

Occupational Safety Health and Work Motivation on Worker Performance Construction Projects

Daniel Kurniawan Sunarjo, Mawardi Amin

Master of Civil Engineering, Mercu Buana University, Jakarta, INDONESIA

E-mail: daniel.kurniawan.sunarjo@gmail.com, mawardi@mercubuana.ac.id

| Submitted: August 09, 2024 | Revised: February 12, 2025 | Accepted: May 02, 2025 |

| Published: May 13, 2025 |

ABSTRACT

Many construction companies still employ their workers without caring about the implementation of accident risks, by paying attention to work safety, it is expected that the performance of the workers will increase. This study aims to analyze the influence of occupational safety and health factors and worker motivation factors that affect the performance of workers in residential construction projects. The relationship between occupational safety and health, worker motivation and worker performance will be made in a path diagram model, and analyzed using SEM-PLS with a sample of 72 respondents. The results of the study found that the dominant factors in occupational safety and health are worker health monitoring, emergencies, personnel selection and placement, and hazard inspections. Meanwhile, the dominant factors that influence the motivation of craftsmen are wages, timely payment, and continuity (job security). In residential construction projects, occupational safety and health have a significant positive effect ($P < 0.05$) on the motivation of craftsmen, in addition, worker motivation also has a significant positive effect on worker performance. In addition, occupational safety and health also have a significant positive effect directly on worker performance.

Keywords: occupational; safety; health; motivation; performance.

INTRODUCTION

Construction work on a small, medium to large scale in all technical work details always requires human labor. Craft workers are the main actors in construction projects, and are at risk of experiencing work accidents. Construction is the largest contributor to work accidents in Indonesia (Hasanudin, 2022). BPJS Employment data (2016) records that at least 30% of construction sector worker accidents account for total work accidents in various industries. According to the Ministry of Manpower's report, in 2017, although there was a reduction in the number of work accidents, workers who died as a result of work accidents increased by 349.4%. In 2015, data recorded that 530 workers died and this increased in 2016 to 2,382 people. Of these accidents, 50% occurred in the construction industry or affected construction workers, and the majority of cases were accidents from falls from heights (Deny., 2017).

Work accidents experienced by building construction workers include falls from heights (26%), impacts (12%), and material being crushed (9%) (Widowati. & Safitri., 2017). The consequences of work accidents can vary from minor injuries to serious injuries, partial anatomical defects, partial functional disabilities, permanent total disabilities, and even death (Eze. et al., 2020). Artisanal workers are the ones who feel the most direct impact of work accidents so it can have bad consequences for these workers.

Regulations regarding K3 (Occupational Safety and Health) in the construction sector in Indonesia are outlined in the Minister of Public Works and Public Housing Regulation Number 10 of 2021 concerning Guidelines for Construction Safety Management Systems (SMKK). Construction safety is the fulfilment of security, safety, health and sustainability standards that guarantee construction engineering safety, workforce safety and health, public safety and the environment.

Implementation of K3 for construction workers (craftsmen) is very important. The performance of construction workers (craftsmen) will be optimal if they always guarantee comfort and safety at

work. Increasing work safety programs will produce high work motivation in improving construction worker performance (Othman. et al., 2017).

Unfortunately, according to research by Puerto et. al. (2014), the K3 culture in landed house residential construction projects is still not fully supported and implemented, compared to other construction projects on a larger scale (for example infrastructure or complex tall buildings). This is also supported by Indah research (2017), where the average implementation is better in large-scale projects compared to medium and small-scale projects. In one of the residential construction projects in Bekasi Regency carried out by PT. DR Although there are no formal records regarding the history of accidents that occurred on the project, from interviews with Pimpro, the author obtained information on accidents in the last three years for a project with a daily workforce of around 70-90 people: (1) Minor accidents requiring outpatient treatment: 8 to 12 incidents in one year, (2) Serious accidents requiring hospitalization: 1 (one) incident in one year, (3) Accidents resulting in fatalities: nil

The role of construction workers is very important in achieving the success of construction projects because the number of construction workers is very large and the expenditure on workers' daily performance wages is quite sufficient so it needs to be paid attention to during the project. In this case, builders are required to have good skills in the field so that the resulting performance can support the achievement of project success. Good performance is influenced by motivation. The existence of differences in worker backgrounds can influence the level of work motivation and differences in factors that can increase work motivation (Setiawan & Soekiman, 2023). Based on research conducted by Obaied and Fawzy (2022), the main motivation for builders is wages. This is in line with research by Azeez, et. al. (2019). Work safety is generally not the main motivation for construction workers. This problem is an irony. Many construction companies still employ workers without caring about the risk of accidents. This condition is worrying amidst the current high growth of the construction industry. Awareness that implementing K3 is an important part that should not be separated from their work activities (Widaningsih, 2020).

