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Design and Construction of Motorcycle Telescopic Oil Seal Remover with Installer

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ABSTRACT

This study, entitled "Design and Construction of Motorcycle Telescopic Oil Seal Remover with Installer," is a device to assist the technician in safely, comfortably, and efficiently servicing the motorcycle telescopic. This study was conducted to determine the essential components of the gadget in terms of supplies, tools, and equipment to be used. To determine the production cost of the study in terms of materials cost and labor. To determine also the function and limitation of the tool in terms of capacity, longevity, and to identify its functionality, cost effectiveness, aesthetics, and design. This device is composed of a frame, a telescopic holder, an oil seal remover, and an installer, which makes the whole system functional. The questionnaires were distributed and answered by the 60 respondents, composed of 50 BITM students and 10 experts. The findings show that the materials and supplies used in fabricating the said project were made up of affordable materials. The total cost of the gadget is Php 11,105.00. It took 43 hours to make this tool. The device was found to be very functional, attractive, and affordable, based on the combined assessment of the expert and the students. Based on the findings and results, the fabrication of the project is technically feasible and could be produced locally. It helps technicians to easily remove and install the motorcycle telescopic oil seal remover with an installer. Thus, the study should be conducted to improve the design and efficiency of the complete project.

Keywords: Construction, Design, Motorcycle, Seal, Telescopic

INTRODUCTION

A motorcycle is a two or three wheeled motor vehicle. A motorcycle will be considered to be built, designed to sustain travel in overcrowded urban traffic, sail away, sports, and derby, or off-road riding. The purpose of registration can be described as activities that define the appearance, function, and engineering of motorcycles. Professionally, it is a branch of industrial design, similar to automotive design, using identical techniques and methodology, but confined by a set of conventions about what is acceptable to the buying public. These conventions have been defined by the acceptance of the industry and media as a whole to the assumption that the public will only purchase machines that bear more than a passing resemblance to competition machines of whatever kind. The four largest motorcycle markets in the world are all in Asia: China, India, Indonesia, and Vietnam. India, with an estimated 37 million motorcycles, was home to the largest number of motorized two-wheelers in the world. China came in a close second with 34 million motorcycles (Foale, 2002).

Modern suspension uses very light oils. A change in viscosity by just a couple of points makes a big difference in suspension compliance and action. All that a pplies to the fork also pertains to the shock (or shocks). The piston wears on the shock body, picking up metal that then travels through the oil and damping circuit. If the metal chips are large enough, they can cut through seals; even at best, they act like sandpaper to damage the seals over time. A reasonable interval for sport bikes, simple replacement of fluids and seals at 10,000 miles, will bring new life to the bike (Dave Moss 2012). Gulliver (2013) said that motorcycles are the top mode of transportation in the Philippines. Since there are lots of dealers offering installment plans, most Filipinos can easily afford to get a motorcycle, which is also how the scooter and motorcycle riding and racing culture started in the country.

In consonance with the problem, the researcher came up with the idea of a motorcycle telescopic oil seal remover with an installer, which will help the technician or the shop owner to minimize their time. Motorcycle telescopic tool ensures that the technician and other people can operate easily and safely. The fabricated motorcycle telescopic tool is made up of materials that are widely available in hardware or in a salvage yard. The Province of Davao Oriental is one of the places here in the Philippines, where you can find most of the r esidents as well as business-minded people used motorcycle to transport products and crops within and outside the province. This study on motorcycle telescopic oil seal remover with installer is very important to the students in servicing motorcycle front fork, also it serves as a motivating factor to encourage them to do research. The school can also benefit from this tool to assess students during actual performance. On the other hand, to those technicians who encounter a front fork problem this tool can help them to lessen their burden.

This study generally aims to design and construct a motorcycle telescopic oil seal remover with an installer. Specifically, it seeks to define the procedures employed in designing, constructing, and testing the project. It also aims to determine the production cost of the project in terms of materials and labor costs. Furthermore, the study intends to evaluate the project based on its functionality and cost-effectiveness.

MATERIALS AND METHODS

The project entitled “Design and construction of Motorcycle Telescopic oil seal remover with installer” is made up of round bar, angle bar, shafting, and plywood, which are available in every hardware of Mati City. The Motorcycle Telescopic Holder Tool is simply designed to hold the outer tube and remove the oil seal, which makes the work easy. The tool also allows

the technician and a non-expert to prevent damage and possible accidents in servicing a motorcycle Telescopic. The tool is needed for all technicians, especially in Davao Oriental, for servicing the Motorcycle Telescopic. The tool is effortless compared to the existing tool because technicians need more force to do the task.

Research design

The project employed a developmental-experimental type of research. It is a systematic study of designing, developing and evaluating an instructional system, process, and products that meet the criteria of internal consistency and effectiveness. This is an experiment where the researcher attempts to maintain control over the factors that may affect the result of an experiment. In doing this, the researcher attempts to determine or predict what may occur (Srinagesh, 2006).

