POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

MOTORIZ BARROW

GROUP MEMBERS :	MATRIC NO.
MUHAMAD 'AMMAR MUSAIYAR BIN MUSTAFFA	(08DPB17F1186)
AHMAD AMMRU BIN MOHD AZIZI	(08DPB17F1241)
NUR AIZAH BINTI NASARUDIN	(08DPB17F1132)
NOR EG BINTI AZMAN	(08DPB17F1235)

JABATAN KEJURUTERAAN AWAM

SESI JUN 2019

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

MOTORIZ BARROW

GROUP MEMBERS:

MUHAMAD 'AMMAR MUSAIYAR BIN MUSTAFFA (08DPB17F1186)

AHMAD AMMRU BIN MOHD AZIZI (08DPB17F1241)

NUR AIZAH BINTI NASARUDIN (08DPB17F1132)

NOR EG BINTI AZMAN (08DPB17F1235)

Laporan ini dikemukakan kepada Jabatan Kejuruteraan Awam sebagai memenuhi sebahagian syarat penganugerahan Diploma Perkhidmatan Bangunan

JABATAN KEJURUTERAAN AWAM

SESI JUN 2019

AKUAN KEASLIAN HAK MILIK

TAJUK : MOTORIZ BARROW

SESI : JUN 2019

1. Kami , **1. MUHAMAAD 'AMMAR MUSAIYAR BIN MUSTAFFA (08DPB17F1186)**

2. AHMAD AMMRU BIN MOHD AZIZI (08DPB17F1241)

3. NUR AIZAH BINTI NASARUDIN (08DPB17F1132)

4. NOR EG BINTI AZMAN (08DPB17F1235)

Adalah pelajar tahun akhir **Diploma Perkhidmatan Awam, Jabatan Kejuruteraan Awam, Politeknik Sultan Salahuddin Abdul Aziz Shah** yang beralamat di **Persiaran Usahawan , 40150 Shah Alam , Selangor .**

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

3. Kami bersetuju melepaskan pemilikan harta intelek Projek Motoriz Barrow kepada Politeknik terebut bagi memenuhi keperluan untuk penanugerahan **Diploma Perkhidmatan Bangunan** kepada kami.

Diperbuat dan dengan sebenar-benarnya diakui)

oleh yang tersebut)

a) MUHAMAD 'AMMAR MUSAIYAR BIN MUSTAFFA) ……

(No. Kad Pengenalan : 990108-07-5473)) MUHAMAD 'AMMAR MUSAIYAR BIN MUSTAFFA

b) AHMAD AMMRU BIN MOHD AZIZI) .....

(No. Kad Pengenalan : 990128-06-5299)) AHMAD AMMRU BIN MOHD AZIZI

c) NUR AIZAH BINTI NASARUDIN) ……..
(No. Kad Pengenalan : 990214-06-5690)) NUR AIZAH BINTI NASARUDIN

d) NOR EG BINTI AZMAN) ……..
(No. Kad Pengenalan : 991121-08-5152)) NOR EG BINTI AZMAN

Di hadapan saya, NOOR AZILA BINTI JAMARI) ……..
(730113-01-5300) sebagai penyelia projek pada) NOOR AZILA BINTI JAMARI
Tarikh : …….

PENGHARGAAN

Kami ingin merakamkan penghargaan ikhlas kepada penyelia projek, diatas bimbingan dan perbincangan yang diberikan sepanjang tempoh projek ini dilaksanakan.

Penghargaan ini juga diberikan kepada sesiapa sahaja yang samada secara langsung atau tidak langsung membantu dalam penghasilan projek ini.

ABTRACT

Motoriz barrow is an innovated wheelbarrow from the existing wheelbarrow. Wheelbarrow are a very useful means of transportation for the community to carry out transportation activities of gardeners, farmers, or building goods and so on. When viewed from the definition of a wheelbarrow, it is a hand-driven, one-wheel-drive vehicle, driven by an operator through a handle. The first objective achieved is the addition of a brake system that enables users to stop the wheelbarrow quickly, especially on sloping roads. It is intended to ensure the safety of users when carrying heavy loads. The second objective is to have an absorber that provides balance when traveling in an uneven way. The absorber also protects the sap, bearing and supports the load on the tire. Next, the third objective is to have a sound sensor that works to find out the load limit level the wheelbarrow can accommodate. Freight transportation is an activity that requires a significant amount of energy. The average energy consumption required by a wheelbarrow operator is ± 4080 kcal / day during work hours. This value is close to the upper limit of energy allowed for heavy work, which is ± 4800 kcal / day. NIOSH explains that 40% of energy is spent lifting loads and 20% is pushing and pulling loads. This study makes it easy for employees and users of the wheelbarrow to enable them to use this product safely and comfortably. The scope of our research is in the construction , agriculture, collection area and factory areas. The data and analysis we got for the brake system at 40kg and the gradient at 45°, the time taken for wheelbarrow to stop is 5 second. Next, the maximum load limit before the buzzer sound is 49kg. Lastly for absorber, at the 40kg of weight the wheelbarrow that goes through the uneven road is still stable to handle.

Keywords: wheelbarrow, censor sound, absorber, braking system

ABTRAK

Motoriz barrow merupakan kereta sorong yang diinovasikan daripada kereta sorong sedia ada. Kereta sorong merupakan satu alat pengangkut yang sangat berguna bagi masyarakat untuk melakukan aktiviti pengangkutan hasil pekebun, peladang, atau barang- barang bangunan dan sebagainya. Jika ditinjau dari definisinya kereta sorong adalah alat pengangkutan yang disorong dengan tangan, memiliki sebuah roda , dan disorong oleh seorang operator melalui pemegang. Objektif pertama yang dicapai adalah dengan penambahan sistem brek yang memudahkan pengguna untuk memberhentikan kereta sorong dengan cepat terutama apabila melalui jalan yang cerun. Ia bertujuan untuk memastikan keselamatan pengguna apabila membawa beban yang berat. Objektif kedua yang dicapai adalah dengan adanya penyerap hentakan (absorber) yang memberikan keseimbangan apabila melalui jalan yang tidak rata . Penyerap hentakan (absorber) juga dapat melindungi bahagian batang sap, galas (bearing) dan menyokong beban yang dikenakan ke atas tayar. Seterusnya, objektif ketiga yang dicapai adalah dengan adanya sensorbunyi yang berfungsi untuk mengetahui had maksimum beban yang dibawa oleh kereta sorong .Aktiviti pengangkutan dengan kereta sorong adalah aktiviti yang memerlukan sejumlah besar tenaga. Penggunaan tenaga purata yang diperlukan oleh pengendali pengguna kereta sorong adalah ± 4080 kcal / hari semasa waktu kerja. Nilai ini hampir kepada had atas tenaga yang dibenarkan untuk kerja berat, iaitu ± 4800 kcal / hari. NIOSH menerangkan bahawa 40% tenaga dibelanjakan untuk mengangkat beban dan 20% untuk menolak dan tarik beban. Kajian ini memudahkan pekerja dan pengguna kereta sorong supaya mereka dapat menggunakan produk ini dengan selamat dan selesa. Skop kajian kami adalah di kawasan pembinaan, pertanian, kawasan pengumpulan barang, dan kawasan kilang. Analisi data yang kami dapat untuk sistem brek pada 40kg dan kecerunan pada 45^{o} , masa yang diambil untuk kereta sorong berhenti ialah 5 saat. Seterusnya, had beban maksimum sebelum bunyi buzzer ialah 49kg. Untuk penyerap hentakan pada berat 40kg, kereta sorong masih stabil untuk dikendalikan apabila melalui jalan yang tidak rata.

Kata kunci : kereta sorong , sensor bunyi, absorber, sistem brek

Contents

LIST OF TABLE

1

LIST OF FIGURE

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The word wheelbarrow has been in the English language since the 14th century, and comes from the old English word “bearwe." A barrow (without a wheel) was similar to a stretcher, giving two people the ability to carry a load. The wheelbarrow was a technological advance in that it allowed one person to move a heavy load on his own. Putting sides on the wheelbarrow also allowed a single person to move loose or liquid loads without fear of dropping or spilling.

Wheelbarrows is a kind of tool that is often used in agriculture or construction to facilitate load transport work. The wheelbarrow has existed since ancient Greece. The wheelbarrow are used to carry goods such as land, sand, cement, rubbish and so on. While known mostly as a device for carrying small loads for the household gardener, a wheelbarrow is often also used in construction and industry for carrying larger loads. Wheelbarrows have a wheel on the front for movement purposes, a pair of holders, a pair of feet and a filler. As we know, the wheelbarrow requires a lot of energy to move the load. Manpower is used to move the tool. (Bruno, 2017)

The wheelbarrows have the one wheel, hand holder, a foot and filling component. wheelbarrow wheels are usually 2-2.5 feet in diameter consisting of rim iron and black rubber tires whether have wind tubs or 'Dead Tires'. If using a wind wheel then the 'lightweight' wheelbarrow is used and if using the tire dies becomes' rather heavy. The goodness of a dead tire is that it is not easy to leak and lasts long.

The main structural component of the wheelbarrow consists of a strong 'hollow iron' with a pair of holders at the end of the iron. At the bottom of the wheelbarrow there is a pair of legs made of leprous iron that functions to stabilize the wheelbarrow. The essential part of the wheelbarrow is the filling iron placed between the tire and a pair of loaded load .This filling container is also divided into two, the plastic filling container is lighter and non-rusted and the iron filling is easy to rust and heavy.

There are various types and quality of wheelbarrow in Malaysia depending on manufacturer specifications. Price per unit depends on type and quality between RM80.00-RM150.00 per unit.

As such, enhancements need to be introduced to provide maximum comfort and convenience to consumers. In addition to identifying the usefulness, strengths, advantages and disadvantages of this project and helping solve the problem of this project. Thus, with the innovation of the wheelbarrows, it will facilitate the user's work. (JillMays, 2014)

1.2 BACKGROUND RESEARCH

From our research, most users are experiencing problems with their wheelbarrow resistance. Most of their wheelbarrow is not long lasting due to several factors. The first factor is bearing problems. Bearing of bearings is easily damaged due to overloading. Additionally, users are also often abused in the hand portion due to the holder on the hard drive. Users also often experience back pain due to wrong body structure. The stem sap is easily broken at the front of the stroller due to the overload.

Therefore, our innovation product is the motoriz barrow created to help employees simplify their work in maintaining the endurance of the wheelbarrow. This wheelbarrow makes it easy for users to stop the wheelbarrow when passing through slopes. Then, users will also be able to know the limit of load carried by the wheelbarrow.

The advantages of a wheelbarrow are the wheels, allowing the pull of something to be of greater ease. There is also the way the structure of the frame allows more space in the barrow, and the balance control it maintains. The wheelbarrow is designed to distribute the weight of its load between the wheel and the operator so enabling the convenient carriage of heavier loads.