In relation to the background and identification of the problems that have been determined above, the formulation of the problems that will be discussed in this study can be arranged as follows: (1) Does the implementation of K3 affect the motivation of construction workers (craftsmen) in residential construction projects? (2) Does motivation affect the performance of construction workers (craftsmen) in residential construction projects? (3). Does the implementation of K3 affect the performance of construction workers (craftsmen) in residential construction projects?

Construction Safety Management System (SMKK) Guidelines in accordance with PUPR Ministerial Regulation No. 21/PRT/M/2019 states that the Construction Safety Management System (SMKK) is part of the construction work implementation management system in order to ensure the realization of "construction safety", namely the fulfillment of security, safety, health and sustainability standards that guarantee construction engineering safety, safety and workforce health, public safety and the environment. Construction management consultants, construction supervision consultants and contractors must implement SMKK that meets security, safety, health and sustainability standards. SMKK is applied at the stages of selection, implementation and handover of work. Keselamatan dan Kesehatan Kerja yang selanjutnya disingkat K3 adalah segala kegiatan untuk menjamin dan melindungi keselamatan dan kesehatan tenaga kerja melalui upaya pencegahan kecelakaan kerja dan penyakit akibat kerja (Pemerintah, 2012)

Philosophically, safety is defined as an idea and effort to ensure the physical and spiritual integrity and perfection of the workforce in particular and humans in general as well as the results of their culture and work. From a scientific perspective, it is defined as knowledge and its application in an effort to prevent the possibility of accidents and work-related diseases (Ramli., 2009).

According to Suma'mur (2009), occupational health is a specialization of health/medical science and its practices which aims to ensure that workers/working communities obtain the highest degree of health, both physical, mental and social, with preventive or curative efforts against diseases/health disorders caused by occupational and work environment factors as well as general illnesses. Definition of work accident (accident) according to Ministerial Regulation no. 04 of 1993

concerning Work Accident Insurance, namely, accidents that occur in connection with work relations, including illnesses that arise due to work relations, as well as accidents that occur on the way from home to work, and returning home via roads that are passable or reasonable.

Factors that influence work safety in construction projects according to Divya et. al. (2017) can be grouped into 3 groups as can be seen in Figure 1

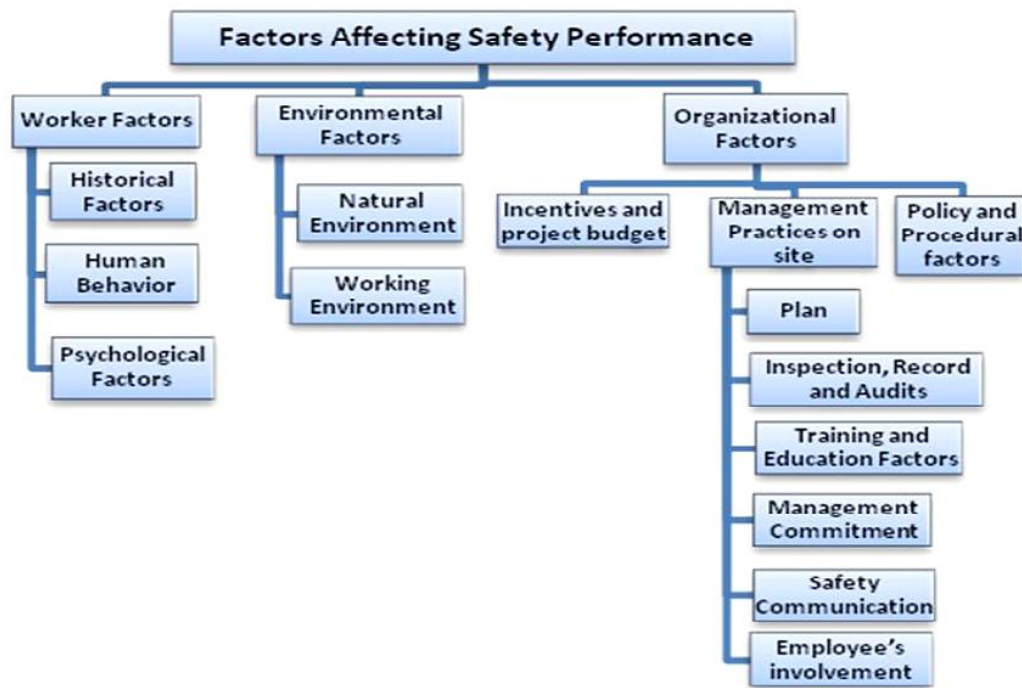


Figure 1. Factors Affecting Work Safety Source: Divya, et. al. (2017)

