavior and not on individual faults. The leader works with subordinates at all times while maintaining a position of authority. They must be able to synergize by talking with assistants by showing respect for individual needs, abilities, and opinions. This feedback and recognition need to be done by a leader to help subordinates' loyalty [11].

4. Conclusion

This study aims to measure the influence of indicators that shape safety leadership. The interpretation of the results of data analysis shows that the dominant accountability indicator shapes the behavior of safety leadership and the feedback-recognition indicator is less dominant in shaping the safety leadership behavior in the power plant environment. This is caused by the factor that the accountability of a leader is needed at every level of the company to realize the best quality of performance safety. The feedback-recognition indicator on the results of this study explained that it was less dominant in shaping the character of safety leadership. Leaders feedback and recognition of their subordinates can improve safety performance in the company. This research is only conducted in a power plant environment with a high enough occupational risk, but not limited to other industries that have a high occupational risk. This research is also expected to not be limited to the character of safety leadership in building safety behavior and culture in the company, but also how to create a safety climate so that in the future the safety performance of the company can continue to improve. This increase in safety performance ultimately contributes positively to the performance of companies, especially power plant companies.

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References

[1]   M. West, K. Armit, L. Loewenthal, R. Eckert, T. West, and A. Lee, "Leadership and Leadership Development in Health Care: The Evidence Base," *Kings Fund*, 2015.
[2]   T. R. Krause and T. Weekley, "Safety Leadership: A four-factor model for establishing a high-functioning organization," *Prof. Saf.*, vol. 50, no. 11, pp. 49–54, 2005.
[3]   S. Oah, R. Na, and K. Moon, "The Influence of Safety Climate, Safety Leadership, Workload, and Accident Experiences on Risk Perception: A Study of Korean Manufacturing Workers," *Saf. Health Work*, vol. 9, no. 4, pp. 427–433, Dec. 2018.
[4]   N. C. Skeepers and C. Mbohwa, "A Study on the Leadership Behaviour, Safety Leadership and Safety Performance in the Construction Industry in South Africa," *Procedia Manuf.*, 2015.
[5]   C. Wu, N. Li, and D. Fang, "Leadership improvement and its impact on workplace safety in construction projects: A conceptual model and action research," *Int. J. Proj. Manag.*, 2017.
[6]   D. Zohar and G. Luria, "The use of supervisory practices as leverage to improve safety behavior: A cross-level intervention model," *J. Safety Res.*, vol. 34, no. 5, pp. 567–577, Jan. 2003.
[7]   D. Cooper, "Effective Safety Leadership," *Prof. Saf.*, vol. 60, no. 2, pp. 49–53, 2015.
[8]   J. Mullen, E. K. Kelloway, and M. Teed, "Employer safety obligations, transformational leadership and their interactive effects on employee safety performance," *Saf. Sci.*, vol. 91, pp. 405–412, Jan. 2017.
[9]   C. F. Chen and S. C. Chen, "Measuring the effects of Safety Management System practices, morality leadership and self-efficacy on pilots' safety behaviors: Safety motivation as a mediator," *Saf. Sci.*, 2014.
[10]   J. Mahoney, "Leadership skills for the 21st century," *J. Nurs. Manag.*, vol. 9, no. 5, pp. 269–271, Sep. 2001.
[11]   C. Wu, D. Fang, and N. Li, "Roles of owners' leadership in construction safety: The case of high-speed railway construction projects in China," *Int. J. Proj. Manag.*, 2015.
[12]   D. J. Hickey and J. Essid, *Identity and leadership in virtual communities: Establishing credibility and influence*. 2014.

[13] K. Hoffmeister, A. M. Gibbons, S. K. Johnson, K. P. Cigularov, P. Y. Chen, and J. C. Rosecrance, "The differential effects of transformational leadership facets on employee safety," *Saf. Sci.*, 2014.

[14] S. Swanson and A. Kent, "The complexity of leading in sport: Examining the role of domain expertise in assessing Leader credibility and prototypicality," *J. Sport Manag.*, 2014.

[15] C. Sheehan, R. Donohue, T. Shea, B. Cooper, and H. De Cieri, "Leading and lagging indicators of occupational health and safety: The moderating role of safety leadership," *Accid. Anal. Prev.*, 2016.

[16] R. Kark, T. Katz-Navon, and M. Delegach, "The dual effects of leading for safety: The mediating role of employee regulatory focus," *J. Appl. Psychol.*, 2015.

[17] I. Rajiani and N. Ismail, "Management innovation in balancing technology innovation to harness universities performance in the era of community 4.0," *Polish J. Manag. Stud.*, 2019.

[18] T. D. Smith, F. Eldridge, and D. M. DeJoy, "Safety-specific transformational and passive leadership influences on firefighter safety climate perceptions and safety behavior outcomes," *Saf. Sci.*, 2016.

[19] R. Ambarwati and G. A. Handiwibowo, "The Relationship of Outdoor Management Development and Organizational Mission," in *1st International Conference on Intellectuals' Global Responsibility (ICIGR 2017)*, 2018, pp. 202–205.

[20] U. von Thiele Schwarz, H. Hasson, and S. Tafvelin, "Leadership training as an occupational health intervention: Improved safety and sustained productivity," *Saf. Sci.*, 2016.

[21] P. T. Balwant, "Transformational Instructor-Leadership in Higher Education Teaching: A Meta-Analytic Review and Research Agenda," *J. Leadersh. Stud.*, 2016.

[22] B. Fernández-Muñiz, J. M. Montes-Peón, and C. J. Vázquez-Ordás, "Safety leadership, risk management and safety performance in Spanish firms," *Saf. Sci.*, 2014.

[23] N. Langerman, "Safety leadership," *Journal of Chemical Health and Safety*. 2011.

[24] C. Pilbeam, N. Doherty, R. Davidson, and D. Denyer, "Safety leadership practices for organizational safety compliance: Developing a research agenda from a review of the literature," *Safety Science*. 2016.

[25] L. R. Ginsburg *et al.*, "The relationship between organizational leadership for safety and learning from patient safety events," *Health Serv. Res.*, 2010.

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