The wheelbarrow's advantages were that loads could be lifted and carried close to the ground, as opposed to two-person handbarrows that required carrying to be done at waist level. A wheelbarrow carrying a basket of goods could be unloaded quickly and put back into action, although it was too unwieldy at this date to be emptied by simply tilting and twisting it. One person using a wheelbarrow cuts labor costs in half, and it's easier than two people coordinating their movements as they carry a load. Wheelbarrows quickly became items crafted by carpenters to be sold to construction workers.

The modern wheelbarrow can have one, two, or four wheels. These wheels can be either in front or beneath the load. Other conveniences include storage space compartments or side clips to carry tools. Wheelbarrows are considered a necessity for the backyard gardener as well as industry, for they are considered simple, unmotorized, yet effective ways for one person to carry a heavy load. (wheelbarrow ' how products are made', 2019)

1.3 PROBLEM STATEMENT

After conducting a survey, there are some expressions of problems with existing wheelbarrow in the market. Among the problems faced by construction, laborers, farmers and others is that they are difficult to lift and push the wheelbarrow. As a result of overloading heavy loads, they suffer from various problems, easy to grip hands and difficulty pushing the wheelbarrow to smooth and uneven surfaces.

Firstly, manual wheelbarrow cannot absorb the vibration better, control and handling are less efficient. . In addition, this problem also occurs due to some other aspects of uneven and slippery road conditions. This slippery road can occur due to the rainy season and uncertain weather. The uneven road is due to the sandy and rocky roads. The wheelbarrows also often damage the front, especially on the sap and bearing stems for a short period of time when carrying more heavy loads.

Manual wheelbarrow do not have a braking system that makes it difficult for users to stop the wheelbarrow quickly, especially through sloping roads. Manual wheelbarrow do not have sensors load that make it difficult for the user to know what load limit they can carry. So, we added a load sensor to our wheelbarrow.

Figure 1.1 shows a resistance wheelbarrow

1.4 OBJECTIVE RESEARCH

1. To identify the brake system installed on the wheelbarrow to enable users to stop the wheelbarrow easily and quickly, especially through sloping roads.

2. To design the absorber installed on the wheelbarrow to facilitate more control and handling and to protect sap and bearing stems.

3. To identify the sound sensor to find out the load limit level the wheelbarrow can accommodate.

1.5 SCOPE RESEARCH

The scope of the research is in the area of freight transport which is iron. These wheelbarrow are mainly used for transporting iron, ans used goods.

This wheelbarrow also can be used on construction sites to lift bricks and sand. Used to facilitate freight and load transfer. Additionally, these wheelbarrow are used at construction sites for construction projects such as 'rumah mesra rakyat' and for large-scale construction. Most of user can carry at least a pack of cement is 50 kg and the weight of a brick is 2kg.

In addition, this wheelbarrow also can be used at the factory to lift factory items such as steel and others. These wheelbarrow can also be used in agricultural and farm areas such as oil palm, fruit and vegetable crops.

The advantage of this wheelbarrow is that it has a weight sensor that makes it easy for the user to know the maximum weight that the wheelbarrow can carry. Moreover, this wheelbarrow has a brake system that enables users to stop wheelbarrow quickly, especially in slopes. This wheelbarrow also has an absorber that allows the wheelbarrow to operate better and the absorbers are not easily damaged by sap and bearing parts.

1.6 IMPORTANCE OF RESEARCH

Among the importance of the research from the project is to improve the existing wheelbarrow to the better. Additionally, it can make it easier for workers who use wheelbarrow because this wheelbarrow design the absorber installed on the wheelbarrow to facilitate more control and handling and to protect sap and bearing stems.

Secondly, this wheelbarrow also add the brake system installed on the wheelbarrow to enable users to stop the wheelbarrow easily and quickly, especially through sloping roads. In addition, this wheelbarrow also have the sound sensor to find out the load limit level the wheelbarrow can accommodate.

1.7 DEFINITION OF TERMS

Motoriz Barrow - Motoriz is a motorbike concept that has a absorber to support the load that a wheelbarrow carries. Barrow is means the wheelbarrow has one tire.

Absorber - Absorber or so-called shock absorber is a component that helps to control the spring movement in the system's driver system and the components that helps to control the movement of the spring in the vehicle rolling system.

Brake - Brake is used to slow or stop the movement of a machine or vehicle, or may be a means of preventing it from moving again.

Sound censor - Sensors function to detect the presence of an object or the status of a process to enable the control system to monitor the system whether it's partial or fully automatic.

1.8 CONCLUSION

In conclusion, although there are many new technologies and tools introduced, the use of the wheelbarrow is still important in agriculture, construction and so on. Overall in this chapter such as background, problem statement, study objectives, scope of study, and research interests have been discussed to address the problems faced by existing wheelbarrow. Preliminary study is very important in the success of a product. This study is important to obtain the details that need to be reviewed, refurbished and taken to make this project successful. We can also learn to work together. In conclusion, this initial study is very important in the success of a product. This study is important to obtain the details that need to be reviewed, refurbished and taken into account for the success of this project.

CHAPTER 2

LITERATURE VIEW

2.1 INTRODUCTION

At the preliminary stage of the project, literature review is carried out, which is a previous study which includes research from sources such as internet resources, newspaper clippings, magazines and resources related to motoriz wheelbarrows. The collection of information from literature studies is especially important as a preliminary study.

In implementing a project, various steps must be taken from the initial stage until the completion of the project. Problems encountered in the product are reviewed and refurbished to get better products.

This chapter is a review about the system to install in the wheelbarrow. The purpose of a literature review is to identifies gaps in current knowledge and helps us to avoid reinventing the wheel by discovering the research already conducted on a topic.

2.2 CONCEPT/THEORY

2.2.1 HISTORICAL REVIEW OF WHEELBARROW

The wheelbarrow originated in China, where it was probably first used to move military supplies. Archaeologists have found paintings in Chinese tombs dating to the second century of men using wheelbarrows. These vehicles were used in China well into the 20th century and possibly still are in rural areas. The Chinese wheelbarrow differs from ours, in that the single wheel was much larger and more entered, with the load-carrying surface built around the wheel instead of behind it. This made it easier for a single operator to carry a much heavier load, as the entered wheel bore more of the weight. Sometimes another person or an animal was hitched to the front of the barrow. Sails were also commonly used to help with heavy loads. (Moore, 2016)

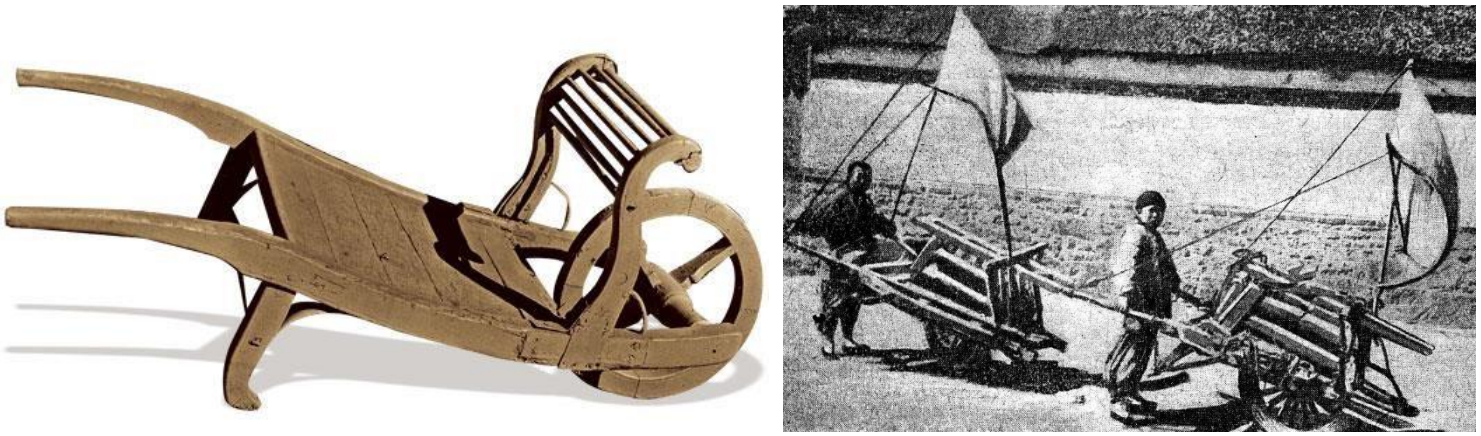


Figure 2.1 shows a Chinese traditional wheelbarrow

The traditional Chinese people also have been using the assisted wheelbarrows with windshield using a screen mounted on the stroller and having a large wheel in the middle that accommodates the entire load being lifted. (Moore, 2016)

The first use of the wheelbarrow in Europe was probably in agriculture then, it spread to construction, transportation of goods, mining, and brick making. Some wheelbarrows had a wooden, box-like body with feet. Others had a flat slatted or wicker framework with feet. French, Flemish, and Dutch wheelbarrows usually had a rack to rest the load or basket against. Swiss wheelbarrows had solid wheels, while English ones had four feet and spoked wheels. Bohemians of the time also used spoked wheels, but no feet were used to help lower the load. To assist when moving loads, European wheelbarrows of around 1200 a.d. had leather straps that wound around the handles. Operators would slip the straps around their necks. (Secrest, n.d.)

Figure 2.2. shows a Europe wheelbarrow

2.2.2 THEORY (MECHANISM) OF OPERATION OF WHEELBARROW

Wheelbarrows are compound machines. It consists of 3 simple machines. They are lever, wheel and axle, and inclined plane. A wheelbarrow is a small hand-propelled vehicle, usually with just one wheel, designed to be pushed and guided by a single person using two handles to the rear or a sail may be used to guide the ancient wheelbarrow by wind. Wheelbarrows are designed to distribute the weight of its load between the wheel and the operator so enabling the convenient movement of heavier and bulkier loads than would be possible were the weight carried entirely by the operator.

As a lever, wheelbarrows lift heavy loads while minimizing the effort required. Levers consist of resistance arms, effort arms and a fulcrum. In class 2 levers, like the wheelbarrow, the resistance arm is in the middle between the fulcrum and the effort arm. The wheelbarrow's effort arms are the handles that the person uses to lift up the heavy load in the barrow. The barrow and its heavy load are the resistance arm that push down. The wheel is the fulcrum that allows the wheel barrow to pivot up and down. (Force and simple machine, n.d.)

