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THE OPENING OF POLTRADA BALI CONVERSION WORKSHOP AND SIMULATION OF ROADWORTHINESS TESTING RESULT OF CONVERTED ELECTRIC MOTORCYCLES FOR CONVERSION WORKSHOP IN BALI PROVINCE

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ABSTRACT
The Indonesian government has developed a roadmap to contribute to achieving Net Zero Emission (NZE) in 2060 which is set nationally and then applies 5 (five) details of the main principles, including increasing the use of new renewable energy (EBT), reducing fossil energy, using electric vehicles in the transportation sector, increasing the use of electricity in households and industries, and utilising Carbon Capture and Storage (CCS). The Government of Indonesia's target in 2023 is to produce 50,000 units of converted motorbikes and in 2024 to 150,000 units, but the achievement of electric motorbike conversion results in 2023 only reached 181 units. In the process of converting electric motorbikes, three parties are involved, namely the Government, the Community and the Conversion Workshop. Indonesia's big national target in achieving NZE and accelerating the electric vehicle ecosystem, Bali Land Transportation Polytechnic implements a community service programme in the form of opening a Bali Land Transportation Polytechnic Conversion Workshop and Roadworthy Testing Simulation of Converted Electric Motorbikes for Conversion Workshops in Bali Province, with the aim of Poltrada Bali trying to fully contribute to the field of sustainable land transportation, especially the type of electric motorcycle vehicle to achieve the sustainability of Bali tourism. The Roadworthiness Testing Simulation starts with a brake test, headlights, horn, empty vehicle weight and speedometer ending with the provision of minutes of inspection of test results, and the evaluation stage is carried out by distributing questionnaires on the entire activity process and outlined in the preparation of the final report.

Keywords: community service; conversion workshop; conversion; electric motorbike; roadworthy testing

INTRODUCTION
Transportation is the activity of moving goods or people from one place to another (Aruperes et al., 2018). Transportation means are among the most commonly used by people every day as a means of supporting daily life. Without transportation, people's daily activities would be hindered. Therefore, the role of transportation is crucial for the social welfare of society. Over time, the growth and development of vehicles have gradually increased, from personal vehicles to public transport. This increase also brings potential transportation issues on the road, such as congestion, environmental emissions, and high fuel consumption. Currently, most countries around the world still rely on energy sourced from conventional fuels to meet daily needs. One of the resolutions for emissions is NZE (Net Zero Emission). To achieve the NZE target, each country is required to focus on low-emission energy, according to agreements made during climate conference forums. Emission issues have also become one of the many aspects frequently highlighted in these conferences, with the transportation sector contributing about 23% of global CO_2 emissions, or approximately 7.98 Gt (Fauzan, 2023).

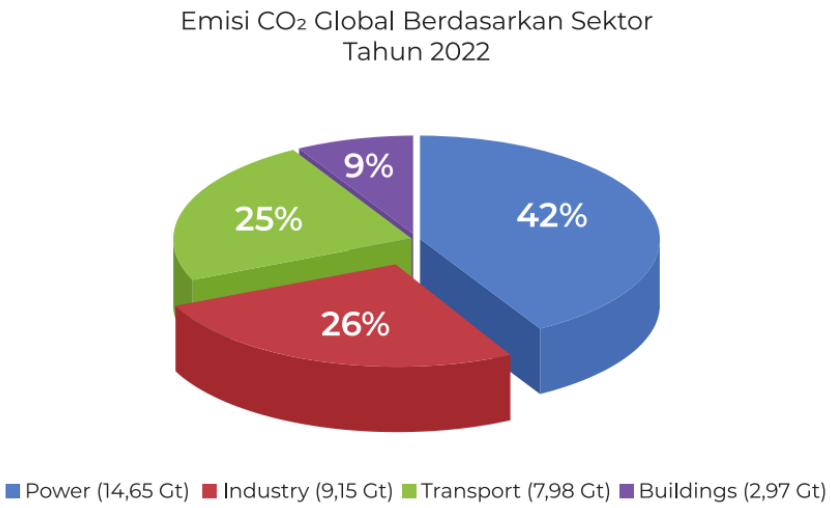


Figure 1. Global CO_2 Emissions by Sector for 2022 (Fauzan, 2023)

