JABATAN KEJURUTERAAN MEKANIKAL

SESI JUN 2020

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

THE MOVERS

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Laporan ini dikemukakan kepada Jabatan Kejuruteraan Mekanikal sebagai memenuhi sebahagian syarat penganugerahan Diploma Kejuruteraan Mekanikal

JABATAN KEJURUTERAAN MEKANIKAL

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : THE MOVERS

SESI : JUN 2020

1. Kami, **1. MUHAMMAD SALLEHUDDIN BIN ABDULLAH(08DMP18F1064)**
2. MUHAMMAD SHAHIR RAFIQ BIN MUHAMAD SHUKRY(08DMP18F1082)
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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

2. Kami mengakui bahawa "Projek tersebut di atas' dan harta intelek yang ada di dalamnya adalah hasil karya/reka cipta asli kami tanpa mengambil atau meniru mana-mana harga intelek daripada pihak-pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek 'projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk peanugerahan **Diploma Kejuruteraan Mekanikal** kepada kami.

Diperbuat dan dengan sebenar-benarnya diakui

Oleh yang tersebut;

a) MUHD SALLEHUDDIN	)	…….
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Di hadapan saya, WAN MAJDAH BT TON MAMAT (811009-11-5330)	)	…….
sebagai penyelia projek pada tarikh: 4/6/2020	)	WAN MAJDAH BT TON MAMAT

ACKNOWLEDGEMENT

Alhamdulillah , In the name of Allah the most gracious and the most precious, first and foremost , I would like extend our deepest praise to Allah SWT who given us the patient , strength ,determination, obstacle that helping us to think wisely in making a decision and courage to completed this project .Plus , many thanks and highest gratitude to Puan Wan Majdah Binti Ton Mamat , our supervisor , which helps , lead and guides us with our project "The Movers".

Abstrak

The Movers ”adalah inspirasi dari prinsip tuas. The Movers mempunyai reka bentuk yang ringkas dan mudah digunakan sehingga dapat dengan mudah mengangkat dan memindahkan perabot seperti almari, meja dan perabot lain dari satu tempat ke tempat lain pada jarak 10-100 meter. Objektif mencipta produk ini adalah untuk menjimatkan tenaga kerja dan masa. Selain itu, The Movers juga mempunyai inovasi pada roda, 4 roda getah ditambahkan ke dasar untuk memberikan pergerakan yang lancar. Reka bentuk Movers sesuai untuk semua jenis perabot kerana projek kami dapat disesuaikan mengikut ukuran perabot yang akan dipindahkan. Kadar penyelidikan yang diperoleh dari tinjauan menyatakan bahawa sukar untuk memindahkan perabot berat dan memerlukan dua orang atau lebih .Sebilangan besar responden bersetuju bahawa "The Movers" sesuai digunakan di rumah, gudang dan kilang.

Kata kunci:: prinsip tuas

Abstract

The Movers” is a inspiration from the principle of the lever .The Movers has a simple design and easy to use so that can easily lift and move furniture such as closets, desks and other furniture from one place to another for a distance of 10-100 meters .The objective of creating this product is to save labor and time. In addition, the The Movers also has innovations on the wheelbase, 4 rubbers wheels were added to the base to give a smooth movement. The Movers design is suitable for all types of furniture because our project can be adjusted according to the size of the furniture to be moved.The research rate that obtained from the survey stated that is difficult to move heavy furniture abd it required two peoples or more.Most respondents agrees that “The Movers” is suitable to use at home,warehouse and factories.

Keywords: : lever principle

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Prepared by:Muhammad Sallehuddin Bin Abdullah

CHAPTER 1
INTRODUCTION

1.1 **RESEARCH BACKGROUND**

Today, most people use technology to simplify their lives in all aspects.People are always looking for something to help them in their daily lives. Therefore, a tool needs to be built to help reduce human consumption while lifting and moving heavy objects from one place to another such as trolley. With this tool can help solve human health problems, especially those involving reports of spinal pain after doing strenuous activities.

