

Effect of Safety Education to Workers Productivity at The Electric Welding Workshop

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Abstract: Productivity is generally defined as a measure of the amount of output generated per unit of input. The aim of this research is to analyse the effect of the fulfilment of Occupational Safety and Health as well as the ability, experience, motivation, and discipline of workers on the probability of low productivity in the Electric Welding Workshop. The method used in this study was a qualitative descriptive method with questionnaires and observation sheets. The result showed that the Electric Welding Workshop workers felt that the fulfilment of OSH aspects, their ability, experience, motivation, and discipline impacted their productivity. The study concludes that Electric Welding Workshop is not included in low productivity because it produces stuffs with quality and quantity according to standards, although it has not yet fulfilled the aspects that increase productivity.

Keywords: low productivity; quantity; quality; welding workshop

INTRODUCTION

Productivity is generally defined as a measure of the amount of output generated per unit of input (Linna et al., 2010). Productivity measures the effectiveness and efficiency with which commodities and services are produced. Thus, its primary characteristics are expressed in physical or economic units and in quantities or values based on measurements made at various levels, including those of the enterprise and its individual plans and units as well as the level of the economy as a whole, a specific sector or branch of the economy, and that of individual (HESAPRO, 2013) s. The idea of productivity also becomes more and more associated with the standard of input, output, and process itself. The skill level of the personnel, its management, and its working circumstances are critical factors, and it has long been understood that raising productivity and enhancing quality of life at work frequently go hand in hand. The key indices of the quality of working life are the mental, physical, and social circumstances of workplaces, as well as the effectiveness of health and safety measures (HESAPRO, 2013).

It has been discovered that skills increase labors' productivity, and productivity enhances performance. The indirect connections relate to the effects that each driver has on the other drivers as well as how other factors affect these drivers. In order to facilitate welding workshop activities, skills are crucial (Gambin et al., 2009) l. The correlation between motivation and output is favorable. In other words, we ought to expect increased productivity because of more motivation. This represents the idea that there is a direct cause and effect relationship between higher motivation and increased production (Albano, 2008). In order to achieve the company's objectives, it is necessary to instill a sense of discipline among employees. This encourages orderliness and enthusiasm at work, which increases productivity (Kencana et al., 2021).

Occupational safety and health (OSH) is a crucial element in electric welding workshops to ensure the safety and health of workers. The most important means of protecting the labours of electric welders is local exhaust ventilation, if required supplemented by general exchange ventilation of electric welding rooms, which contributes to maintaining the normalized state of the air environment. The design of exhaust devices should correspond to the nature of the performed welding work, as well as the space-planning solution for the mutual arrangement of welding posts and supply and exhaust devices, especially in rooms with a limited volume (Shaptala et al., 2021). Ensuring OSH

in electric welding workshops is crucial to maintain a safe and healthy working environment for workers, which can ultimately lead to the increase of productivity.

Accidents and their interconnected damages caused to the equipment, property and workers, generate adverse effects on overall productivity. These accidents mostly occurred due to the ever-changing site conditions, varied human behaviour, and unsafe work procedures (Abdelhamid & Everett, 2000). In the developing countries, business strategies do not include OSH regulations (Sarosh et al., 2006). and the CI still relies more on labour than the equipment (Yi & Chan, 2014). Unsafe OSH conditions still exist in various construction sites, resulting into cost overruns, time delays, and low productivity (Farooqui et al., 2007). The objective of this research is to determine the effect of the fulfilment of occupational safety and health and the ability, experience, motivation, and discipline of workers regarding the possibility of low productivity in the Electric Welding Workshop.

METHODS

In this study we used a qualitative descriptive method. Qualitative description (QD) is a label used in qualitative research for studies that are descriptive in nature (Kim et al., 2017). Qualitative content analysis (often supplemented by descriptive statistics to describe the study sample) is a common strategy for data analysis (Neergaard et al., 2009). Qualitative descriptions can provide factual responses to questions about how people feel about a particular space, then what reasons they have for using the features of the space that employ certain services or functions of the space, and the factors that facilitate or hinder use (Colorafi & Evans, 2016).

