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Assessing the Impact of Training on Electric Motor Conversion for Sustainable Energy Transition in Indonesia

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ABSTRACT: This study evaluates the effectiveness of training programs focused on converting fuel-powered motorcycles to electric motorcycles in Indonesia as part of the sustainable energy transition. Using a mixed-methods approach, quantitative data were collected from 31 alumni of the 2022 training cohort, while qualitative insights were gathered through interviews with select participants. Quantitative result reveal that facilities have a positive and significant effect on individual impact, as does training material. However, no significant effect is observed between training syllabus and individual impact. Qualitative results reveal that while the training content is generally effective, regulatory issues, unclear conversion standards, and limited workshop certifications hinder the implementation of learned skills. Participants also noted the need for additional training on electric motorcycle servicing and battery maintenance. The study emphasizes the importance of stronger collaboration between training providers, government agencies, and industries to address these challenges. By improving training curricula, reducing financial barriers, and aligning policies with field needs, this program can further contribute to Indonesia's renewable energy goals and the development of a skilled workforce in the electric vehicle industry.

Keywords: conversion of fuel oil motors into electric motorbikes, training evaluation, training management.

ABSTRAK: *Penelitian ini mengevaluasi efektivitas program pelatihan yang berfokus pada konversi sepeda motor berbahan bakar minyak menjadi sepeda motor listrik di Indonesia sebagai bagian dari transisi energi berkelanjutan. Menggunakan pendekatan metode campuran, data kuantitatif dikumpulkan dari 31 alumni pelatihan angkatan 2022, sementara wawasan kualitatif diperoleh melalui wawancara dengan beberapa peserta. Hasil kuantitatif menunjukkan bahwa fasilitas memiliki pengaruh positif dan signifikan terhadap dampak individu, begitu pula dengan materi pelatihan. Namun, tidak ditemukan pengaruh signifikan antara silabus pelatihan dan dampak individu. Hasil kualitatif mengungkap bahwa meskipun konten pelatihan umumnya efektif, masalah regulasi, standar konversi yang belum jelas, dan keterbatasan sertifikasi bengkel menjadi hambatan dalam penerapan keterampilan yang telah dipelajari. Peserta juga menyoroti kebutuhan akan pelatihan tambahan terkait servis sepeda motor listrik dan pemeliharaan baterai. Penelitian ini menekankan pentingnya kolaborasi yang lebih kuat antara penyedia pelatihan, instansi pemerintah, dan industri untuk mengatasi tantangan tersebut. Dengan meningkatkan kurikulum pelatihan, mengurangi hambatan finansial, serta menyelaraskan kebijakan dengan kebutuhan lapangan, program ini dapat semakin berkontribusi pada pencapaian target energi terbarukan Indonesia serta pengembangan tenaga kerja terampil di industri kendaraan listrik.*

Kata Kunci: *evaluasi pelatihan, konversi motor berbahan bakar minyak menjadi motor listrik, manajemen pelatihan.*

INTRODUCTION

Energy conversion, in the context of sustainable development, energy and material efficiency, along with the integration of renewable resources, plays a pivotal role. Currently, challenges in energy conversion are not limited to technological advancements at the conversion level but extend to energy utilization, management, and infrastructure development. In the case of energy conversion in Indonesia, the government has demonstrated a strong commitment to implementing energy conversion as an effort to enhance economic growth and competitiveness, achieve energy security, and address global climate change by reducing CO_2 emissions. Energy conversion initiatives in Indonesia are carried out by improving energy management to enhance energy efficiency in industries and promoting energy conservation behaviors among individuals (Jaelani et al., 2020; Laksmi et al., 2018).

Energy conversion plays a very important role in sustainable development, especially in improving energy and material efficiency and integrating renewable resources. In Indonesia, the government has demonstrated a strong commitment through national policies, such as the General National Energy Plan (RUEN) in Presidential Regulation Number 22 of 2017, which targets 23% renewable energy by 2025. This strategy is also supported by Government Regulation Number 79 of 2014 on the National Energy Policy, which emphasizes the development of new and renewable energy. However, the challenges in achieving this target are still large, including technological innovation, energy management, infrastructure readiness, and public acceptance of new technology (Affandi et al., 2021; Hermanto, 2019)

One important effort to support the energy transition in Indonesia is the development of energy conversion technology, such as electric vehicles and renewable energy-based power plants. However, several studies indicate that there are significant barriers to the adoption of this technology. For example, Tiwari et al. (2023) highlighted the high cost of electric vehicles as a major barrier, while Rimbawati et al. (2022), and, Erivianto et al. (2020) shows that the development of renewable energy-based power plants requires further innovation in system design and implementation.

Research on energy conversion has been extensively conducted. A study by Tiwari et al. (2023) analyzed electric vehicles, highlighting that customers are hesitant to purchase electric vehicles due to their high costs. To address this, the government offers subsidies for commercial fuel-based vehicles to encourage broader adoption of electric vehicles. However, a significant drawback of electric vehicles is that battery costs remain significantly higher for electric cars compared to fuel-powered vehicles.

Rimbawati et al. (2022) examined the design and development of a system for converting fire heat energy into electrical energy, demonstrating that the utilization of heat energy for micro-capacity power generation can be achieved

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using thermoelectric elements. Additionally, Erivianto et al. (2020) explored the application of electric energy conversion systems as an alternative energy source for household needs. Their research proposed an environmentally friendly electricity generator based on an electric energy conversion system to meet domestic energy demands.