According to Bagabaga College of Education (2019), occupational safety and health (K3) indicators at construction project sites consist of: (1) Workers use PPE at the project site, (2) Holes and dangerous areas have been secured, (3) The contractor ensures the cleanliness of the project site (3) Work at the project site is carried out by workers who are trained and experienced in their fields, (3) Project workers receive K3 introduction/induction (4) Availability of First Aid for Accidents (P3K) at the project site (5) Danger signs and safety instructions are posted at the project site, (6) Workers are familiar with the concepts of risk and danger, (7) There are K3 officers who carry out inspections within the project to ensure that safety and danger risks have been managed properly.

Performance is a result achieved by employees in their work according to certain criteria that apply to a job (Robbins. & Judge., 2019). According to Keith Davis (Hamali., 2016), factors that influence employee performance achievement are ability and motivation factors.

Performance is basically measured according to the interests of the organization, so that the indicators in the measurement are adjusted to the interests of the organization itself. Meanwhile, Mondy, Noe, Premeaux in Priansa (2014) outlined the following methods for measuring performance: Work quantity is the amount of work and productivity generated by employees in a given amount of time, or the outcomes attained by a specific number of employees based on standards previously established by the firm. Worker quality is correlated with the standard of outcomes related to worker quality. Here, it refers to the employee's capacity to finish tasks in a way that meets predetermined requirements for precision, neatness, and thoroughness. Workers can finish within the allotted time and make the most of the time for other tasks. The ability to work and

fulfill obligations on one's own, with as little assistance from others as possible, is referred to as independence. initiative in finishing work, which refers to employees making decisions or taking appropriate action without direction. pertaining to the capacity for group collaboration

Work motivation is something that creates encouragement or enthusiasm for a person in doing things related to work activities in order to achieve organizational goals (Hasibuan., 2016)

The Hierarchy of Human Needs, often known as Maslow's Theory, was developed by clinical psychologist Abraham Maslow and outlined five needs for humans in order of significance. Humans strive to satisfy their needs starting with the most basic, which are physiological demands. Once those needs are met, they go on to the next level, which is self-actualization, and so on, until they satisfy their most fundamental needs (Robbins. & Judge., 2019)

