UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND FABRICATE VEHICLE TRAINER KIT FOR EDUCATIONAL PURPOSE (BODY STRUCTURE) WITH AIDE OF COMPUTER AIDED ANALYSIS

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for Bachelor of Mechanical Engineering Technology (Automotive) with Honors.

by

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Tajuk Projek ini adalah ' Reka bentuk dan fabrikasi alatan bantuan pengajar kenderaan(struktur badan)' ramai pelajar yang mengatakan mereka bimbang tentang sistem pendidikan dan juga tentang kekurangan alat latihan yang boleh membantu, ini telah membuatkan mereka merasakan kekurangan latihan praktikal dan ini akan memberi kesan kepada mereka dari segi memahami apa yang mereka telah belajar dalam bilik darjah kerana apa yang mereka telah pelajari tidak dapat dipraktikkan dalam bentuk latihan amali. Ini menjadikan pelajar-pelajar tidak biasa dengan alat-alat serta bahagian-bahagian yang boleh dijumpai di dalam kenderaan yang mereka perlu tahu. Ini mungkin kerana tidak semua latar belakang mereka dari pelajar-pelajar kursus-kursus automotif, mereka adalah graduan daripada pelbagai institusi pendidikan seperti Matrikulasi, Politeknik, STPM dan banyak institusi-institusi lain. Ini adalah mengapa ramai di antara mereka masih tidak sedar bahagian asas kenderaan. Projek ini bertujuan untuk mereka bentuk dan fabrikasi alatan bantuan pengajar kenderaan yang boleh digunakan oleh pelajar untuk meningkatkan kemahiran praktikal. Produk ini akan direkabentuk untuk memenuhi keperluan pelajar dan ini dapat dilakukan dengan pengumpulan data melalui kaji selidik dan selepas data penting telah diperolehi, ia akan digunakan untuk proses Reka bentuk dan ini dibantu dengan menggunakan kaedah pemilihan konsep reka bentuk produk spesifikasi dan juga house of quality. Selepas rekabentuk telah diperolehi selepas melaksanakan pelbagai ujian di SIMSOLID dan juga ujian menggunakan mahasiswa sendiri, rekabentuk akhir dapat dikeluarkan untuk membuktikan bahawa produk yang dikeluarkan memenuhi kriteria dan bahawa ia adalah selamat untuk digunakan untuk pembelajaran.

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ABSTRACT

The project's title is' DESIGN AND FABRICATE VEHICLE TRAINER KIT FOR EDUCATIONAL PURPOSE ' Many of the students who say they are concerned about the education system and also about the lack of training tools that can help, this have made them feel a lack of practical training, and this will affect them in terms of understanding what they have learned in the classroom because what they have learned cannot be practiced in the form of practical training. This made the students unfamiliar with the tools and parts that can be found in a vehicle they should know. This could be because not all of their backgrounds are students from automotive courses, they graduated from various learning institutions such as matriculation, polytechnics, STPM and many other institutions. Therefore, many of them are unaware of the basic parts of the vehicles. The aim of this project is to design and fabricate learning vehicle teaching tools that can be used by students to enhance practical skills. This product will be designed to meet students' needs and this is done with data collection through surveys and after significant data has been obtained, it will be used to process design and this is assisted by using method selection of design concept, product specifications and also the quality house. After the design has been obtained after performing various test types in SIMSOLID and testing using the students themselves, the final design can be produced to prove that the products produced meet the criteria and that it is safe to use for learning.

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DEDICATION

This dedication is to my mother Siti Rafeah binti Mat Jah, to my father Fadli Yusof bin Md Tajudin and also to my family. Because of them, this book can be produced, they've been taking care of my upbringing from small until now, that's why I've continued to strive to be successful. This dedication also applies to my supervisor, Ts. Luqman Hakim bin Hamzah and my technical staff Tc. Mohd Syakir bin Mohtarudin because they willingly spend their time teaching and correcting all my wrongdoing to finish this report. And last but not least, to my fellow BMMA cohort 6 who, through this task together, may we pass with flying colour.

