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The Development of Industry-Based Competency Test Materials (MUK) For LSP P1 SMK In Motorcycle Periodic Maintenance Cluster

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Abstract

Efforts to enhance labor competitiveness have increased access to competency certification for SMK graduates, with 4,083 out of 14,500 SMKs certified through the LSP P1 SMK network in Indonesia (Direktorat SMK, 2019). LSP P1 SMK requires quality assurance through competency certification testing. This study aims to develop, assess eligibility, practicality, validity, reliability, and effectiveness of the Competency Test Material (Indonesian: *Materi Uji Kompetensi*, MUK) for Motorcycle Periodic Maintenance Cluster, Industry-Based, at LSP P1 SMK.
The research follows the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). Data analysis includes determining MUK feasibility, practicality, internal validity and reliability of multiple-choice questions, MUK effectiveness, and effectiveness of TUK facilities. Results show high feasibility (4.62), practicality (97.58%), internal validity and reliability (86 out of 86 questions valid, KR20 reliability value 0.917), effectiveness (91.70%), and utilization of TUK facilities (87.13%). The developed MUK is deemed highly feasible, practical, valid, reliable, and effective for competency certification testing at LSP P1 SMK, meeting KKNI Level II standards for Motorcycle Engineering and Business Expertise Competence in Motorcycle Periodic Maintenance Cluster.

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INTRODUCTION

Vocational education is a policy concept aimed at boosting the economy (Abuselidze & Beridze, 2019; Becker, 2019; Mustapha & Greenan, 2002; Pavlova, 2014) in many countries, including Indonesia. The implementation of vocational education faces several significant challenges that hinder acceleration. Among them is the high unemployment rate among SMK graduates (Ulya, 2019). They encounter difficulties in finding employment that aligns with their expertise. On the other hand, SMKs must be oriented towards and as closely aligned with the industrial world as possible (Retnowati et al., 2018; Rintala & Nokelainen, 2019) to ensure the absorption of their graduates.

Efforts to enhance labor competitiveness involve opening access to competency certification for SMK graduates. The new certification access has reached 4,083 out of 14,500 SMKs through the LSP P1 and SMK network in Indonesia (Direktorat SMK, 2019). Only 3% of the total number of schools have the First Vocational School Professional Certification Institute (*Indonesian*: *Lembaga Sertifikasi Profesi Pendidikan Pertama Sekolah Menengah Kejuruan*, LSP P1 SMK) licenses. This fact indicates that the majority of SMK graduates do not possess nationally recognized work competency certificates according to Leigh et al. (2007). During the Development of LSP P1 SMK in Central Java Province in 2020, conducted by the Provincial Education and Culture Office of Central Java in collaboration with the Central Java LSP P1 SMK Forum on November 16-18, 2020, at Hotel Sahid Jaya Solo, attended by 94 LSP P1 SMK chairpersons from across Central Java, 26 SMK supervisors, and 1 educator, recommendations were made: (1) the need for the preparation of guidelines for conducting competency tests at LSP P1 SMK; (2) the need for the development of the 2020 Competency Test Material (MUK) model, and (3) the need for the development of LSP P1 performance standards. LSP P1 SMK requires quality assurance through competency certification tests. The depth of the test material and the implementation techniques to fulfill competency principles based on tests need enhancement. Therefore, industry-based MUKs for LSP P1 SMK need to be developed.

Relevant research on the development of industry-based MUKs for LSP P1 SMK includes studies by Hartanto (2018), which indicate that learning materials for Motorcycle Tune-Up based on industry-defined competencies are crucial to be taught in SMKs, particularly in the Motorcycle Engineering and Business Competence. Findings from Asyari's research (2019) demonstrate that the development of competency certification test models for the Light Vehicle Engineering scheme in SMKs, with the creation of electrical modules, is effective in preparing for competency tests for Light Vehicle Engineering teachers. Nurtanto's study (2020) shows that the development of competency certification test models for LSP P1 in the Injection System Engine Tune-Up scheme, using a competency-based test approach that includes case studies, demonstrations, interviews, and full compliance with competency-related instruments, results in competency certification tests with well-standardized KKNI benchmarks.

Developing MUKs is a competency possessed by a competency assessor. This competency includes performance criteria as follows: 1) Analyzing available assessment instruments for suitability of use, identifying necessary modifications; 2) Developing assessment instruments to meet workplace/candidate standards and needs; 3) Writing clear instructions for candidates and assessors regarding the use of assessment instruments; 4) Ensuring that draft assessment instruments meet required standards and specific workplace/candidate needs, and recording, documenting, and confirming examination results (Occupational Assessor Competency Certification Scheme within the Competency Assessor Training Module by BNSP, 2020: 16-18).

The development of industry-based MUKs for motorcycle periodic maintenance clusters is expected to produce test graduates who possess "Top Skill, Top Speed, and Top Action" abilities. Top Skill refers to having excellent skills in competency units according to the Standard Operational Procedures or Repair Guidebooks issued by the industry. Top Speed means having speed in performing tasks in competency units according to the Part Catalog, which includes Flat Rate Service Time (FRT), representing the required working time. Top Action entails demonstrating performance or attitudes that implement Safety Talk work culture and the 5S work culture (Sort, Straighten, Shine, Standardize, and Sustain) according to industry standards (Astra Honda Training Center. Honda Motorcycle Technical Material: SMK Basic Module Semester 1-3, 2014, and Fahrul Anam Setiawan et al., 2021: Basics of Automotive I).

METHODS

The research design used in this study is Research and Development type, aimed at developing a new product or improving existing ones. The design used in this development is an integration of test instruments and the ADDIE development model. The research procedure adapts the ADDIE development model from Dick and Carey (1996), which consists of five stages: analysis, design, development, implementation, and evaluation. The MUK development diagram can be seen in Figure 1.1.