Respondents of the study

Through the use of the evaluation sheet, the respondents validated the functionality, aesthetics, design, cost, and effectiveness of the device. The 3rd year and 4th year BITM students, five (5) experts and five (5) industrial instructors will be the respondents of this study.

For the students as respondents, the researchers first identified the respondents who would participate in the study. A questionnaire was then prepared and validated by a statistician through pilot testing among selected students. A formal letter was submitted to the program head requesting permission for the students to participate in the project evaluation. The respondents were then gathered for a demonstration and simulation of the tool, during which the researcher explained the operation of the tool and the contents of the questionnaire. After the explanation, the questionnaire was distributed to the respondents. The completed questionnaires were subsequently collected for tabulation and analysis, which were subjected to appropriate statistical treatment. Finally, the results of the study were presented.

For the experts as respondents, the researchers first identified the experts who would participate in the study. A questionnaire was then prepared and validated by a statistician through pilot testing among selected experts. A formal letter was submitted to the program head requesting permission for the experts to participate in the project evaluation. The questionnaires were individually distributed to the respondents, after which the researcher explained the contents of the questionnaire and demonstrated the operation of the tool. The completed questionnaires were then collected for tabulation and analysis, which were subjected to appropriate statistical treatment. Finally, the results of the study were presented.

Data collection

The evaluation sheets or questionnaire were distributed and answered by the 60 respondents, which consisted of 5 experts from local motorcycle technicians, 5 instructors and professors, and 50 students from the 3rd and 4th year levels. Eventually, the respondents were from DOSCST taking up the BITM course, wherein the project was being conducted. These data were interpreted by the statistician. Based on the data gathered, the interpretation of the project was very functional, very affordable, and very attractive. Motorcycle telescopic oil seal remover with installer.

Bill of supplies and materials

The table below includes the quality, units, description of materials and supplies used

in the fabrication of the study.

Table 1. Bill of supplies and materials.

Quantity	Units	Description of materials	Unit Cost (Php)	Total Cost (Php)
1 ½	cm	(2x2cm x1/2cm) Angle bar	910.00	1,820.00
½	ft.	Shafting 2 steel round bar (1 scrap)	230.00	230.00
½	ft.	Shafting 1 ½	225.00	225.00
3	kg.	Shafting 1 (scrap)	20.00	60.00
2	kg.	Round bar 12mm (scrap)	12.00	24.00
12	pc.	Bolt/nut/washer 6/1x2mm	8.00	96.00
1	pc	Return spring	20.00	20.00
4	pc	Wheel rubber	129.00	516.00
1	ltr.	Enamel paint/thinner	214.00	214.00
			Total cost	**Php. 3,205.00**

Tools and Equipment

The table below presents the tools and equipment and their function in the construction of the Motorcycle Telescopic Oil Seal Remover with Installer.

Table 2. Tools and Equipment and their function.

Tools	Function
Steel tape/ruler	Used for measuring dimensions.
Hack saw	Used for cutting metals
Welding machine	Use to join the metals.
Vernier caliper	Used to measure inside and outside dimensions.
Lathe machine	Used to make threads in the shafting.
Drill press	Use for drilling.
Power grinder	Used for sanding rough surfaces.
Wire brush	Used to remove rust in the small areas of the components.
Welding mask	Used to protect the face from harmful ray during welding.

Construction procedure

Prepare the layout of the tool and also the measurement, always put in mind safety first, don't be so careless when making slowly and surely. So that you can work properly and conveniently, prepare the tools and equipment needed for fabrication.

A. Construction of the frame

The construction of the frame began with the preparation of the necessary materials and equipment. A 2×2×1/2 angle bar was prepared and carefully measured to a length of 80 cm. After taking the measurements, the angle bar was cut according to the specified dimensions. Once the pieces were ready, the process of assembling the frame of the tool was started. Finally, the parts were joined together through the welding process to form a sturdy frame for the tool.

Figure 1. Frame construction.

B. Construction of the motorcycle telescopic oil seal remover

Constructing a motorcycle telescopic oil seal remover begins by preparing the materials, specifically a shafting with a length of 20 cm. The shafting is then measured and marked at 2.5 cm intervals as required for the design. After marking, the shafting is cut based on the specified measurements. Next, the portion of the shafting that needs threading is marked, ensuring it will be threaded to a specification of 5/8 × 11 TPI. Finally, the shafting is threaded according to the standard thread specification to complete the required component for the oil seal remover.

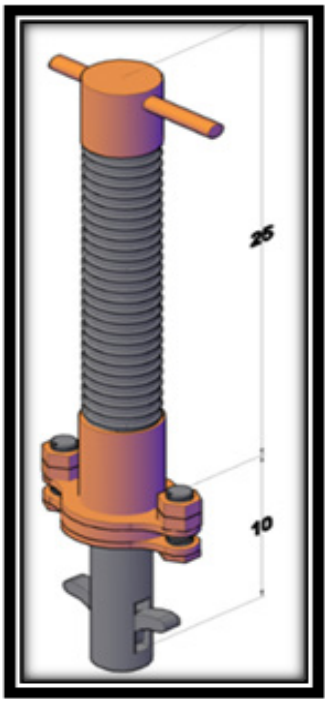

Figure 2. Threaded remover.