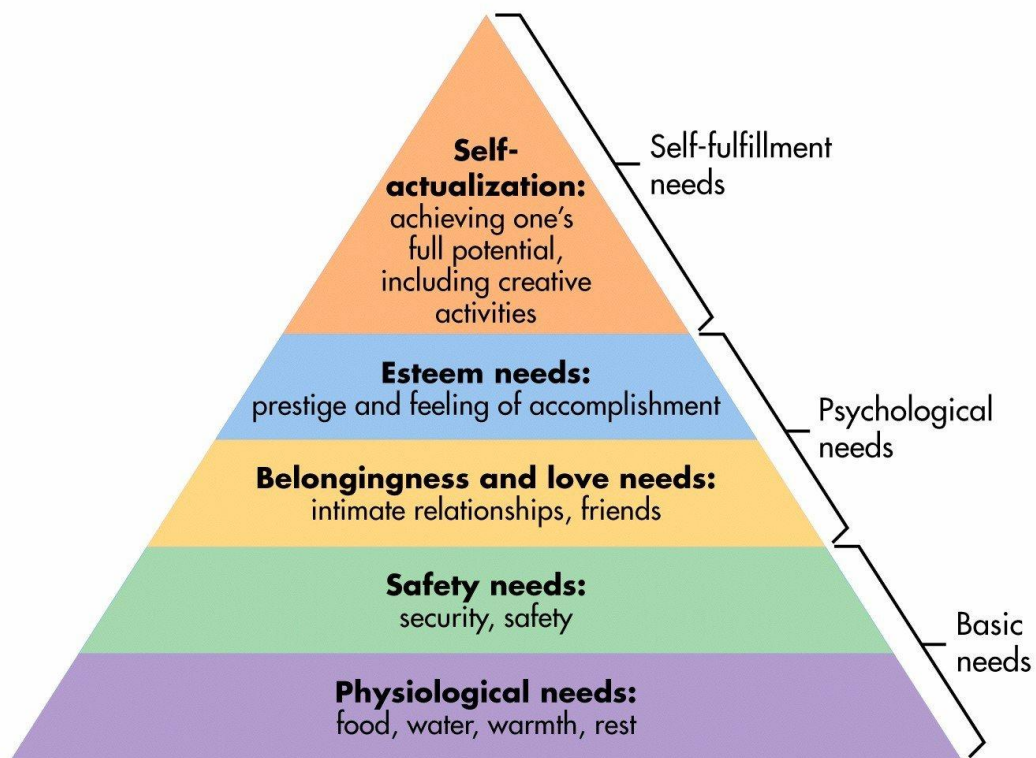


Figure 2. Maslow's Hierarchical Motivation Theory

Motivational and hygiene are part of the two-factor theory put forward by Herzberg, known as Herzberg's Two Factors Motivational Theory. According to Herzberg (Hasibuan., 2016), people want two kinds of need factors, namely motivational factors and hygiene factors. Herzberg's motivation theory can be seen in figure 3 below.

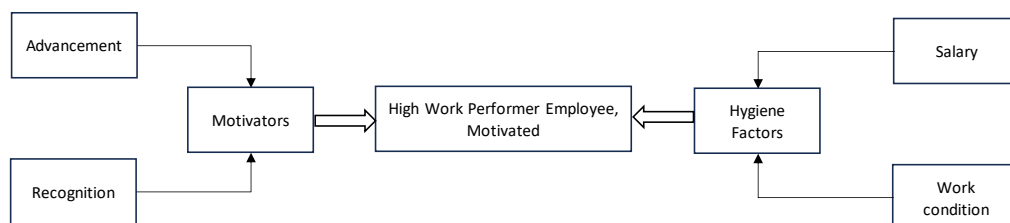


Figure 3. Herzberg's Motivation Theory Framework Source: Obaied and Fawzy (2022).

According to Obaied and Fawzy (2022), the factors that influence the motivation of construction workers are: Salary / wages, Recognition, Advancement / skill development, Work conditions / work environment, Job Security / certainty of continued employment, Relationships / interactions with fellow workers, Supervision and Achievement

According to Azeez, et. al. (2019), factors that influence the motivation of construction workers can be grouped into four, namely: Financial, such as wages, Development, such as training, learning, Social, such as organizational culture, performance support, working hours, Personal, such as suitable work, responsibility, job variety.

So the proposed hypothesis can be seen in Figure 4. below this:

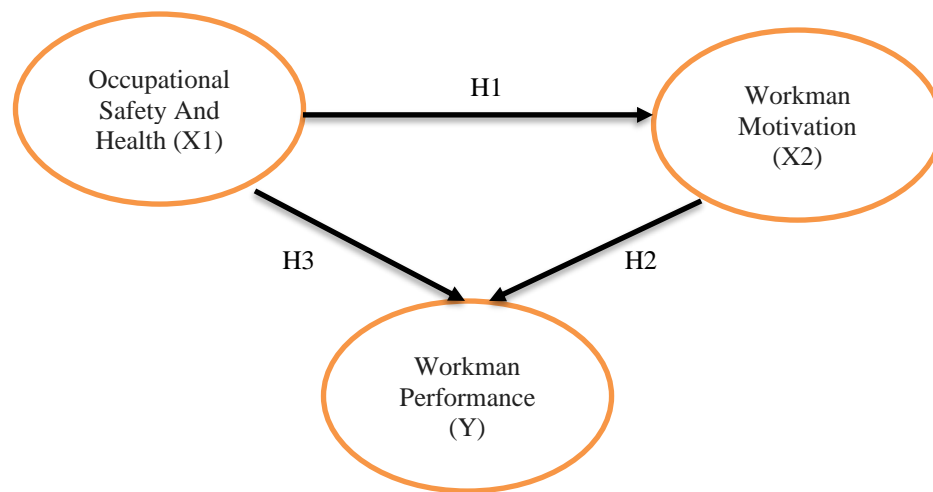


Figure 4 Hypothesis Model

RESEARCH METHODS

Materials

This study uses a quantitative approach, data analysis is quantitative or statistical in nature with the aim of testing the established hypothesis. The research method used in this study is a survey method to respondents through the distribution of questionnaires. The process of this research stage can be seen in Figure 5.