This lifting device is called 'The Movers". This tool can not only transport and transfer furniture but can also be used to transport various items such as large boxes, cement, bricks and the like. We use the principle of the lever as the main pulse to lift the modified furniture and trolley as a medium of movement. For this project, we manufacture durable steel trolley modified to make it easier to use. In addition, we also refer to the standards set by AWS (American Welding Association) on specific welding areas that contain critical areas and ensure the project runs smoothly without risks or problems.

In addition to being used at home, this machine can also be used in places that require a lot of manpower such as factories and warehouses. This is because "The Movers" are easy to use and not complicated. With the completion of our project all the goals are expected to be achieved. This project has its own goals. The main purpose of this machine is to facilitate the process of moving and lifting goods in one place. In addition, the project must be safe to use and economical.

Prepared by:Muhammad Sallehuddin Bin Abdullah

1.2 PROBLEM STATEMENT

We identify problems where people have difficulty moving a furniture. This problem may have a greater impact on women than men. This problem arises when trying to move house and tidy the house It usually takes two or more people to lift furniture such as cupboards and shelves weighing almost 40-50 kilograms. If the furniture needs to be moved at a distance of 300-500 meters, of course the energy used to lift it is high. Then a product is needed to help solve this problem.

1.3 RESEARCH OBJECTIVES

-Ensure energy consumption can be saved while using this tool

-Save travel time, best use for distances between 10-50 Meters.

-Reduce the number of people to lift furniture

1.4 RESEARCH QUESTIONS

This study will answer the following research questions:

i. Whether this project can lift the target load?

ii. What type of material that can be used to make this project cheaper?

iii. Can the furniture be moved without any problems?

1.5 SCOPE OF RESEARCH

The scope of this study includes residential houses and construction areas around the Sultan Salahuddin Abdul Aziz Shah Polytechnic (PSA). The scope of this study focuses on residential areas such as apartments and terrace houses where it is difficult to lift and move goods from one place to another around Selangor.

There are 3 areas of study namely design, material and durability. From the scope of this study, data from various respondents were collected. This study aims to facilitate students and employees so that consumers can use this product safely and comfortably. Survey respondents consisted of 60 people aged between 20 to 50 years on average. The research was obtained from the distribution of questionnaires in the google form. The results show that a large number of respondents agree with this project based on the set objectives

57 people agreed that this car would save energy. In line with the requirements of Sultan Salahuddin Abdul Aziz Shah Polytechnic, Shah Alam, the implementation of the project takes 6 months to be determined by the lecturers and 3 months is required to carry out the data collection process from all respondents.

1.6 IMPORTANT OF THE STUDY

This study has several interests. These are:

• Facilitate the transfer of goods from place to place while workers are working.

• enables time-saving and lifting of heavy items.

• Reduce the level of hazard compared to lifting using manpower

1.7 DEFINITION OF OPERATIONAL TERMS

Trolley- a large metal basket or frame on wheels, used for transporting heavy or large items, such as supermarket purchases or luggage at an airport

Lever- A **lever** is a simple machine consisting of a beam or rigid rod pivoted at a fixed hinge, or fulcrum.

1.8 CHAPTER'S SUMMARY

Nowadays, using tools to facilitate work with the help of equipment or machines is a good thing and beneficial for everyone. This project can be used in homes, factories and warehouses. Specifically, this chapter discusses and explains the introduction, research background, problem statement, research objectives, research scope, research interests, definition of terms and summaries in this study. In conclusion, these factors are very important for the success of a product. This study is important to get the details that need to be reviewed, updated and taken into account to make this project a success**.**

Prepared by:Muhammad Sallehuddin Bin Abdullah

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

At the beginning of the project, a literature review was conducted, which included studies from sources such as internet sources, newspaper clippings, magazines and sources related to "The Movers". Gathering information from a literature review is very important as a first step. In the implementation of a project, various steps must be taken from the beginning to the completion of the project. Problems encountered in the product are reviewed and improved to get a better product.