These studies collectively indicate that energy conversion research has been widely conducted, aiming to reduce reliance on fossil fuel-based energy sources and promote the transition to renewable energy alternatives.

The training programs implemented must be effectively managed to ensure that participants experience meaningful improvements in workplace competencies after completing the training. This is crucial given the significant financial investment required for training programs. Organizations must demonstrate the impact of employee training on the overall success and business performance of the organization. Consequently, assessing the effectiveness of training and organizational development becomes a priority (Alfes et al., 2013; Mollahoseini & Farjad, 2012; Ozioma Obi-Anike & Ekwe, 2014).

On the other hand, the successful implementation of renewable energy technology depends not only on technical innovation but also on developing workforce competency through training. Effective training can ensure the workforce has the knowledge and skills needed to operate and maintain new energy systems. Post-training evaluation is an important step to measure increased competency and its impact on the implementation of new technology (Jha & Sachdeva, 2024; Uslu et al., 2022). A significant investment is often required to develop and deliver such training, making it imperative to evaluate the training's impact on both individual competencies and organizational performance. Post-training evaluations can measure improvements in knowledge, skills, attitudes, and practical applications (Suprapti, 2018), thereby informing stakeholders about the effectiveness of the training and guiding future program enhancements.

Moreover, numerous studies have been conducted on post-training evaluations. These studies emphasize that the effectiveness of training can be assessed through post-training evaluations, which involve measuring or assessing behavioral changes and competencies gained during the training. Post-training evaluations are critical in identifying improvements in knowledge, skills, attitudes, and workplace behaviors. Additionally, such evaluations play a vital role in gathering data and determining the extent to which training objectives have been achieved (Suprapti, 2018).

However, studies linking training evaluation directly with the implementation of energy conversion technologies—especially in the context of converting fuel-powered motors to electric motors—are still limited. This gap is significant considering Indonesia's renewable energy target of 23% by 2025 and broader national energy transition strategies (Reyseliani & Purwanto, 2021). By highlighting the lack of research connecting training evaluation with practical adoption of new energy conversion methods, this study aims to offer a unique perspective that can strengthen the body of knowledge in this domain.

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Based on the above discussion, considering the importance of post-training evaluation, this study aims to analyze the outcomes of training on the conversion of fuel-powered engines into electric motors. In the current context, electricity has become a fundamental necessity for individuals worldwide. The utilization of electrical energy extends beyond household needs, as electric transportation is increasingly being favored by society. This preference is attributed to its minimal noise pollution, low operational costs, and lightweight design. Enhancing the adoption of electric transportation is anticipated to reduce air pollution and mitigate road infrastructure damage.

RESEARCH METHOD

This study adopts a comprehensive mixed-methods approach, integrating both quantitative and qualitative methodologies to thoroughly evaluate the energy conversion training programs in Indonesia (Arpin, 2021; Butler, 2024; Yildirim & Özturk, 2023). The research employs a sequential explanatory design, which involves two distinct phases executed in sequence (Liem, 2018; Wipulanusat et al., 2020). The first phase focuses on quantitative data collection and analysis, providing a broad overview of the training program's effectiveness through measurable outcomes. The subsequent qualitative phase seeks to deepen the understanding of the quantitative findings by exploring participants' experiences, perceptions, and contextual factors influencing the training outcomes. This design facilitates a comprehensive evaluation by combining the strengths of both quantitative and qualitative approaches, allowing for the triangulation of data and the validation of results through multiple lenses.

For the quantitative data, the target population of this study consists of alumni from the 2022 Community Training cohort, specifically those engaged in converting fuel oil engines to electric motors. This training program was conducted between August and November 2022 and involved a total of 49 participants. To achieve a representative sample, purposive random sampling was employed. This method was chosen to ensure that responses were collected from individuals who were both relevant to the study objectives and possessed the necessary data to address the research questions (Gul et al., 2024; Khalijian et al., 2024). From the distributed questionnaires, approximately 65% (31 out of 49) of the alumni responded. The questionnaires were designed to evaluate various aspects of the training outcomes, including knowledge enhancement, skill acquisition, and the application of learned concepts in the workplace. The quantitative instrument consisted of Likert-scale questions to capture structured responses.

To complement the quantitative data, structured interviews were conducted as part of the qualitative data collection. These qualitative instruments were designed to gather in-depth feedback on participants' training experiences, such as their perceptions of the training content, instructional methods, and overall satisfaction (Hujala et al., 2020; Samuel et al., 2023). Participants for the qualitative data collection were selected based on demographic considerations. Out of the 31 alumni respondents, 14 were from West Java, making this subgroup

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the focus of the interviews. This geographical selection was also influenced by the ease of accessibility to participants, ensuring practicality in conducting the interviews.

The data analysis process integrates both quantitative and qualitative methodologies to ensure a robust and nuanced interpretation of the findings. To analyze the quantitative data, the collected questionnaire responses were processed using SmartPLS software, a widely used tool for Partial Least Squares Structural Equation Modeling (PLS-SEM). This analysis involved several key steps: developing the structural model, assessing the validity and reliability of the measurement model (outer model), and testing the significance of relationships between variables (inner model) (Ashraf & Ahmed, 2022; Chang & Arisanti, 2022; Chun & Abdullah, 2023).