In simpler sentences, simple machines is a tool that makes our work easier. Simple machine using a single force charged to do work on load. Machine briefly can be classified into several categories:

i. Lever

ii. The pulley

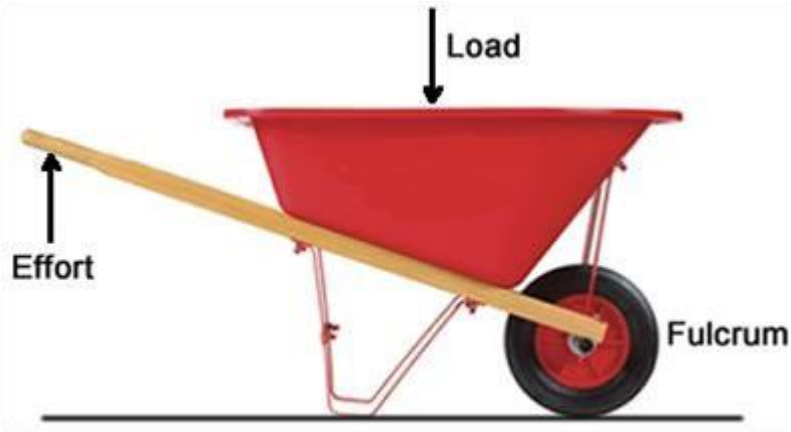
iii. Wheel and axle

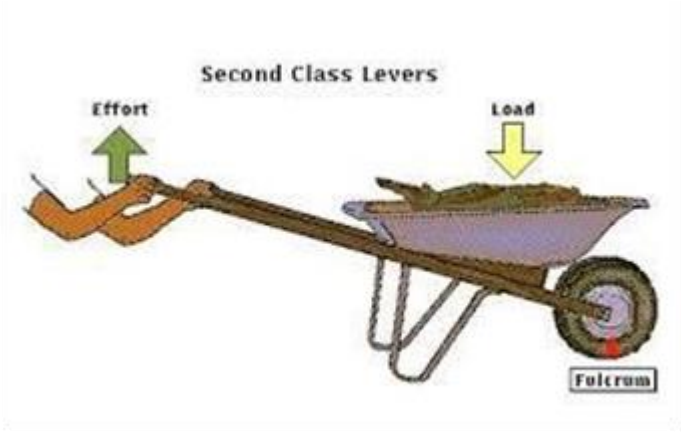
iv. Inclined plane

v. Screw

vi. Gear

The compact machine found on the wheelbarrow consists of wheels and axles, levers second class and inclined plane.





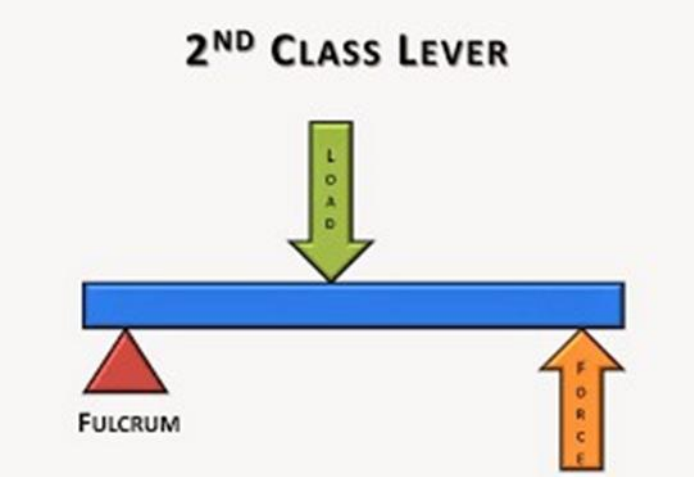


Figure 2.3 shows a second class level

Wheelbarrows have a wheel at the fulcrum with a smaller, cylindrical axle at the center. The wheelbarrow's wheel and axle help it move without friction, making it easier to push and pull. As with all wheel and axle assemblies, the wheelbarrow's wheel and axle have a size ratio that corresponds to the amount of force applied to the axle and distance that the wheel covers. For example, the wheel's radius may be 10 times larger than that of the axle. When force is applied to the wheelbarrow's axle (by pushing the wheelbarrow), the axle does 10 times more work but travels one-tenth of the distance. When the wheel turns, it covers 10 times more ground than the axle would if it were traveling on the ground. The wheel, however, only requires one-tenth of the effort applied to it.

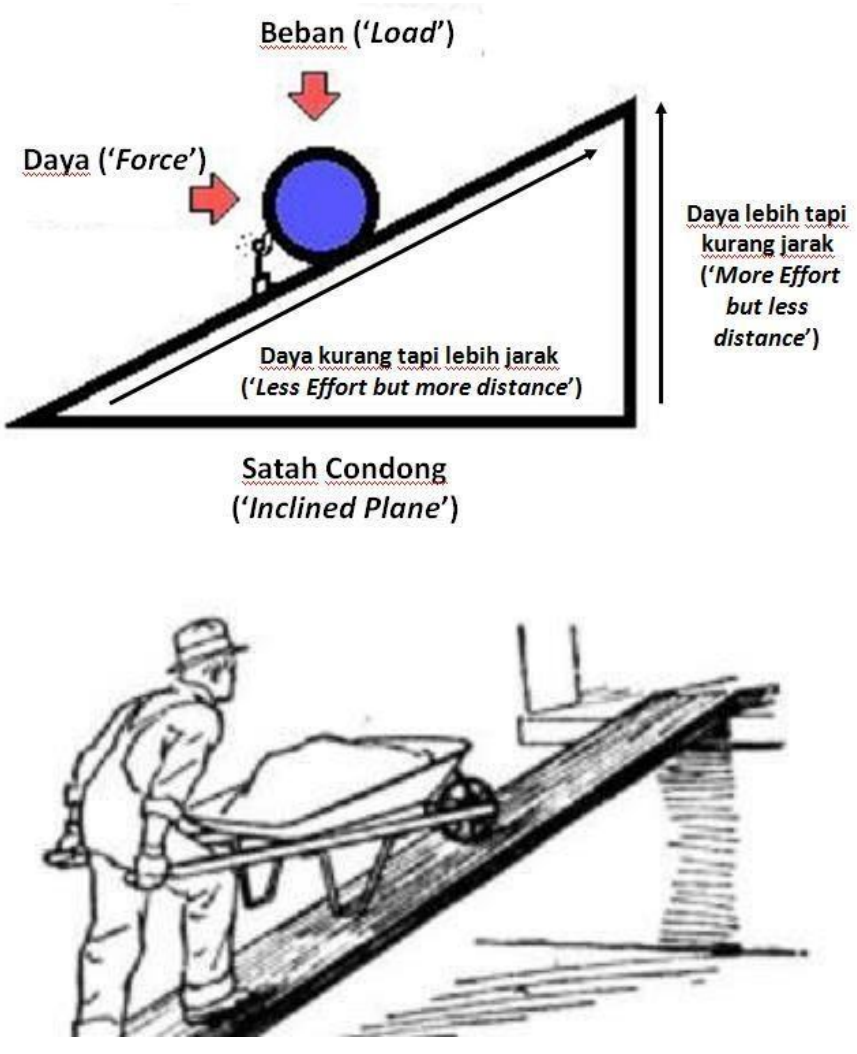


Figure 2.4.shows a inclined plane

2.2.3 COMPONENTS OF WHEELBARROW

2.2.3.1 TYPE OF ABSORBER

2.2.3.1.1 GAS SHOCK ABSORBER

The 'gas' type 'shock absorber' is rather 'hard' slightly compared to the type of oil. Usually used by vehicles whose use is quite rugged and the use of speeding. If it often carries a heavier load, it is appropriate to use the gas-type shock absorber. In the event of damage like leaking, it is easy to detect because there will also be a discharge of the oil and the suspension system becomes soft and the car is firmly pressed. The oil in the shock absorber's gas type acts as a lubricant for its strut piston iron down and up. (azrol, 2012)

The use of a gas shock absorber is recommended if you are frequent through severe roads. This is because gas shock absorbers have a better performance. Gas shock absorbers for a challenging environment and better performance. This absorber is suitable for high load vehicles. Then, the absorber is rugged and has a better durability. (Proffy, 2018)

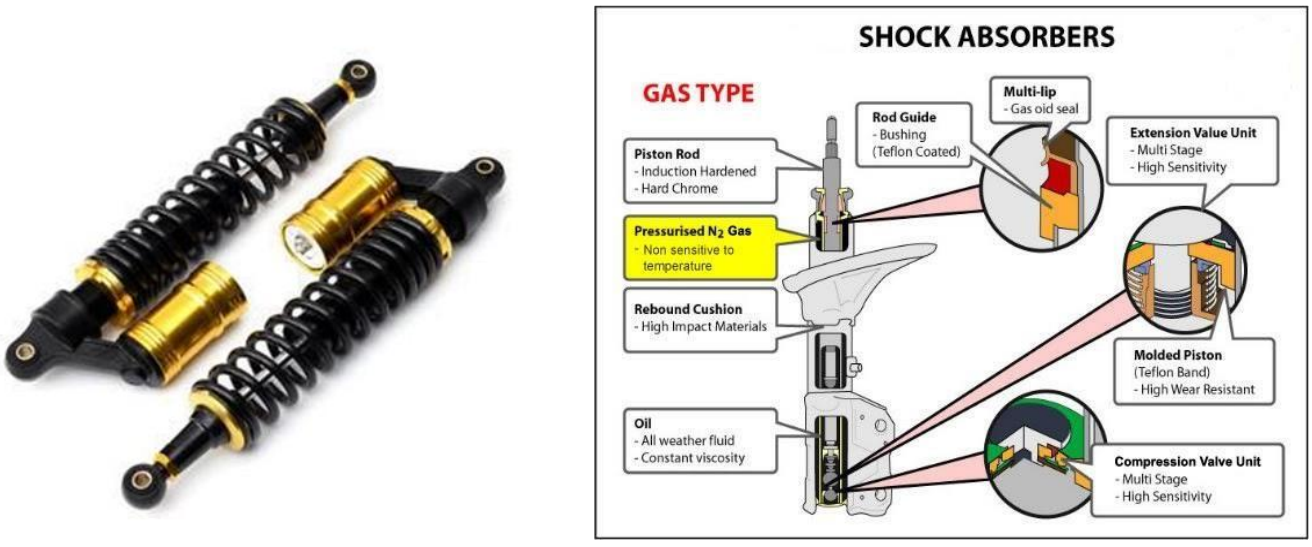


Figure 2.5 shows a gas shock absorber

2.2.3.1.2 OIL SHOCK ABSORBER

Shock absorber type 'oil' is commonly used by standard vehicles where the use is not rugged. Absorber type oil is quite soft but can be hardened by doing "injection". If the shock absorber type of oil is leaked, it is easy to detect because the oil will come out and cause the suspension car to be fired quite strongly. This type of shock absorber is suitable for casual use, very suitable. The price is quite cheap compared to the gas shock absorber. (azrol, 2012)