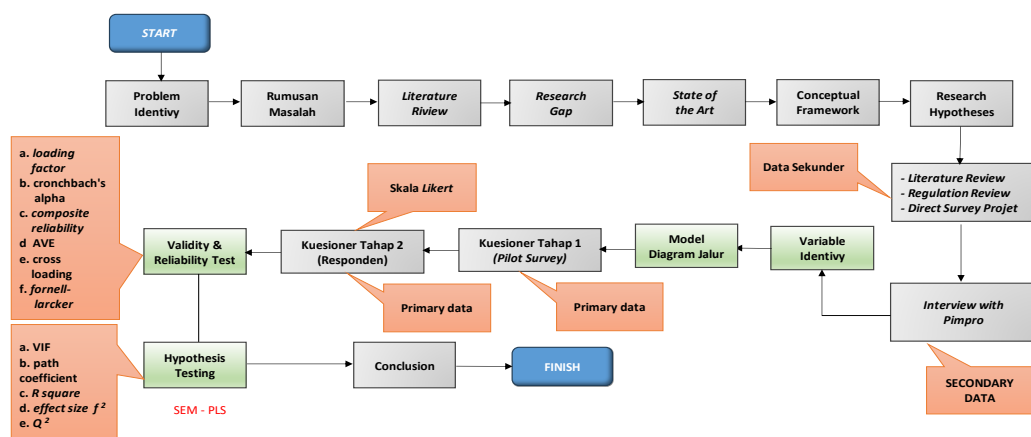


Figure 5. Research Stages

Methods

The research carried out is causal descriptive research, using a quantitative approach, Occupational Safety and Health variables (X1) with indicators: Personnel selection and placement, Occupational Safety and Health Culture, Worker health monitoring, Hazard inspection, Environmental cleanliness, Restricted areas Emergencies, K3 information, Work systems, Hazard inspections, Organization and performance (Divya et al., 2017), (Education, 2019). Motivational variables with indicators: Wage, Accuracy of payment, Development, Position advancement, Job fit, Responsibility, Work environment, job security, Communication, supervision and Work life balance (Azeez et al., 2019) (Obaied & Fawzy, 2022). Performance variable with indicators: Number (output) of work results, Quality of results and Team work (Priansa., 2014).

Data Analysis

In this research, because the population is 72, the author uses saturated sampling, where questionnaires will be distributed to all craftsmen working on the project. According to Sugiyono (2019), saturated sampling is a sample selection technique if all members of the population are sampled. The measurement variables in the questionnaire use a Likert scale, the model used in this research is a causality or relationship or influence model and to test the proposed hypothesis, the analysis technique used is SEM (Structural Equation Modeling)-PLS (Partial Least Squares).

RESULT AND DISCUSSION

From the results of distributing questionnaires to craftsmen in residential projects, answers were obtained from 72 respondents. The profile of respondents based on education can be seen in Table 1, where 9 respondents (12%) have elementary school education, 33 respondents (46%) have junior high school education, and 30 respondents (42%) have high school/vocational education. Meanwhile, if we look at work experience, 44 respondents (61%) have work experience on construction projects for less than 5 years, 21 respondents (29%) have work experience on construction projects between 5 and 10 years, and 7 respondents (10%) have work experience on construction projects for less than 5 years. %) have work experience of more than 10 years. This can be seen in Figure 4.2 below, so it can be seen that most respondents' work experience is less than 5 years. In this picture, it can be seen that the age of most respondent craftsmen is 31-35 years old

Table 1. Profile of Participants

Profile	Amount	Percentage
Age		
1. 18 – 25 years	7	10
2. 26 – 30 years	19	26
3. 31 – 35 years	27	38
4. 36 – 40 years	13	18
5. \geq 40 years	6	8
Education		
1. High School/Equivalent	30	42
2. Junior high school	33	46
3. Elementary school	9	12
Job Experience		
1. < 5 years	44	61
2. 6 – 10 years	21	29
3. > 10 years	7	10

Outer model

Testing and assessing the connections between indicators and their constructs—latent variables—is the goal of the measurement model, also known as the outer model. If the loading factor value of a variable is (\geq) 0.7 or greater, it can be considered valid. The loading factor value for each indicator is larger than ($>$) 0.7, according to the computation findings. This suggests that every indicator is

legitimate, meaning they all serve as variables. Additionally, the results of the discriminant validity test demonstrate that each indicator has excellent discriminant validity because its correlation value with its own variable is greater than its correlation with other variables. Construct reliability and validity test findings, such as Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha (CA) Table 2 summarizes Average Variance Extracted (AVE) and Composite Reliability (CR), arranged from lowest to highest. All variables (constructs) have CA and CR values greater than 0.7, indicating their reliability. Similarly, all variables have an AVE value greater than 0.5, indicating their validity (Hair et al, 2021). For this reason, every research variable is legitimate, trustworthy, and appropriate for usage and additional analysis. There are indicators removed with a loading factor of less than 0.7, namely: Hazard inspection, Organization and performance, Promotion, Responsibility and communication.