C. Construction of the threaded holder

The process begins by preparing a shafting with a measurement of 25 cm. The shafting is then carefully measured to ensure it meets the required 25 cm length. After confirming the measurement, the round bar is cut based on the 25 cm specification. Next, the round bar is marked for threading from the 20 cm point down to the bottom, following a 1/8 × 11 TPI thread specification. Finally, the bar is threaded according to the standard threading requirement.

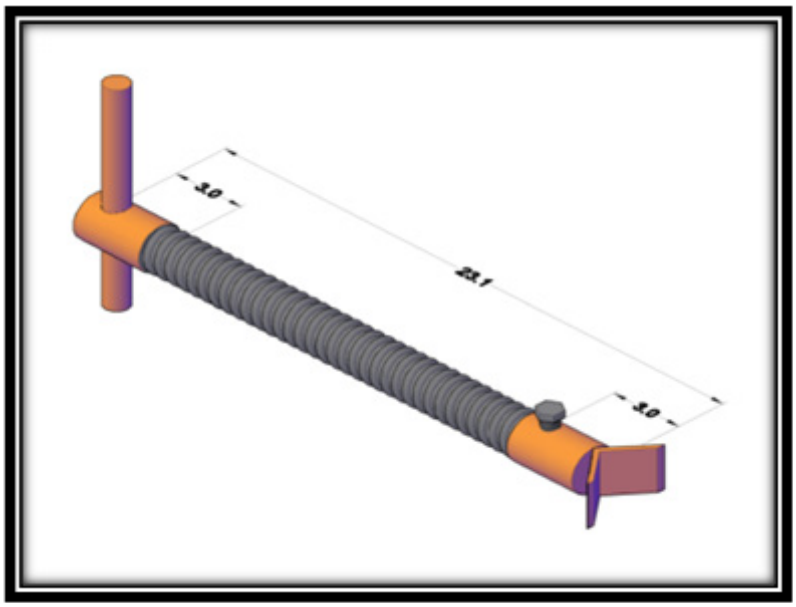

Figure 3. Constructing for threaded holder.

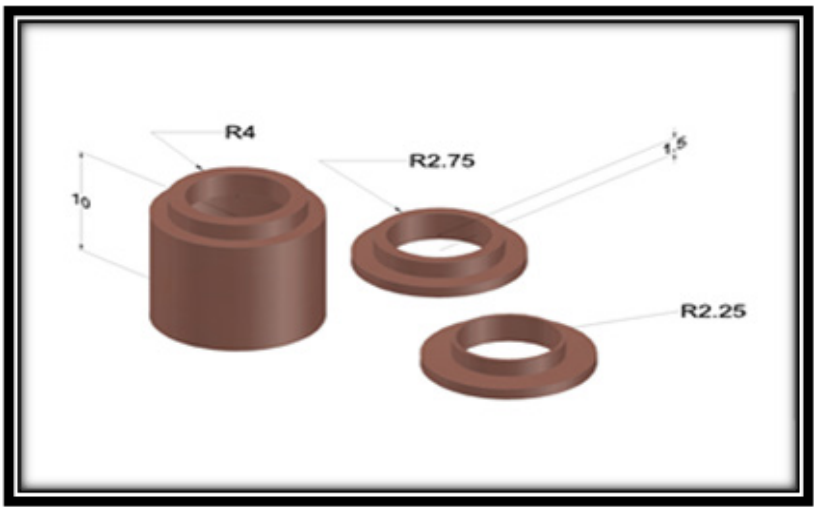

Figure 4. Constructing for oil seal installer.

D. Different view of the project

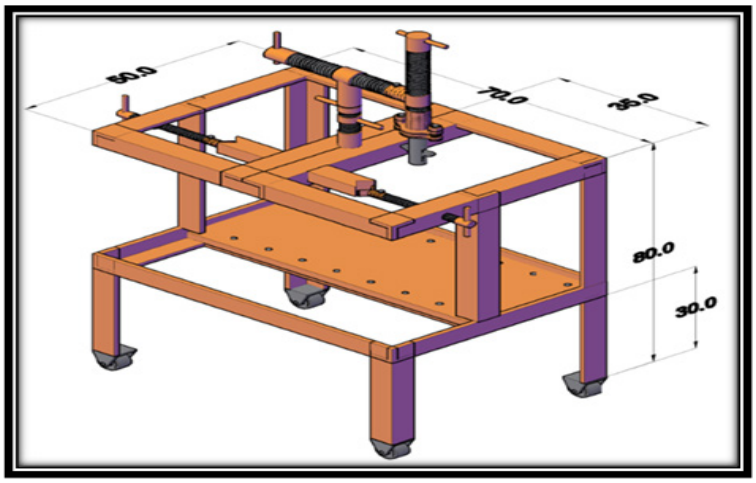

Figure 5. Isometric view of the project.