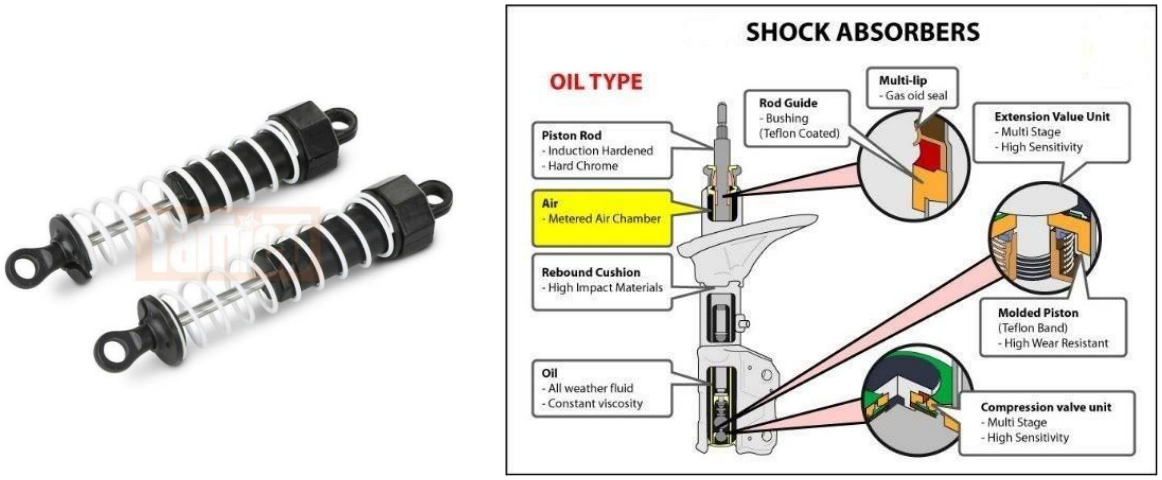


Figure 2.6 shows a oil shock absorber

In their simplest form, shock absorbers are hydraulic (oil) pump like devices that help to control the impact and rebound movement of springs and suspension. Along with smoothening out bumps and vibrations, the key role of the shock absorber is to ensure that the tyres remain in contact with the road surface at all times, which ensures the safest control and braking response.

Firstly, a little bit of science. Shock absorbers work by taking the kinetic energy (movement) of your suspension and converting it to thermal energy (heat) that is then dissipated into the atmosphere through the mechanism of heat exchange. As mentioned, shock absorbers are basically oil pumps. A piston is attached to the end of a piston rod and works against hydraulic fluid in the pressure tube. As the suspension travels up and down, the hydraulic fluid is forced through orifices (tiny holes) inside the piston Shock absorbers automatically adjust to road conditions because the faster the suspension moves, the more resistance they provide. (SHOCK ABSORBERS EXPLAINED, n.d.)

2.2.3.2 TYPES OF BRAKE

2.2.3.2.1 CALIPER BRAKE

A caliper brake (sometimes called a side-pull) consists of a pair of curved arms or calipers pivoting somewhere beneath the headset bearings, with ‘blocks’ of friction material at their lower extremities. By the action of a pull rod, push bar, or more usually a flexible cable these days, the friction blocks are moved towards each other, squeezing the two outer faces of the wheel rim in the process.

The caliper is light and cheap, because the rotating element is already in place, but being completely exposed to the elements, it is badly effected by rain, grease, oil and grit. Different calipers and brake blocks are affected in different ways, but the most important element is the frictional co-efficient of the wheel rim material. Chromed steel lasts for ever, and works very well when dry, but loses most of its stopping ability in the wet. Aluminium is less effective in the dry, but relatively good in the wet, making it a safer material overall. Unfortunately, aluminium rims can wear away quite fast, especially on small-wheeled bikes. (brake system, n.d.)

Calipers are notoriously difficult to centre correctly, which can leave one brake block rubbing against the rim, and a wobbly rim will cause one or both blocks to rub intermittently. Generally, the rim disposes of heat quite successfully, but heat build-up can be a problem on long descents, particularly for heavily-laden or small- wheeled bikes. Excessive heat in the rim can cause tube failure and a catastrophic blow-out. (brake system, n.d.)

Figure 2.7 shows a caliper brake

2.2.3.2.2 V BRAKE SYSTEM

The lever design is divided into 3 curved sections. The first curve is closest to the pivot closer to the handle bar. Stretch to the side of the arch two extending far beyond the bar. The third curve is shorter and more extreme. Leveraging these 3 curves gives an effective towing effect at every level of lever pull. The third curve is more like a buffer, keeping the finger from sliding out of the lever. The lever for the V brake works to pull the brake cable. (henshaw, 2004)

The pivot for the lever is located inside to provide a pull effect when the brake lever is pulled. The cable is attached to the lever. The advanced lever is designed with a cable tensioner. The V-braking part acts to slow the wheel spin. Has 2 hooks mounted on the saddle tube for the rear brake and on the foot for the front brake. The pivot is mounted on the bottom of the spikes. (henshaw, 2004)

Figure 2.8 shows a v brake

V Brakes are the most common term for this style of brake. Shimano actually named these and other brake companies label them "linear-pull" or "direct-pull" brakes. These brakes are extremely powerful. They are most common on mountain and off-road bikes. They have the power to slow and stop a wet or even muddy wheel making them ideal for off-road use. They are a little heavier than either Cantilever or Caliper brakes. These brakes are a "rim brake" style of brake and they require frame/fork mounts to be attached to a bike. (brake system, n.d.)

2.2.3.3 TYPES OF TYRE

2.2.3.3.1 PNEUMATIC TYRE

As I know, pneumatic tires are similar to our regular car or truck tires, and are most commonly used outdoors. There are two types, solid pneumatics and air pneumatics. The air pneumatics are filled with air, while the solid pneumatics are made of rubber and more puncture proof. If you have nails, rocks, or other sharp objects around the yard or workspace, you may want to lean more towards the solid pneumatic option. (Collom, 2017) Pneumatic tires or full air, are made of airtight inner core filled with pressurized air. The flowers, usually reinforced with belting of steel or other material, include these inner core and provide the area of contact with the road. The air pressure in the tire is much higher than the air pressure of the atmosphere, so the tire continues to rise even with the weight of the vehicle located on it. Tire air pressure provides resistance to troops trying to change the shape of the tire, but it does provide a certain level. (GRABIANOWSKI, n.d.)

Figure 2.9 shows a pneumatic tires

Pneumatic tires have disadvantages, especially in high performance or very dangerous applications. The main problem is that the tire puncture causes a total failure. Another problem with pneumatic tires involves variation of air pressure and tire performance. However, the pressure in the tire does not only maintain the "up and down" stiffness - it also maintains the side tire stiffness. Pneumatic tires are also susceptible to temperature changes, which can alter tire internal pressure. (GRABIANOWSKI, n.d.) One of the biggest benefits of using pneumatic tires are their ability to absorb the unevenness of terrain. This allows for a smoother ride, and less bumping and shaking. They are also going to have a thicker tread, which provides traction to drive over loose and uneven surface. (Collom, 2017)

2.2.3.3.2 SOLID TYRE

Solid tires or also called airless tires, are manufactured using a few different methods. Solid tires can be manufactured on a frame or metal wheel structure which will then be mounted on a specific vehicle. Solid tires can also be made to fit on rims that are manufactured to support pneumatic tires. Solid tires differ in two ways. The first is the rubber compounds they're made with, and the second is the purposes they're made for. Unlike the curing process of a pneumatic tire, solid tires are rolled in thin layers of rubber onto a metal frame mount and pressed through a hydraulic system. This solidifies the form and makes the rubber hold. These layers are added using a wheel. With every full rotation of a wheel turn, the process adds another layer. The thickness of these layers varies depending on the application of the tire. (Solid Tires, 2018)

Figure 2.10 shows a solid tyre

2.2.3.4 TYPES OF CONTAINER

2.2.3.4.1 PLASTIC WHEELBARROW

From what I know, plastic wheelbarrows are typically used around the garden for carrying lighter materials such as empty pots, gardening tools or bags of gardening soil. Since the bucket of the wheelbarrow is plastic, it is also supposed to be easier to lift which would essentially be easier on the back. Plastic wheelbarrows are commonly used to haul garden items such as mulch and seedlings easily from one side of the yard to the other. Although these wheelbarrows are lighter and typically less expensive than steel wheelbarrows, they can be more susceptible to wear and tear. (OSMOND, n.d.)

Figure 2.11 shows a plastic wheelbarrow

A benefit of using a plastic wheelbarrow include being lighter weight, which will help both physically and shipping cost wise. Plastic wheelbarrows will certainly be easier to lift than a steel wheelbarrow, even when full of gardening supplies. Plastic wheelbarrows also aren't susceptible to rust like steel wheelbarrows are. Plastic wheelbarrow could leave out in the rain a few times and not have to worry about it rusting or rotting away. (OSMOND, n.d.)

Although plastic ones are lighter and essentially, this could also mean the wheelbarrow could buckle under too much weight. Since the material is plastic and not steel, this plastic wheelbarrow need to be careful with what and how much materials that put into it. . (OSMOND, n.d.)

2.2.3.4.2 STEEL WHEELBARROW

Steel wheelbarrows are a more traditional tool in that they can handle hauling heavy duty stuff such as cement and logs. Traditionally, it is slightly more common to see a steel wheelbarrow sitting around a yard or construction site than a plastic one. Extremely durable, the steel wheelbarrow will be much heavier since it can hold much more weight without buckling or folding. Since these are made of steel, they will be heavier so the more you fill it the heavier it will be and you may have difficulty lifting it. These wheelbarrows are great if needing to haul building materials such as paint cans, gravel, and bricks since the steel reinforcement makes the wheelbarrow virtually impenetrable. These definitely won't buckle under heavy weight, but this wheelbarrow can be too heavy to lift if not careful. (OSMOND, n.d.)

Figure 2.12 shows a steel wheelbarrow

Steel wheelbarrows are extremely sturdy and can carry anything from a pile of bricks to heavy garden mulch with ease. Steel models are also not very delicate, so they can go through years of heavy use and abuse before we should see any real problems. Part of why construction workers love these tools so much is that they are extremely versatile and dynamic.

Although steel models are a bit sturdier, since they are made of steel this makes them much heavier, too. Even if empty, a steel wheelbarrow will be much heavier than a plastic one. Steel wheelbarrows are also susceptible to rust, so if have accidentally leave the tool out in the rain, we can expect rust to follow. . (OSMOND, n.d.)

2.2.3.5 TYPES OF SOUND CENSOR

2.2.3.5.1 LOAD CELL CENSOR

A load cell is a type of force sensor that, when connected to appropriate electronics, return a signal proportional to the mechanical force applied to the system. They can be hydraulic, pneumatic, or, most commonly, based on strain gauges. The advantages of a Typical Load Cell is very accurate (<0.1% of full scale), readily available and calibrated by manufacturer.