2.2 TROLLEY HISTORY

The shopping trolley is one of the most successful marketing inventions of the 20th century. It came into existence in 1937 as a by-product of a new kind of shopping experience popularised in the 1920s: the supermarket.
The trolley was the idea of American supermarket owner Sylvan Goldman, who dreamed it up as a way of encouraging shoppers to buy more items in his Humpty Dumpty chain of stores.

The frame was inspired by a folding chair and held two wire shopping baskets, one above the other, doubling the quantity of goods that could be carried. They were unpopular at first because they reminded women of prams and men considered them effeminate. To counteract this Goldman hired male and female models who spent their days pushing trolleys around his stores, leading to their gradual acceptance.

The next big innovation was made by Orla Watson in 1946. He came up with a design with a hinged rear panel which allowed trolleys to be easily pushed together for storage. The Telescope Cart was patented in 1949 and remains the model for most trolleys today. The 1950s saw massive growth of supermarket and mall-style shopping with huge parking areas, making a trolley an almost an obligatory shopping aid. The density of customer traffic made

compact storage essential. In 1954, the further refinement of a fold-down seat for toddlers meant that parents were free to focus on the shelves.

Increasing store size has since created demand for larger shopping trolleys to cope with increased sales, and the arrival of self-scanning equipment attached to the trolley handle has simplified the checkout process in some places. In 2013, a jet-propelled shopping trolley reached 70 kilometres per hour in Britain, but the idea has thankfully not been taken up by supermarket chains.

The Edgemar shopping mall in Santa Monica, California, which was designed in the late 1980s by local architect Frank Gehry, has been home to a towering Christmas tree made entirely from shopping trolleys every year since 1995. Created by artist Anthony Schmidt, each tree is over 10 metres high. Although they would appear to be a most appropriate symbol for Christmas consumerism, Schmidt adds that they also remind us of those in the world whose possessions would fill only a single shopping trolley. The first tree's silvery shimmer was, he says, inspired by a friend's mother who had platinum hair.

While the wonky-wheeled trolley has long been a visual gag in film, the abandoned trolley is more often a symbol of urban waste, and many are dumped by roadsides or in waterways. More than one million trolleys are manufactured each year, adding to the millions already in circulation. Most supermarkets now make considerable efforts to retain their property, adding coin-deposit mechanisms to ensure their return in areas of high theft as well as wheels that lock when a trolley is pushed over a magnetic strip set at a mall entrance.

Figure 2.2.1 – Trolley

2.2.1 Advantages of trolleys:

- Unbreakable.
- Sturdy.
- Long lasting.
- Low maintenance.

- Value for money.
- Easy to store.
- Variety of storage.
- **Speed** of service

2.3 LEVER PRINCIPLE

The earliest evidence of the lever mechanism dates back to the ancient Near East circa 5000 BC, when it was first used in a simple balance scale. In ancient Egypt circa 4400 BC, a foot pedal was used for the earliest horizontal frame loom. In Mesopotamia (modern Iraq) circa 3000 BC, the shadouf, a crane-like device that uses a lever mechanism, was invented. In ancient Egypt technology, workmen used the lever to move and uplift obelisks weighing more than 100 tons. This is evident from the recesses in the large blocks and the handling bosses which could not be used for any purpose other than for levers.

The earliest remaining writings regarding levers date from the 3rd century BCE and were provided by Archimedes. He stated, 'Give me a lever long enough and a fulcrum on which to place it, and I shall move the world.'