In relation to the NZE target, the Indonesian government has committed to achieving NZE by 2060. To support this programme, the Indonesian government has developed a roadmap to contribute nationally and has implemented five main principles: increasing the use of new renewable energy (EBT); reducing fossil energy; adopting electric vehicles in the transportation sector; enhancing electricity use in households and industries; and utilising Carbon Capture and Storage (CCS) (DITJEN Ketenagalistrikan, 2023). One significant step towards NZE is the gradual realisation of electric vehicle adoption. The target for electric vehicles in Indonesia by 2025 includes 2,200 electric cars, 711,900 hybrid cars, 2,130,000 electric motorcycles, and 1,000 charging infrastructure units for electric vehicles. By 2050, SPKLU (public electric vehicle charging stations) and SPBKLU (battery swapping stations) will be established for public use (Fauzan, 2023). Bali Province is one of many provinces in Indonesia experiencing a high increase in the number of vehicles, at 3.8% per year (Kariyana et al., 2024). The number of vehicles in Bali from 2021-2023, broken down by type, is recorded in Table 1 according to data from the Central Statistics Agency (BPS) of Bali Province (2024):

Table 1.
Number of Vehicle Data (Badan Pusat Statistik Provinsi Bali, 2024)

Vehicle Type	Number of Vehicles by Type in Bali Province (Unit)		
	2021	2022	2023
Bus	8.911	11.257	11.584
Truck	159.003	171.603	176.882
Motorcycle	3.877.595	4.079.617	4.303.266
Car	465.282	493.887	524.619
Total	4.510.791	4.756.364	5.016.351

Based on the data, it is likely that there will be fluctuations in future figures due to the increasing transportation needs of the population, which is a consequence of the growing population in Bali Province, particularly for motorcycles. Therefore, clear policies are needed to address this growth, as it has the potential to create negative effects in the transportation sector. The situation could worsen if the number of vehicles continues to rise significantly without corresponding improvements in transportation infrastructure. The Bali provincial government is working hard to develop sustainable transportation solutions, such as the operation of electric vehicles or environmentally friendly public transport. Electric vehicles are those where all or part of the propulsion system is powered by a motor using electricity

from a battery. However, public awareness of these technological advancements is limited due to a lack of outreach about electric vehicles. If the government directly initiates policies for a transition from conventional vehicles to electric vehicles, there may be resistance from the majority of the population (Setiawan, 2019). This resistance is partly because many people cannot afford electric vehicles. Additionally, if people purchase new electric vehicles, their existing conventional vehicles will become unused, leading to an increase in the total number of vehicles beyond what is necessary. Consequently, this will contribute to worsening traffic congestion due to the excessive number of private vehicles (Hidayat et al., 2021).

In 2023, the Indonesian government's target was to produce 50,000 converted motorcycles, with an increase to 150,000 units in 2024. However, only 181 converted electric motorcycles were achieved in 2023. The conversion process involves three key parties: the government, the community, and conversion workshops. The government has issued Minister of Transportation Regulation No. PM 39 of 2023 regarding the conversion of petrol motorcycles to battery-powered electric motorcycles, which outlines the role of conversion workshops. To encourage public interest in the conversion process, the government offers subsidies regulated further by Minister of Energy and Mineral Resources Regulation No. 13 of 2023. In response to these challenges and the national targets for achieving NZE and accelerating the electric vehicle ecosystem, the Politeknik Transportasi Darat Bali has launched a community service program titled "Opening of the Politeknik Transportasi Darat Bali Conversion Workshop and Simulation of Roadworthiness Testing for Converted Electric Motorcycles for Conversion Workshops in Bali Province." Poltrada Bali aims to contribute significantly to sustainable land transport, particularly in the motorcycle sector, to support the ongoing development of Bali's tourism industry.