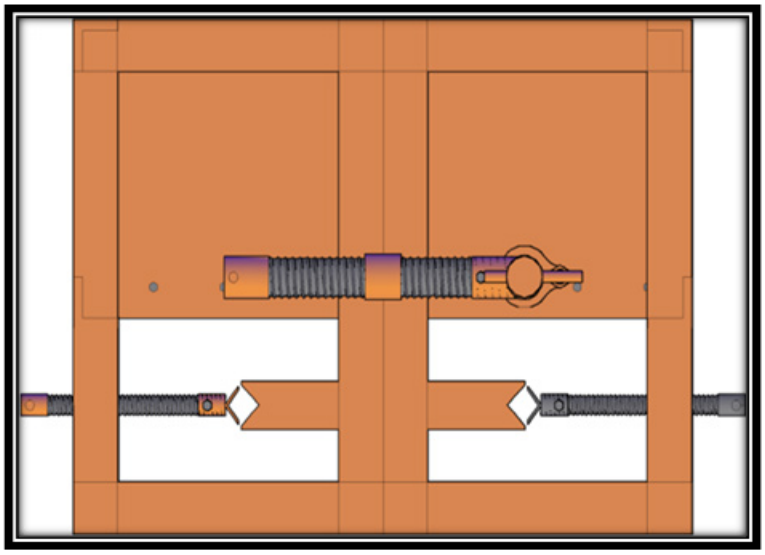

Figure 6. Top view of the project.

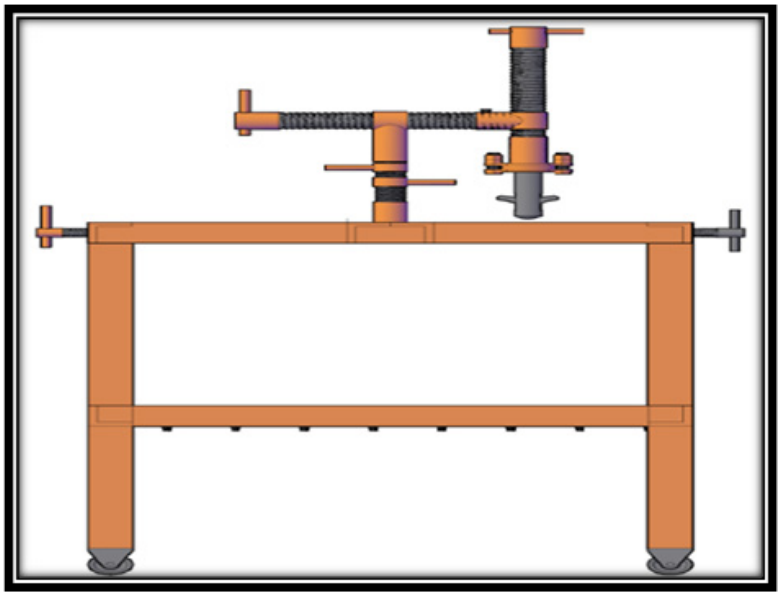

Figure 7. Side view of the project.

Production cost

The table below shows the list of costs for supplies, materials, and labor of the tool.

Table 3. Production cost of the tool.

Source	Cost
Supplies and materials	Php 3,205.00
Labor cost	Php 961.50
Equipment usage	Php 6,938.50
Total cost	Php11,105.00

Construction time frame

The table below shows the list of the time consumed in constructing and completing "Motorcycle Telescopic Oil Seal Remover with Installer.

Table 4. Construction time frame.

Nature of work	Estimated time allotment
Cutting	6 hours
Grinding	8 hours
Drilling	18 hours
Filling	5 hours
Sanding	5 hours
Spraying	6 hours
Total number of hours	**48 hours**

RESULTS AND DISCUSSION

We discussed the methods of organizing and developing the bodily structure and parts of the complete project. The structure includes the functions and interrelation of the parts, capabilities and limitations of the tool. The process includes the operational procedures, maintenance, safety and control measures provided by the project tool. In addition, this chapter discusses the form of the evaluation results for the tool's performance and quality.

Features of the project

The features of the project include several important aspects. First, it is economical because the project tool is made using selected scrap metals, which improves the cost effectiveness of the tool. Second, it is operational, as the tool demonstrates an effective and efficient operational procedure while incorporating safety features and proper safety maintenance. Third, the project emphasizes presentability, with a unique design and aesthetic that were carefully fabricated to make the tool more attractive. Lastly, the project highlights the availability of resources, as all components used are locally sourced and affordable.