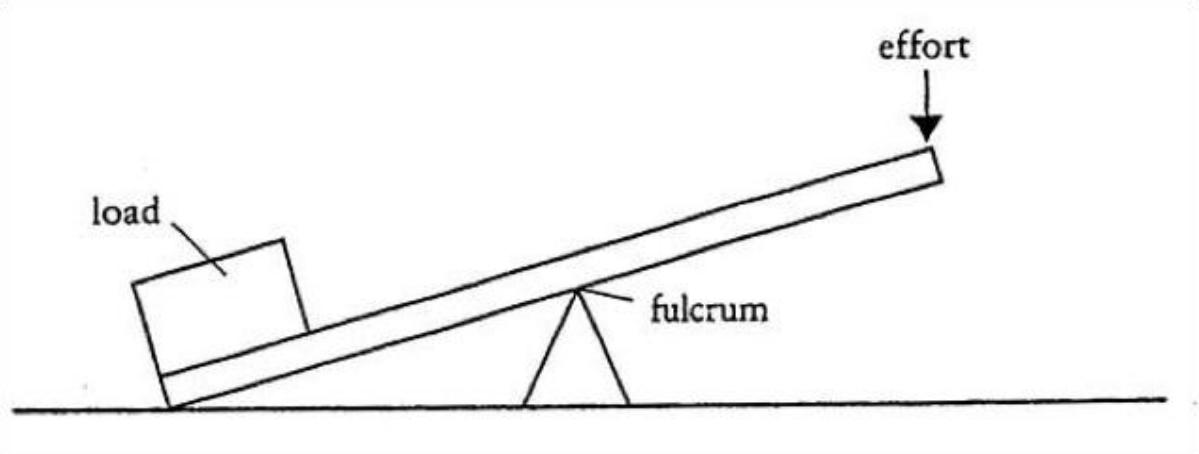


Figure 2.3.1-Lever Priciple

The lever is a movable bar that pivots on a fulcrum attached to a fixed point. The lever operates by applying forces at different distances from the fulcrum, or a pivot.

Assuming the lever does not dissipate or store energy, the power into the lever must equal the power out of the lever. As the lever rotates around the fulcrum, points farther from this pivot move faster than points closer to the pivot. Therefore, a force applied to a point farther from the pivot must be less than the force located at a point closer in, because power is the product of force and velocity.

If a and b are distances from the fulcrum to points A and B and the force F_A applied to A is the input and the force F_B applied at B is the output, the ratio of the velocities of points A and B is given by a/b, so we have the ratio of the output force to the input force, or mechanical advantage, is given by

This is the *law of the lever*, which was proven by Archimedes using geometric reasoning. It shows that if the distance *a* from the fulcrum to where the input force is applied (point *A*) is greater than the distance *b* from fulcrum to where the output force is applied (point *B*), then the lever amplifies the input force. On the other hand, if the distance *a* from the fulcrum to the input force is less than the distance *b* from the fulcrum to the output force, then the lever reduces the input force.

The use of velocity in the static analysis of a lever is an application of the principle of virtual work.

2.4 MATERIAL SELECTION

2.4.1 Steel

Steel is an important element in the manufacturing engineering industry for example shipping, automotive and machining industries. Generally there are various types of steel commonly used such as carbon steel, mild steel and stainless steel. Iron is one of the ingredients that has the power to make a structure strong. Iron has such a high economic value that iron has become one of the biggest elements in business.

Iron also has its benefits.

Figure 2.4.1.1-Steel

2.4.2 Plate Steel Bar

The flat bar is a rectangular section, with squares of varying square size. These affordable steel products are suitable for a wide range of applications and especially in construction, engineering, manufacturing, mining, grating, fabrication and many other industries. The wide range of flat bars can be used in a variety of industries, along with an excellent combination of strength and durability of steel.

Figure 2.4.2.1-Plate Steel Bar

2.4.3 Types of bolts and nuts

2.4.3.1 Bolts

Bolts are widely used in the motor vehicle industry. On motor vehicles there are many components made separately, then combined with bolts and nuts to make it easier to do repairs when needed, for example to do repair work or component replacement.

Flange bolt is a type of bolt that has a flange at the bottom of the head bolt. These flanges are designed to give the bolts strength such as using a washer. The material in this bolt varies from ordinary iron to black steel.

Figure 2.4.3.1.1-Flange Bolt

2.4.3.2 Nuts

It is a mechanical device made from a 6-inch metal mix and in the middle is a hole with screws, so the nut functions as a fastener or lock between the bolt and the object. Therefore, the nut will help the bolt to fasten the object together.