A load cell is a sensor or a transducer that converts a load or force acting on it into an electronic signal. This electronic signal can be a voltage change, current change or frequency change depending on the type of load cell and circuitry used. There are many different kinds of load cells. (Sivaranjith, 2018)

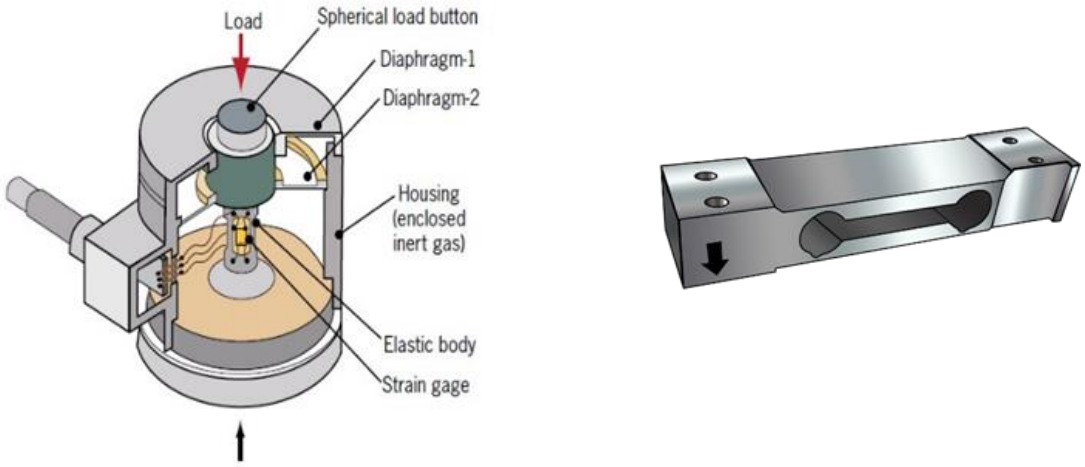


Figure 2.13 shows a load cell censor

Advantage of load cell is inherently explosion proof, insensitive to temperature variations, they do not contain fluids, therefore, there is no possibility of contamination of the process if the diaphragm breaks.The load cells of the voltage meter can be used for both expansion and compression.

2.2.3.5.2 FORCE CENSOR

The force sensitive resistors (AKA, piezoresistive force sensors, or touch sensors) which measure force differently. A force sensitive resistor measures a compressive force directly instead of correlating the strain of a beam to force applied. The force applied to the sensor compresses two layers of a flexible, printed, piezoresistive ink together. This compression results in a proportional change in electrical signal, which like the signal of a load cell, can be calibrated to engineering force units.

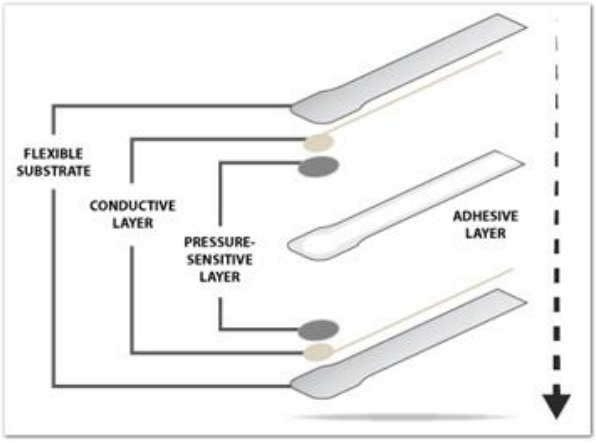


Figure 2.14 shows a force censor

2.3 PREVIOUS RESEARCH

2.3.1 ERGONOMICS

Figure 2.15 shows a body posture of ergonomics

From the research that I found, a wheelbarrow is one of manual material handling equipment which often used by many people. The analysis of subjective complaints shows that palm of hands arms shoulders elbows and wrists are the most possible parts of body having risk injuries. (Mia Monasari, 2006) Previous research has provided evidence that farm youth performing farm chores may be at risk of developing a low back musculoskeletal injury. (Susan E. Kotowski, 01 January 2009)

Previous research (Susan E. Kotowski, 01 January 2009) has found muscle strains and body discomfort to be prevalent in many farm youth. The high physical demands associated with these tasks are not only detrimental to youth because of the pain and discomfort they cause in the short term, but also raise the risk potential that later in their adult life they will develop low back or other musculoskeletal disorders. The wheelbarrow design is currently perceived as not ergonomic. This causes discomfort in the wrist, back, waist, fingers and toes. Workers in operating the existing wheelbarrow also often experience an average work accident of 2.5 times per month and quickly feel tired of spending a lot of energy as much as 4.45 Kcal / minute. (Agung Kristanto, 2014)

Some of the problems faced by users are transport processes that require enormous energy because wheelbarrow is not ergonomic. The difficulty faced by the operator is wheelbarrow's unbalanced when used because the wheel is only one. In addition it bends the operator when lifting wheelbarrow, it is due to the steering wheel too down. The steering wheel is detached from the grip because the rubber is small and slick. In addition, the use of wheelbarrows has been found to have complaints on users, including hard handles that can cause injuries. (Agung Kristanto, 2014)

From the research (Sunni, 2016) the result showed that there is a correlation between age ($p = 0.028$) and frequency of hauling ($p = 0.025$) and the incidence of low back pain. And there was no correlation between working period ($p = 0.423$) and the incidence of low back pain.

2.3.2 PREVIOUS PRODUCT

2.3.2.1 WHEELBARROW WITH MOTOR

Figure 2.16 shows a wheelbarrow with motor

From the data that I found, this wheelbarrow facilitates the user in the process of decelerating goods or materials with minimum human resource utilization.

This wheelbarrow has a stainless steel filling frame that is a hollow iron frame. Additionally, the wheelbarrow has 3 die tires and the maximum load capacity that can be lifted by the wheelbarrow is 200kg. And in Malaysia, this type of wheelbarrow priced is RM600.

Among the shortcomings or problems faced is that they are largely overseas. Like most wheelbarrow available in Malaysia as well, consumers need to use a lot of energy to lift the burden to put into the filling container. Next, the price is also expensive for those who want to have it besides the additional cost to import goods from abroad. It is also not an eco-green type. Furthermore, in the event of damage to this type of stroller, it will be difficult to repair without a specialist about it and the cost of overhaul is also much more expensive. (DeadNuts, n.d.)

2.3.2.2 SEMI-AUTOMATIC WHEELBARROW

Figure 2.17 shows a semi-automatic wheelbarrow

The innovation of semi-automatic wheelbarrow for palm oil collectors was designed to solve their current problems. The palm oil collectors and loaders can get many benefits such as lighten the load and reduce the risk of injury to workers from the use of this semi-automatic wheelbarrow. The two most significant improvements are in the use of power motor and two extra wheels to stabilize the semi-automatic wheelbarrow. The heavy manual task is taken over by the power motor, which powers the semi-automatic wheelbarrow. Palm oil collectors and loaders only need to hold and steer the semi-automatic wheelbarrow.

This situation will help the palm oil collectors and loaders to reduce energy consumption by eliminating the need to push heavy load and thus shall reduce work related muscular skeletal disorders (WMSDs) risks and injuries. Furthermore, this new semi-automatic wheelbarrow could help collectors and loaders to collect more FFBs from one tree to the next tree more efficiently and subsequently it will increase work productivity. The manufacturing process is also very practical because it does not require expensive machines or materials that are difficult to obtain. (N S M Nawi11, 2015)

2.4 CONCLUSION

In conclusion, studies covering theories, analyzes, problems and planning are very important in the success of a product. This study is important to get the details that need to be studied and taken into account for the success of this motoriz wheelbarrow. A literature review is an overview of research on a given topic and answer to related research .This study is important to get the details that need to be studied and taken into account for the success of this motoriz wheelbarrow .In this chapter we present a study on morphological aspects. Through past research, the objectives and questions of the study can be done well. This contributes to the reference and guidance in making this study.

CHAPTER 3

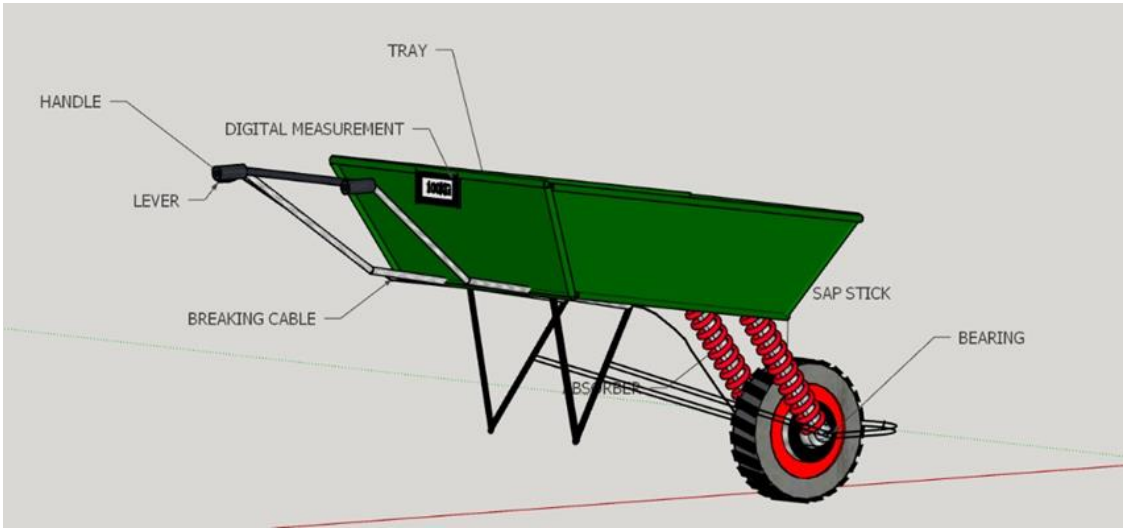
METHODOLOGY

3.1 INTRODUCTION

From what I understand, the research methodology covers the methods, methods and approaches used to achieve the objectives and goals of the study. The methodology of this study makes the study conducted more systematic and the course of study is more organized and focused in achieving the objectives. This methodology requires the method and the method in obtaining data, with adequate data, then a study can be carried out properly. To obtain good data, the research methodology of this study should be perfect and according to its own procedural.

The methodology of the study is the method and technique of forming, collecting and analyzing data in order to produce evidence that can support a study. Methodology explains the way a problem is investigated and the reason for a specific method and technique is used. The purpose of the methodology is to help us understand more broadly or more about applying the method by making a description of the research process.