The instrument we used in this study was a questionnaire with open and closed questions and an observation sheet. We used conventional content data analysis approach. Conventional content analysis is used in studies that aim to describe a phenomenon where existing research and theory are limited. The data are collected from open-ended questions, read word for word, and then coded. Notes are made and codes are categorized (Colorafi & Evans, 2016). The use of validated measures can help generate reliable and meaningful findings, especially when instruments such as surveys, questionnaires, or checklists used in studies have been used on others, helping build theory, improve predictions, or make recommendations (Miles et al., 2014). The sample from our research on the Electric Welding Workshop has 4 permanent workers. The questionnaire was addressed to the 4 workers. The age range of workers at the Electric Welding Workshop was 30-40 years old with an educational background of 1 person from elementary school graduate, 1 person from junior high school graduate, and 2 persons from vocational high school graduates. Then, we also filled the observation sheet according to our observations of the conditions at the Electric Welding Workshop.

RESULT AND DISCUSSION

The division of the outputs (goods and services) among one or more entries (such as labor, capital, or management) results in productivity. These three elements are essential for raising productivity. Identify the key areas where administrators may boost productivity. Identification of the problems that arise in those groups of components and the differentiation of the factors that are within control constitute the first step in improving productivity. It is possible that another institution's internal factors are external and uncontrollable factors for a corporation (Ramos Aranda et al., 2015).

A previous study looked at the relationship between organizational culture, intellectual development, organizational support, motivation, training, performance evaluation, job clarity, ability, and environment. The findings indicated a relationship between organizational culture characteristics and worker productivity (Aghajeri & Aghajeri, 2013). From the statements above, it can be concluded that low productivity in Electric Welding Workshops can be caused by various factors ranging from internal and external factors, but what we discussed here are only a few factors such as fulfilment of occupational safety and health and the ability, experience, motivation, and discipline of workers.

The following are some general reasons why measuring productivity is important: it improves communication within the organization, assists in evaluating the progress made toward improving productivity, facilitates changes after a certain period, reveals potential issues and identifies areas for improvement, serves as feedback, as a source of motivation, and can assist in setting priorities. Along with measuring productivity throughout multiple time periods, companies may compare the data to understand team dynamics, worker performance, and potential areas for improvement (Ramos Aranda et al., 2015).

Improving worker productivity, occupational safety and health (OSH) are major concerns of industry, especially in developing countries (Shikdar & Sawaqed, 2003). Some of the common features of these industries are

improper workplace design, ill-structured jobs, mismatch between worker abilities and job demands, adverse environment, poor human-machine system design and inappropriate management programs. This leads to workplace hazards, poor worker health, mechanical equipment injuries, disabilities, reduces worker productivity and product/work quality and increases cost (Shikdar & Sawaqed, 2003). Employees displaying safe behaviours are the ultimate solution against idle times, medical leave and material damage arising from work accidents, occupational diseases and adverse working conditions, which negatively affect employee performance and productivity (Bayram, 2022). The primary safe employee behaviours examined in many previous studies were safety compliance and safety participation. For creating a positive safety culture in the workplace, it is vital to have employees who are aware of potential dangers and risks, are trained in OHS rules, have the necessary knowledge and skills to work healthily and safely, and show healthy and safe behaviours (Bayram, 2022).

Education, job satisfaction, and work motivation can affect work productivity. A study on workers in the welding section of rack production found a relationship between education and work productivity, as well as work motivation and work productivity. To improve work productivity, daily standards for the number of racks to be produced by workers need to be set. In addition, praise and rewards should be given to workers for producing racks that are above the standard. External factors such as glass ceilings, workplace discrimination, unfriendly organizational policies, or internal factors such as work-life balance, personal abilities, and perceptions, as well as family and community factors can be challenging for female employees in managerial ranks, which then negatively impacts their productivity and efficiency (Misra & Sirohi, 2019). Overall, factors that impact work productivity in internal and external industry can be diverse and complex, and they can include the work environment, education, job satisfaction, work motivation, external and internal factors, ICT, and motivation.