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TABLE OF CONTENT

ABSTRAK v

ABSTRACT vi

DEDICATION vii

ACKNOWLEDGEMENTS viii

TABLE OF CONTENT ix

LIST OF TABLES xii

LIST OF FIGURES xiii

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE xv

LIST OF APPENDIXES xvi

CHAPTER 1 INTRODUCTION 1

1.1. Background of Study 1

1.2 Problem Statement 2

1.3 Project Objective 3

1.4 Project Scope 4

CHAPTER 2 LITERATURE REVIEW 5

2.1. Skilled Labor 5

2.1.1. Skilled Labours in Malaysia 6

2.1.2. Skill Labor in Automotive Sector 7

2.2. MTUN (Malaysian Technical University Network) 9

2.2.1. Establishment of MTUN 10

2.3. UTeM (Universiti Teknikal Malaysia Melaka) 11

2.3.1. Establishment of UTeM 12

2.4. FTKMP (Faculty of Mechanical and Manufacturing Engineering Technology) 14

2.5. Hands-On 15

2.5.1. Kinesthetic and Tactile Learners 17

2.6. Problem in Hands-On in UTeM for Automotive Students' Base on Survey 19

2.7. Problem Solving 24

2.7.1 Industries Visits 24

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2.7.2 Extra Classes 26
2.7.3 Trainer Kit 27
2.7.4 The Best Way 28
CHAPTER 3 METHODOLOGY 29
3.1. Overview 29
3.2. Overall Process 29
3.3. Methodology Flow Chart 31
3.4. Identify the Problem Faced by Automotive Student by Using Survey Form 32
3.5. Product Design Specification (PDS) 36
3.5.1 Function 36
3.5.2 Cost 36
3.5.3 Weight 37
3.5.4 Maintenance Maintainability 37
3.5.5 Durability 38
3.5.5.1 Material Selection 38
3.5.5.2 Computer Aided Drafting (CAD) design 40
3.5.5.3 Design Load Testing Using SIMSOLID 40
3.5.5.4 Load Test on Seating Area 41
3.5.6 Safety 41
3.5.7 Part 41
3.5.7.1 CATIA Software Application 42
3.5.7.2 Step of Making the Design in CATIA 42
3.5.7.3 Design criteria selection 44
3.5.8 Overall Selection Criteria 48
3.6 Final Design Fabrication 49
3.6.1 Machine and Tool Used 49
3.7 Fabrication Testing 50
3.8 Colour Selection 51
CHAPTER 4 RESULT & DISCUSSION 52
4.1 Introduction 52
4.2 Product Design Specification 59

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4.2.1 Function. 61
4.2.2 Cost 61
4.2.3 Weight 62
4.2.4 Maintenance Maintainability 63
4.2.5 Durability 64
4.2.5.1 Material Selection 65
4.2.5.2 The Analysis Concept and Design Analysis 66
4.2.5.3 Selected Design Analysis 70
4.2.5.3.1 Von Mises Stress 70
4.2.5.3.2 Principal Stress 71
4.2.5.3.3 Sheer Stress 71
4.2.5.3.4 Principal Strain 72
4.2.5.3.5 Safety Factor 74
4.2.6 Safety 75
4.4 Fabrication Process 77
CHAPTER 5 CONCLUSION & RECOMMENDATION 86
5.1 Introduction 86
5.2 Conclusion 86
5.3 limitation 87
5.4 Recommendation 88
REFERENCE 89
APPENDIX 92

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LIST OF TABLES

Table 3.1: Advantages and disadvantages of material 39
Table 3.2: Criteria Selection 44
Table 3.3: Concept Scoring 45
Table 3.4: Advantages and Disadvantages of Design 46
Table 3.5: Advantages and disadvantages of seat design 47
Table 3.6: Design Specification 48
Table 4.1: Survey demographic 58
Table 4.2: Function summary rating 61
Table 4.3: Cost summary rating. 62
Table 4.4: Weight summary rating 63
Table 4.5: Maintenance summary rating. 64
Table 4.6: Comparison between material 65
Table 4.7 Von mises stress and displacement 66
Table 4.8: Selected design 69
Table 4.9: Design Criteria Scoring 75
Table 4.10: Safety summary rating. 76
Table 4.11: Bill of Material 84
Table 4.12: Bill of Material for Proton Perdana 85