Convergent validity was evaluated using loading factor values, which reflect the strength of the correlation between constructs and their respective indicators. An indicator is considered valid if its loading factor exceeds 0.7. Additionally, the Average Variance Extracted (AVE) was used to assess construct validity, with a threshold value of 0.5 indicating sufficient discriminant validity. Reliability testing was conducted using Composite Reliability (CR), which measures the internal consistency of constructs. A CR value exceeding 0.7 confirms that the constructs are reliable. The results showed that all indicators had values above these thresholds, confirming the validity and reliability of the measurement model.The structural model (inner model) was then assessed by examining the significance of relationships between variables using t-statistics. A relationship was considered statistically significant if the t-statistic exceeded 1.96 at a 95% confidence.

The qualitative data collected from interviews and open-ended questionnaire responses are processed using thematic analysis facilitated by NVivo 12, a qualitative data analysis software (Bufoni et al., 2017). The analysis involves several steps:

Data Coding: Transcripts from interviews and open-ended responses are systematically coded to identify recurring themes, patterns, and significant statements related to the training program

Theme Development: Codes are grouped into broader themes that encapsulate the underlying meanings and insights derived from the data. These themes reflect participants' experiences, perceptions, and contextual factors influencing the training outcomes.

Interpretation: The identified themes are interpreted to provide a deeper understanding of the quantitative findings. This interpretation explores the reasons behind the success or challenges of the training program, offering actionable recommendations for improvement.

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The mixed-methods approach culminates in the integration of quantitative and qualitative findings to present a comprehensive evaluation of the training program. The quantitative results provide a measurable assessment of the training's effectiveness, while the qualitative insights offer contextual explanations and nuanced understanding of the participants' experiences. This integrative analysis allows for the validation of results through triangulation, ensuring the reliability and depth of the study's conclusions.

Findings from both types of data were then compared directly to highlight areas of convergence and divergence. Quantitative results that demonstrate the effectiveness of training from a statistical perspective are complemented by qualitative insights that reveal participants' experiences and contextual factors that influence training success.

To assess the sustainability of training results, this research also includes a follow-up evaluation six months to one year after the program. This is done to observe skill retention and application of concepts learned in the real world. This approach is expected to provide a more comprehensive picture of the effectiveness of the training program.

RESULT AND DISCUSSION

Quantitative Results

At the structural development stage, no indicators were excluded, as all indicators demonstrated values >0.7 based on the measurement results.

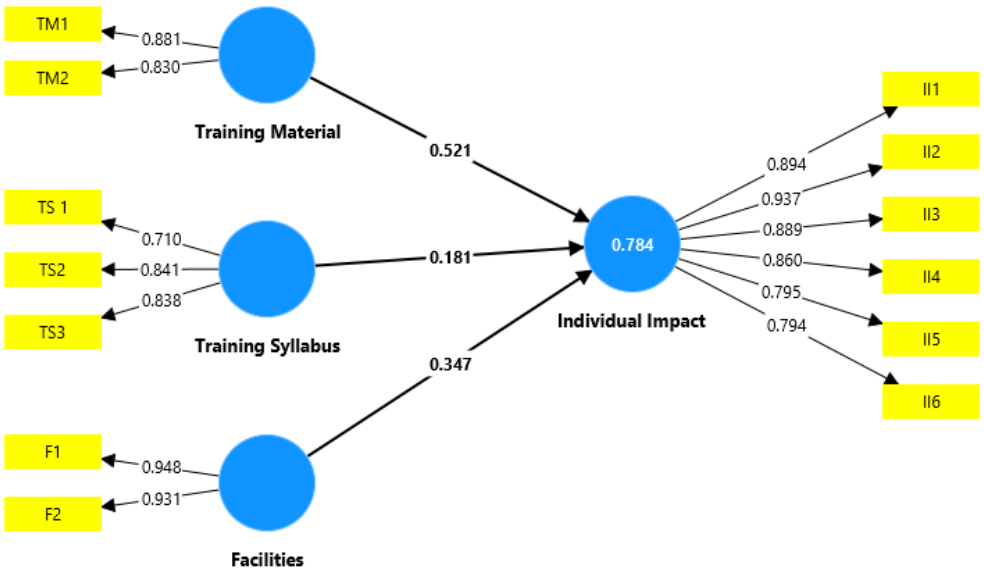

Figure 1. Results of SEM-PLS Testing

In evaluating convergent validity, it can be assessed through the loading factor values, which reflect the strength of the correlation between a construct and its indicators. An indicator meets the validity criteria if its loading factor value > 0.7.

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The measurement results for the loading factor values are presented in Table 1 below:

Table 1. Results of Convergent Validity Testing

Variable	Indicator	Outer loadings	Validity
Facilities	F1	0.948	Valid
	F2	0.931	Valid
Individual Impact	II1	0.894	Valid
	II2	0.937	Valid
	II3	0.889	Valid
	II4	0.860	Valid
	II5	0.795	Valid
	II6	0.794	Valid
Training Material	TM1	0.881	Valid
	TM2	0.830	Valid
Training Syllabus	TS 1	0.710	Valid
	TS2	0.841	Valid
	TS3	0.838	Valid

Based on the table above, it is evident that all loading factor values exceed 0.7, indicating that the indicators for each variable are valid. The AVE (Average Variance Extracted) value is used to determine whether a variable is valid or not. The AVE value for each construct reflects which variables function as reflective indicators. Reflective indicators are considered valid if the AVE value > 0.5 (Table 2).