Parts and functions of the project

The tool consists of several important parts that contribute to its function. The main body is the part that holds the telescopic fork securely. The stand of the main body supports the tool and keeps it stable, preventing imbalance and reducing the risk of danger while using

it. The oil seal remover is the part designed to remove the oil seal from the outer tube of the telescopic fork. The handle is the part the user holds when adjusting the long bolt and the adjusting knob. Lastly, the wood is the part of the tool where components can be assembled or disassembled, allowing the parts of the telescopic fork to be placed on it during the process.

Capabilities of the project

The motorcycle telescopic oil seal remover with installer is capable of telescopic tooling without causing any damage or scratches to the tube, even in the inner part of the tube. The tool can service motorcycle telescopic of the size from 16mm to 60mm. The tool canservice motorcycle telescopic of the size from 16mm to 60mm. The tool also operated with only one person.

Operating procedures

To ensure the proper execution of motorcycle telescopic oil seal installation using the tool, the appropriate operating procedures must be carefully followed. First, place the tool in the desired area and make sure it can be moved easily. Next, assemble the tool and check if all parts are properly installed. After assembling, check all the adjusted bolts to ensure they are tightened properly. Then, place the telescopic fork in the clamp to hold it securely. Fix the remover to the outer tube of the telescopic and make sure the tool is properly aligned with the center of the telescopic tube. Once everything is properly positioned and secured, you can begin servicing the telescopic.

Maintenance procedures

To ensure effective operation when servicing a telescopic fork, the gadget must always be kept clean and properly maintained. Preventive maintenance should be followed regularly. After using the tool, clean it with clean, dry rags to remove dirt and oil. The main body of the tool should then be placed properly in its storage area. It is also important to store the tool in a dry place to prevent rust and damage. In addition, each threaded part, especially the remover, should be lubricated once every month to keep the tool functioning smoothly and efficiently.

Safety and control measures

To ensure the effectiveness of the gadget during operation, several special precautions must be observed and followed. When operating the motorcycle telescopic oil seal remover with the installer, the tool should not be used in an improper way and must always be operated according to the correct procedures. It is also important to clean the tool before and after use to maintain its condition and performance. Before starting any task, the parts of the tool should be checked to ensure they are in good working condition. The tool should not be used when it is covered with grease or oil to avoid accidents or improper handling. Lastly, proper Personal Protective Equipment (PPE) must always be worn while performing the task to ensure safety.

Validation of performance and reliability

The performance and reliability of the project tool were evaluated by selecting 60 respondents. Using the questionnaire answered by the respondent, the gathered and analyzed data show the validation based on functionality, aesthetics, design, and effectiveness of the tool.

Assessment of expert on its functionality

Table 5 shows that the respondents composed of the experts, strongly agreed that

the functionality of the tool was easy and simple to operate by one person or a non-expert. As indicated by the total mean of 4.81. The statements number 1, 5, and 7 have the lowest mean of 4.70, which means the tool is simple to use and allows one man to service a descriptive rating as very functional. Statement number 4 got the highest mean of 5.0, which is the device to fit according to its purpose, and the remark is very functional.

Table 5. Level of assessment of experts on the functionality of the motorcycle telescopic oil seal remover with an installer.

Statements	Scale					Mean	Remarks
	1	2	3	4	5		
1. The tool is feasible and simple to use.	0	0	1	1	8	4.70	Very functional
2. The tool is very useful in servicing the motorcycle's telescopic	0	0	0	2	8	4.80	Very functional
3. The tool is a great help to the technician and non-expert.	0	0	0	1	9	4.90	Very functional
4. The tool operates according to its purpose.	0	0	0	0	10	5.00	Very functional
5. The tool can be used on any type of motorcycle with a telescopic.	0	0	0	3	7	4.70	Very functional
6. The tool is for motorcycle telescopic servicing, used only.	0	0	0	2	8	4.80	Very functional
7. The tool can be operated by a non-expert.	0	0	0	3	7	4.70	Very functional
8. The tool provides safety when servicing a motorcycle's telescopic	0	0	0	2	8	4.80	Very functional
9. The tool is stable to use.	0	0	0	2	8	4.80	Very functional
10. The tool can be operated by one person on both sides.	0	0	0	1	9	4.90	Very functional
Overall mean						**4.81**	**Very functional**

Assessment of experts on its cost-effectiveness

Table 6 shows that the respondents, composed of the experts, strongly agreed on the cost-effectiveness of the tool, with an overall mean of 4.66. Statement numbers 1 and 2 got the lowest mean of 4.40, which means the parts of the tool can be easily fabricated with low and the remarks are very affordable. The statements numbers 4, 5, 7, and 10 got the highest mean of 4.80, which indicates that the shop owners and technicians can afford the tool, and the remarks are very affordable.

Table 6. Level of assessment of experts on the cost-effectiveness of the motorcycle telescopic oil seal remover with an installer.