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LIST OF FIGURES

Figure 1.1: Students respond to the need of trainer kit 2
Figure 1.2: Students respond to the knowledge of basic car part 3
Figure 2.1: Percentage of Malaysian Automotive Industry 2018 8
Figure 2.2: Percentage of export, import and sales 9
Figure 2.3: Brain scan of people who have taken a practical approach to learning 16
Figure 2.4: Features of tactile learner 19
Figure 2.5: Students respond to the previous qualification 20
Figure 2.6: Students respond to the previous educational level 20
Figure 2.7: Students respond to the driving license that they have 21
Figure 2.8: Students respond to the vehicle that they have 21
Figure 2.9: Students respond to the previous working experience 22
Figure 2.10: Students respond to the knowledge about car part 22
Figure 2.11: Students respond to the knowledge about car part 23
Figure 2.12: Students respond to the knowledge about car part 23
Figure 3.1: Project flow chart 32
Figure 3.2: Continuation of project flow chart 32
Figure 3.3: Sample survey demographic of the student 33
Figure 3.4: Sample question on the problem 34
Figure 3.5: Sample question part 2 on the problem 35
Figure 3.6: Step in CATIA 43
Figure 3.7: Step in CATIA 43
Figure 3.8: Step in CATIA 44
Figure 3.9: MIG welding 49
Figure 3.10: Hand grinder 50
Figure 4.1 Students respond to the previous educational level 53
Figure 4.2: Students respond to the student experience as foreman 53
Figure 4.3: Students respond to the student previous working experience in automotive industry 54
Figure 4.4: Students respond to the knowledge of car part 54
Figure 4.5: Students respond to the knowledge about part function 55

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Figure 4.6: Students respond to the knowledge of car part 55
Figure 4.7: Students respond to the knowledge about part function 56
Figure 4.8: Students respond to the knowledge of car part 56
Figure 4.9: Students respond to the knowledge about part function 57
Figure 4.10: Students respond to the knowledge of automotive car part 57
Figure 4.11: Students respond to the prefer learning method 58
Figure 4.12: The user requirement 60
Figure 4.13: The user requirement 60
Figure 4.14: Displacement magnitude design 1 67
Figure 4.15: Displacement magnitude design 2 68
Figure 4.16: Von mises stress design 1 68
Figure 4.17: Von mises stress design 2 69
Figure 4.18: Von mises stress 70
Figure 4.19: Major principal stress (MPa) 71
Figure 4.20: Max shear stress (MPa) 72
Figure 4.21: Major principal strain 73
Figure 4.22: Safety factor. 74
Figure 4.23: The number 3 design 76
Figure 4.24: Dissembling the actual part from scrap car 77
Figure 4.25: Collecting the actual part 78
Figure 4.26: Designing the product 78
Figure 4.27: Cutting the material into smaller pieces 79
Figure 4.28: welding the material together 80
Figure 4.29: washing all the part 80
Figure 4.30: part that have been spray 81
Figure 4.31: Assembly the front part 82
Figure 4.32: Assembly the rear part 82
Figure 4.33: Assembly the middle part 83
Figure 4.34: Finish product 83

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

UTeM	-	Universiti Teknikal Malaysia Melaka
UTHM	-	Universiti Tun Hussein Onn Malaysia
UMP	-	Universiti Malaysia Pahang
UniMAP.	-	Universiti Malaysia Perlis
MTUN	-	Malaysian Technical University Network
TVET	-	Technical Education and Vocational Training
KUITTHO	-	Kolej Universiti Teknologi Tun Hussein Onn
KUTKM	-	Kolej Universiti Teknikal Kebangsaan Malaysia
KUKTEM	-	Kolej Universiti Kejuruteraan & Teknologi Malaysia
KUKUM	-	Kolej Universiti Kejuruteraan Utara Malaysia