Table 2. Results of Variable Validity Testing Using Average Variance Extracted (AVE)

Variable	Average variance extracted (AVE)
Facilities	0.882
Individual Impact	0.745
Training Material	0.733
Training Syllabus	0.638

Based on the table above, it is evident that each variable exhibits an AVE value > 0.5. Specifically, the Facilities variable has an AVE value of 0.882, the Individual Impact variable has an AVE value of 0.745, the Training Material variable has an AVE value of 0.733, and the Training Syllabus variable has an AVE value of 0.638. Therefore, all latent variables in this study can be considered valid. To assess reliability, reflective indicators were evaluated using composite reliability. An indicator is considered reliable if its composite reliability value > 0.7. The results of the reliability testing are presented in the following table:

Table 3. Reliability Test Results

Variable	Composite Reliability

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Facilities	0.938
Individual Impact	0.946
Training Material	0.846
Training Syllabus	0.840

Based on Table 3, it can be observed that the Facilities variable has a composite reliability value of 0.938, the Individual Impact variable has a composite reliability value of 0.946, the Training Material variable has a composite reliability value of 0.846, and the Training Syllabus variable has a composite reliability value of 0.840. These results indicate that each variable demonstrates a composite reliability value greater than 0.7, confirming that all latent variables are reliable.

After confirming the validity and reliability of all variables and indicators, the model is then evaluated by examining the significance values to understand the relationships between variables. In this study, a t-statistic significance level of >1.96 was applied. The results of the hypothesis testing are illustrated in the following figure:

Tabel 4. Hasil Uji Hipotesis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Facilities -> Individual Impact	0.347	0.355	0.163	2.130	0.033
Training Material -> Individual Impact	0.521	0.516	0.171	3.047	0.002
Training Syllabus -> Individual Impact	0.181	0.189	0.132	1.370	0.171

From Table 4, it is evident that the relationships between variables with a t-statistic value greater than 1.96 are as follows: Facilities -> Individual Impact with a t-statistic value of 2.130, and Training Material -> Individual Impact with a t-statistic value of 3.047. However, the relationship between Training Syllabus -> Individual Impact has a t-statistic value below 1.96.

These results indicate that Facilities have a positive and significant effect on Individual Impact, as does Training Material. However, no significant effect is observed between Training Syllabus and Individual Impact. This suggests that while improving facilities and training materials can enhance individual outcomes, the training syllabus alone does not directly influence individual impact in this context.

Qualitative Results

Licensing and Regulation

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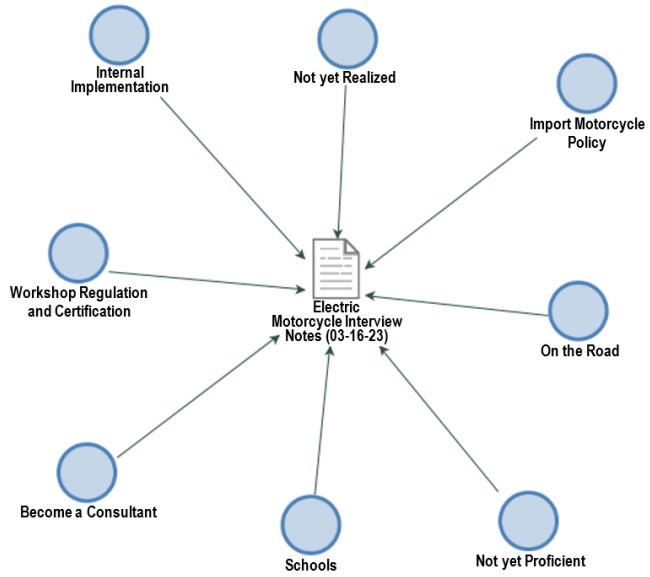

Figure 5. Licensing and regulation

Based on the results of the interview which was then visualized in Nvivo, on the question of how regulations and licensing and the impact of electric motorcycle conversion training are. There were several respondents' responses to the question, including for alumni who have converted, there are obstacles such as the conversion results cannot be on the road. The obstruction of the OTR (On The Road) permit is due to financing which is considered difficult and the licensing is still difficult. The licensing difficulties experienced by the participants in this post-training evaluation are access to get blue plates, where there is only one organizing body that can issue blue plates and it is located in Bekasi. In addition, there are also participants who have not been able to carry out the conversion of electric motorcycles, this is due to the expensive conversion costs and the absence of budget allocation to convert electric motorcycles. Apart from funding, based on the results of the interview, licensing to carry out this conversion is also considered difficult. This again refers to the regulation, namely workshop certification is also an obstacle.

Workshop regulations and certifications

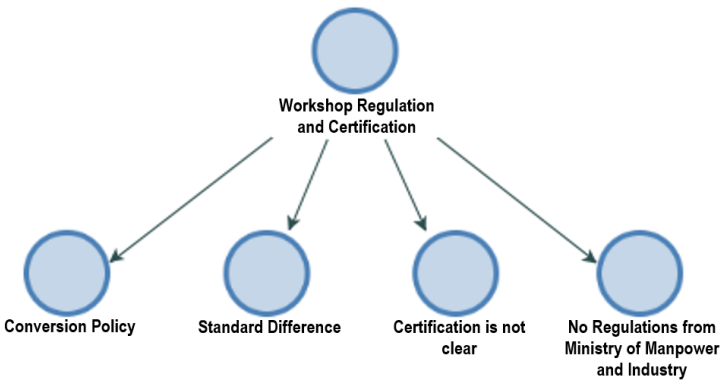

Figure 6. Workshop regulations and certifications

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In the implementation of electric motorcycle conversion, one of the things that became a problem according to the participants was the clarity of the legal basis of this conversion policy, because participants argued that until now they did not know the legal umbrella of this conversion policy. Then there is also a difference in standards between what is taught in the training and the conditions in the field, the thing exemplified by the participants related to this is "based on the conversion standard of the automatic motorcycle Ministry of Energy and Mineral Resources must not replace the original components. But in some other seminars or other institutions make changes such as the engine is completely removed, then replaced". According to partispan, until now there has been no clear regulation from the Ministry of Manpower and industry so there is no clear certification.