3.2 RESEARCH DESIGN



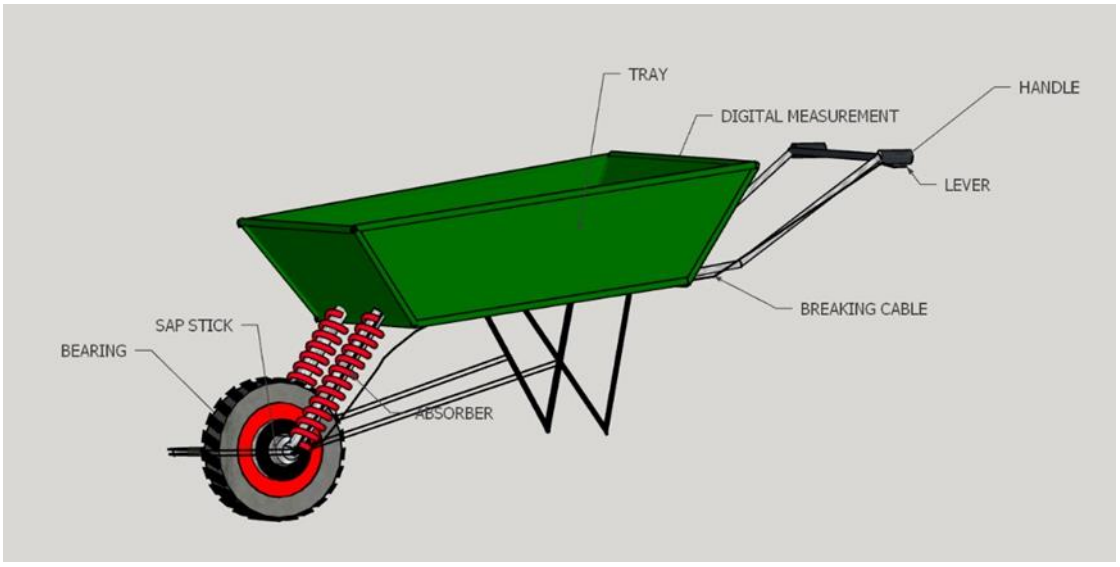


Figure 3.1 shows a side view of wheelbarrow

3.2.1 EXPLANATION FOR THE DESIGN

We are improving the existing wheelbarrow by adding absorber, brake, and cell load censor Absorber installed on the front and while the adjustable stand is mounted on the back of the wheelbarrow. The absorber works to support the weight that the tire holds and protect the sap. Then the adjustable stand is functioning to adjust the wheelbarrow height.

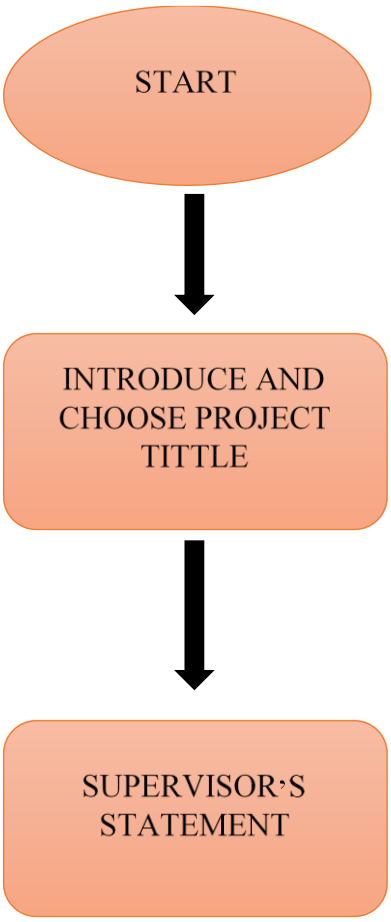
We choose shock absorber gases for the product. The advantages of shock absorber gases is because recommended if frequent through severe roads. This is because gas shock absorbers have a better performance. Gas shock absorbers is for a challenging environment and better performance. This absorber is suitable for high load vehicles. Then, the absorber is rugged and has a better durability.

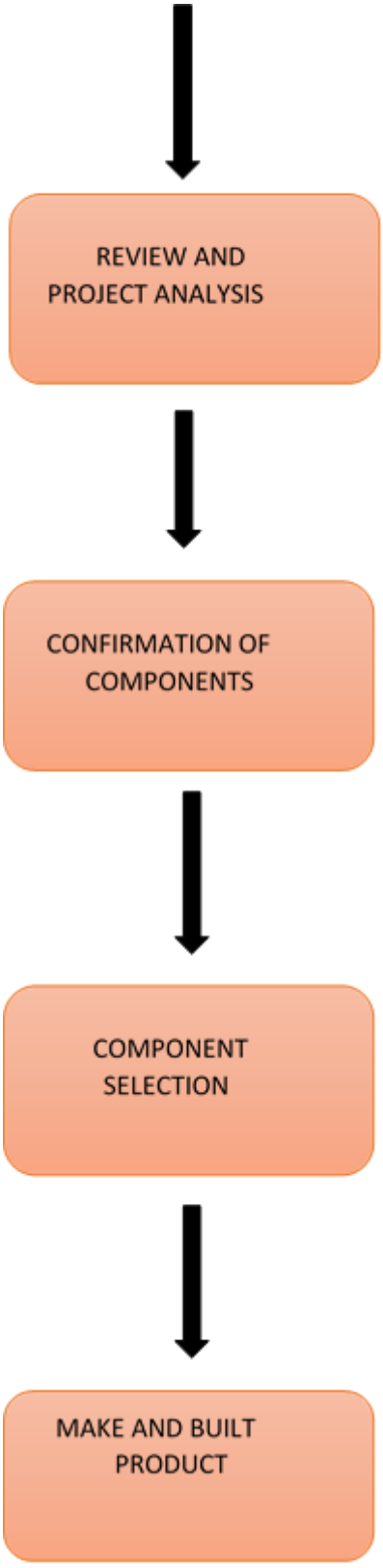
After that we choose pneumatic stand adjustable for the product. The advantages of pneumatic stand adjustable is have a simple design and easy to control. Then, can accommodate the heavy loads. One of the biggest benefits of using pneumatic tires are their ability to absorb the unevenness of terrain. This allows for a smoother ride, and less bumping and shaking. They are also going to have a thicker tread, which provides traction to drive over loose and uneven surface. (Collom, 2017)

3.3 DATA COLLECTION METHODS

3.3.1 CHANGE STAGES OF PROJECT IMPLEMENTATION STEP

To make this project a success, several steps need to be taken and should be followed to ensure that the project will be smooth and successful. If there is a problem, this flow chart needs to be referred back to help before or during the project. With this flow chart, it encourages the use of more timely and systematic timing because it can follow all the instructions exactly and perfectly. Among the steps that need to be followed are as follows:




REVIEW AND
PROJECT ANALYSIS
CONFIRMATION OF
COMPONENTS
COMPONENT
SELECTION
MAKE AND BUILT
PRODUCT

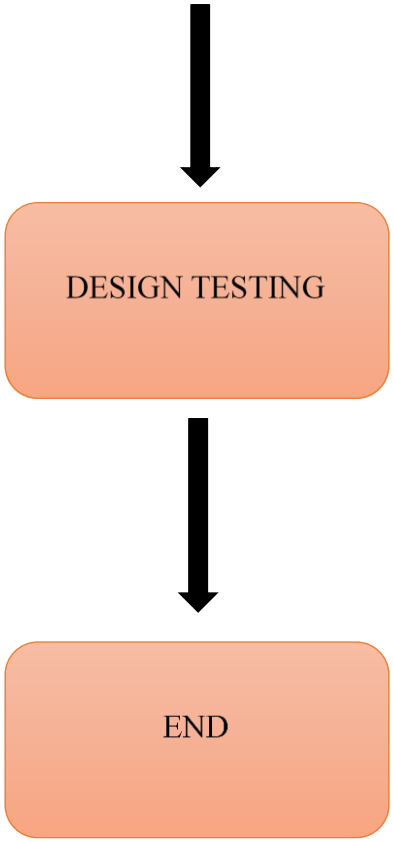


Figure 3.2 shows a flow chart about project implementation

3.3.2 FLOW CHART ABOUT HOW TO WRITE THE REPORT

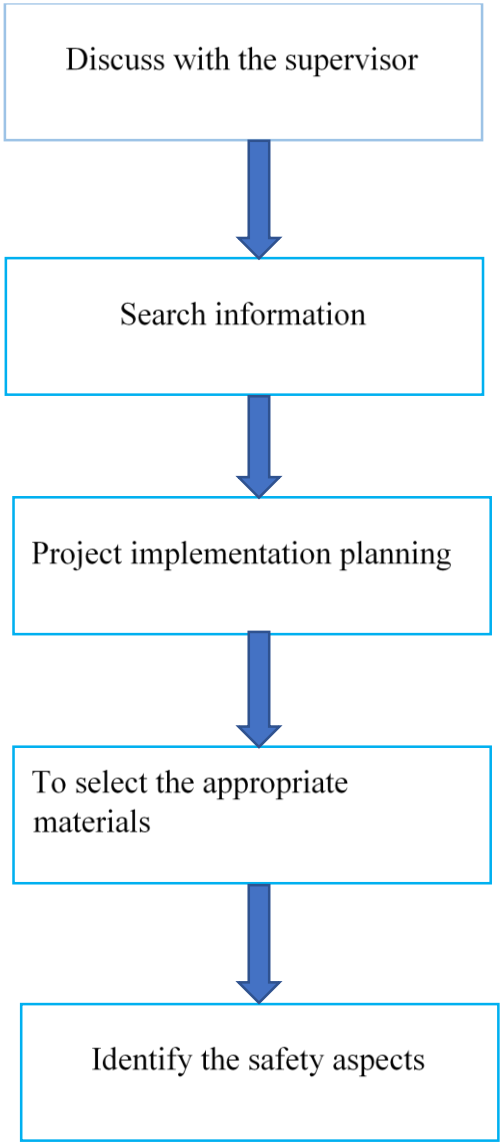


Figure 3.3 shows a flow chart about how to write the report

3.3.3 FLOW CHART DESCRIPTION

a) Problem statement: Find out why and how this project is selected.

b) Choosing the appropriate title: Choosing the appropriate title for the project by making a group discussion with the supervisor.

c) Conduct research on projects: Find suitable materials such as filling, hydraulic and tires.

d) Testing: The finished material should be tested to determine whether the material is strong or weak.

e) Reports: Upon completion of the project, the final report is mandatory provided by each group.

f) Exp: Submit reports and prepare for project presentation.

3.4 RESEARCH INSTRUMENT

3.4.1 SELECTED COMPONENTS

3.4.1.1 GAS SHOCK ABSORBER

Figure 3.4 shows a gas shock absorber

We choose this gas shock absorber because in the event of damage like leaking, it is easy to detect because there will also be a discharge of the oil and the suspension system becomes soft and the car is firmly pressed. This shock absorber gas can also accommodate a lot of load. This is because gas shock absorbers have a better performance. Gas shock absorbers for a challenging environment and better performance. This absorber is suitable for high load vehicles. Then, the absorber is rugged and has a better durability.