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LIST OF APPENDIXES

APPENDIX 1 SURVEY 92

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CHAPTER 1
INTRODUCTION

1.1. Background of Study

The primary purpose of this project is to produce an educational vehicle trainer kit (body structure) for use by BMMA UTeM students. There are no such trainer kits in any UTeM-owned automotive workshop or laboratory Trainer kits would be used by students to polish their hands-on skills to another level, this product will help students continue working to empower their hands-on skills. Previously they have to use a real car if they want to do activities such as opening the braking system, this will make it difficult for students in the learning process because they cannot take a closer look at the components they need to know when using the real car.

This is because most of the items masked by many more objects that obstruct their vision, this will suppress the students ' learning process when they are unable to fully learn about the components. They only knew components in class during theory lesson without looking at the real things and know their own functions and where the item is placed in the vehicle. Later, most students require vehicle trainer kits like this to help them getting better understanding about the components they have learned in the classroom, this can be proved in Figure 1.1, where 85 (94.4 %) students agreed that they requires a vehicle trainer kit to help them learn the subject of automotive.

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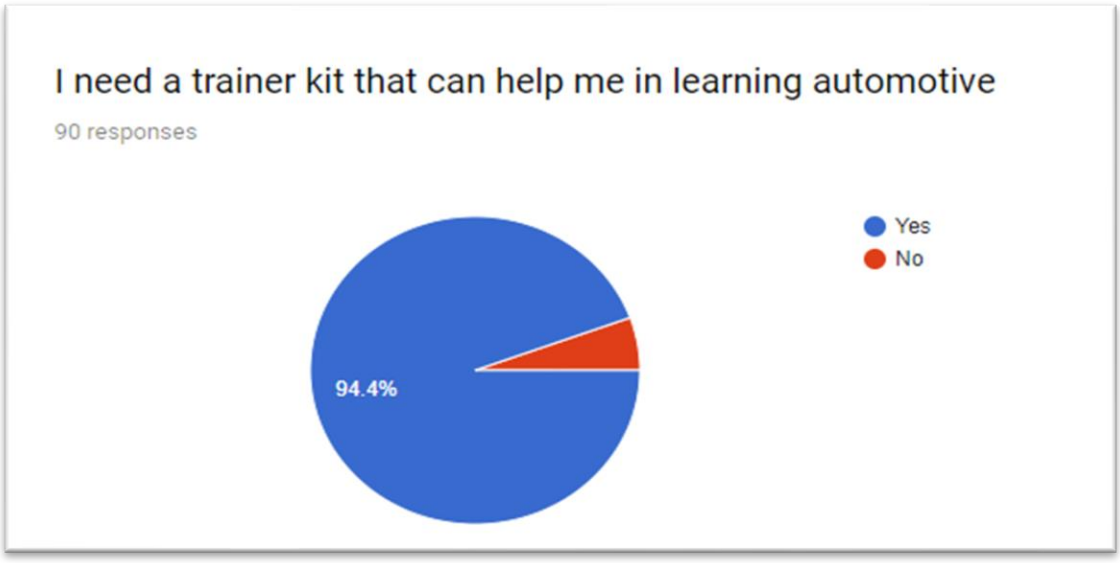

Figure 1.1: Students respond to the need of trainer kit

1.2 Problem Statement

A survey was conducted and distributed to 90 participating of BMMA cohort 6 UTeM students. As can be seen in figure 1.2, a total of 29 (32.2 %), 31 (34.4 %) and 18 (20 %) students stated that they did not know the basic car part. This shows that almost all students are not aware of vehicle parts, this percentage remained of concern where students who take the automotive course are not aware of the basic parts of a vehicle. They should be more aware of that condition. This is maybe because students are not exposed to things like this at an earlier stage over the years, which will make it difficult for them to cope with the environment of employment.