Implementation of Training Results in Schools

Apart from the electric motor conversion activity carried out in the workshop, because there are participants from schools, the implementation of training results for participants with educator backgrounds is as follows:

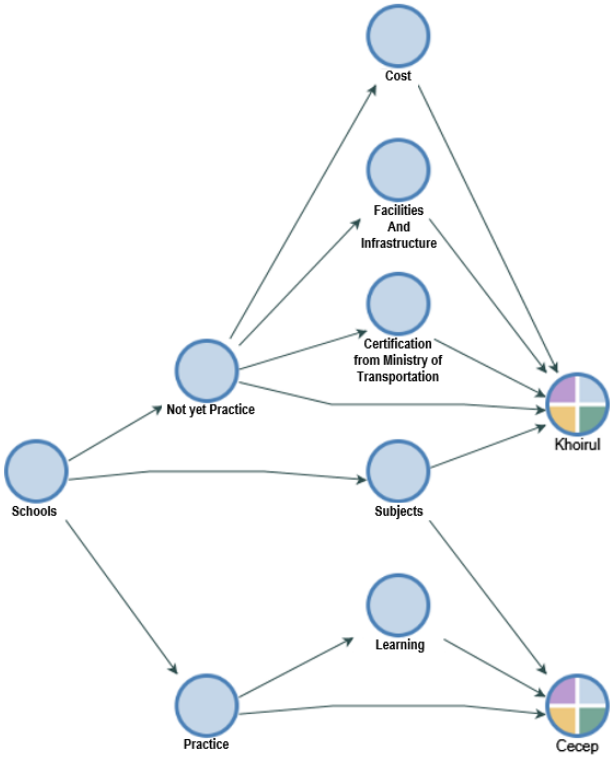

Figure 7. *Implementation of training results in schools*

Based on the answers of participants with teacher backgrounds, there are two different answers, the first is able to do conversion practice and the second is not or has not done conversion practice, but both of them input the results of this training into teaching materials in a subject. Obstacles for participants who cannot carry out the practice are sourced from costs or budgets, facilities or infrastructure and there is no permit because there is no certification from the Ministry of

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Transportation. Based on the story of one of the speakers who has not been able to implement the conversion of electric motorcycles, one of the things he does is to make his workshop a place for consultation on electric motorcycle conversion, utilizing the material that has been given during the training.

Curriculum

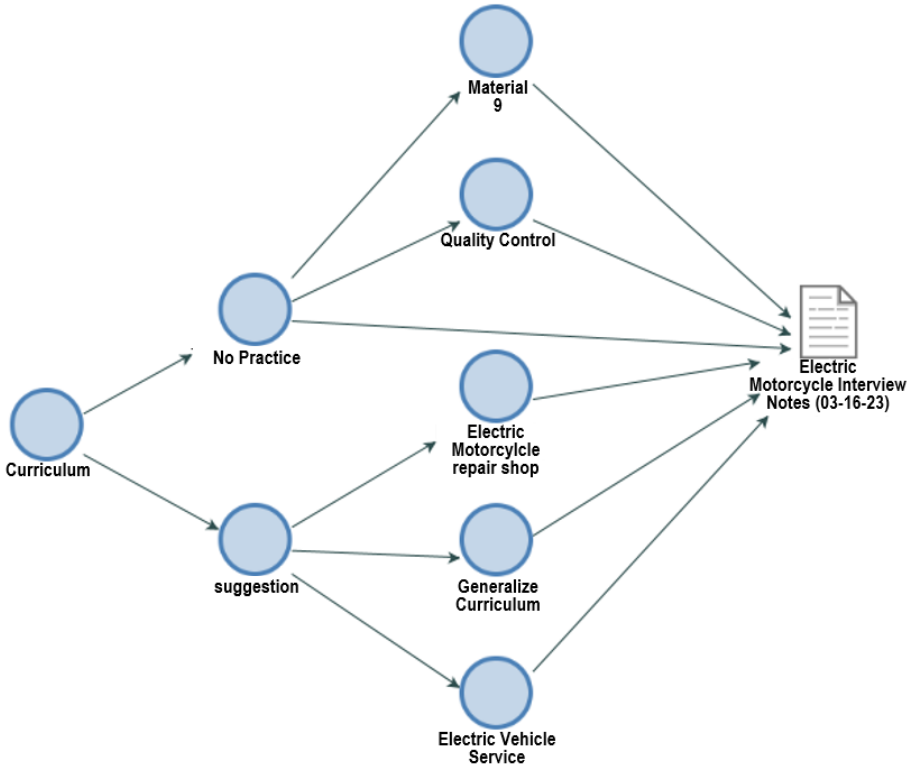

Figure 8. Curriculum

Furthermore, in relation to the training curriculum, in general, the training material is sufficient, but there are two training subjects that are rather difficult to carry out in practice, namely the quality control training subject and material 9 regarding the application of the conversion of fuel motorcycles into electric motorcycles. Both materials cannot be done, one of which is because of expensive and limited practical tools. To overcome these expensive practical tools, respondents proposed financial assistance or subsidies for assisted workshops that convert. Then there is also input for future training, namely the generalization of the curriculum so that it is clear which points must be conveyed. In addition, there is also an additional new training subject, namely electric motorcycle battery service to overcome the problem of expensive battery prices and how to handle electric vehicles to support making workshops or workshops for electric motorcycle service.

