Grand Design of the Corporate Value for Work Regulations at Teaching Factory Classes

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Abstract. The tendency of teaching factory referral schools only prioritizes vocational competence and overrides corporate value. This research aims to produce a grand design for the development of corporate values that are relevant to work standards in the industry. The research method used is Research and Development. Data analysis techniques used a mix of methods with more dominant qualitative analysis. This research was conducted at Vocational School and partner industries. The results of the study indicate that they have not applied the standards of occupational safety and health management. Whereas, in AHASS dealer, occupational safety and health management used is guided by ISO 45001: 2018. The resulting grand design is in the form of occupational safety and health discipline development, the design of the completeness of work safety equipment, reference occupational health and safetysigns, identification of potential hazards, prevention analysis and handling of accidents in the teaching factory workshop. The results of the expert assessment showed a percentage of the feasibility of 86%, which means that the grand design is very feasible to be applied in the vocational teaching reference factory, while the results of trials on automotive expertise teachers obtained a mean of 41.5 which means very feasible.

Keywords: ISO 45001, occupational safety and health, teaching factory

1 Introduction

Teaching factory can bridge the competency gap between industry needs and school knowledge[1]. Suggests that the real aspects of production are essential to be used as teaching objectives as directives to improve teaching activities with knowledge of them, their existence in the process of industrial activities every day [2]. The concept of "factory-to-classroom" is the principle of the teaching factory. The idea requires vocational learning to be more contextual.Teaching factory needs to be integrated in high school curriculum [3]. This is supported by research [4],[5] that the teaching factory learning model is suitable for high school students to educate students to be better prepared to work in industry and as well as independent entrepreneurs. The teaching factory program today is a new breakthrough for the world of education in Indonesia. It cannot be doubted that to create competent and ready work to vocational school graduates according to the demands of the workforce, work-based learning is one solution.

The existence of the teaching factory development program, of course, it is essential to have a grand design development of teaching factory that is suitable to be applied in learning in vocational schools in real terms. In this case, the integration of industrial values into the

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teaching factory that is applied in vocational schools, especially in learning. Corporate values, such as work attitudes and ethics, discipline, and occupational health and safety[6]. Moreover, the activity in the teaching factory is the transfer of skills to impact the competence of manufacturing or industry standards [7]. One of the weaknesses of managing the teaching factory at SMK Muhammadiyah Prambanan is that there is no occupational health and safety standard operating procedure (OHS SOP) that can be applied in teaching factory classes, especially in terms of workshop management and the implementation of student work processes.

Furthermore, the essence of OHS is getting stronger and must be applied in work processes for employees in industries that are proactively controlled directly by the organization/leader [8]. This provision is guaranteed in ISO 45001: 2018 to prevent injuries, work accidents, health problems, increase employee understanding and provisions on OHS, create a safe work environment, improve work efficiency and open national and international markets and assist the government in implementing OHS legislation requirements [9]. The principle of occupational health and safetyis not only to ensure the well-being of workers but also to contribute positively to productivity [10]. Healthy workers are more likely to be better motivated, enjoy greater job satisfaction, and contribute to better-quality products and services [11]. The same thing is confirmed from the results of research that the safety of OHS in the OHS management system plays a role in controlling occupational accidents, especially in preventing recurring work accidents [12]. So in a workshop SOP that is actualized in practice, students need a grand design of developing corporate values in the industry-based OHS dimension. The OHS management system cycle with ISO 45001: 2018 standards includes: (1) context of the organization, (2) leadership, (3) planning, (4) support, (5) operation, (6) performance evaluation, and (7) improvement [13],[14]. In developing corporate value, as stated in the SOP practices, the standards that can be adopted from ISO 45001: 2018 are the substance of planning, support, and implementation.This research aims to produce a grand design for the development of corporate values that are relevant to work standards in the industry.