Table 2. Result of the Outer Model

Construct	CA	CR	AVE
Safety And Health (X ₁)	0.914	0.929	0.594
Workman Motivation (X ₂)	0.912	0.928	0.588
Workman Performance (Y)	0.716	0.841	0.639

Hypothesis Testing

Hypothesis testing in research includes the influence of Occupational Safety and Health, motivation, and performance. The results of the t value of the path coefficient and the structural model are presented in Figure 4 and summarized in Table 4. All hypotheses (H1 to H3) were significantly supported, showing significance at the t value exceeding the critical value of the t table for $\alpha = 0.05$ and 0.01. Specifically, the value of occupational safety and health influences work motivation with a path coefficient value of 0.713, then motivation influences performance with a path coefficient value of 0.507, then safety and health influences performance with a path coefficient value of 0.263. The smallest path coefficient observed is the impact of safety and health on performance, while the largest path coefficient is the impact of safety and health on motivation.

Table 3. Hypothesis Testing Result

Hypothesis	Original sample (O)	Tstatistics (O/STDEV)	P values	Information
safety and health on motivation	0.713	12.131	0.000	Supported
motivation on performance	0.507	4.342	0.000	Supported
safety and health on performance	0.263	2.049	0.041	Supported

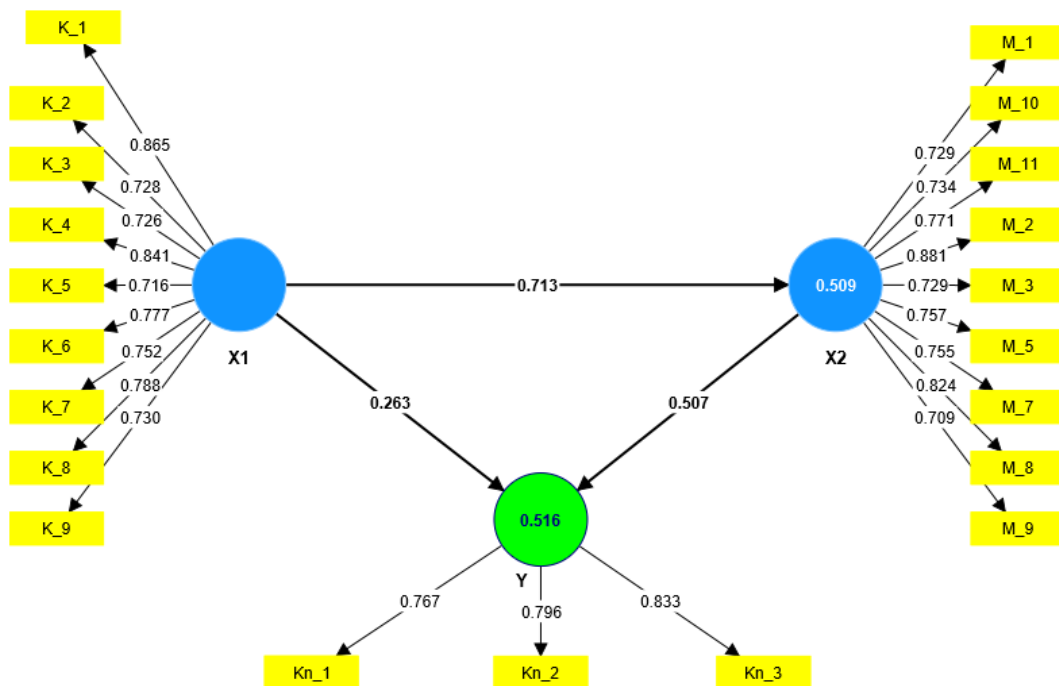


Figure 6. SemPLS Models

Discussion

Occupational Safety and Health on Worker Motivation

The results of the study found that Occupational Safety and Health (X1) had a significant effect on Worker Motivation (X2) with a t value greater than the t table ($12.131 > 1.994$) with a P value of less than 0.05 ($0.000 < 0.05$), the better the level of work safety and health on a project, the higher the craftsman's motivation to work.

Work safety has many benefits for employees and companies, employees who feel safe in the work environment tend to be more motivated to work and vice versa, discomfort or worry about injury or danger can interfere with focus and productivity. By ensuring good workplace safety, employees can focus fully on their tasks without unnecessary distractions. Work safety can be a source of motivation for craftsmen who care about their own well-being and that of their co-workers. When fitters realize that good safety practices allow them to work safely and safeguard their health, they tend to be motivated to comply with established safety procedures.