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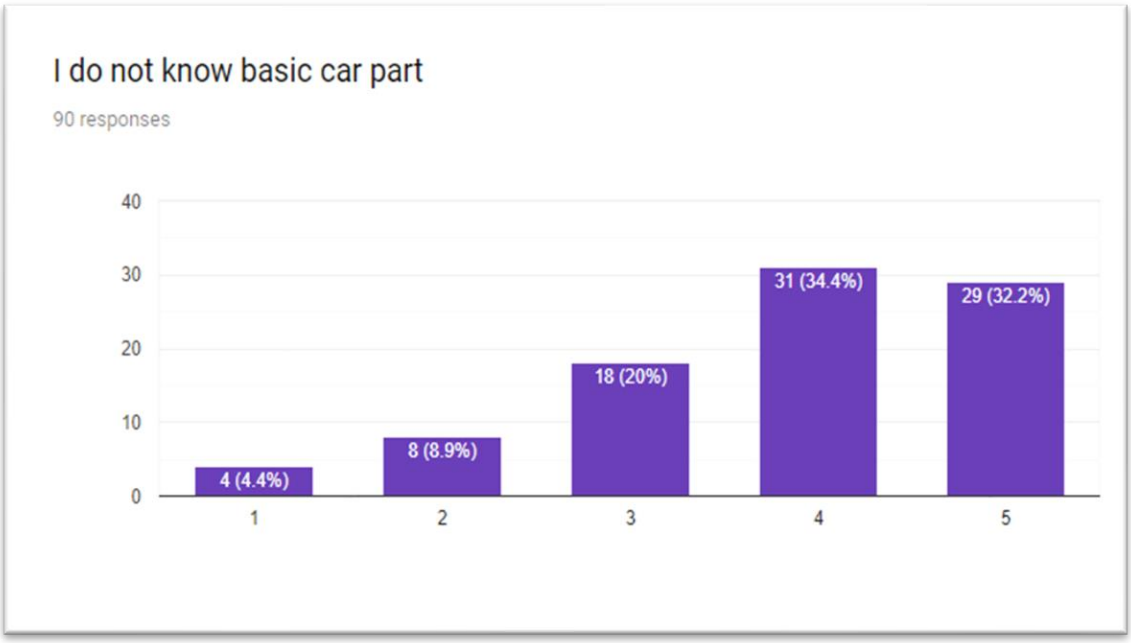

Figure 1.2: Students respond to the knowledge of basic car part

This has deviated from FTKMP's goal of producing highly skilled students in the automotive field, resulting in FTKMP-produced graduates not being accepted at a higher level because they are not highly skilled. So, with this trainer kit, student will be able to polish their hands-on skill thus this will help them in becoming the highly skilled students and labor.

1.3 Project Objective

The main purpose of this project is to produce a vehicle trainer kit for educational purposes that can be used by students to improve their hands-on skills. It will enhance their knowledge of how to do a variety of processes such as changing the brake system and many more. Then, to exposed student to the actual part so they can see and learn about it. Lastly is to design the best structure for the seat base that can bear the load that will be given.

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1.4 Project Scope

There is a few limitation or project scope for this project. The first scope is that this project product is limit or focus mainly to BMMA students, this product purpose is to improve the hands-on skill that the BMMA students already have and to create the hands-on skill if their does not have it. Second is, the learning element that will be implant in this project product such as the braking system and suspension system. Lastly is the seat base area structure design, the reason this is the only area that will be focus in this project is because there is not enough time to study the other variable upon this project product.

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CHAPTER 2
LITERATURE REVIEW

2.1. Skilled Labor

Person, who is specialized know-how, has enough training and experience to accomplish more-complicated physical or mental tasks than routine job functions. That is the definition for skilled labour or worker. Skilled labour usually or commonly related to person who has higher educational background, have high level expertise that has be attained through various training and a long time experience, and higher wages (Unnes, 2010). A skilled labour usually has these all three criteria but sometime, even some who lack on one of it can be call as skilled labour. Someone who does not have higher educational background can make it up by attained a lot of experience, they usually stand out more than person who has higher educational background.