2 Method

This research uses the Research & Development (R & D) method. It is producing the final product in the form of grand design for the development of corporate value that has been tested for its effectiveness by expert judgment and disseminated to the Vocational School Reference teaching factory. The research and development model used in this study is adopting the opinion of Borg & Gall which has been adapted to the needs of the research and reduced to 6 steps which include: (1) initial research and information gathering, (2) planning, (3) development initial product format, (4) product validation test, (5) product improvement revision, and (6) dissemination [15]. The place of research was carried out at Muhammadiyah Prambanan Vocational School and AHASS workshop PT. Cahaya Sakti Chandra Motor. Partner industry informants were chosen: (a) the head of the workshop, (b) OHS experts in the industry and (c) trade unions. The informant of the referral vocational school was chosen: (a) automotive department, (b) productive teacher who taught OHS, (c) teacher coordinator class teaching factory. Data collection techniques used in this study include (1) interviews, (2) participant observation, (3) documentation, and (4) questionnaire. Data analysis techniques in

this study used a mixed-method with more dominant qualitative analysis. To find out the feasibility of the grand design is analyzed using descriptive statistics.

3 Results and Discussion

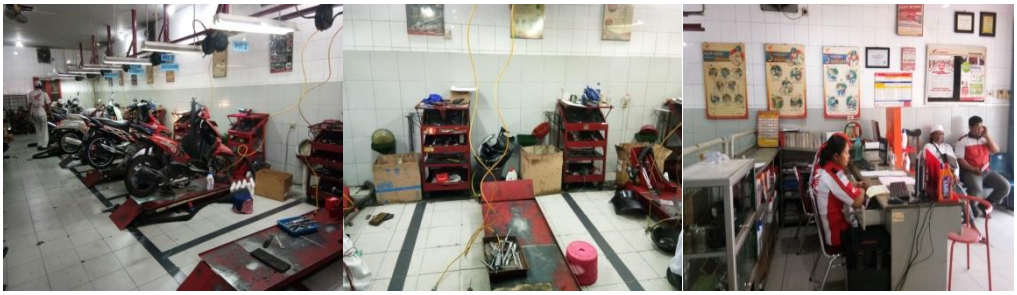
3.1 Differences in the implementation of occupational health and safetyin Vocational Schools with AHASS

Workshop The findings of the interviews and observations at the motorcycle workshop in the teaching factory class showed that the OHS implementation was still weak, there was no written SOP for the teaching factory class at the Muhammadiyah Prambanan Vocational School. While the OHS attributes provided are still minimal, namely in the form of wear pack and equipped with oil storage tanks and cleaning tools.

(1) (2) (3)

Fig. 1- 3. Motorbike repair shop environment motorcycle teaching factory class at Muhammadiyah Prambanan Vocational School

The OHS implementation in PT. Cahaya Sakti Chandra Motor is very well seen from the SOP used in AHASS dealers referring to the guidelines of PT. Astra by referring to ISO 45001: 2018. Control of the implementation of mechanical work is carried out by SA. Every technician is equipped with OHS knowledge, especially first aid. In the case of planning, a first aid box was prepared, OHS signs were installed on the wall of the workshop, installation of the slogan Concise, Neat, Clean, Care, Diligent, recommended the maintenance of environmental hygiene through a green program. In terms of human resources support each year, they take part in level 1 and 2 AHASS training related to mechanical skill training while level 3 is related to workshop management. Moreover, the OHS Attributes provided include masks, gloves, wear packs, shoes, APAR, first aid boxes for accident victims (P3K), helmets, oil waste disposal tanks, cleaning tools, and OHS posters.



(4) (5) (6)

Fig. 4-6. An environment of the AHASS Workshop PT. Cahaya Sakti Chandra Motor

3.2 Grand design corporate value

The results of the design development of corporate values contained in the OHS SOP consist of sub designs (1) objectives; (2) work safety and health rules; (3) work safety equipment; (4) OHS signs; (5) identification of hazards; (6) prevention of work accidents; and (7) handling of accidents. The content in the seven sub-designs was developed in accordance with the needs of the motorcycle workshop, which was developed by adopting the OSH management system in the partner industry, namely the ISO 45001: 2018 standard.

First, the sub-objectives are translated into maintaining a healthy and environmentally friendly workshop environment, cultivating high occupational health and safety attitudes, ensuring occupational health and safety, maintaining workshop equipment, minimizing the risk of workplace accidents.