Interview Results of Post-Training Aspects

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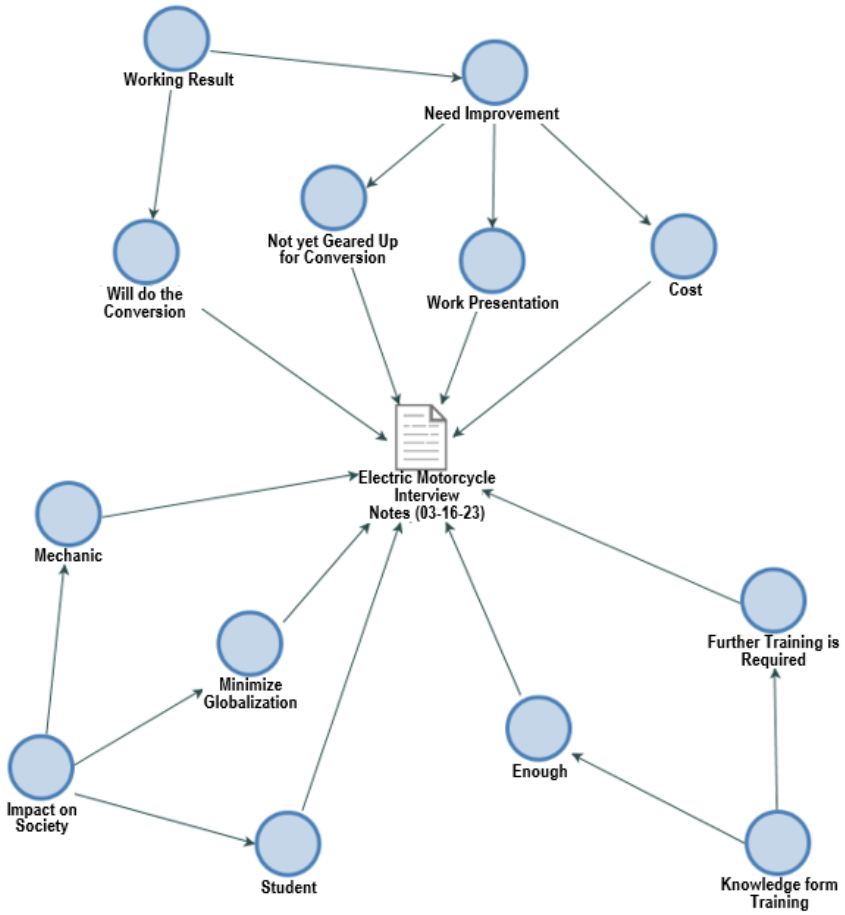

Figure 9. Interview results of post-training aspects

Based on the interview results that were subsequently analyzed and visualized using NVivo concerning post-training aspects, the data revealed that the impacts of the training provided to the community through the training participants include the establishment of electric motor conversion mechanics, the minimization of globalization effects, and the provision of materials or lessons to students regarding electric motor conversion. On the other hand, the participants' knowledge aspects, as reported by the participants in this training evaluation, were deemed sufficient. However, improvements are necessary in terms of training materials and tools, and participants received feedback based on the evaluation results of the training.

According to the participants in the training evaluation, the work outcomes achieved are already commendable, and they indeed plan to undertake conversions. Nevertheless, they believe that further improvements are needed concerning their work results, particularly in three areas: the allocated costs, the direction of conversion policies, and the need for clearer guidelines.

Another aspect addressed during the interviews was the utility of training modules as work guides. Participants responded that the modules can be effectively applied to meet the teaching and learning needs of students in the classroom. Based on the interview results, participants indicated that the training

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outcomes provide benefits in the form of economic improvement. This is because, through the training, participants are able to develop themselves and offer electric vehicle servicing. Additionally, as a result of the training, participants are also capable of re-teaching the material that has been provided.

Input Training Results

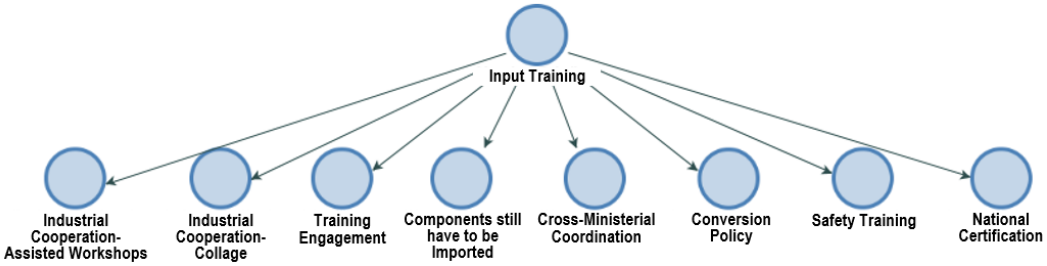

Figure 10. Input training results

From the results of the interviews conducted, there were several inputs for Based on the interviews conducted, several suggestions emerged for the future implementation of the training programs. One of the key recommendations is the need for collaboration between the industry and designated workshops. This collaboration is essential given the high cost of electric motor conversion tools. Through such partnerships, it is hoped that designated workshops can receive support from industries with substantial financial resources. In addition to collaboration between the industry and workshops, another recommendation is to foster partnerships between the industry and Higher Education Institutions.