3.4.1.2 PNEUMATIC TYRE

Figure 3.5 shows a pneumatic tyre

We choose this pneumatic tyre because the air pressure in the tire is much higher than the air pressure of the atmosphere, so the tire continues to rise even with the weight of the load located on it. Three advantages of pneumatic tires, first is good shock absorption. Second is the lighter structure. Pneumatic wheels adopt a hollow structure and internal filler is air, which is lighter than solid rubber wheels and helps to reduce the weight of the entire electric scooter. Lastly have the good stability

3.4.1.3 STEEL WHEELBARROW

Figure 3.6 shows a steel wheelbarrow

We choose these steel wheelbarrows because this wheelbarrow are great if needing to haul building materials such as paint cans, gravel, and bricks since the steel reinforcement makes the wheelbarrow virtually impenetrable. This type of wheelbarrow also lasts longer than the plastic wheelbarrow. Being Steel material tremendously durable, they can carry everything from a stones piles to heavy garden mulch with comfort. Can extreme use and abuse for the years without seeing any real trouble as they are incredibly versatile and dynamic. Though these types of wheelbarrows are heavily used in construction sites and yards, they also can be in handy around the garden as well.

3.4.1.4 V- BRAKE

Figure 3.7 shows a v brake

This brake has the advantage of other forms of media. It is smaller and lighter than the old vinyl record. A cd also won't break as easily as a cassette record or tape.This brake slow down the vehicle by creating friction between the moving party and the stationary section.

3.4.1.5 LOAD CELL CENSOR

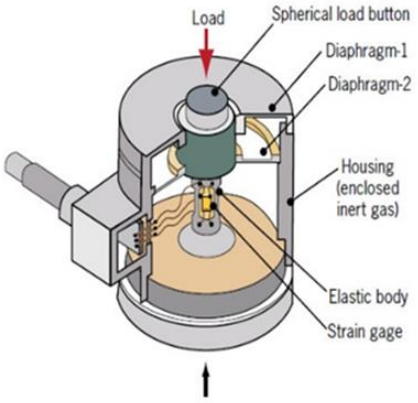


Figure 3.8 shows a load cell censor

We choose this load cell censor because the advantage of load cell is inherently explosion proof, insensitive to temperature variations, they do not contain fluids, therefore, there is no possibility of contamination of the process if the diaphragm breaks.The load cells of the voltage meter can be used for both expansion and compression.

3.5 SAMPLING TECHNIQUE

This study uses a non-probability sampling that is a sampling technique intended to answer the objectives set by the researcher. Non-probability is a sampling technique where the samples are gathered in a process that does not give all the individuals in the population equal chances of being selected.

We can use this sampling technique when we has limited budget, time and workforce. This technique also be used in an initial study which will be carried out again using a randomized, probability sampling.

Non-probability sampling is a more conductive and practical method for researchers deploying survey in the real world. Although statisticians prefer probability sampling because it yields data in the form of numbers. However, if done correctly, non-probability sampling can yield similar if not the same quality of result.

Getting responses using non-probability sampling is faster and more cost-effective as compare to probability sampling because sampling is known to researcher, they are motivated to respond quickly as compared to people who are randomly selected.

3.6 DATA ANALYSIS METHOD

3.6.1 DISCUSS WITH THE SUPERVISOR.

The implementation of this project is the result of discussion and guidance from supervisors who give ideas and contributions. This discussion can help in terms of developing student ideas with supervisors through exchange of opinion sessions.

3.6.2 INFORMATION SEARCH.

The information retrieval required to carry out this research is collected through the website, reference from the book and from the collection of information. collecting information from questionnaires made using "google form". It is delivered to the farm workers, contractors, breeders and manufacturers who use wheelbarrows to get feedback on the problems encountered, comments or ideas that can be used to produce a product that can help them to work. A combination of these resources helps to complete the quest for ideas to carry out this study. Every information obtained should also be analyzed in advance so as to be relevant to the study conducted.

3.6.3 QUESTIONNAIRE.

We collect information using google form. they are sent to farm workers, breeders, contractors and factory workers to get feedback on the problems encountered, comments or ideas that can be used to produce a product that can help them in performing wiring work.

3.6.4 DATA ANALYSIS METHOD USING GOOGLE FORM

The data collection used in this study was questionnaire, observation and interview. A questionnaire was developed to obtain information on improvements to our products is wheelbarrows.

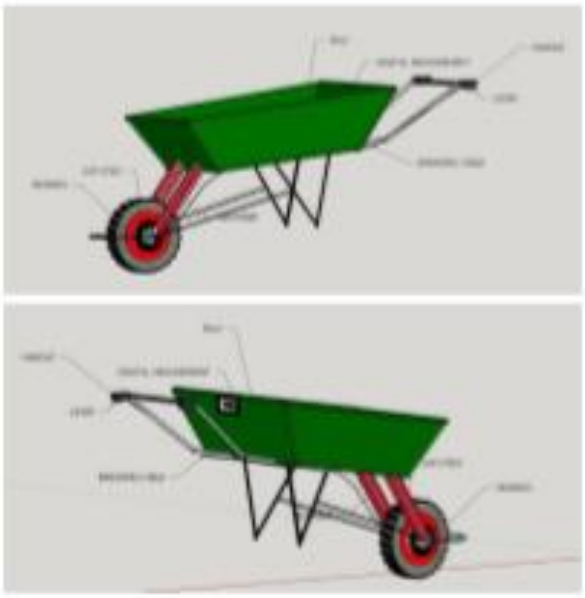
POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

DIPLOMA KEJURUTERAAN PERKHIDMATAN BANGUNAN

PENYELIDIKAN RESPONDEN PROJEK TAHUN AKHIR

Pengenalan: Tajuk penyelidikan ini ialah **"Motoriz Barrow"** yang merupakan inovasi daripada kereta sorong sedia ada. Borang kaji selidik ini dilakukan untuk mendapatkan maklumbalas setelah segala pelaksanaan awal dilakukan serta menerima penambahbaikkan daripada aspek rekaan, fungsi, bahan dan sebagainya. Objektif kami ialah menambah baik kereta sorong sedia ada dengan menambah absorber, brek dan sensor pemberat. Sila jawab semua soalan dengan lengkap berdasarkan arahan yang diberi. Kerjasama daripada pihak tuan/puan amatlah dihargai. Sekian, terima kasih.

GAMBAR KERETA SORONG YANG TELAH DI INOVASI



2. PENAMBAHAN ABSORBER DAPAT MENGURANGKAN GETARAN PADA KERETA SORONG APABILA MELALUI PERMUKAAN JALAN YANG TIDAK RATA.

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

3. DENGAN ADANYA SENSOR PEMBERAT INI, MEMUDAHKAN PENGGUNA UNTUK MENGETAHUI HAD LIMIT BEBAN YANG BOLEH DIBAWA BAGI MENGURANGKAN RISIKO SAKIT BELAKANG, BAHAGIAN TANGAN DAN BAHAGIAN PINGGANG.

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

4. ADAKAH ANDA BERSETUJU SEKIRANYA ABSORBER DITAMBAH PADA KERETA SORONG INI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

MENGAPA? BERIKAN SEBAB ANDA.

_____

_____

5. ADAKAH ANDA BERSETUJU SEKIRANYA SENSOR PEMBERAT DITAMBAH PADA KERETA SORONG INI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

MENGAPA? BERIKAN SEBAB ANDA.

_____

_____

BAHAGIAN B: KESELAMATAN

1. JENIS BREK YANG MANAKAH SESUAI DUGUNAKAN?

BREK V / BREK RIM ☐

BREK JENIS HIDRAULIK ☐

BREK JENIS MEKANIKAL ☐

MENGAPA? BERIKAN SEBAB ANDA?

_____

_____

2. DENGAN ADANYA PENAMBAHAN SISTEM BREK INI, IA DAPAT MEMPERLAHANKAN KELAJUAN TERUTAMANYA KETIKA LALUAN DALAM KEADAAN CERUN.

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

3. PENAMBAHAN SISTEM BREK INI DAPAT MENGAWAL KERETA SORONG SEMASA DALAM PERJALANAN DAN BOLEH MEMBERHENTIKAN KERETA SORONG DENGAN CEPAT APABILA DIKEHENDAKI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

Figure 3.9 shows a google form / questionnaire

3.7 CONCLUSION

Each study has its own research methodology according to the type of research conducted. In addition, the research methodology used should be in line with the objectives of the scientific training title. It is a very important thing to do in research to obtain authentic and quality information. With the methodology of the study, the research will be more organized and will yield better study results. The methodology of the study can also be considered as a preliminary plan towards which a study will be carried out either towards success or otherwise.

CHAPTER 4

RESULT

4.1 INTRODUCTION

This chapter explain about the research that we want to carry out. This chapter also presents and analyses the study data. The findings of the study are related to the results of a study. After obtaining the required data and information through the questionnaire form as well as the information obtained orally and through the questionnaire. These data were then analysed to formulate a conclusion. Initially, the researcher obtained frequency and percentage for the purpose of complementing the respondent demographics.

The researcher also obtains frequency and percentage calculation for variables such as age, gender, occupation, race, and religion. The study analysis is an important part of carrying out the best and most feasible research objectives. It will mostly focus on demographic section and question relate to the research objectives. All relevant information is collected to identify the needs of the analyst. This process will determine the result of the analysis studies. The design and analysis of the study is fundamental to ensuring that respondents understand the research being carry out.