Statements	Scale					Mean	Remarks
	1	2	3	4	5		
1. The tool is affordable due to its exact price, that cost Php11,105.00	0	0	1	4	5	4.40	Very affordable
2. The labor cost of the tool is affordable at Php 7,900.00	0	0	1	4	5	4.40	Very affordable

3. The materials used are well selected based on their quality and cost.	0	0	0	3	7	4.70	Very affordable
4. The project is simple to operate.	0	0	0	2	8	4.80	Very affordable
5. The materials used are accessible in the local market.	0	0	0	2	8	4.80	Very affordable
6. The fabrication of the tool has a reasonable price based on its quality and value.	0	0	0	5	5	4.50	Very affordable
7. The materials used are affordable.	0	0	0	2	8	4.80	Very affordable
8. The beneficiary can afford to fabricate the improvised tools.	0	0	0	3	7	4.70	Very affordable
9. The labor cost can be regained in a short time due to each reasonable labor price.	0	0	0	3	7	4.70	Very affordable
10. The parts of the tool can be easily fabricated at low cost.	0	0	0	2	8	4.80	Very affordable
Overall mean						**4.66**	**Very affordable**

Assessment of experts on aesthetics and design

Table 7 shows that the respondents composed of the experts, indicate the lowest mean of 4.50. Statement 1, which means that the components of the tool are in quality condition, which is an equal descriptive rating, is very attractive. The highest mean of 4.90, statement 8 means the design of the tool is very presentable, which is equal to a descriptive rating that is very attractive. Overall, the mean from the 10 experts who evaluated the Aesthetics and Design of the tool is 4.69, which is the rating as very attractive.

Table 7. Level of assessment of experts on aesthetics and design of the motorcycle telescopic oil seal remover with an installer.

Statements	**Scale**					**Mean**	**Remarks**
	1	**2**	**3**	**4**	**5**		
1. The tool is capable of use and in good condition.	0	0	2	1	7	4.50	Very attractive
2. The materials used in the tool are durable and standard.	0	0	1	2	7	4.60	Very attractive
3. The parts of the tool are polished and properly assembled.	0	0	0	3	7	4.70	Very attractive
4. The color of the tool is fitted to the design and function.	0	0	0	2	8	4.80	Very attractive
5. The design of the tool is standard and stable.	0	0	0	3	7	4.70	Very attractive
6. The tool design is feasible for maintenance.	0	0	1	2	7	4.60	Very attractive
7. The tool design is easy and safe to use.	0	0	0	4	6	4.60	Very attractive
8. The modification of the tool has a great advantage and has a unique appearance.	0	0	0	1	9	4.90	Very attractive
9. The design of the tool is less time-consuming in servicing.	0	0	0	2	8	4.80	Very attractive

10. The design and function of the tool are innovative.	0	0	0	4	6	4.60	Very attractive
11. All parts of the tool are precisely attached.	0	0	0	2	8	4.80	Very attractive
Overall mean						**4.69**	**Very attractive**

Assessment of students on its functionality

Table 8 shows that the respondents composed of students, indicate the lowest mean of 4.62 in statement 1, which means that the tool is easy and simple to use or operate by one person or a non-expert. As indicated by the total overall mean of 4.73. Statement number 4 got the highest mean of 4.82, which is the device to fit according to its purpose, and the remark is very functional.

Table 8. Level of assessment of students on the functionality of the motorcycle telescopic oil seal remover with an installer.

Statements	**Scale**					**Mean**	**Remarks**
	1	**2**	**3**	**4**	**5**		
1. The tool is capable of use and in good condition.	0	0	2	1	7	4.50	Very attractive
2. The materials used in the tool are durable and standard.	0	0	1	2	7	4.60	Very attractive
3. The parts of the tool are polished and properly assembled.	0	0	0	3	7	4.70	Very attractive
4. The color of the tool is fitted to the design and function.	0	0	0	2	8	4.80	Very attractive
5. The design of the tool is standard and stable.	0	0	0	3	7	4.70	Very attractive
6. The tool design is feasible for maintenance.	0	0	1	2	7	4.60	Very attractive
7. The tool design is easy and safe to use.	0	0	0	4	6	4.60	Very attractive
8. The modification of the tool has a great advantage and has a unique appearance.	0	0	0	1	9	4.90	Very attractive
9. The design of the tool is less time-consuming in servicing.	0	0	0	2	8	4.80	Very attractive
10. The design and function of the tool are innovative.	0	0	0	4	6	4.60	Very attractive
11. All parts of the tool are precisely attached.	0	0	0	2	8	4.80	Very attractive
Overall mean						**4.69**	**Very attractive**

Assessment of students on its functionality

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Table 8. Level of assessment of students on the functionality of the motorcycle telescopic oil seal remover with an installer.