The demand for skilled labour in all kind of work sector is highly ascending all across the world. This is due to the side effect for the uprising in the technology industrial. Each country is racing to get their hand on skilled labour especially countries in Asia. Meantime, rather than depending on hired skilled labour worker from overseas, big and advance country like U.S. and Western European, which have monopolized economic growth since the mid-1800s, they are paying more attention to preservation and growth of their skilled labour workforce. Their focus in making they own skilled labour by doing various training program extensively for both new and existing employees in order to increase the rate of the skilled labour (Unnes, 2010).

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2.1.1. Skilled Labours in Malaysia

Now the world has already entered the era of the industrial revolution 4.0, this is an era where it is closely linked to the importance of information and data to humans in the future and to ensure that industrial players are not left behind in this matter, they should always be sensitive to the cyber physical system, this system should involve in new capabilities with technology that should be up-to-date. The industrial revolution 4.0 requires technology and larger production scale, this indirectly have impact to the Malaysia industry. All of this would not be likely to happen if it is not powered by the energy of highly skilled labour, they are needed especially in important and complexes assignments, such as developing systems, applications and services such as artificial intelligence and analyse large data (Kamarudin, 2019).

To qualify a country and industry community to be recognised as cyber-physical systems successfully implemented, this stage should be fully carried out. Malaysia is still far behind in aspect of the provision of skilled workforce to face the fourth industrial revolution, this is because still too many industries in Malaysia that puts the dependence on employment manual that require human energy. The lack of effort in developing its own technologies in line with the requirements of the relevant industry has caused Malaysia to put the dependence on foreign technology to help in the efforts to solve these problems (Kamarudin, 2019).

Malaysia was also not spared from the need at skilled labour, as a country that is rapidly developing economically, Malaysia requires a skilled labour. A skilled workforce propagates national excellence is a must, in order to fulfil in becoming a developed nation by 2020, focusing in to build human capital that can help the country achieve its goal is the new government agenda (NST, 2018). Malaysian government aim to create 1.5 million jobs by the year of 2020, 60 per cent from it is the jobs that will be require person who is excel in Technical and Vocational Education and Training (TVET) qualifications. TVET is a vital platform to increase the number of skilled workers in the country. Malaysia are

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targeting a 35 per cent skilled workforce by 2020. In fact, it has been anticipate that by 2023, three million jobs will require skilled workers (NST, 2018).

The Malaysian economy need a booster in order to grow continuously in the long term, and skilled labour is one of the best and effective way that what Malaysian need in order to boost its economy, better proportion of skilled labour will move up value chain and be globally competitive. What it means by move up value chain is that higher value of producing goods and services, this means that productivity will surely rise. This will eventually help worker getting better wages and that is the basic on how human capital can help the economy according to the argument of policymakers when they speak on economy improvement.

So basically, to attract large capital investment, Malaysian needs more skilled labour then they do now in order to achieve that goal before or on 2020 (Saieed, 2016). Overly dependent on foreign workers who are not skilled and cheap, lack of creativity and innovation in labour productivity growth is weak, and the lack of skilled workforce make Malaysia far behind in terms of standards for standards of high income countries (Saieed, 2016). To become a country that be the focus of in terms of investment, Malaysia should be able to go through or managed to meet the industrial revolution era 4.0, this will surely attract investors from foreign countries to invest in Malaysia because of the energy-sufficient skilled manpower. Products that are produced for export to other countries will be able to be increased and this will help in the process of technology transfer in Malaysia (Kamarudin, 2019).

2.1.2. Skill Labor in Automotive Sector

Malaysia's automotive sector has increase in the past few years, and it has proven itself to be one of Malaysia's key industries that help in the growth of gross domestic product, to be specific, automotive sector have contributing as much as 4.2 per cent to the total of it (Ariffin, 2019). as we can see in figure 2.1, Malaysian

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