Work environments that have high safety standards tend to be more organized and efficient. When all craftsmen comply with safety procedures, the risk of accidents and work disruptions can be minimized. This creates a more structured work environment and allows fitters to work more effectively. Handymen who work in a safe environment tend to experience lower levels of stress. A sense of security and trust in the work environment can reduce anxiety and tension, which in turn increases work motivation and overall well-being

Motivation on Performance

The results of the research show that Builder Motivation (X2) has a significant positive effect on Builder Performance (Y) in Residential Construction Projects, with an indication of the path coefficient value of craftsman motivation on craftsman performance of 0.507 (significant) then the T value $> T$ table ($4.342 > 1.994$) and at p -value $<$ significance level ($0.000 < 0.05$) the results of this study are in line with research by Van Tam (2021) and Obaied and Fawzy (2022), which states that motivation is an important factor in employee performance, with high motivation, performance will increase.

Builders' motivation is a key factor influencing their performance in construction projects. Motivated handymen tend to be more productive in their work. High motivation drives them to work harder, smarter, and more efficiently, which in turn increases overall productivity on the construction site. Strong motivation can encourage craftsmen to provide extra attention to detail and high quality standards in their work. They may be more likely to follow correct procedures and ensure that the job is done well.

Motivated builders tend to have a higher level of commitment to the project. They feel more connected to the project's goals and are more excited to see it succeed. This can result in greater dedication to the job, including working longer hours if necessary. Motivated handymen are less likely to be absent or late. They have internal motivation to come to work and complete their tasks on time. This reduces disruptions in project schedules and ensures smooth operations

Occupational Safety and Health on Performance

The results of the research show that occupational safety and health (X1) has a significant positive effect on craftsman performance (Y) in residential construction projects, with an indication of the path coefficient value of occupational safety and health on craftsman performance of 0.263 (significant) then the T value > T table ($2.049 > 1.994$) and at p-value < significance level ($0.041 < 0.05$). The results of this research are in line with the research of Othman et. al. (2017) which states that factors that influence the effectiveness of safety management in construction projects are training and introduction to K3. With effective management, performance will increase.

Occupational safety and health (K3) is an important aspect in the construction industry that has a significant impact on the performance of craftsmen. A strong focus on K3 helps reduce the risk of workplace injuries and accidents. Handymen who work in a safe environment tend to be more focused on their tasks and have a lower risk of injury, which in turn can improve their performance.

Good K3 practices can help optimize work processes and reduce disruptions caused by accidents or incidents. In this way, craftsman productivity levels can increase because less time is spent on resolving safety issues that occur. Work accidents and injuries can cause project delays and additional costs in repairs and compensation. Focusing on K3 can help reduce these risks, ultimately saving overall project time and costs. A safe and healthy work environment can increase the morale and motivation of craftsmen. They feel valued and protected by the company, which can increase job satisfaction and enthusiasm to provide the best results in their work

CONCLUSION

The dominant factors in Occupational Safety and Health (K3) in residential construction projects are monitoring of worker health, emergencies, personnel selection and placement, and hazard inspection. Occupational Safety and Health (K3) has a significant positive effect on the motivation of workers in residential construction projects, with a p-value <0.05. The better the level of occupational safety and health of a residential project, the higher the motivation of workers to work. The dominant factors in the motivation of workers in residential construction projects are wages, timely payment, and continuity (job security). Worker motivation has a significant positive effect on the performance of workers in residential construction projects, with a p-value <0.05. The higher the motivation of workers to work, the more it improves the performance of workers. Occupational Safety and Health has a significant positive effect on the Performance of Workers in Residential Construction projects, with a p-value <0.05. The better the level of safety and health of workers, the better the performance of workers. It can be concluded that Occupational Safety and Health (K3) has a significant influence on the motivation of craftsmen and improving the performance of craftsmen.

ACKNOWLEDGEMENT

Thank you to the lecturers of Mercu Buana University who have helped in this research and to all staff of the Civil Engineering Masters Study Program, Mercu Buana University, Jakarta, as well as the residential construction project workers in Tangerang City.