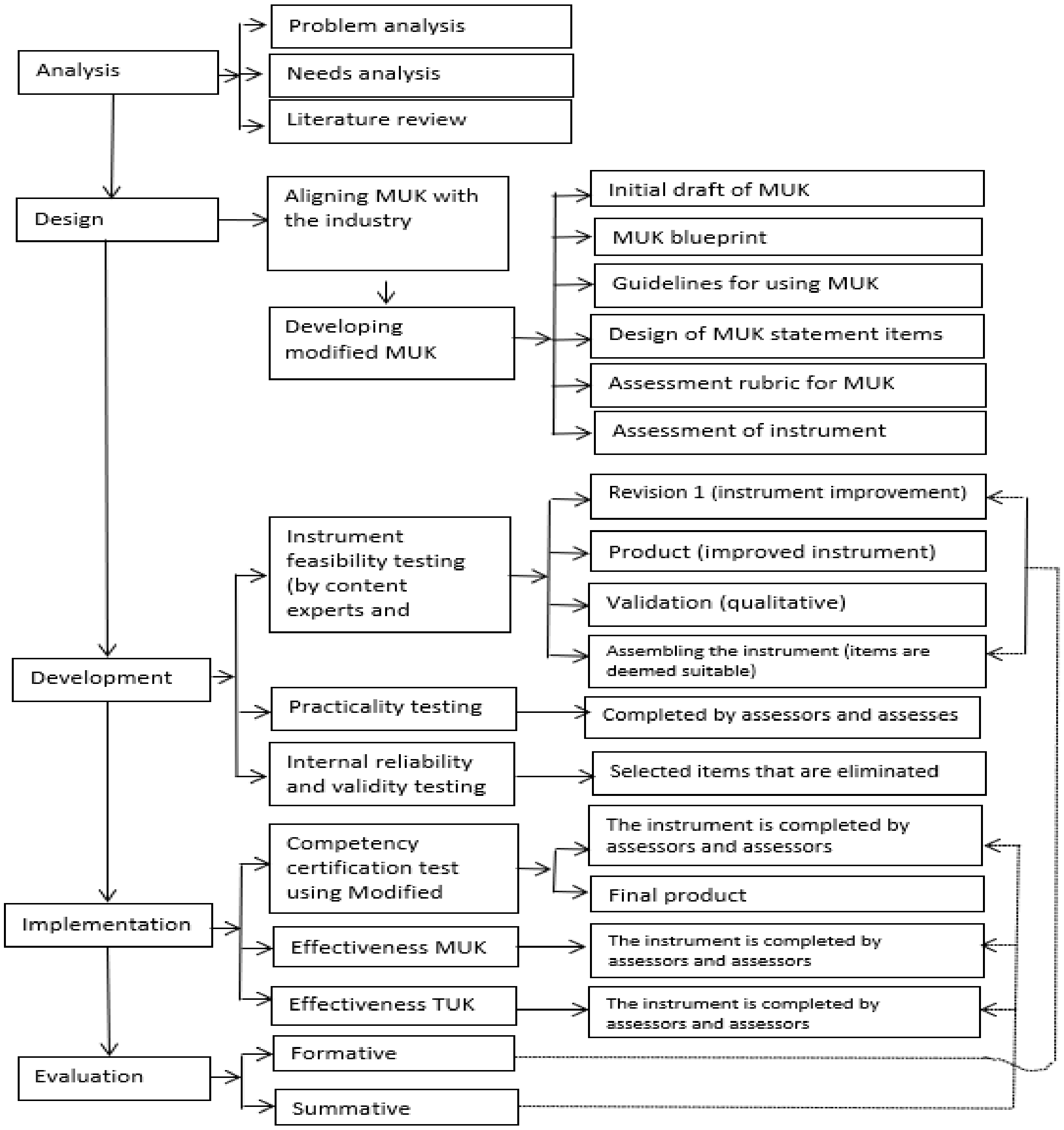

Figure 1. MUK Development Diagram

The research was conducted from April 6th to 9th, 2023, at SMK Negeri 2 Bawang. The data collected in the study include (1) instrument feasibility; (2) instrument practicality; (3) internal reliability and validity; (4) instrument effectiveness; and (5) effectiveness of facility and infrastructure utilization. Data on instrument feasibility were measured from a feasibility instrument, sourced from 2 content experts and 2 evaluation experts. Content experts were industry practitioners, specifically the Senior Technical Service of PT. Astra Honda Motor, responsible for planning training programs and competency certification tests in the industry. Evaluation experts were research and evaluation specialists from the Postgraduate Program of Universitas Negeri Semarang. Data on instrument practicality were collected from a practicality instrument, sourced from 6 teachers (assessors) and 48 students (assesses) using the MUK. Data on internal reliability and validity were obtained from a trial of multiple-choice written test instruments on 48 assesses. Data on the effectiveness of competency test material were measured from an effectiveness instrument, sourced from 6 assessors and 48 users of the material. Data on the effectiveness of facility and infrastructure utilization at the Assessment Center (TUK) were measured from an effectiveness instrument, sourced from 6 assessors and 48 users of the TUK. Assessors were teachers from SMKs under the supervision of the Education Office Branch IX (Wonosobo, Banjarnegara, and Purbalingga). Assessees were 12th-grade students in the Motorcycle Engineering and Business program at SMK Negeri 2 Bawang.

A good instrument should measure accurately according to what should be measured (valid) and be consistent and reliable (reliable). Conversely, an instrument containing misleading elements will result in less effective research. Therefore, it is important to test the validity and reliability of every instrument used to collect data (Sugiyono, 2016; Hadi, 2015).

1. Validity and Reliability Testing of MUK Feasibility Assessment Sheet

a. Validation and Reliability Testing of the MUK Feasibility Assessment Sheet by Content Experts

1) Validity

$$CVR=(2ne/n)-1$$

Where:
CVR = Content Validity Ratio
ne = Number of validation experts who rated "Yes" (important/relevant)
n = Total number of validation experts.

$$CVI = CVR / \Sigma n$$

Where:
n = total number of items across all aspects.
Source: Lawshe (1975)

If the CVI value falls within the range of 0 to 1, then the instrument can be considered good. If the final calculation of CVR and CVI scores meets the minimum threshold value according to Lawshe (1975), which is 0.99, then the MUK is considered valid and suitable for use. In the validation results of the MUK feasibility assessment sheet by content experts, out of 83 items, 73 items were deemed valid.

2) Reliability

The reliability of the MUK feasibility assessment sheet is measured using the Cohen's Kappa coefficient (K), which is an inter-rater reliability measure indicating the consistency between two raters or instruments. The calculation is performed using SPSS Statistics 26 software. The results of the Cohen's Kappa coefficient (K) are interpreted using Table 1.

Table 1. Interpretation of Cohen's Kappa Coefficient (K) Values

Kappa Coefficient Value	Reliability Level	Reliability Percentage
0 – 0.20	None	0 – 4
0.20 – 0.39	Minimal	5 – 15
0.40 – 0.59	Weak	16 – 35
0.60 – 0.79	Moderate	36 – 63
0.80 – 0.90	Strong	64 – 81
Diatas 0.90	Very Strong	82 – 100

(*Source*: Mary L. McHugh, 2012:281)

The reliability test results yielded a Cohen's Kappa coefficient (K) agreement value of 0.883, indicating that the reliability of the MUK feasibility assessment sheet is strong.

b. Validity and Reliability Testing of the MUK Feasibility Assessment Sheet by Expert Evaluation

1) Validity

In the validation results of the MUK feasibility assessment sheet by content experts, out of 20 items, 16 items were deemed valid.

2) Reliability

The reliability test results yielded a Cohen's Kappa coefficient (K) agreement value of 0.828, indicating that the reliability of the MUK feasibility assessment sheet is strong.

2. Validity and Reliability Testing of the MUK Practicality Assessment Sheet

a. Validity

Validity testing of the practicality finding the point-biserial correlation index (rpbi) using Microsoft Excel software. The obtained point-biserial correlation index (rpbi) is consulted with the r-table at a significance level of 0.05. If rpbi ≥ r-table, then the item is considered valid.