Second, the rules include: prohibited from taking or carrying out equipment and spare parts of the workshop without the permission of the teaching coordinator of the factory, use tools and materials according to the needs of motorcycle repair / service, ask if you are in doubt or do not understand when repairing the vehicle, recognize all OHS type of equipment and its location, wear wear pack and shoes in the workshop and use gloves and mask suits for work needs, cultivate Concise, Neat, Clean, Care, Diligent, if there is damage or accident, immediately report to the teacher coordinator, do not play -In the workshop, smoking is prohibited in the workshop, teacher coordinator teaching factory oversees student performance.

Third, work safety equipment consists of light fire extinguishers (APAR), first aid kits, cleaning tools (mats, brooms, trash cans, oil tanks), used oil dumps, PPE (wear pack, gloves, masks, helmets), posters, slogans, OHS signs.

Fourth, OHS signs consist of explosive hazard, electrical hazard, chemical hazard, fire hazard, no smoking, maintain cleanliness, wear a helmet, wear safety shoes, wear gloves, wear masks, carefully slip.

Fifth, identification of hazards including the placement of batteries close to the heat and fire (fire), turning on the stop contact with wet hands, the electrical cable is peeled off, the battery is closed in the wrong cover (electric shock) and fire, the water is spilled when recharged. Do not wear a mask when using the carburetor cleaner, excessive brake fluid filling, brake hose leaking during bleeding, a fire in the garage because of fuel, a fire occurs due to cigarette butts, slipped because of garbage, an accident occurred when the brain drives test drive on the highway, slipped and pierced sharp objects on the leg until bleeding, hands overheated when opening the radiator lid, hand blisters slashed by a lathe/grinder, hand

blisters due to opening a hard body bolt, an accident or arising a disease in the respiratory tract, slipping because the oil scattered on the floor when changing oil and lubricate the wheel chain.

Sixth, prevention of work accidents by means of batteries placed at normal temperature, the workshop room is equipped with fans and adequate ventilation, and keep the fire away from the batteries. Make sure the battery cover is not open, install OHS signs in the workshop and do first aid for students, making sure the hands are dry when holding the stop contact, making sure there is no peeling power cord, pinch the battery according to the thumb cable. The red cable is closed (+), and the black cable is closed (-), using a hose and gloves when filling the battery water. Fill the brake fluid right at the limit of the sign up and use gloves, make sure the hose to the brake master does not leak, place the fuel at normal temperature and tightly closed, each student, teacher, and customer is prohibited from smoking in the garage, throwing garbage in its place, using helmet when test drive. Using shoes when working in the garage and when washing motorbikes, use gloves when opening the radiator lid and make sure the engine is cold, open the wheel bolts or body with gloves, use gloves when grinding / turning the disc plate / disc disc, using a mask when cleaning the oil filter, air filter, cleaning the carburetor, maintaining cleanliness, using the tub when changing oil and lubricating the chain, cleaning the floor from oil spills. Dispose of oil in used oil storage tanks.

Seventh, handling accidents by extinguishing them with CO_2, dry chemical and halon fire extinguishers, using sacks, sand, extinguishing with CO_2, dry chemical and halon fire extinguishers, rescuing electrocuted victims by turning off the power source, preparing RJP (Cardiac Lung Resuscitation) with fifteen chest compressions and two breaths, Apply hydrocortisone to itchy skin, drink CTM, Batasone, insidal etc., clean the skin with running water and skin soap thoroughly, extinguish the fire with a foam type, CO_2, dry chemical, and Halon 1211, extinguish with sacks, sand and water, extinguish the fire with APAR and contact Damkar, help move the victim to a safe place, reduce the pain with a cold compress, make a splint if there is a broken bone, move the victim in a safe position, refer to the nearest hospital, clean the bleeding part with water / alcohol, give betadine and bandages. If too much blood is pressed directly on the bleeding part and apply a bandage, do elevation (elevate the injured area of the heart), cold compress the blistering/hot hand, clean the bleeding part with water/alcohol, give betadine and bandage. If too much blood is pressed directly on the bleeding part and give a bandage, do elevation (elevate the injured area of the heart), take white air and consult a doctor for routine check-ups, help move the victim in a safe place, reduce pain with cold compresses , make a splint if there is a fracture.