Figure 2.4.3.2.1-Lock Nut

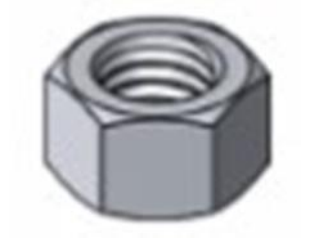


Figure 2.4.3.2.2-Hexagon Nut

2.4.4 Bearing

Ball bearing is very common as it can handle both radial and core loads but can handle only small loads. It is often found in widespread applications such as roller blades and in hard drives but will change shape under excessive load.

Figure 2.4.4.1-Ball Bearing

2.5 CHAPTER'S SUMMARY

In conclusion, after conducting a review of the items and components needed to build this project, it was found that components with the appropriate specifications should be used to contain any unwanted incidents or accidents. In addition, it is also important that this component saves costs for this project as well as increases knowledge of the materials used for this project. In the meantime, the final project can be carried out smoothly without any unresolved problems.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Methodology is one of the chapters that describes the activities that can be done to solve a problem. Choosing a methodology for building a project is an important aspect of ensuring that a project is built in a systematic and systematic manner. As such, this chapter describes the steps taken to solve the "The Movers" problem. For a better understanding of the implementation, the methodology will be presented in flow chart.

This prpject design is custom designed based on the suggestions and discussions of group members. This innovation must take into account the original aspects and theory of this project. The design produced must not be complicated, light and easy to carry. Component selection is based on research and testing so "The Movers" can works perfectly. Even the safety and comfort aspects are also a priority.

3.2 Flowchart

To make this project a success, several steps need to be taken and also to be followed to ensure that the project will be smooth and successful. If there is a problem, this flow chart should be referenced again to assist before or during the project. Having this flow chart promotes a more organized and systematic use of time as it is able to follow all instructions in a timely manner. The steps to follow are as follows:

3.2 FLOW CHART

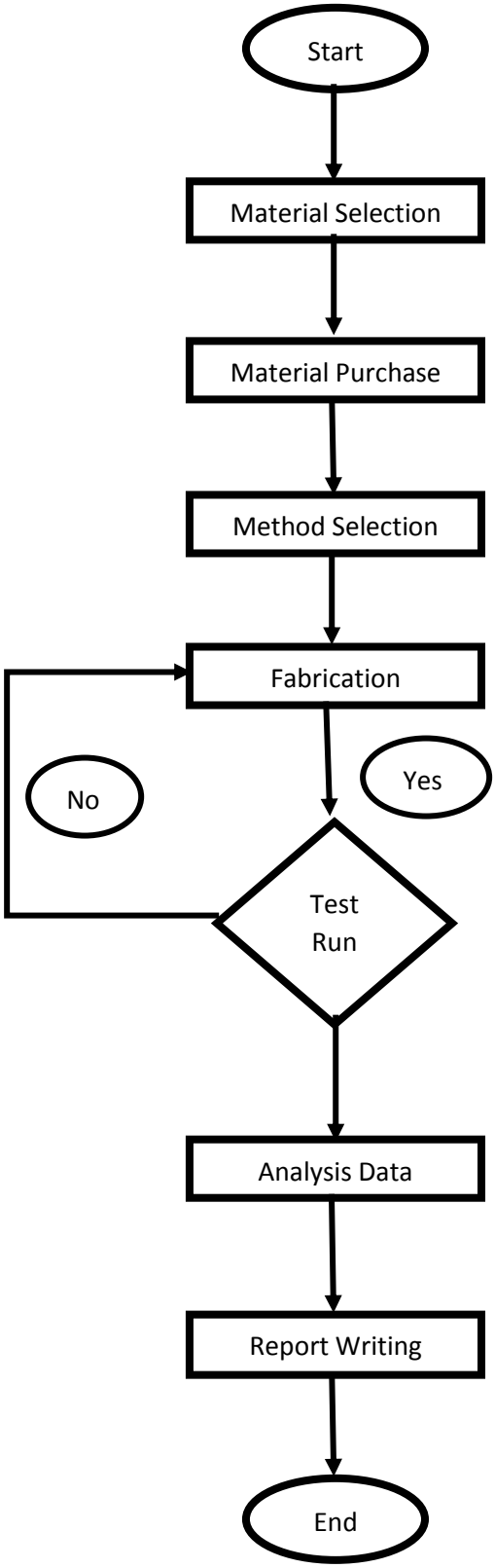


Figure 3.2.1 – Flow Chart

3.3 Flowchart Explanation

- **Material Selection**

  1) Heavy duty steel

Figure 3.3.1- Heavy Duty Steel (Body)

This steel supplies far greater strength-to-weight ratio than other flooring materials to bear the heavy load of furniture. One of the reason we choose this steel is because it got ligther weight and higher strength than other steel.