Statements	Scale					Mean	Remarks
	1	2	3	4	5		
1. The tool is feasible and simple to use.	0	0	0	19	31	4.62	Very functional
2. The tool is very useful in servicing the motorcycle's telescopic.	0	0	1	10	39	4.76	Very functional
3. The tool is a great help to the technician and non-expert.	0	0	1	14	35	4.68	Very functional
4. The tool operates according to its purpose.	0	0	0	9	41	4.82	Very functional
5. The tool can be used on any type of motorcycle with a telescopic fork.	0	0	0	11	39	4.78	Very functional
6. The tool is for motorcycle telescopic servicing, used only.	0	0	0	11	39	4.78	Very functional
7. The tool can be operated by a non-expert.	0	0	1	16	33	4.64	Very functional
8. The tool provides safety when servicing a motorcycle's telescopic.	0	0	0	14	36	4.72	Very functional
9. The tool is stable to use.	0	0	0	11	39	4.78	Very functional
10. The tool can be operated by one person on both sides.	0	0	0	12	38	4.76	Very functional
Overall mean						**4.73**	**Very functional**

Assessment of students on the cost-effectiveness

Table 9 shows that the respondents were composed of students indicating the lowest mean of 4.54 for statement number 1, which states that the tool is part of the tool that can be easily fabricated with low and the remarks are very affordable. The price cost of Php11, 105.00 only the equal to the rating as very affordable. The highest mean was 4.86 for statement number 8. The beneficiary can afford to fabricate the improvised tools that are equal to the rating as very affordable. The overall mean of 4.71 from the 50 students who evaluated the Cost and Effectiveness of the tool.

Table 9. Level of assessment of students on the cost-effectiveness of the motorcycle telescopic oil seal remover with installer.

Statements	Scale					Mean	Remarks
	1	2	3	4	5		
1. The tool is affordable due to its exact price that cost Php.11,105.00	0	0	1	21	28	4.54	Very affordable
2. The labor cost of the tool is affordable at Php 7,900.00	0	0	1	14	35	4.68	Very affordable
3. The materials used are well selected based on their quality and cost.	0	0	2	12	36	4.68	Very affordable

4. The project is simple to operate. based on their quality and cost.	0	0	0	13	37	4.74	Very affordable
5. The materials used are accessible in the local market.	0	0	0	13	37	4.74	Very affordable
6. The fabrication of the tool has a reasonable price based on its quality and value.	0	0	0	13	37	4.74	Very affordable
7. The materials used are affordable.	0	0	0	19	31	4.62	Very affordable
8. The beneficiary can afford to fabricate the improvised tools.	0	0	0	7	43	4.86	Very affordable
9. The labor cost can be regained in a short time due to each reasonable labor price.	0	0	0	12	38	4.76	Very affordable
10. The parts of the tool can be easily fabricated at low cost.	0	0	0	13	37	4.74	Very affordable
Overall mean						**4.71**	**Very affordable**

Assessment of students on aesthetics and its design

Table 10 shows that the respondents composed of the students indicate the lowest mean of 4.68 which the statement number 9 which means that's the components of the tool have less time consuming in servicing and are in quality condition, which is an equal descriptive rating that is very attractive. The highest mean is 4.82, which is the statement 8, which means the design of the tool is very presentable, which is equal to a descriptive rating that is very attractive. Overall mean from the 50 Students evaluated the Aesthetics and Design of the tool is 4.74, which is the rating as very attractive.

Table 10. Level of assessment of students on aesthetics and design of the motorcycle telescopic oil seal remover with an installer.

Statements	**Scale**					**Mean**	**Remarks**
	1	**2**	**3**	**4**	**5**		
1. The tool is capable of use and is in good condition.	0	0	0	14	36	4.72	Very attractive
2. The materials used in the tool are durable and standard.	0	0	0	12	38	4.76	Very attractive
3. The parts of the tool are polished and properly assembled.	0	0	0	12	38	4.76	Very attractive
4. The color of the tool is fitted to the design and function.	0	0	0	13	37	4.74	Very attractive
5. The design of the tool is standard and stable.	0	0	0	13	37	4.74	Very attractive
6. The tool design is feasible for maintenance.	0	0	0	9	41	4.82	Very attractive
7. The tool design is easy and safe to use.	0	0	0	14	36	4.72	Very attractive
8. The modification of the tool has a great advantage and has a unique appearance.	0	0	0	13	37	4.74	Very attractive
9. The design of the tool is less time-consuming in servicing.	0	0	0	16	34	4.68	Very attractive

10. The design and function of the tool are innovative.	0	0	0	15	35	4.70	Very attractive
11. All parts of the tool are precisely attached.	0	0	0	10	40	4.80	Very attractive
Overall mean						**4.74**	**Very attractive**

Assessment of experts and students of its functionality

Table 11 shows that the respondents were composed of students, indicating the lowest mean of 4.63, which is statement 1, which means equal rating as very functional, that the tool is feasible and simple to use or operate by one person or a non-expert. As indicated by the total overall mean of 4.75. Statement number 4 got the highest mean of 4.85, which is that the device or the tool is operated or fitted according to its purpose, and the remark is very functional.

Table 11. Level of assessment of experts and students on the functionality of the motorcycle telescopic oil seal remover with an installer.