3.3 Feasibility level of grand design

Based on the results of the assessment of 5 experts consisting of 1 workshop management expert, two occupational health and safetyexperts and one automotive expert obtained the following data.

$$PK = (\Sigma N1 + \Sigma N2 + \Sigma N3 + \Sigma N4 + \Sigma N5) / 240 \times 100\% \quad (1)$$
$$= (40 + 41 + 43 + 39 + 44) / 240 \times 100\%$$
$$= 86\%$$

The information in equation (1) is PK, namely the percentage of feasibility, ΣN1, namely the total assessment of the workshop management expert 1, ΣN2, namely the total assessment of the workshop management expert 2, ΣN3, namely the total assessment of occupational health and safetyexperts 1, ΣN4, namely the total assessment of occupational health and safetyexperts 2, ΣN5 is the total rating of automotive experts.With the acquisition of the feasibility percentage of 83%[16], it can be concluded that the level of feasibility of grand

design of OHS SOP is categorized as very feasible to be applied in the motorcycle workshop class teaching factory at Muhammadiyah Vocational High School in Prambanan. Furthermore, the results of trials on ten teachers of automotive expertise at Muhammadiyah Prambanan Vocational School showed that the mean 41.50 was in the very high category or very feasible. The complete data can be seen in the table below.

Table 1. Test statistics grand design

N	Valid	10
	Missing	0
Mean	41.50	
Median	41.50	
Mode	41a	
Std. Deviation	1.080	

Table 2. Frequency distribution of grand design trials

No.	Interval	Category	Frequency	Percentage (%)
1.	37 - 44	Very High	10	100%
2.	28 - 36	High	0	0%
3.	19 - 27	Enough	0	0%
4.	10 - 18	Less than	0	0%
		Total	10	100%

3.4 Discussion

The lack of OHS implementation in the motorcycle workshop class teaching factory can be improved by adopting the ISO 45001: 2018 standard as implemented by the partner industry. The strengthening of OHS management in this study was realized in the grand design of the OSH SOP. Where in the concept describes the completeness of the equipment and OHS signs that must be in the automotive workshop, confirms the OSH rules that must be obeyed, analyzed the potential hazards, provided accident prevention solutions and described the procedures for handling accidents that are good and right. This design integrates cycle three planning, cycle four support, and cycle five implementation in ISO 45001: 2018 [17]. It was further emphasized in the findings of the research that an excellent OHS management system can be started from careful planning, especially the analysis of potential hazards and their prevention [18]. Therefore, to increase awareness of the importance of OSH in workplaces/workshops, an alternative to installing OHS signs in an attractive location can be done. The SOP design results are nineOHS signs that are suitable for the needs of the workshop environment. The OSH guidelines and rules designed in this SOP are the results of the adoption of facilities and management systems in the AHASS workshop. In line with this, offer solutions to the obstacles to the implementation of OSH practices, namely through the support of industrial partners to help consolidate OSH practices [19]. In other words, the APD completeness adoption system and the addition of OHS attributes in the teaching factory class is a form of indirect support from the industry in terms of providing information and direct observation from the AHASS workshop environment. Further discussion on the accident prevention sub-design is controlled through the use of complete personal protective equipment (PPE), responsive to OSH signs, working in accordance with the SOP and OSH rules, separating the causes of potential hazards and adding knowledge to human resources. The

substance in this sub design is relevant to the research that prevention to reduce risk by eliminating hazards, replacing materials, processes, equipment with non-hazardous materials, using technical controls, installing warnings/ OHS signs, carrying out administrative controls and the use of personal protective equipment [13]. Then in the orderly sub design in writing, it discusses administrative control and technical controversy in the implementation of OHS in the workshop areconcluded that ISO 45001: 2018 focused more on strengthening the organizational context, including employees and leaders in the control of the implementation of OSH [20]. So that grand design can be said to have reliable control from the teacher, including students in the application of OHS in the teaching factory classroom workshop environment.

4 Conclusions

The grand design of corporate value in-class reference teaching factory includes sub design goals, OHS rules, OHS tools, OHS signs, hazard identification, prevention of work accidents, and accident prevention. The design feasibility percentage from an expert assessment is 86% (very feasible) while the design test results obtained mean 41.5 (very high / very feasible). Thus the grand design of the OHS SOP is very feasible and can be immediately applied in the vocational school teaching factory.