The validation of the MUK practicality assessment sheet, consisting of 24 items, resulted in all 24 items being deemed valid.

b. Reliability

Reliability testing of the practicality assessment sheet is calculated using KR20 test with Microsoft Excel software. The results of the KR20 test are interpreted using a reliability score classification table. According to Riwikdigdo (2007), an instrument falls into the reliable category if it has a reliability coefficient of 0.7 or higher.

Table 2. Reliability Score Classification

Reliability Response Index	Criteria
< 0.2	Very Low
0.2 - 0.4	Low
0.4 - 0.5	Fair
0.5 - 0.8	High
0.8 - 1	Very High

The reliability testing results yielded a KR20 value of 0.715, indicating high reliability of the practicality assessment sheet.

3. Internal Validity and Reliability Testing of the Multiple-Choice Test Items in the MUK

a. Difficulty Level of the Test Items

The difficulty level of the test items is calculated by finding the Mean Output using SPSS Statistics 26 software. The Mean Output SPSS values are interpreted using Table 3.

Table 3. Interpretation of MUK Multiple-Choice Test Item Difficulty Level

Difficulty Level Index	Criteria
0.00 – 0.15	Very difficult. should be discarded
0.16 – 0.30	Difficult
0.31 – 0.70	Moderate
0.71 – 0.85	Easy

(Karno To, 1996:15)

The results of the difficulty level test for the 86 test items indicate that there are 42 moderately difficult items, 32 easy items, and 12 very easy items. The very easy items should be discarded.

b. Item Differentiation

Item differentiation is calculated by finding the R value using SPSS Statistics 26 software. The R value is interpreted using Table 4.

Table 4. Interpretation of Multiple Choice Item Differentiation

Item Differentiation Index	Item Differentiation Criteria
Negative – 0.09	Very poor. should be discarded
0.10 – 0.19	Poor. preferably discarded
0.20 – 0.29	Fairly good or sufficient
0.30 – 0.49	Good
0.50 and above	Very good

(Karno To, 1996:15)

The results of the item differentiation test from 86 items revealed that 22 items had sufficient item differentiation, 60 items had good item differentiation, and 4 items had very good item differentiation.

c. Effectiveness of Distractors

In terms of the selection of distractors in the top and bottom groups:

If: NA = Number of test participants in the top group who selected the distractor

NB = Number of test participants in the bottom group who selected the distractor

Then: NA < NB = Distractor is considered effective

NA > NB = Distractor is considered misleading

NA = NB = Distractor is considered ineffective

In terms of the number of selections in the sample of test participants, a distractor is considered functional if: for a multiple-choice question with 5 options, the distractor is chosen by at least 3% of all test participants from the top and bottom groups.The results of the effectiveness test of multiple-choice question distractors from 86 items showed 344 distractor items, consisting of 265 items accepted, 66 items revised, and 13 items discarded.

d. Internal Validity

The validity test results were calculated by finding the point biserial correlation index (rpbi) using Microsoft Excel software. In the validation of the MUK practicality assessment sheet, out of 86 items, 88 items were found to be valid.

e. Internal Reliability

The reliability test results yielded a KR20 value of 0.917, indicating that the reliability of the MUK practicality assessment sheet is very high.

4. The Validity and Reliability Test of the Effectiveness Assessment Sheet for MUK

a) Validity

The validity test was calculated by finding the point biserial correlation index (rpbi) value using Microsoft Excel software. The validation of the effectiveness assessment sheet for MUK from 18 items showed that all 18 items were valid and could be used in instrument reliability calculations.

b) Reliability

The reliability test resulted in a KR20 value of 0.822, indicating that the reliability of the assessment sheet for the effectiveness of the MUK is very high.

5. Validity and Reliability Testing of the Effectiveness of Facility and Infrastructure Utilization Assessment Sheets at the Assessment Center (TUK)

a) Validity

The validity test was conducted by calculating the point biserial correlation index (rpbi) using Microsoft Excel software. Validation of the assessment sheet for the effectiveness of MUK by assessors and assesses from 18 items resulted in all 18 items being valid and suitable for reliability instrument calculations.

b) Reliability

The reliability test yielded a KR20 value of 0.781, indicating the reliability of the MUK assessment sheet.

RESULTS AND DISCUSSION

Results

1. Analysis

At the analysis stage, various assessments were conducted including problem analysis, needs analysis, and literature review. Problem analysis revealed several issues: 1) The legitimacy of competency certificates issued by LSP P1 SMK in the industry and job market is still lacking; 2) Technical guidelines for implementing and fulfilling the principles of competency certification tests within the MUK are insufficient; 3) The MUK used has not been aligned/synchronized with the latest technological developments in the industry and job market; 4) Support for infrastructure and facilities in industry-based TUKs is still inadequate.

Needs analysis is as follows: 1) The MUK is aligned/synchronized with the latest technological developments in the industry and job market as expected by assessors and assesses; 2) The MUK is developed practically and effectively so that it can be easily used by assessors and assesses; 3) The MUK is made effective in fulfilling the principles of competency tests that facilitate assessors and assesses as users; 4) The utilization of TUK infrastructure and facilities is made effective to facilitate assessors and assesses effectively.

Literature review analysis is as follows: 1) BNSP Regulation Number: 09/BNSP.301/XI/2013 Regarding Guidelines for Competency Assessment Implementation; 2) KKNI Level II scheme in the competency of motorcycle engineering and business can be achieved through a cluster approach and must be achieved within 3 years. The cluster developed is Motorcycle Periodic Maintenance (KKNI Level II Competency Scheme for Motorcycle Engineering and Business, 2017); 3) Industrial competency test material (Honda Motorcycle Engineering Curriculum (KTSM-Honda)); 4) Core Competencies Basic Competencies Curriculum 2013 Motorcycle Engineering and Business Honda; 5) Repair Guidebook; and 6) Part Catalog (Astra Honda Training Center. *Honda Motorcycle Engineering Material: Basic Module for Vocational High School Semesters 1-3*, (2014) and Fahrul Anam Setiawan (2021): Fundamentals of Automotive I).

2. Design

Tahap design dilakukan untuk mempermudah peneliti dalam merancang MUK yang akan disusun. Tahap perancangan meliputi:

a. Alignment of MUK with the Industry

The alignment of MUK was conducted by the researcher with Senior Technical Service practitioners from PT. Astra Honda Motor Branch in Yogyakarta. The purpose of aligning MUK was to obtain input and adjustments relevant to the latest technological developments in the industry. The alignment was carried out on August 16, 2022, with the following results: 1) MUK of the Honda Motorcycle Engineering Curriculum (KTSM-Honda) on assessment items I.1 to I.18 (see the Venn diagram caption) is already in accordance with KKNI Level II in the Competency of Motorcycle Engineering and Business, Motorcycle Periodic Maintenance Cluster; 2) Modified MUK to be developed needs to add assessment items I.19 to I.24; 3) The completion time for each competency unit is standardized according to industry demands, specifically at Astra Motor using Flat Rate Service Time (FRT) listed in the Part catalog; 4) The implementation of Occupational Health and Safety procedures is adjusted to the industrial work culture of Safety Talk and 5S (Sort, Straighten, Shine, Standardize, and Sustain).