Another suggestion from the training evaluation analysis is the involvement of additional parties in the implementation of the training. Specifically, it is expected that both the industry and Road Testing and Motor Vehicle Certification Center participate in delivering the training programs. The involvement of Road Testing and Motor Vehicle Certification Center is particularly important because, under current conditions, participants feel that there is still a wide variety of materials, making it difficult to pass the tests administered by Road Testing and Motor Vehicle Certification Center. Furthermore, Road Testing and Motor Vehicle Certification Center is one of the authorized entities to provide eligibility certification, which is necessary for obtaining blue license plates.

These recommendations aim to address the existing challenges in the training programs by enhancing resource availability, ensuring standardized certification processes, and improving the overall effectiveness of the training through collaborative efforts.

Collaboration between institutions

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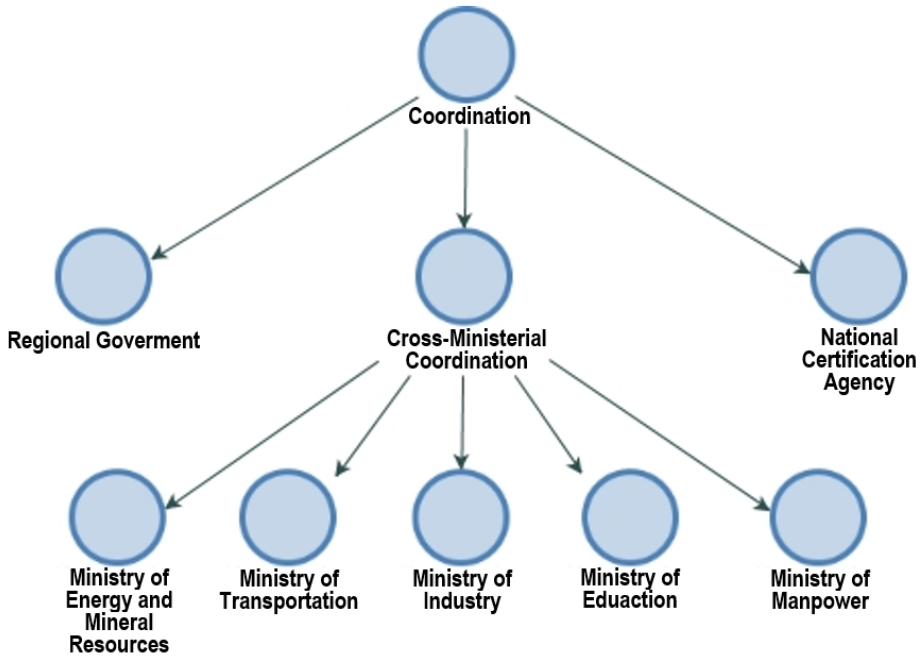

Figure 11. Collaboration between institutions

Based on the interviews conducted, several suggestions have been made for the future implementation of training programs. One key recommendation is the need for collaboration between the industry and designated workshops. This collaboration is essential considering the high costs of electric motor conversion tools. Through such partnerships, it is expected that designated workshops can receive support from industries with substantial financial resources. In addition to collaboration between the industry and workshops, another suggestion is to foster partnerships between the industry and Higher Education Institutions.

Another recommendation from the training evaluation analysis is the involvement of additional parties in the implementation of the training. Specifically, it is expected that both the industry and Balai Pengujian Jalan dan Sertifikasi Kendaraan Bermotor (BPLJSKB) or Road Testing and Motor Vehicle Certification Center participate in delivering the training programs. The involvement of Road Testing and Motor Vehicle Certification Center is particularly important because, under current conditions, participants feel that there is still a wide variety of materials, making it difficult to pass the tests administered by Road Testing and Motor Vehicle Certification Center. Furthermore, Road Testing and Motor Vehicle Certification Center is one of the authorized entities to provide eligibility certification, which is necessary for obtaining blue license plates.

Furthermore, in following up on the training organized by the Ministry of Energy and Mineral Resources, participants suggested that the training should not be conducted solely by the Ministry of Energy and Mineral Resources. Instead, it should be a collaborative effort involving multiple ministries, including the Ministries of Transportation, Industry, Education, and Manpower. Additionally, cooperation with Regional Governments and the National Certification Agency is required.

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Regarding the National Certification Agency, another suggestion provided is the establishment of a national certification standard for electric motor conversions. With the implementation of such national certification, it is expected that there will no longer be discrepancies or differing standards between the training provided and the actual conditions in the field.

Lastly, it is hoped that the training will include explanations of the legal foundations concerning electric motor conversion policies. Additionally, there is an expectation for the inclusion of training modules on safety or Occupational Health and Safety in electric motor conversions. This will ensure that participants are not only technically proficient but also adhere to safety standards during the conversion process.