METHOD

The community service activity titled "Opening of the Bali Land Transport Polytechnic Conversion Workshop and Simulation of Roadworthiness Testing for Converted Electric Motorcycles for Conversion Workshops in Bali Province" was carried out using methods of socialisation and direct simulation to the community, as well as roadworthiness testing for converted electric motorcycles at conversion workshops in Bali Province. Participants in the community service activity included conversion workshops in Bali such as Electric Wheel Conversion Workshop, Volto Conversion Workshop, Makara Conversion Workshop, Sadhana EV Conversion Workshop, SR Electric Conversion Workshop, Spora Conversion Workshop, and Elders Conversion Workshop. Additionally, invitations were extended to the Motor Vehicle Roadworthiness Testing and Certification Office (BPLJSKB) of the Ministry of Transportation, PT. PLN Bali Distribution Unit, and the Electricity Survey and Testing Office (BBSP KEBTKE) of the Ministry of Energy and Mineral Resources.

The event took place on 21 June 2024, at the Poltrada Bali campus in Gianyar, Jl. Batuyang No.109x, Batubulan, Sukawati, Gianyar-Bali. The stages of the activity included forming an internal team, defining objectives, preparing socialisation and simulation materials, conducting socialisation and simulation, and evaluation. During the internal team formation stage, a team of lecturers and students was established, followed by the issuance of a Director's Decree regarding task allocation for each team. The objectives were formulated collectively to determine the desired outcomes, while the preparation of socialisation and simulation materials involved creating brochures/leaflets, stickers, keychains, and goodie bags. For the simulation, all testing equipment, including brake testers, headlights, horns, vehicle weight scales, and speedometers, were prepared. Finally, the evaluation stage

involved distributing questionnaires regarding the entire process and compiling them into a final report.

RESULTS AND DISCUSSION

Internal Team Formation

The opening of the Poltrada Bali Conversion Workshop and the community service activity for the simulation of roadworthiness testing for converted motorcycles, organised by the P3M POLTRADA Bali, was based on the Director's Decree of the Politeknik Transportasi Darat Bali Number: PL.302/1/2/Poltrada Bali 2024. The implementation team from the D-III Automotive Technology programme consisted of 14 lecturers and 7 students.

External Team Formation

The community service activity for the opening of the Politeknik Transportasi Darat Bali Conversion Workshop and the simulation of roadworthiness testing for converted electric motorcycles involved forming an external team consisting of management and technicians from conversion workshops in Bali Province.

Formulation of Objectives

The objectives were formulated based on the background, goals, and desired outcomes of the socialisation and simulation activities, which included: 1) the opening of the Conversion Workshop; 2) the simulation of roadworthiness testing for converted motorcycles; and 3) Roadworthiness Test Inspection Report.

Preparation of Socialisation and Simulation Materials

The preparation phase involved the development of socialisation materials. These materials served as a medium to convey the content of the socialisation. Several types of materials were used to optimise the socialisation process for participants, addressing visual, auditory, and kinesthetic learning styles. Below is an overview of the socialisation materials used:

1. **Poltrada Bali Conversion Workshop Brochure**
   In the community service activity, the brochure was used as a collection of information related to the Poltrada Bali Conversion Workshop. The brochure used in this activity consisted of one page containing the following material: 1) About the Poltrada Bali Conversion Workshop; 2) The services provided. As shown in Figure 2.

Figure 2. Poltrada Bali Conversion Workshop Brochure

2. Conversion Workshop Guide Flyer

In the socialisation and simulation activities, a Guide Flyer was also used. This aimed to remind participants of the importance of conducting type approval and roadworthiness tests for converted vehicles. The model of the Flyer is shown in Figure 3.

Figure 3. The Guide Flyer

The Implementation of Simulation

The implementation of the community service activity for the opening of the Poltrada Bali Conversion Workshop and the Roadworthiness Testing Simulation for Converted

Motorcycles for Conversion Workshops in Bali Province began with speeches from the Director of Politeknik Transportasi Darat Bali, the Head of the Motor Vehicle Roadworthiness Testing and Certification Centre (BPLJSKB), and the Ministry of Energy and Mineral Resources (ESDM). This was followed by the official inauguration of the conversion workshop, which involved a ribbon-cutting ceremony by the Director of Politeknik Transportasi Darat Bali and the Head of BPLJSKB..