2) Wheel

Figure 3.3.2 - Plastic Wheel

Each of these wheels can withstand almost 100kg and it is used to support The Movers when we want to lift the furniture. There is four wheel of this type has been used at each corner of The Movers.

3) Pads

Figure 3.3.3 – Carpet Pads

These pads place at each corner of The Movers. It is used to avoid any furniture slipped while lifting the furniture. Other than that, these pads can protect the corner of our furniture from damage during the lifting process.

- **Material Purchase**

  This process is really important because we need to find the best part with the best price to meet our budget. After survey the price of the material from hardware store to another one, we calculate the amount of material that we needed. Lastly, we go to the best store to purchase the material.

- **Fabrication**

After all the material has been purchased, we start to fabricate our project from the scratch. We start with building the body of the project. Cutting and welding the steel to build the project body is the main process. Then, we need to connect the bolt and nuts as the screw at the part of the sliding section of the project. Lastly, we install the wheel and also the pads to the project. Same process has been used to create the second body part.

- **Analysis Data**

During the data analysis period, we need to carefully through the session in order that we can avoid any simple mistake.

- **Report Writing**

With writing the report, we can tracking the progress of the project, analyse risk, plan future action and manage the cost management of our project.

- **Project Ends**

We submit our project to our supervisor for the review.

3.4 INTERVIEW & RESEARCH

After seeking some research on the internet and also do the interview through the google form, many respondent agree that housewives having difficulties to lift the furniture without any help. However, some of them more willing to asking for other family member help than resort to using these kinds of tools.

3.5 PROJECT DESIGN

The sketch of our project is a compact but strong furniture lifter that any family must have at their home. Our expectation is this tool can be used with a really smooth process and does not have any storage problem. Furthermore, we want to make this tool so it can lift the furniture like closet without the user having to worry about the content.

Figure 3.5.1

3.6 OPERATIONAL METHODOLOGY

Prepared by Muhammad Hazwan bin Mohd Sharif

Figure 3.6.1

Cutting

Cut the part of the metal plate that has been selected and measured into the parts that have been set. the first step is to take safety measures to cut the iron. the iron is cut according to the marked dimensions.

Figure 3.6.2

Soldering

The cut iron will be connected using the solder method. first of all take the largest part of the iron, this is calculated as an easy step to start the soldering step according to the parts. parts will be connected one by one until all parts are complete.