Below are the table of workers' opinions regarding the fulfilment of OSH aspects, their ability, experience, motivation, and discipline is impacting their productivity.

Table 1. The Fulfilment of OSH Aspects

Workers' Opinion	Yes %	Maybe %	No %
I think the layout of work equipment is in accordance with work safety standards	50	50	0
In my opinion, the provision of safety equipment as a means of prevention, help, and protection (personal protective equipment) for employees is adequate	25	0	75
There is a labor benefit	100	0	0
In my opinion, the work environment is clean, the temperature, air, water, ventilation, and waste disposal system in the workplace meet health standards	50	50	0
There is an adequate first aid kit	0	25	75
The company provides labor health services	0	0	100

Table 2. The Production on the Workshop

Workers' Opinion	Yes %	Maybe %	No %
In my opinion, the amount of output or production volume is according to the standard.	100	0	0
In my opinion, the quality of products is in accordance with work standards	75	25	0
In my opinion, the work done is completed on time	100	0	0
In my opinion, there are often errors in the production produced	0	100	0
Overtime work is necessary to increase work productivity	0	0	100

Table 3. The Influence of Experience, Motivation, and Discipline

Workers' Opinion	Yes %	Maybe %	No %
My previous experience helps me in my work	75	25	0
I can master the work equipment provided by the company	75	25	0
During my work, I hardly make any mistakes because I am good at my job	25	0	75

Table 1 presents results of workers' opinion regarding Occupational Health Safety aspects at the workshop. The result shows that 3 out of 6 questions, the workers of Electric Welding Workshops answer positively. It means the Electric Welding Workshops has perform a decent OSH regulation. Table 2 presents results of workers' opinion regarding the production and their ability at the Electric Welding Workshops. The result shows the workers' agreement on the workshops total production, product quality, and time spent on the production is good. But the workers do not agree that overtime work is necessary to increase work productivity. Table 3 presents results of workers' opinion on their experience, motivation, and discipline is influencing their work productivity. The result shows the workers' confident in their work ability and they agreed that their experience does help in their work.

From the data above, it can be concluded that the Electric Welding Workshop workers felt that the fulfilment of OSH aspects, their ability, experience, motivation, and discipline are impacting to their productivity. This result is in line with the previous research result done by Segbenya & Yeboah (2022) where the OSH regulations had a statistically significant impact on worker productivity. It also in line with Ayu et al. (2021) where workers motivation has influence on work productivity.

EFFECT

According to (Alli, 2008), the promotion of occupational safety and health is done to ensure worker welfare and boost output as part of the overall improvement of working conditions. As per our variable which is fulfilment of OSH aspects influences the work productivity. It matches up with our research results. The workers agree on the impact of the fulfilment of OSH aspects but the company has yet to fulfil the proper OSH regulation. If the facilities are adequate such as work layout, provision of safety equipment, clean and healthy work environment, workers will work effectively. Automatically, work productivity will increase.

Our research shows that the work is on target, the quality and quantity of goods are up to standard, completing work on time and rarely making mistakes. It means that their productivity is good and stable, so it is not considered as low productivity. Motivation has an influence on the work productivity (Uka & Prendi, 2021a). The good level of satisfaction and motivation is benefiting to the work productivity. It aligned with our research where workers feel that internap and personal motivation and discipline make them better improve their hard work, thus increasing productivity. With high working experience, workers tend to be more knowledgeable and make fewer mistakes. Therefore, their productivity will be good and stable (Uka & Prendi, 2021b).

CONTROLLING

Each manufacturing industry should have a comprehensive safety education and accident prevention programme in place for its workers to prevent accident and injury (B.N, 2013). Here are some safety educations that reduce low productivity in electric welding workshop that should be done by the company and the workers.