Figure 4. Speeches and Ribbon-Cutting Ceremony

After the speeches and ribbon-cutting ceremony were completed, the activity continued with the Roadworthiness Testing Simulation for Converted Electric Motorcycles. There were five stages tested at the Poltrada Bali Conversion Workshop, which included:

1. Physical and Sound Level Test
   The test was conducted by inspecting electrical leakage in conversion components and measuring the dimensions of the motorcycle using tools such as rulers, plumb lines, chalk, and measuring tapes. Additionally, the horn was tested with a sound level meter to determine its noise level. The procedure involved placing the tester 2 meters away from the vehicle and pressing the horn for 5 seconds according to the tester's instructions.

Figure 5. Physical and Sound Level Test Activity

2. Vehicle Weight Test
   The test was performed to ascertain the vehicle's weight post-conversion. The process entailed positioning the car onto a gadget that measures the weight on the axle. Subsequently, the driver would disembark from the vehicle, while providing support with a single hand. The weight of the vehicle without any load would be shown on the LCD screen of the axle load and documented in the inspection report by the tester.

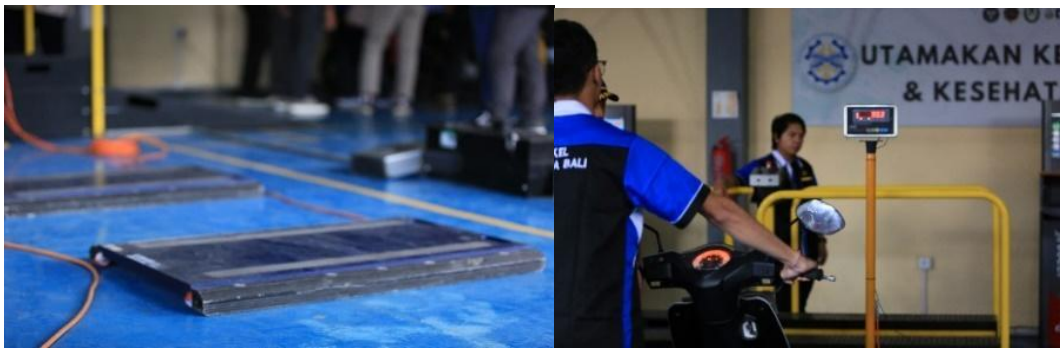


Figure 6. Vehicle Weight Test Activity

3. Speedometer Accuracy Test
   Deviations in the speedometer readings were identified through the execution of the test. The procedure involved placing the vehicle on a roller speedometer tester and then accelerating the vehicle to 40 km/h. Once the desired speed was reached, the driver was instructed by the tester to honk the horn (as a validation for both the vehicle's speedometer and the testing device). The deviations in the vehicle's speedometer reading were then noted on the testing device and recorded in the inspection report by the tester. The tolerance range for deviations was set at +15% and -10% from 40 km/h, which translates to a range of 36 to 46 km/h.