Discussion

Research findings show that this training program can improve individual competency, especially in terms of facilities and teaching materials, this is in line with research results that there is a positive and significant relationship between facilities on individual impact and training materials on individual impact with higher results than the relationship between the training syllabus and individual impact. Therefore, facilities and teaching materials can be of concern to training organizers. Interviews further support these results, as alumni reported tangible benefits from the training. These benefits not only increase the knowledge gained but also positively influence the social dimension of the alumni's experiences. Additionally, post-training evaluations demonstrate that participants rate the opportunity to improve workplace knowledge highest, suggesting that the training substantially contributes to enhanced knowledge application in professional settings. Consequently, performance and productivity are expected to improve, a finding consistent with prior research showing that training exerts a positive impact on productivity and correlates positively with employee performance (Motlokoa et al., 2018; Nassary, 2020).

Employee performance refers to the fulfillment of predetermined tasks within an organization, typically evaluated by goals that align with the organization's strategic objectives. Key Performance Indicators (KPIs) include productivity, efficiency, effectiveness, quality, and profitability (Armstrong & Taylor, 2023; Aulia Safitri et al., 2019). Training is considered a critical factor in predicting employee performance, as it enhances individual capabilities, capacities, competencies, and awareness of work responsibilities (Dagnew Gebrehiwot & Elantheraiyan, 2023; Zar Thwin et al., 2022).

Meanwhile, based on the results of research related to training on converting fuel oil motorbikes into electric motorbikes, for alumni who have already converted, there are obstacles such as the fact that the conversion results cannot be on the road and that the permit to carry out the conversion is difficult. This refers to regulations, namely workshop certification, which is an obstacle. Although electricity is an alternative to transportation activities, Electrical energy storage in batteries is a source of energy for electric vehicles. Whereas pure battery electric vehicles are considered a more efficient alternative than other

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fuel-driven vehicles, there are obstacles in the development of electric vehicles, namely the storage of electrical energy and their speed, which are still unable to compete with vehicles in general or conventional vehicles (Rodrigue et al., 2013). The results of the study state that workshop certification is an obstacle, and the authors indicate that it is in line with research (Khrisnan & Koshy, 2021) stated that public acceptance of electric vehicles is still low; this is due to low trust in policy implementation, supporting facilities, and the availability of electric vehicle charging. The variables used in Krishnan and Koshy's research are technology, social, price, ease of use, policy, benefits, performance, and after-sales service.

Then, in relation to the training curriculum, there are training subjects that are difficult to implement because practical tools are expensive and limited. As it is known, the curriculum is related to training materials; according to (Kasmir, 2016), training materials are teaching materials or materials that will be given to training participants. The depth of the material provided will certainly increase the participants' knowledge for the better, and vice versa. The training material is a determining factor in the success of the training. Meanwhile, limited practice tools can affect achievement in material aspects. This is in line with the results of the study, which state that improvements must be made in the form of materials and tools.

In addition, the research results state that the training module can be used as a work guide, and even alumni can teach the material that has been provided. In training, modules are, of course, needed as training material guides. The modules in the training are structured and made to be a source of learning for the trainees in the learning process whenever and wherever. The modules here can vary and be developed (module development); this is done to suit the needs of the trainees so that the training objectives can be achieved. Research states that there is a development of a module called virtual tour, where the module is suitable to support on-the-job training needs; besides that, there are other studies that develop video game training modules as a learning by discovery model. This is, of course, done and adjusted to the needs (Sepasgozar, 2021; Thorngate, 2018).

The results of the study stated that there were inputs in the implementation of future training, including the need for collaboration between industry and the assisted workshops. This was felt to be important because the prices of electric motor conversion equipment were expensive, so with this collaboration, it could be assisted by industries that have large funds. In addition, collaboration between institutions is also expected to be important to support the achievement of training objectives and produce new breakthroughs. This is in line with research that states that collaboration carried out by organizations is expected to obtain innovative results, breakthroughs, or achievements jointly for those who collaborate; besides that, collaboration can also bring about developments within the organization and realize a shared vision in a complex environment (Dorisman et al., 2021). The complex environment in question is in the form of expensive electric motor conversion equipment constraints.

As it is known that energy conversion is a change in the form of energy, research says this energy transfer is the ability of the system to produce work that

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has a positive impact on human needs. Energy is a stored quantity that can change forms and be transferred from one system to another, but the total amount remains the same (Shenderovich et al., 2019)

CONCLUSION

Post-training evaluation of the Electric Motor Conversion program shows that the main success of the training lies in increasing the participants' knowledge and skills in their work. However, the research results also reveal that current training facilities do not fully meet alumni expectations, so alignment is needed to support the learning process optimally. Each training session represents varying levels of achievement, particularly in terms of syllabus, training materials, facilities and individual impact.

Although training is generally effective, its implementation faces a number of major challenges, such as complex regulatory barriers and high costs of conversion equipment. To overcome this problem, concrete steps are needed in the form of strengthening training materials, especially regarding electric motorbike servicing, as well as improving the quality of training facilities that are adapted to technical needs in the field. In addition, training providers need to work more closely with governments and relevant authorities to simplify regulations, provide incentives and support participants in applying their skills.

The main recommendations from this research are further training focused on technical aspects and servicing of electric vehicles, increasing investment in training facilities, as well as fostering collaboration between training providers and the government. It is hoped that this approach can overcome existing obstacles, support the sustainability of the electric motor conversion industry, and create a more significant impact in the future.

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