REFERENCES

- Azeez, M., Gambatese, J., & Hernandez, S. (2019). What do construction workers really want? A study about representation, importance, and perception of US construction occupational rewards. *Journal of Construction Engineering and Management*, 145(7), 4019040. [https://doi.org/10.1061/\(asce\)co.1943-7862.0001669](https://doi.org/10.1061/(asce)co.1943-7862.0001669)
- Deny., S. (2017). Pekerja yang meninggal di 2016 naik lebih dari 300 persen. Retrieved March 5, 2023, from <https://www.liputan6.com/bisnis/read/2825144/pekerja-yang-meninggal-di-2016-naik-lebih-dari-300-persen>
- Divya, P., Bhavsar, J. J., & Pitroda, J. (2017). A Critical Review on Safety Management in Construction Projects. *International Journal of Constructive Research in Civil Engineering*, 3(4), 148–154. <https://doi.org/10.20431/2454-8693.0304013>
- Education, B. C. (2019). Risk and Safety Management in the Construction Industry: A Case of Tamale Metropolis, Northern Region. *International Journal of Vocational and Technical Education Research*, 5(3), 22–39.
- Eze., E., Sofolahan., O., & Siunoje., L. (2020). Health and Safety Management on Construction Projects: The View of Construction Tradespeople. *CSID Journal of Infrastructure Development*, 3(2), 152–172. <https://doi.org/10.32783/csid-jid.v3i2.165>
- Hair, J. F. et al. (2021). *Partial Least Squares Structural Equation Modeling (PLSSEM) Using R, Practical Assessment, Research and Evaluation*. United States of America: SAGE Publications, Inc.
- Hamali., A. Y. (2016). *Pemahaman Manajemen Sumber Daya Manusia: Strategi Mengelola Karyawan*. CAPS (Center for Academic Publishing Service). Yogyakarta.
- Hasanudin. (2022). Konstruksi penyumbang terbesar kecelakaan kerja di Indonesia. Retrieved March 5, 2023, from <https://www.konstruksimedia.com/konstruksi-penyumbang-terbesar-kecelakaan-kerja-di-indonesia/infrastruktur/>
- Hasibuan., M. (2016). *Manajemen Sumber Daya Manusia*. Jakarta: Bumi Aksara.
- Indah, A. (2017). Evaluasi Penerapan Keselamatan Dan Kesehatan Kerja (K3) Pada Proyek Bangunan Gedung Di Kabupaten Cirebon. *Jurnal Teknik Sipil & Perencanaan*, 19(1), 1–8.
- Lopez del Puerto, C., Clevenger, C. M., Boremann, K., & Gilkey, D. P. (2014). Exploratory study to identify perceptions of safety and risk among residential Latino construction workers as distinct from commercial and heavy civil construction workers. *Journal of Construction Engineering and Management*, 140(2), 4013048. [https://doi.org/10.1061/\(asce\)co.1943-7862.0000794](https://doi.org/10.1061/(asce)co.1943-7862.0000794)
- Obaid, F. A., & Fawzy, M. F. (2022). Motivation Factors'impact On Construction Employees'performance At A Saudi Company. *International Journal of Economics, Commerce and Management*, 10(5), 102–123. Retrieved from <http://ijecm.co.uk>
- Othman., I., Shafiq., N., & Nuruddin., F. M. (2017). Effective Safety Management in Construction Project. In *IOP Conference Series: Materials Science and Engineering* (Vol. 291, p. 12018). <https://doi.org/10.1088/1757-899X/291/1/012018>
- Pemerintah, P. (2012). Peraturan Pemerintah Nomor 50 Tahun 2012 tentang Penerapan Sistem Manajemen Keselamatan Dan Kesehatan Kerja.
- Priansa., D. J. (2014). *Perencanaan dan Pengembangan Sumber Daya Manusia*. Bandung: Alfabeta.
- Ramli., S. (2009). *Sistem Manajemen Keselamatan dan Kesehatan Kerja*. Jakarta: PT. Dian Rakyat.
- Robbins., P. S., & Judge., T. A. (2019). *Perilaku Organisasi : Organizational Behavior*. Jakarta: Salemba Empat.
- Setiawan, A. P., & Soekiman, A. (2023). Faktor-Faktor yang Mempengaruhi Motivasi Pekerja pada Proyek Konstruksi Berdasarkan Latar Belakang Pekerja. *Rekayasa Sipil*, 17(2), 130–139. <https://doi.org/10.21776/ub.rekayasasipil.2023.017.02.3>

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: PT Alfabeta.

Suma'mur, P. K. (2009). *Hiegiene Perusahaan dan Keselamatan Kerja*. Jakarta: CV Sagung Seto.

Van Tam, N. (2021). Motivational factors affecting construction labor productivity: a review. *Management Science and Business Decisions*, 1(2), 5–22. <https://doi.org/10.52812/msbd.31>

Widaningsih, L. (2020). *Tukang Bangunan Pewarisan Keterampilan Vokasional*. Bandung: Universitas Pendidikan Indonesia Press.

Widowati., E., & Safitri., N. (2017). Penerapan Risk Management Pada Pekerjaan Di Ketinggian Berdasar SNI ISO 31000:2011. *HIGEIA (Journal Of Public Health Research And Development*, 1(2), 77–88. Retrieved from <https://journal.unnes.ac.id/sju/index.php/higeia/article/view/14005>