Figure 7. Speedometer Accuracy Test Activity

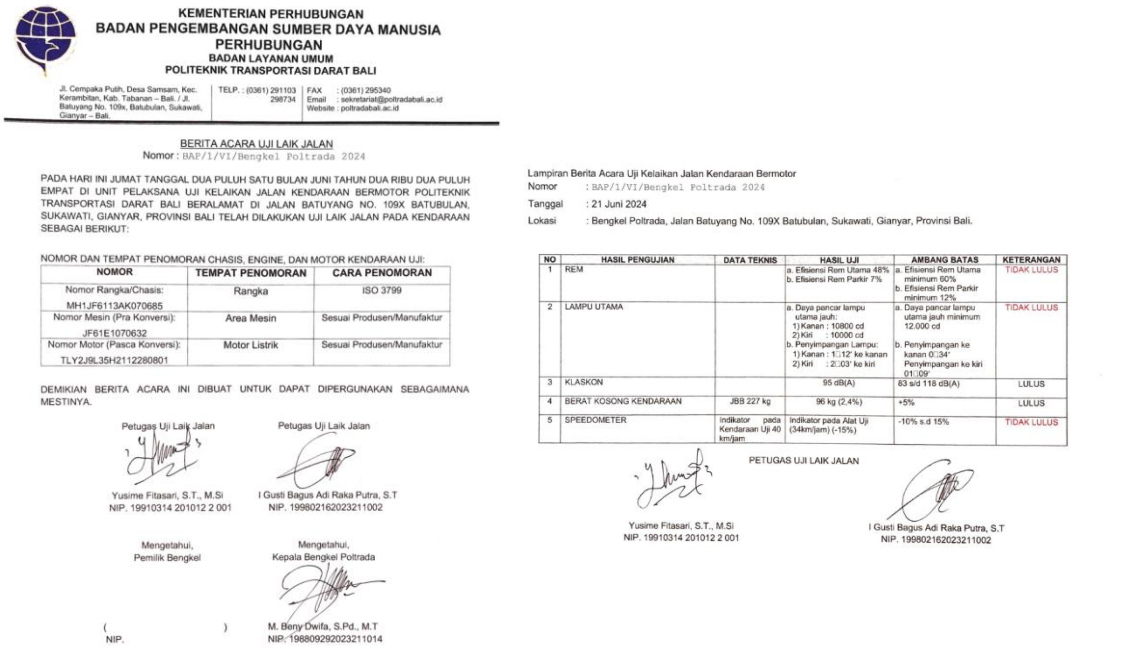
4. Brake Testing
   This test was carried out to ensure that the braking performance of the vehicle is good and safe for use. The procedure involved elevating the vehicle onto the testing device, with the front wheels placed on the rollers and the rear wheels secured by the device to keep the vehicle in place. The vehicle was then advanced until the rear wheels were on the rollers and the front wheels were secured by the device. The braking measurement results were displayed on an LCD screen and recorded in the inspection report. The threshold for braking performance was set at 60%.

Figure 8. Brake Testing Activity

5. Lamp Testing
   In order to ascertain the brightness of the vehicle's lighting, this examination was implemented. The procedure involved aligning the vehicle with the testing device and then aligning the device with the vehicle's lights. After waiting for the measurement results to be displayed, the results were recorded in the inspection report. The threshold for the brightness level of the lights was set at 12,000 Cd.

Figure 9. Lamp Testing Activity

6. Issuance of the Roadworthiness Inspection Report.
   Upon the completion of the comprehensive roadworthiness simulation for converted electric motorcycles, the issuance of the Roadworthiness Inspection Report was carried out, as seen in Figure 10.



KEMENTERIAN PERHUBUNGAN
BADAN PENGEMBANGAN SUMBER DAYA MANUSIA PERHUBUNGAN
BADAN LAYANAN UMUM
POLITEKNIK TRANSPORTASI DARAT BALI

Jl. Cempaka Putih, Desa Samsam, Kec. Kerambitan, Kab. Tabanan – Bali. / Jl. Batuyang No. 109x, Batubulan, Sukawati, Gianyar – Bali. | TELP. : (0361) 291103 298734 | FAX : (0361) 295340 Email : sekretariat@poltradabali.ac.id Website : poltradabali.ac.id

BERITA ACARA UJI LAIK JALAN
Nomor : BAP/1/VI/Bengkel Poltrada 2024

PADA HARI INI JUMAT TANGGAL DUA PULUH SATU BULAN JUNI TAHUN DUA RIBU DUA PULUH EMPAT DI UNIT PELAKSANA UJI KELAIKAN JALAN KENDARAAN BERMOTOR POLITEKNIK TRANSPORTASI DARAT BALI BERALAMAT DI JALAN BATUYANG NO. 109X BATUBULAN, SUKAWATI, GIANYAR, PROVINSI BALI TELAH DILAKUKAN UJI LAIK JALAN PADA KENDARAAN SEBAGAI BERIKUT:

NOMOR DAN TEMPAT PENOMORAN CHASIS, ENGINE, DAN MOTOR KENDARAAN UJI:

NOMOR	TEMPAT PENOMORAN	CARA PENOMORAN
Nomor Rangka/Chasis: MH1JF6113AK070685	Rangka	ISO 3799
Nomor Mesin (Pra Konversi): JF61E1070632	Area Mesin	Sesuai Produsen/Manufaktur
Nomor Motor (Pasca Konversi): TLY2J9L35H2112280801	Motor Listrik	Sesuai Produsen/Manufaktur

DEMIKIAN BERITA ACARA INI DIBUAT UNTUK DAPAT DIPERGUNAKAN SEBAGAIMANA MESTINYA.

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( )
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Mengetahui,
Kepala Bengkel Poltrada
M. Beny Dwifa, S.Pd., M.T
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Lampiran Berita Acara Uji Kelaikan Jalan Kendaraan Bermotor
Nomor : BAP/1/VI/Bengkel Poltrada 2024
Tanggal : 21 Juni 2024
Lokasi : Bengkel Poltrada, Jalan Batuyang No. 109X Batubulan, Sukawati, Gianyar, Provinsi Bali.

NO	HASIL PENGUJIAN	DATA TEKNIS	HASIL UJI	AMBANG BATAS	KETERANGAN
1	REM		a. Efisiensi Rem Utama 48% b. Efisiensi Rem Parkir 7%	a. Efisiensi Rem Utama minimum 60% b. Efisiensi Rem Parkir minimum 12%	TIDAK LULUS
2	LAMPU UTAMA		a. Daya pancar lampu utama jauh: 1) Kanan : 10800 cd 2) Kiri : 10000 cd b. Penyimpangan Lampu: 1) Kanan : 1'.12' ke kanan 2) Kiri : 2'.03' ke kiri	a. Daya pancar lampu utama jauh minimum 12.000 cd b. Penyimpangan ke kanan 0'.34' Penyimpangan ke kiri 01'.09'	TIDAK LULUS
3	KLASKON		95 dB(A)	83 s/d 118 dB(A)	LULUS
4	BERAT KOSONG KENDARAAN	JBB 227 kg	96 kg (2,4%)	+5%	LULUS
5	SPEEDOMETER	Indikator pada Kendaraan Uji 40 km/jam	Indikator pada Alat Uji (34km/jam) (-15%)	-10% s.d 15%	TIDAK LULUS

PETUGAS UJI LAIK JALAN
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Figure 10. Results of the Roadworthiness Test Report

Evaluation

To assess the effectiveness of the socialisation and simulation and identify areas for improvement, an evaluation of the activity was conducted. This evaluation was carried out with participants online using Google Forms. The indicators evaluated were: 1) Satisfaction with the socialisation and simulation methods provided by the speakers; 2) The overall process of the socialisation, simulation, and community service activities; 3) The usefulness of the socialisation, simulation, and community service activities; and 4) Whether the socialisation, simulation, and community service activities could be continued by the community partners.

CONCLUSION

The community service activity for the opening of the Poltrada Bali Conversion Workshop and the Simulation of Roadworthiness Testing for Converted Electric Motorcycles for Conversion Workshops in Bali Province was conducted to accelerate the electric vehicle ecosystem, particularly in Bali. The simulation aimed to provide information on the importance of testing converted vehicles, specifically converted electric motorcycles, for road safety.The media and materials used in this activity included brochures/flyers for the Poltrada Bali Conversion Workshop, Roadworthiness Testing Stages, stickers, keychains, and goodie bags. The Poltrada Bali Conversion Workshop conducted tests covering: 1) Physical and sound level testing; 2) Weight testing; 3) Speedometer testing; 4) Brake testing; and 5) Light testing. At the end of the activity, a roadworthiness inspection report was provided.

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