For the Company

Strengthen safety regulations. Enforcing safety regulations, such as the Occupational Safety and Health Act, helps ensure that workers are protected from workplace hazards. This may include providing PPE (*Personal Protective Equipment*), conducting regular safety inspections, and providing training on safety protocols (Obi Daniel et al., 2020). *Conduct hazard identification and risk assessment.* Conducting a hazard identification and risk assessment will help identify potential hazards and risks in the electric welding workshop. This can be done by using some methods such as fishbone charts, HIRARC charts, and Pareto charts.

Provide education and training. Providing training to the workers improves their skills and knowledge, increases their productivity and improves the quality of their work (Shuaib et al., 2021). Safety education and training in the welding industry is essential to ensure workers understand the risks and how to prevent them. This may include welding industry safety knowledge and skills, basic welding theory, and practical training in welding techniques. Ergonomic parameters such as hand tremor and body posture are often neglected as secondary factors in welder training. However, the efficiency of training can be increased by analyzing qualified welders and trainees based on ergonomic parameters (Lee et al., 2023). Train employees in workplace emergency preparedness and prevention,

including first aid management (Obi Daniel et al., 2020). *Provide safety education resources.* Employers can provide safety education resources such as training materials, videos, and safety posters. These resources help strengthen safety practices and promote a culture of safety in the workplace.

Monitor workers. Monitoring the workers helps ensure that the workers is following safety protocols and wearing PPE appropriately. Methods such as wireless cameras and image recognition software can be used to identify if a worker is wearing an earplug. Conduct regular audits and inspections to ensure that safety measures are being followed and the workplace is safe for workers (Obi Daniel et al., 2020). Regular safety inspections help identify potential hazards and ensure that safety procedures are being followed. Inspections may include checking ventilation systems, *ensuring personal protective equipment is in use, and checking that welding equipment is in good condition.*

Use proper welding equipment. The design and development of improved micro butt welding power plants can help increase productivity and reduce equipment costs through the development and introduction of improved resistance butt welders (Abdullah et al., 2022). Equipment monitoring and maintenance. Regular maintenance and monitoring of equipment can improve productivity by preventing breakdowns and ensuring that equipment is performing at peak stage (Shuaib et al., 2021). Regular maintenance of welding equipment can prevent breakdowns and downtime. This may include cleaning, lubricating and replacing worn parts. *Optimize spot welding parameters.* Predicting spot welding parameters using fuzzy logic control helps optimize processes and increase productivity (Hussein et al., 2019).

Provide appropriate Personal Protective Equipment (PPE). Providing suitable PPE such as a welding helmet, gloves and protective clothing can protect the workers from hazards such as electric shock and burns (Obi Daniel et al., 2020). Ensure the workers understands how to use PPE properly. Emphasize the importance of wearing PPE whenever working in the store (B.N, 2013).

For the Workers

Workers comply with the provisions of the Health and Safety at Work Act 2010 and other regulations, policies and standard operating procedures (Obi Daniel et al., 2020). Workers should be encouraged to report safety concerns to their supervisor or safety officer. This helps identify potential hazards and prevent accidents. Investigate all incidents and take appropriate steps to address the underlying security issue (B.N, 2013).

CONCLUSION

The Electric Welding Workshop fulfilled aspects that increase productivity such as the use of Personal Protective Equipment (PPE), training and education for workers, monitoring workers, and others, but not yet fully. However, the workers at the Electric Welding Workshop work with discipline and produce stuffs with good quality and quantity according to standards. Thus, Electric Welding Workshop is not included in low productivity. The purpose of the research is to know the effect of the fulfilment of Occupational Safety and Health as well as the ability, experience, motivation, discipline of workers on the probability of low productivity in the Electric Welding Workshop. This research is expected to show whether the Electric Welding Workshop is included in low productivity or not, and whether it has fulfilled aspects that increase productivity or not.

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