Statements	**Scale**					**Mean**	**Remarks**
	1	**2**	**3**	**4**	**5**		
1. The tool is feasible and simple to use.	0	0	1	20	39	4.63	Very functional
2. The tool is very useful in servicing the motorcycle's telescopic	0	0	1	12	47	4.77	Very functional
3. The tool is a great help to the technician and non-expert.	0	0	1	15	44	4.72	Very functional
4. The tool operates according to its purpose.	0	0	0	9	51	4.85	Very functional
5. The tool can be used on any type of motorcycle with a telescopic.	0	0	0	14	46	4.77	Very functional
6. The tool is for motorcycle telescopic servicing, used only.	0	0	0	13	47	4.78	Very functional
7. The tool can be operated by a non-expert.	0	0	1	19	40	4.65	Very functional
8. The tool provides safety when servicing a motorcycle's telescopic.	0	0	0	16	44	4.73	Very functional
9. The tool is stable to use.	0	0	0	13	47	4.78	Very functional
10. The tool can be operated by one person on both sides.	0	0	0	13	47	4.78	Very functional
Overall mean						**4.75**	**Very functional**

Assessment of experts and students on the cost-effectiveness

Table 12 shows that the respondents were composed of experts and students, which indicates the lowest mean score of 4.52, which is the statement number 1, which states that the tool can be easily fabricated with low cost, and the remark is Very Affordable. Price the cost Php.11, 105.00 only the equal to the rating as very affordable. The highest mean is 4.83, which is statement 8. The beneficiary can afford to fabricate the improvised tools that are equal to the rating as very affordable. The overall mean is 4.70 from the Cost and Effectiveness of the tool.

Table 12. Level of assessment of experts and students on the cost-effectiveness of the motorcycle telescopic oil seal remover with installer.

Statements	Scale					Mean	Remarks
	1	2	3	4	5		
1. The tool is affordable due to its exact price that cost Php.11,105.00	0	0	2	25	33	4.52	Very affordable
2. The labor cost of the tool is affordable at Php 7,900.00	0	0	2	18	40	4.63	Very affordable
3. The materials used are well selected based on their quality and cost.	0	0	2	15	43	4.68	Very affordable
4. The project is simple to operate. based on their quality and cost.	0	0	0	15	45	4.75	Very affordable
5. The materials used are accessible in the local market.	0	0	0	15	45	4.75	Very affordable
6. The fabrication of the tool has a reasonable price based on its quality and value.	0	0	0	18	42	4.70	Very affordable
7. The materials used are affordable.	0	0	0	21	39	4.65	Very affordable
8. The beneficiary can afford to fabricate the improvised tools.	0	0	0	10	50	4.83	Very affordable
9. The labor cost can be regained in a short time due to each reasonable labor price.	0	0	0	15	45	4.75	Very affordable
10. The parts of the tool can be easily fabricated at low cost.	0	0	0	15	45	4.75	Very affordable
Overall mean						**4.70**	**Very affordable**

Assessment of experts and students on aesthetics and design

Table 13 shows that the respondents composed of experts and students, indicate the lowest mean of 4.68, which is the statement numbers 1 and 10, which means the components of the tool has capable of use and quality condition. The design and function of the tool are innovative, and the equal descriptive rating is very attractive. The highest mean is 4.80, which is the number 11, which means all parts of the tool are precisely attached, which is equal to a descriptive rating that is very attractive. The overall mean is 4.73, which indicates that the rating was very attractive.

Table 13. Level of assessment of experts and students on the aesthetics and design of the amotorcycle telescopic oil seal remover with installer

Statements	Scale					Mean	Remarks
	1	2	3	4	5		
1. The tool is capable of use and is in good condition.	0	0	2	15	43	4.68	Very attractive
2. The materials used in the tool are durable and standard.	0	0	1	14	45	4.73	Very attractive
3. The parts of the tool are polished and properly assembled.	0	0	0	15	45	4.75	Very attractive

4. The color of the tool is fitted to the design and function.	0	0	0	15	45	4.75	Very attractive
5. The design of the tool is standard and stable.	0	0	0	16	44	4.73	Very attractive
6. The tool design is feasible for maintenance.	0	0	1	11	48	4.78	Very attractive
7. The tool design is easy and safe to use. maintenance.	0	0	0	18	42	4.70	Very attractive
8. The modification of the tool has a great advantage and has a unique appearance.	0	0	0	14	46	4.77	Very attractive
9. The design of the tool is less time-consuming in servicing.	0	0	0	18	42	4.70	Very attractive
10. The design and function of the tool are innovative.	0	0	0	19	41	4.68	Very attractive
11. All parts of the tool are precisely attached.	0	0	0	12	48	4.80	Very attractive
Overall mean						**4.73**	**Very attractive**

CONCLUSION

Based on the findings and results of the study, the researchers concluded that the tool is effective and functional in its intended purpose. It is safe to use and operates according to its designed function. The tool is also very useful in motorcycle shop servicing, particularly when working with telescopic forks. Furthermore, local technicians can easily fabricate the tool because the materials needed are affordable and readily available.

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