The analysis of the relationship between KKNI Level II in the Competency of Motorcycle Engineering and Business, Motorcycle Periodic Maintenance Cluster, and KTSM-Honda MUK can be related to the Core Competency Standards Basic Competencies (SKL KI-KD) of the 2013 Curriculum, which can be explained in the Venn diagram as follows:

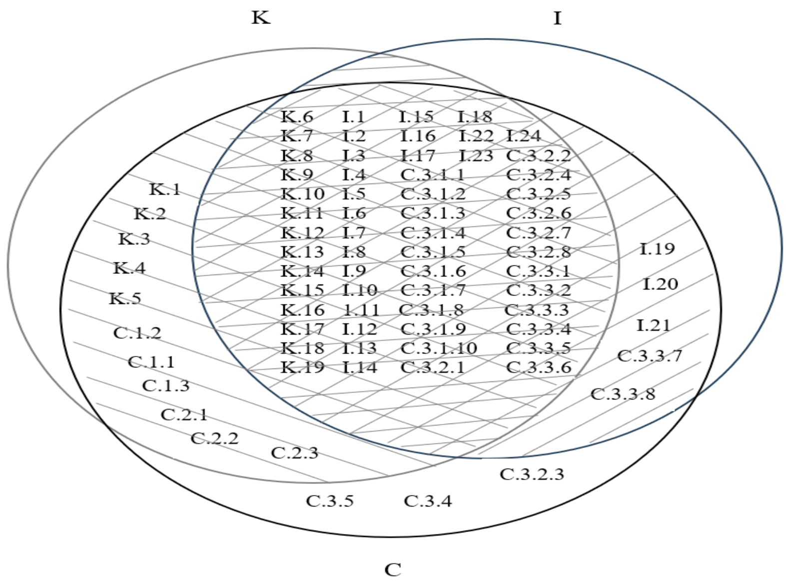

Figure 2. Venn Diagram of the Relationship between KKNI Level II Motorcycle Engineering and Business, Motorcycle Periodic Maintenance Cluster, KTSM-Honda MUK, and 2013 Motorcycle Engineering and Business Curriculum

Where:

K: KKNI Level II in Competence of Motorcycle Engineering and Business, Periodic Maintenance Motorcycle Repair Cluster	**I: KTSM-Honda's Work Instruction**	**C: Curriculum 2013 of Motorcycle Engineering and Business (Groups C1, C2, C3)**	
K.1: Following Safety, Occupational Health, and Environmental Procedures	I.1: Inspection of Lights and Horns	C.1.1: Simulation and Digital Communication	C.3.2.7: Periodic maintenance of steering systems
K.2: Reading and Understanding Technical Drawings	I.2: Inspection/Replacement of Engine Oil	C.1.2: Physics	C.3.2.8: Periodic maintenance of rear wheel drive chain
K.2: Using and Maintaining Tools and Equipment in the Workplace	I.3: Carburetor Cleaning	C.1.3: Chemistry	C.3.3 : Motorcycle Electrical Maintenance (KD for periodic maintenance)
K.4: Contributing to Workplace Communication	I.4: Air Filter Cleaning	C.2.1: Automotive Technical Drawing	C.3.3.1: Periodic maintenance of lighting systems
K.5: Using and Maintaining Measuring Instruments	I.5: Spark Plug Inspection	C.2.2: Basic Automotive Technology	C.3.3.2: Periodic maintenance of instrument and signal systems
K.6: Maintaining the Engine and Its Components	I.6: Valve Clearance Adjustment	C.2.3: Basic Automotive Engineering Jobs	C.3.3.3: Periodic maintenance of starter systems
K.7: Maintaining and Repairing Emission Controls	I.7: Inspection/Adjustment of Automatic Clutch	C.3.1: Motorcycle Engine Maintenance (KD for periodic maintenance)	C.3.3.4: Periodic maintenance of conventional ignition systems
K.8: Maintaining the Cooling System and Its Components	I.8: Inspection/Adjustment of Manual Clutch	C.3.1.1: Periodic maintenance of valve mechanisms	C.3.3.5: Periodic maintenance of electronic ignition systems
K.9: Maintaining the Gasoline Fuel System	I.9: Drive Belt Inspection (Visual)	C.3.1.2: Periodic maintenance of lubrication systems	C.3.3.6: Periodic maintenance of charging systems
K.10: Maintaining Manual and Automatic Clutch Units	I.10: Inspection, Adjustment, and Lubrication of Wheel Chain	C.3.1.3: Periodic maintenance of cooling systems	C.3.3.7: Security system maintenance
K.11: Maintaining Manual Transmission Systems	I.11: Wheel and Tire Inspection	C.3.1.4: Periodic maintenance of intake and exhaust systems	C.3.3.8: Maintenance of electronic control injection sensor systems
K.12: Maintaining Brake Systems	I.12: Front and Rear Brake Inspection/Adjustment	C.3.1.5: Periodic maintenance of carbureted fuel systems	C.3.4 : Motorcycle Workshop Management
K.13: Maintaining Steering Systems	I.13: Battery Voltage Inspection and Measurement	C.3.1.6: Periodic maintenance of fuel injection systems	C.3.5 : Creative Products and Entrepreneurship
K.14: Inspecting Suspension Systems	I.14: Inspection/Adjustment of Handlebar and Suspension Free Movement	C.3.1.7: Periodic maintenance of manual transmission systems	
K.15: Maintaining Suspension Systems	I.15: Carburetor Adjustment	C.3.1.8: Periodic maintenance of automatic transmission systems	
K.16: Maintaining Chain Systems	I.16: Throttle Adjustment	C.3.1.9: Periodic maintenance of manual clutch systems	
K.17: Testing, Maintaining, and Replacing Batteries	I.17: Inspection, Tightening of Bolts and Nuts	C.3.1.10: Periodic maintenance of automatic clutch systems	
K.18: Maintaining Brake Systems	I.18: Fuel Pressure Inspection	C.3.2: Motorcycle Chassis Maintenance (KD for periodic maintenance)	
K.19: Maintaining Transmission Systems	I.19: ECM Reset	C.3.2.1: Periodic maintenance of hydraulic brake systems	
	I.20: Altitude Setting	C.3.2.2: Periodic maintenance of mechanical brake systems	
	I.21: Answer Back System Setting	C.3.2.3: Periodic maintenance of ABS brake systems	
	I.22: Combi Brake System Adjustment	C.3.2.4: Periodic maintenance of rims	
	I.23: CVT Disassembly and Assembly	C.3.2.5: Periodic maintenance of tires	
	I.24: Shim Replacement	C.3.2.6: Periodic maintenance of suspensions	