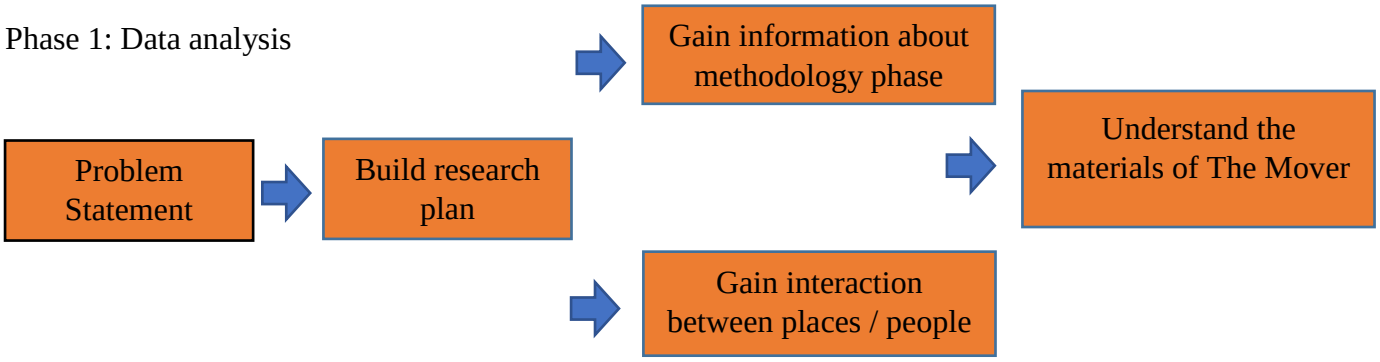
Figure 3.6.3

Levelling

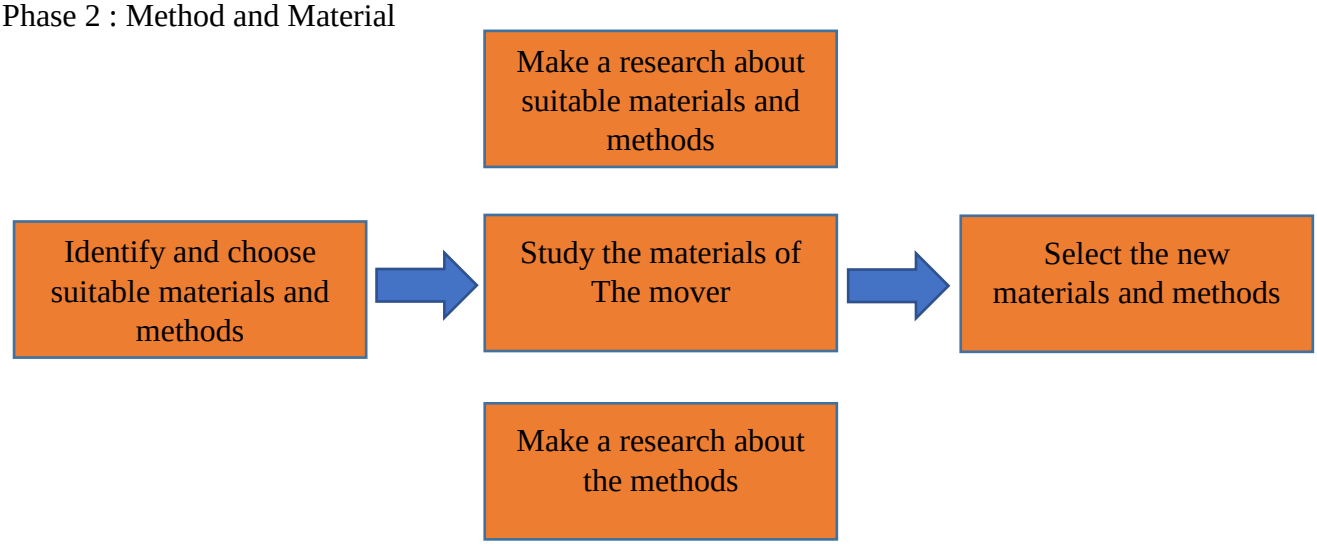
This process is done to level the surface of the solder so that it looks neater. grinding machines are used in this process. this measure is intended to cover defects in the soldering process on the surface of our project.