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References

[1] L. Rentzos, M. Doukas, D. Mavrikios, D. Mourtzis, G. Chryssolouris, "Integrating Manufacturing Education with Industrial Practice using Teaching Factory Paradigm: A Construction Equipment Application," in *Procedia CIRP 17 (2014)*, pp. 189 – 194. 2014

[2] R. C. Putra, I.H. Kusumah, M. Komaro, Y.Rahayu, E.P. Asfiyanur., "Design Learning of teaching factory in mechanical engineering," in *IOP Conf. Series: Materials Science and Engineering 306*, pp. 1–5, 2008.

[3] G.Chryssolouris, D. Mavrikios, L.Rentzos. "The Teaching Factory: A Manufacturing Education Paradigm," in *Procedia CIRP 57*, pp. 44–48, 2016.

[4] A. M. Khoiron., "The Influence of Teaching Factory Learning Model Implementation to the Students' Occupational Readiness," *J. Pendidik. Teknologi. dan Kejuruan.*, vol. 23, no. 2, pp. 122–129, 2016.

[5] T. Kuat, "Implementation of edupreneurship through the teaching factory in vocational high school of hotel accommodation: Case study at SMK N 6 Yogyakarta.," *J. Vocat. Educ. Stud.*, vol. 1, no. 1, pp. 7–12, 2018.

[6] Departement of Labor and Employmentoccupational Safety and Health Center, "Basic Occupationalsafety and Health Training." [Online]. Available: http://www.oshc.dole.gov.ph/images/OSHTrainingAnnouncement/BOSH-Manual_Narrative-Handout.pdf, 2010.

[7] D. H. Martawijaya, "Developing a Teaching Factory Learning Model to Improve Production Competencies Among Mechanical Engineering Students in a Vocational Senior High School,"

J. Tech. Educ. Train., vol. 4, no. 2, pp. 45–56, 2012.

[8] Tom O' Connor, M.Flynn, D. Weinstock, J,Zanoni. "Education and Training for Underserved Populations," in *National Conference on Eliminating Health and Safety Disparities*, pp. 14–15, 2011.

[9] International Organization for Standardization, *Occupational health and safety ISO 45001*. Switzerland: ISO Central Secretariat, 2018.

[10] M. Dieleman and J. W. Harnmeijer, "Improving health worker performance: in search of promising practices." Department of Human Resources for Health Geneva, 2016.

[11] B. O. Alli, *Fundamental Priciples of Occupational Health and Safety*. Geneva: International Labour Office, 2008.

[12] D. Ratnawati and Setuju, "Problem analysis on the work cycle of occupational safety and health management system in manufacturing industry," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 535, no. 1, pp. 1–10, 2019.

[13] R. Kleinova and P. Szaryszova, "The New Health And Safety Standard Iso 45001:2018 And Its Planned Changes," *Int. J. Interdiscip Theory Pr.*, vol. 3, 2014.

[14] Masjuli, "Antisipasi Industri dalam Merespon Publikasi Iso 45001 Tahun 2018," *J. Ind. Hyg. Occup. Heal.*, vol. 1, no. 2, 2017.

[15] W. R. Borg and M. D. Gall, *Educational Research An Introduction*. New York: Longman, 1983.

[16] S. Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: PT. Rineka Cipta, 2010.

[17] S. C. C. M. (SCCM), *Implementing ISO 45001 and Transition from OHSAS 18001*. Netherlands, 2017.

[18] R. Muthuviknesh and K. A. Kumar, "The Effect of Occupational Health and Safety Management on Work Environment: A prospective Study," *Int. J. Adv. Res. Comput. Sci. Manag. Stud.*, vol. 2, no. 6, pp. 63–70, 2014.

[19] B. B. Puplampu, "Key Issue on Occupational Health and Safety Practices in Ghana: A Review," *Int. J. Bus. Soc. Sci.*, vol. 3, no. 19, pp. 151–156, 2012.

[20] J. H. O. Kauppila and V. S., "Integrated HSEQ Management Systems: Developments and Trends," *Int. J. Qual. Res.*, vol. 9, no. 2, pp. 231–242, 2015.