The overlapped Venn diagram highlighted above with members: K.6, K.7, K.8, K.9, K.10, K.11, K.12, K.13, K.14, K.15, K.16, K.17, K.18, K.19, I.1, I.2, I.3, I.4, I.5, I.6, I.7, I.8, I.9, I.10, I.11, I.12, I.13, I.14, I.15, I.16, I.17, I.18, I.22, I.23, I.24, C.3.1.1, C.1.1.2, C.3.1.3, C.3.1.4, C.3.1.5, C.3.1.6, C.3.1.7, C.3.1.8, C.3.1.9 C.3.1.10, C.3.2.1, C.3.2.2, C.3.2.4, C.3.2.5, C.3.2.6, C.3.2.7, C.3.2.8, C.3.3.1, C.3.3.2, C.3.3.3, C.3.3.4, C.3.3.5, C.3.3.6 indicate that the competency units in KKNI Level II in Motorcycle Engineering, Periodic Maintenance Cluster have similar job types with the notations K, assessment items in KTSM-Honda MUK with the notation I, and part of the 2013 Motorcycle Engineering and Business Curriculum largely overlap. Items to be added in the modified MUK are assessment items I.19, I.20, I.21, and Basic Competencies C.3.3.7, C.3.3.8.

b. Modification of MUK Development

The modification of MUK is carried out through the following stages: drafting the initial MUK, structuring the MUK framework, compiling certification testing guidelines, designing statement items, and creating MUK rubrics.

The MUK initial draft consists of:

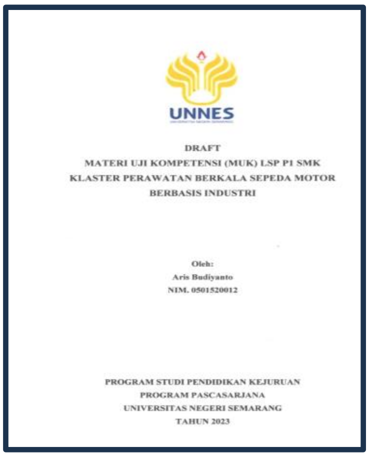

Figure 3. The cover of the modified MUK

DAFTAR DOKUMEN
MATERI UJI KOMPETENSI (MUK) LSP P1 SMK
KLASTER PERAWATAN BERKALA SEPEDA MOTOR BERBASIS INDUSTRI

No	JENIS DOKUMEN
PELAKSANAAN ASESMEN:	
1.	FR.APL-01 Permohonan Sertifikasi Kompetensi
2.	FR.APL-02 Asesmen Mandiri
3.	FR.MAPA.01 Merencanakan Aktivitas dan Proses Asesmen
4.	Skema Sertifikasi
5.	FR.MAPA.02 Peta Instrumen Asesmen Hasil Pendekatan Asesmen dan Perencanaan Asesmen
6.	FR.AK.01 Persetujuan Asesmen dan Kerahasiaan
7.	FR.AK.04 Banding Asesmen
PERANGKAT ASESMEN:	
8.	FR.IA.01 Ceklis Observasi Aktivitas di Tempat Kerja Atau Tempat Kerja Simulasi
9.	FR.IA.02 Tugas Praktik Demonstrasi
10.	FR.IA.05 Pertanyaan Tertulis Pilihan Ganda, FR.IA.05A Kunci Jawaban dan FR.IA.5B Lembar Jawab
11.	FR.IA.07 Pertanyaan Lisan
12.	FR.IA.11 Ceklis Meninjau Instrumen Asesmen
KEPUTUSAN:	
13.	FR.AK.02 Formulir Rekaman Asesmen Kompetensi
14.	FR.AK.03 Umpan Balik dan Catatan Asesmen
LAPORAN:	
15.	FR.AK.05 Laporan Asesmen
16.	FR.AK.06 Meninjau Proses Asesmen
VALIDASI:	
17.	FR.VA. Memberikan Kontribusi Dalam Validasi Asesmen

Figure 4. List of Modified MUK Documents

3. Development

This stage aims to assess the extent of the feasibility of the designed MUK. Therefore, the steps taken are as follows:

a. Feasibility Testing of MUK

The feasibility of the MUK questionnaire resulting from non-test research is assessed through analytical techniques involving the following steps:

1) Converting qualitative assessments to quantitative ones according to the criteria outlined in the following table:

Table 5. Score Scale for MUK Feasibility Assessment

Kriteria	Skor
Very Good (SB)	5
Good (B)	4
Fair (CB)	3
Poor (KB)	2
Very Poor (SKB)	1

Source: Modified from Djemari Mardapi (2008)

2) Calculating the overall mean value and each aspect using the formula.

$$\bar{x} = \frac{\Sigma x}{n}$$

Where:

$\bar{x}$ = Mean value

$\sum x$ = Sum of scores

n = Number of indicators

1) Interpreting the overall mean value and each aspect qualitatively using the following criteria:

Table 6. Conversion Criteria of MUK Feasibility Scores into Five-Scale

Value	Formula	Range	Classification
5	$\bar{xi} + 1.8\ S < \bar{x} \leq \bar{xi} + 3\ S$	4.21 – 5.00	Very Good
4	$\bar{xi} + 0.6\ S < \bar{x} \leq \bar{xi} + 1.8\ S$	3.41 – 4.20	Good
3	$\bar{xi} - 0.6\ S < \bar{x} \leq \bar{xi} + 0.6\ S$	2.61 – 3.40	Fair
2	$\bar{xi} - 1.8\ S < \bar{x} \leq \bar{xi} - 0.6\ S$	1.81 – 2.60	Poor
1	$\bar{xi} - 3\ S < \bar{x} \leq \bar{xi} - 1.8\ S$	0 – 1.80	Very Poor

Where:

Maximum Score = 5

Minimum Score = 1

Ideal maximum score = number of items × highest score

Ideal minimum score = number of items × lowest score

$\bar{x}$ = average score obtained

$\bar{xi}$ = 1/2 (ideal maximum score + ideal minimum score)

S (Ideal standard deviation) = 1/6 (ideal maximum score – ideal minimum score)

Source: (Sukardjo (2008)

Scoring data for the feasibility test of the industry-based MUK for LSP P1 SMK in Motorcycle Periodic Maintenance Cluster by content experts are as follows:

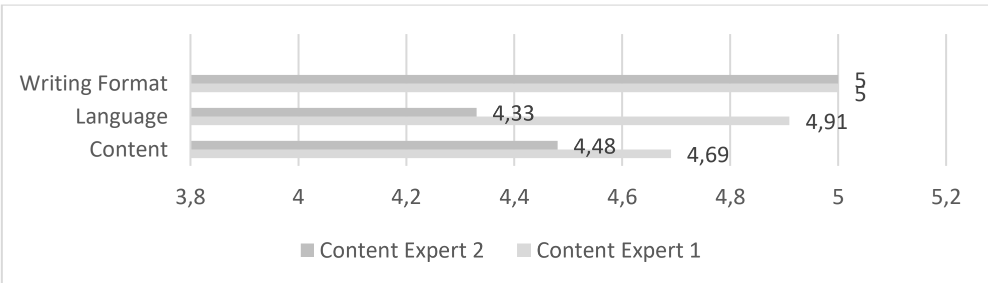

Figure 5. Diagram of the MUK Validity Score by Content Experts

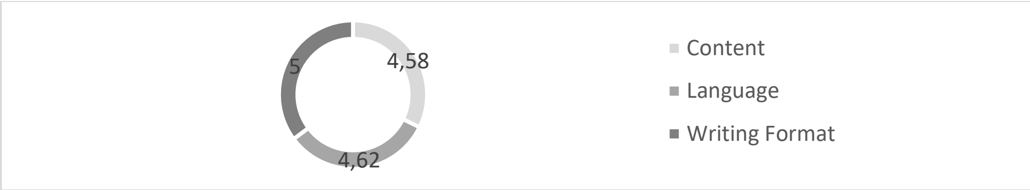

Figure 6. Diagram of Average Feasibility Scores of MUK by Content Experts

Based on figures 5, and figure 6 above, the expert assessment on the content indicator yielded an average score of 4.58, falling into the "very feasible" criteria, while the language indicator scored an average of 4.62, also classified as "very feasible". Additionally, the format writing indicator scored an average of 5.00, which also falls under the "very feasible" category. Scoring data for the feasibility test of MUK by evaluators are as follows:

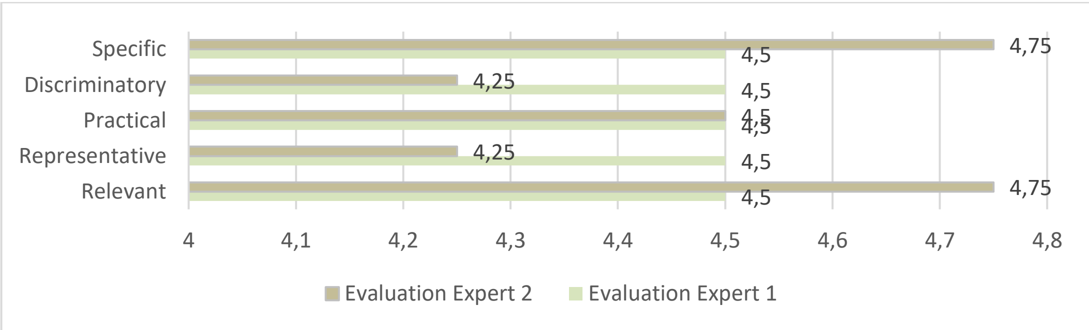

Image 7. Diagram of MUK Feasibility Scores by Expert Evaluation

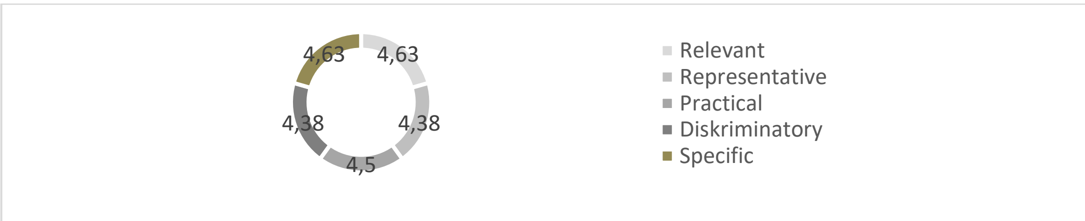

Image 8. Diagram of Average Feasibility Scores of MUK by Expert Evaluation

Based on figure 7, and figure 8 above, the evaluation by the evaluation experts on the relevant indicator has an average score of 4.63, which falls within the "very feasible" criteria. The representative indicator has an average score of 4.38, also falling within the "very feasible" criteria. The practicality indicator has an average score of 4.50, meeting the "very feasible" criteria. The discriminative indicator has an average score of 4.38, which also falls within the "very feasible" criteria. Lastly, the specific indicator has an average score of 4.63, which falls within the "very feasible" criteria. The average score of assessments by content experts and evaluation experts is 4.62, also meeting the "very feasible" criteria.

The results of the instrument feasibility test were carried out in the following steps: 1) Revision (instrument improvement), the instrument is revised according to the notes of criticisms and suggestions written in the comments and suggestions for improvement section; 2) Product (improved instrument), the MUK instrument resulting from improvements becomes the modified MUK product; 3) Validation (qualitative), the modified MUK is validated by assessors and assesses to determine the extent to which the device has practicality and validity; 4) Assembling instruments (items are feasible), using the statement items on indicators that meet feasibility, practicality, and validity to assemble them into a reliable instrument. Improving or removing statement items on indicators that do not meet feasibility, practicality, and validity.

b. Practicality Test of Industry-Based MUK for LSP P1 SMK in Periodic Maintenance Motorcycle Cluster

The practicality analysis of the industry-based MUK is obtained from the responses of assessors and assesses to the evaluation sheets through a questionnaire. The analysis can be conducted with the following criteria:

Table 9. Practicality Response Score Scale

Category	Score
Practical = Agree (S)	1
Impractical = Disagree (TS)	0

Data resulting from assessors and assesses responses are then used to calculate the coefficient of reproducibility (Kr) and the coefficient of scalability (Ks) to determine the practicality of each aspect using the following formulas:

$$Kr = 1 - \frac{e}{n}$$

Where:
Kr = Coefficient of reproducibility
e = Number of errors = 0
n = Number of questions x number of respondents

$$Ks = 1 - \frac{e}{k}$$

Once Kr is known, the coefficient of scalability (Ks) is calculated using the following formula:

Where:
Ks = Coefficient of scalability
e = Number of errors = 0
k = Expected number of errors or c (n -Tn) and c is the likelihood of getting the correct answer. Since the answers are "Yes" or "No," c = 0.5

The MUK is considered practical if the Coefficient of Reproducibility (Kr) is above the practicality requirement of 0,90. The Coefficient of Scalability (Ks) is considered satisfactory if it is above 0,60 (Singarimbun, 2008). Interpreting qualitatively the average (%) questionnaire scores for practicality testing for the overall module and each aspect: In this study, the practicality of the module is reinforced by the scalability test, the Coefficient of Scalability or Ks. The obtained Ks score for Teachers (Assessors) is 0,720, and for Students (Assesses) it is 0,803. These scores meet the criteria (> 0,60) (Nazir & CIA, 2005: 99-113).