3.7 METHODOLOGY PHASE

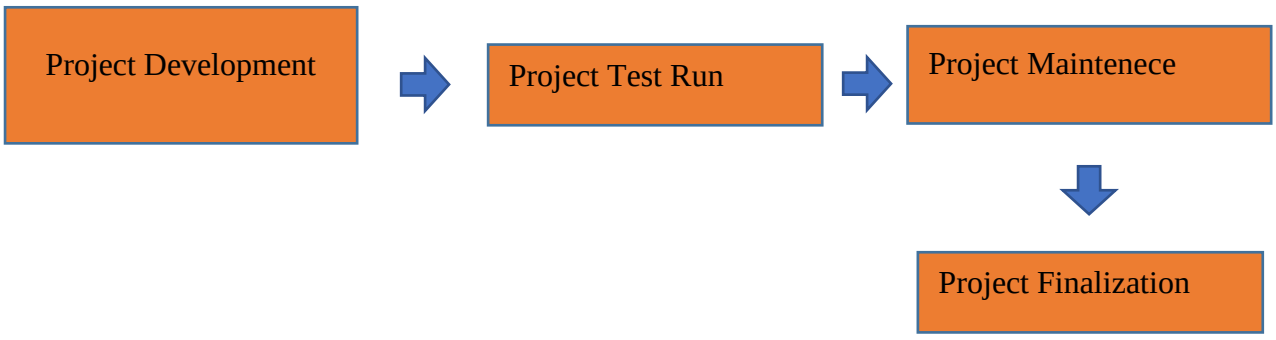
Phase 1: Data analysis



Phase 2 : Method and Material



Phase 3 : Premilinary study



3.8 BUDGET CALCULATION

No	Materials / Equipment	Amount	Price
1.	Steel	4	RM 40
2.	Wheel	16	RM 8
3.	Pads	4	RM 5
4.	Nuts	2	RM 1
5.	Bolts	2	RM 1
6.			RM
7.			RM
8.			RM
9.			RM
10.			RM
		Total	RM 55

Table 3.8.1

3.9 PROJECT ACTIVITY

project Activity **Report Writing**	weeks													
Video and Slide making														
PITEX preparations														
PITEX presentation														

project Activity	weeks 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing and Project Planning														
Project Design														
Material Selection														
Materials Purchase														
Method Selection														
Fabrication														
Test Run														
Analysis Data														

Table 3.9.1

 Planning

 Actual

Summary

As a conclusion, the methods implemented in this project are very crucial and important to complete the project.Besides, the material used in our project is sheet metal. we think this material is easier to find and use in our project. this material is cheap and can grow well when used. In addition, the connection method also plays an important role because the durability of our products depends on the load we will test later

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 INTRODUCTION

This chapter combines all the elements between data and analysis on the ideas and selection of our project materials. This data and analysis are very important for this project to achieve the objectives and scope of the project. This data indicates the successful results of the materials testing. After getting all of this data, we analyze every single possible to make it usable

4.2 ADVANTAGE AND DISADVANTAGE

The projects we implement also have some advantages and disadvantages. these advantages will help the community as well as the environment. However, these weaknesses must be corrected in the future so that we can improve the good and very efficient products that are hard to find on this project.

4.3 CHAPTER'S SUMMARY

As a conclusion for this chapter , the analysis and findings have been made. The mover has a lots of advantages yet still have pros and cons . Therefore we think that our project is proven to be able to do its job well without any problems. The tests we conducted proved that our project was able to solve the problems faced by our targets namely housewives and lifting workers .

CHAPTER 5

DISCUSSION , CONCLUSION AND UPGRADE PLAN

5.1 INTRODUCTION

This chapter explains about discussion , conclusion and upgrade plan all together for the project . From the data from the test run of the project, the analysis have been done. Hence, the discussion from all the results of test run and analysis will be explain in this chapter. Then , the conclusion will be made based on the discussion and upgrade plan that have been made

5.2 DISCUSSION

Based on the data we collect. at first we wanted to use plastic. but the nature of the plastic itself is soft. therefore we turned to pieces of metal. this is because metals are more durable and durable than plastic. however, metal is more expensive than plastic but that is not a problem for us because among the objectives of our products is durability to bear the load. initially, the metal is selected according to the size suitability and then cut into several parts. we only select a few pieces of metal. then. the metal will be connected using a welding tool according to the plan. this method is more effective and its durability is guaranteed. we use spray-based paint because it is easier to use. moreover, this paint can last a long time and the result is neat. we also have a liner on the top surface where the load is placed so that our products do not damage the goods used. Therefore, based on all the discussions that have been made, for future improvements, many improvements can be made to improve the quality of the product.

5.3 CONCLUSION

Based on the projects we have run, it is proven that our projects can be used well without any major issues. the project we are doing is of great benefit especially to housewives or lifting workers. this can leave a positive impact on them as it can ease the heavy burden when they want to move things they can not afford to do on their own. all improvements and improvements will be made so that this project becomes perfect without causing any problems. Therefore, hopefully this project can grow further to everyone in need.

Refference

*https://en.m.wikipedia.org/wiki/Trolley