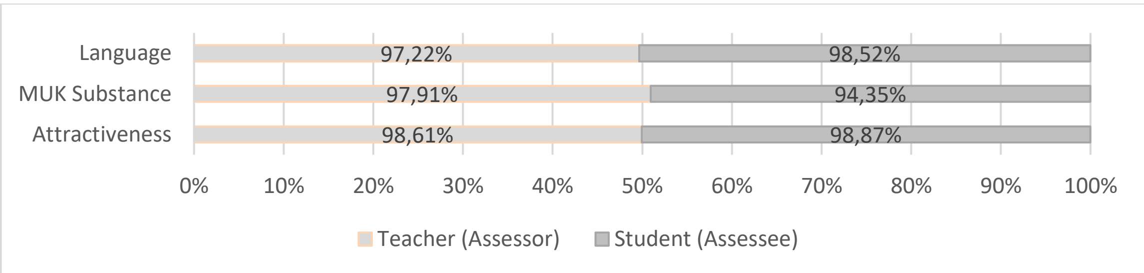

Figure 9. Diagram of MUK Practicality Score

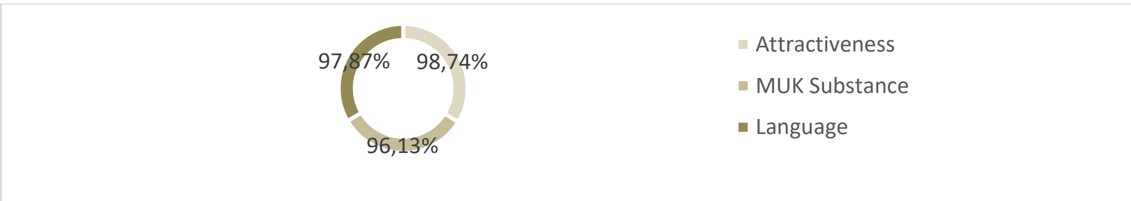

Figure 10. Diagram of Average Practicality Score of MUK

Based on figures 9 and 10, the average results of the practicality test per indicator are as follows: the attractiveness indicator has an average score of 98.74%, meeting the criteria of very practical; the substance of MUK indicator has an average score of 96.13%, meeting the criteria of very practical; and the language indicator has an average score of 97.87%, meeting the criteria of very practical. The conclusion drawn from the responses of both assessors and assesses, with an average score of 97.58%, meets the criteria of being very practical, indicating that the industry-based MUK for LSP P1 SMK in periodic maintenance of motorcycle cluster is highly practical.

3. Implementation

The implementation phase can be carried out if the feasibility test results meet the criteria of being feasible and the practicality test meets the criteria of being practical. Subsequently, the implementation phase of the modified MUK involves conducting competency certification exams at LSP P1 SMK Negeri 2 Bawang with 6 assessors, namely vocational school teachers in the Regional Education Branch Office IX (Wonosobo, Banjarnegara, and Kebumen), and 48 assesses, namely students of grade XII TBSM at SMK Negeri 2 Bawang in Banjarnegara Regency. Data on the responses obtained from filling out the modified MUK instrument by 6 assessors and 48 assesses can be used as data for assessing the effectiveness of MUK and the utilization of facilities and infrastructure at TUK.

4. Evaluation

Evaluation is conducted both formatively and summatively. Formative evaluation is carried out by considering the criticisms, inputs, and suggestions from content experts and evaluation experts to develop the modified MUK. Summative evaluation is conducted by implementing tests on the effectiveness of MUK and the utilization of facilities and infrastructure at the TUK.

a. Effectiveness testing of the industry-based MUK for LSP P1 SMK in the Motorcycle Periodic Maintenance Cluster

The data in the form of questionnaire responses were analyzed using a Likert scale, with positive categories, where positive statements received the highest weight as follows:

Table 12. The Score scale of the effectiveness of MUK Assessment

Criteria	Score
Very Agree (SS)	4
Agree (S)	3
Disagree (TS)	2
Very Disagree (STS)	1

Source: Modified by Riduan (2010:13)

Analysis of the effectiveness questionnaire data for the industry-based MUK for Motorcycle Periodic Maintenance Cluster, LSP P1 SMK, is conducted with the following steps: 1) Assigning scores to each item response: Very Agree (4), Agree (3), Disagree (2), and Very Disagree (1); 2) Assigning scores to each item response: Very Agree (4), Agree (3), Disagree (2), and Very Disagree (1); 3) Summing up the total score for all indicators; and 4) Determining the effectiveness score using the formula:

$$E = \frac{f}{N} \times 100$$

Where:
E = Final Score
f = Obtained Score
N = Maximum Score

Table 13. The MUK Effectiveness Category

Interval	Category
81 – 100	Very Effective
61 – 80	Effective
40 – 60	Sufficiently Effective
21 – 40	Ineffective
0 – 20	Very Ineffective

Source: Modified by Riduan (2010:13)

Analysis of the data from the Effectiveness Test of the industry-based MUK for LSP P1 SMK cluster of periodic maintenance of motorcycle by calculating data per indicator provides interpretations of the effectiveness category of each indicator as follows:

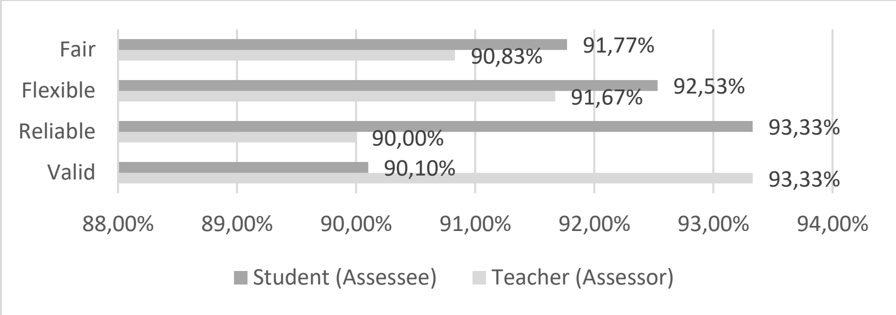

Figure 11. Diagram of the MUK Effectiveness Score

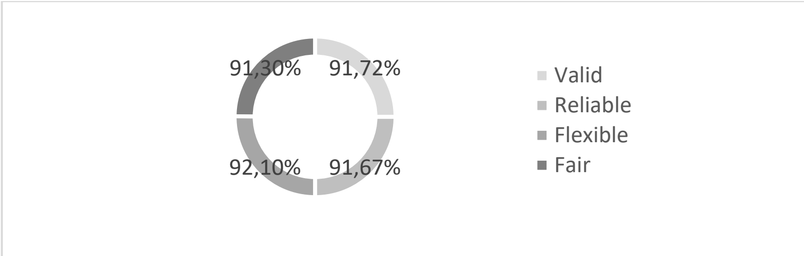

Figure 12. Diagram of MUK Effectiveness Average Score

The results of the effectiveness analysis of MUK per indicator show the following average response values: the validity indicator has an average score of 91,72% with a category of very effective, the reliability indicator has an average score of 91,67% with a category of very effective, the flexibility indicator has an average score of 92,10% with a category of very effective, and the fairness indicator has an average score of 91,30% with a category of very effective.

b. Effectiveness Test of Utilizing Facilities and Infrastructure of Assessment Center/TUK

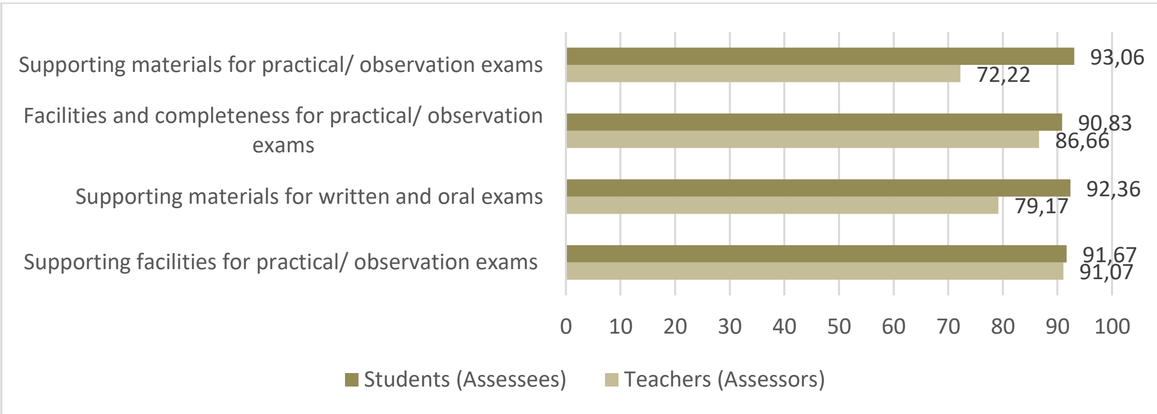

Figure 13. Diagram of the Effectiveness (%) of Utilizing TUK Facilities and Infrastructure

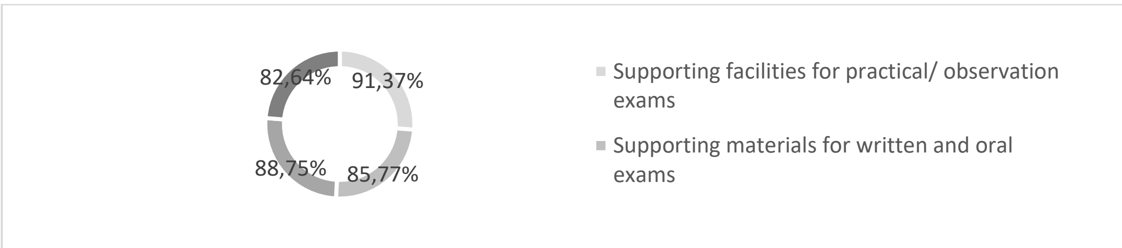

Figure 14. Diagram of Average Effectiveness Score of TUK Facilities and Infrastructure Utilization

The results of the effectiveness analysis of TUK facilities and infrastructure per indicator response are as follows: the indicator of supporting facilities for practical/observational exams materials scored an average of 91.37%, categorized as very effective; the indicator of support for written and oral exam materials scored an average of 85.77%, also categorized as very effective; the indicator of facilities and completeness of practical/observational exams scored an average of 88.75%, falling under the category of very effective; and the indicator of support for practical/observational exam materials scored an average of 82.64%, also classified as very effective. The average effectiveness test score is 87.13%, indicating that the utilization of TUK facilities and infrastructure is highly effective.

Discussion

The final outcome of this development research is the industry-based MUK for LSP P1 SMK in the motorcycle periodic maintenance cluster. It has the following advantages: it is designed with test material substance aligned with the latest industrial competency test materials, presented in language easily understood by assessors and assesses, serving as a practical guide for assessors and assesses during the competency certification assessment process to gather valid, genuine, up-to-date, and adequate competency evidence (VATM).

The feasibility study of the developed MUK is based on the validation results from content experts and evaluation experts. The validity of the industry-based MUK examined in this study includes content validity, which assesses the alignment between presented concepts with established concepts and theories, as well as operational construct validity (Drost & perspectives, :105-123). The validity of a development product can be determined based on validation activities' outcomes (Azwar, 2018). Following the validation process, it can be concluded that the Industry-Based MUK for LSP P1 SMK in the motorcycle periodic maintenance cluster have become the final product and are highly suitable for use by assessors and assesses in implementing competency certification tests in vocational schools.

The overall average validation score from content experts was 4.74, meeting the criteria for being very feasible. The overall average validation score from evaluators was 4.50, meeting the criteria for being very feasible. The overall average validation score from both content experts and evaluation experts was 4.62, thus confirming that the industry-based MUK for LSP P1 SMK in the motorcycle periodic maintenance cluster are valid with revisions and do not require significant overhaul. They are deemed feasible for use as competency assessment tools for the LSP P1 SMK.

According to Akker (1999), one of the objectives of development research is to promote the scholarship and practicality of the final product. The results of the practicality analysis of the industry-based MUK for LSP P1 SMK in motorcycle periodic maintenance cluster average response score 97,49% indicates that the industry-based MUK for LSP P1 SMK in the motorcycle periodic maintenance cluster are very practical for use as assessment tools in vocational schools.

The internal validity of the multiple-choice items out of 86 items, 86 were deemed valid. The reliability value of 0.917, indicating very high reliability. In conclusion, the results of the internal validity and reliability testing of the multiple-choice items indicate that they are valid and reliable.

The results of the effectiveness analysis of the industry-based MUK for LSP P1 SMK in motorcycle periodic maintenance cluster average response score of 91.70% indicates that industry-based MUK for LSP P1 SMK in motorcycle periodic maintenance cluster is very effective as an assessment tool for LSP P1 SMK.

The results of the effectiveness analysis of the utilization of facilities and infrastructure in TUK average response score of 87.13% indicates that the utilization of TUK facilities and infrastructure is very effective in supporting the activities of competency certification tests for LSP P1 SMK.

The new findings in this study are, the MUK of motorcycle periodic maintenance cluster industrial based consists of multiple choice test, oral test and demonstration practice tasks adapted to the latest knowledge of motorcycle technology product, the suitability of the required working time (Flat Rate Service Time) and the implementation of the work culture on Safety Talk and 5 Rs (Concise, Neat, Clean, Caring and Diligent).

CONCLUSION

Based on the results of the study, it can be concluded that, the development of MUK is very eligible, practical and effective to be used in improving the quality of the competency certification test of the LSP P1 SMK on motorcycle periodic maintenance cluster. The industry-based MUK for LSP P1 SMK in motorcycle periodic maintenance cluster will be more effectively implemented in vocational schools that collaborate with PT. Astra Honda Motor and apply the Honda Motorcycle Engineering Curriculum (KTSM-Honda), where the test materials are tailored to the availability of facilities and infrastructure in TUK.

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