4.2 ANALYSIS AND DISCOVERY OF DESCRIPTIVE DATA

4.2.1 CONSTRUCTION AREA

SOIL TYPE	CLAY	SANDY SOIL	PEAT	LIMESTONE	CEMENT AREA/TAR
TICK (/)		/			/

1.BRAKE

WEIGHT(KG)	50KG
GRADIENT	45°
THE TIME TAKEN TO STOP(SECOND)	5 SECOND

2.SOUND SENSOR

LOAD LIMIT LEVEL	30 KG	50 KG	60KG
TICK (/) IF IT SOUND			/

3.ABSORBER

WEIGHT(KG)	20KG	50KG	70KG
TICK (/) IF IT BALANCE	/	/	/

Table 4.1 shows a data analysis at construction area

4.2.2 COLLECTION AREA

SOIL TYPE	CLAY	SANDY SOIL	PEAT	LIMESTONE	CEMENT AREA/TAR
TICK (/)					/

1.BRAKE

WEIGHT(KG)	50KG
GRADIENT	0°
THE TIME TAKEN TO STOP(SECOND)	1 SECOND

2.SOUND SENSOR

LOAD LIMIT LEVEL	30 KG	50 KG	60KG
TICK (/) IF IT SOUND			/

3.ABSORBER

WEIGHT(KG)	20KG	50KG	70KG
TICK (/) IF IT BALANCE	/	/	/

Table 4.2 shows a data analysis at collection area

4.2.3 AGRICULTURE AREA

SOIL TYPE	CLAY	SANDY SOIL	PEAT	LIMESTONE	CEMENT AREA
TICK (/)				/	

1.BRAKE

WEIGHT(KG)	50KG
GRADIENT	35°
THE TIME TAKEN TO STOP(SECOND)	3 SECOND

2.SOUND SENSOR

LOAD LIMIT LEVEL	30 KG	50 KG	60KG
TICK (/) IF IT SOUND			/

3.ABSORBER

WEIGHT(KG)	20KG	50KG	70KG
TICK (/) IF IT BALANCE	/	/	/

Table 4.3 shows a data analysis at agriculture area

4.2.4 FACTORY AREA

SOIL TYPE	CLAY	SANDY SOIL	PEAT	LIMESTONE	CEMENT AREA
TICK (/)					/

1.BRAKE

WEIGHT(KG)	50KG
GRADIENT	0°
THE TIME TAKEN TO STOP(SECOND)	1 SECOND

2.SOUND SENSOR

LOAD LIMIT LEVEL	30 KG	50 KG	60KG
TICK (/) IF IT SOUND			/

3.ABSORBER

WEIGHT(KG)	20KG	50KG	70KG
TICK (/) IF IT BALANCE	/	/	/

Table 4.4 shows a data analysis at factory area

4.3 EMPIRICAL ANALYSIS AND DATA DESCRIPTIVE

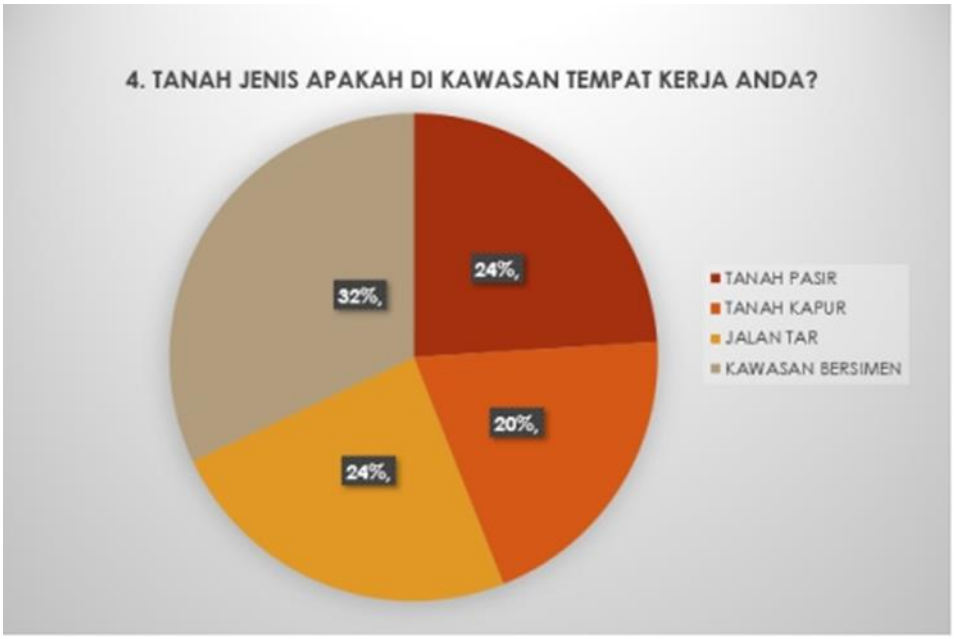


Figure 4.5 type of soil in the work area

A total of 32% of the work area at the cement area, 24% of the work area at the sandy and tarred area and 20% at the limestone area.

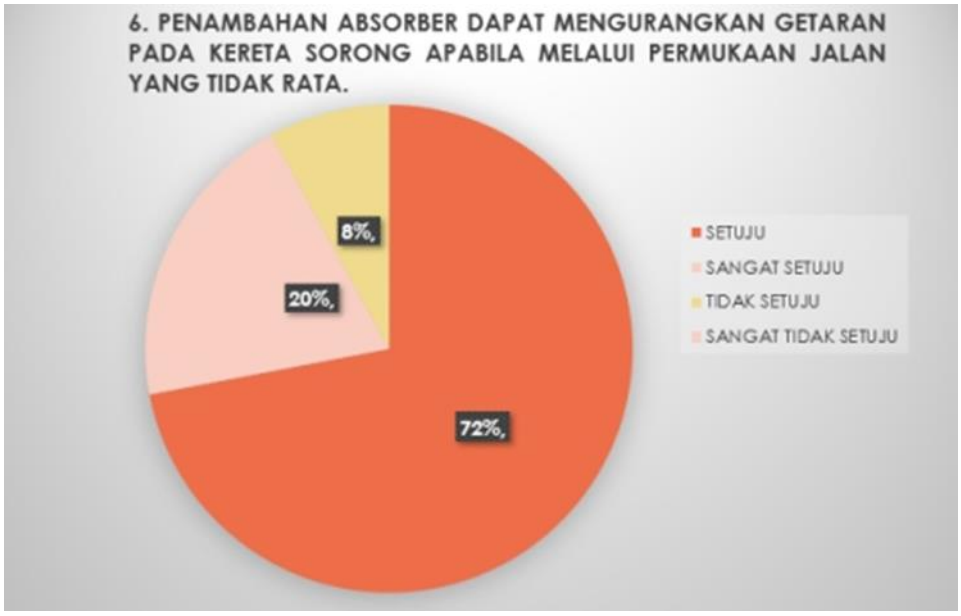


Figure 4.6 The function of absorber

A total of 72% of respondents is agree and 20% of respondents is strongly agree that adding and absorber can reduce vibration on the wheelbarrow when passing through uneven sloping. Then, 8% is disagree.

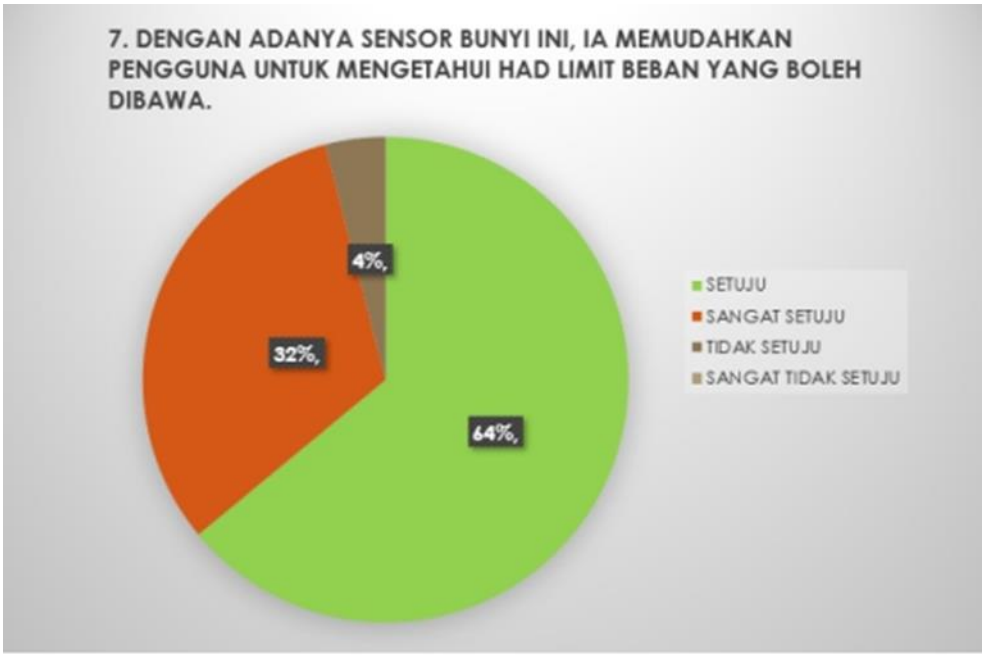


Figure 4.7 The function of sound censor

A total 64% of respondent is agree and 32% of respondent is strongly agree that with the presence of a sound sensor, it is easy to know the load limit. Then 4% is disagree.

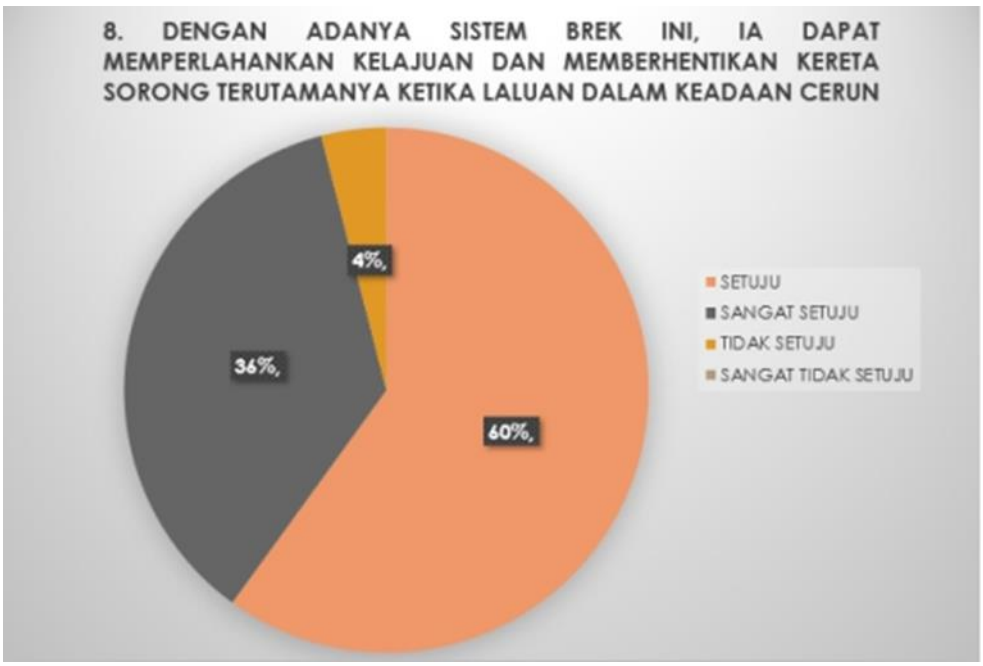


Figure 4.8 The function of brake system

A total 60% of respondent is agree and 36% of respondent is strongly agree with the braking system, it slows down the speed and stops the wheelbarrow especially when the wheelbarrow is sloping. Then, 4% is disagree.

4.3.1 SCHEMATIC DIAGRAM FOR SOUND SENSOR

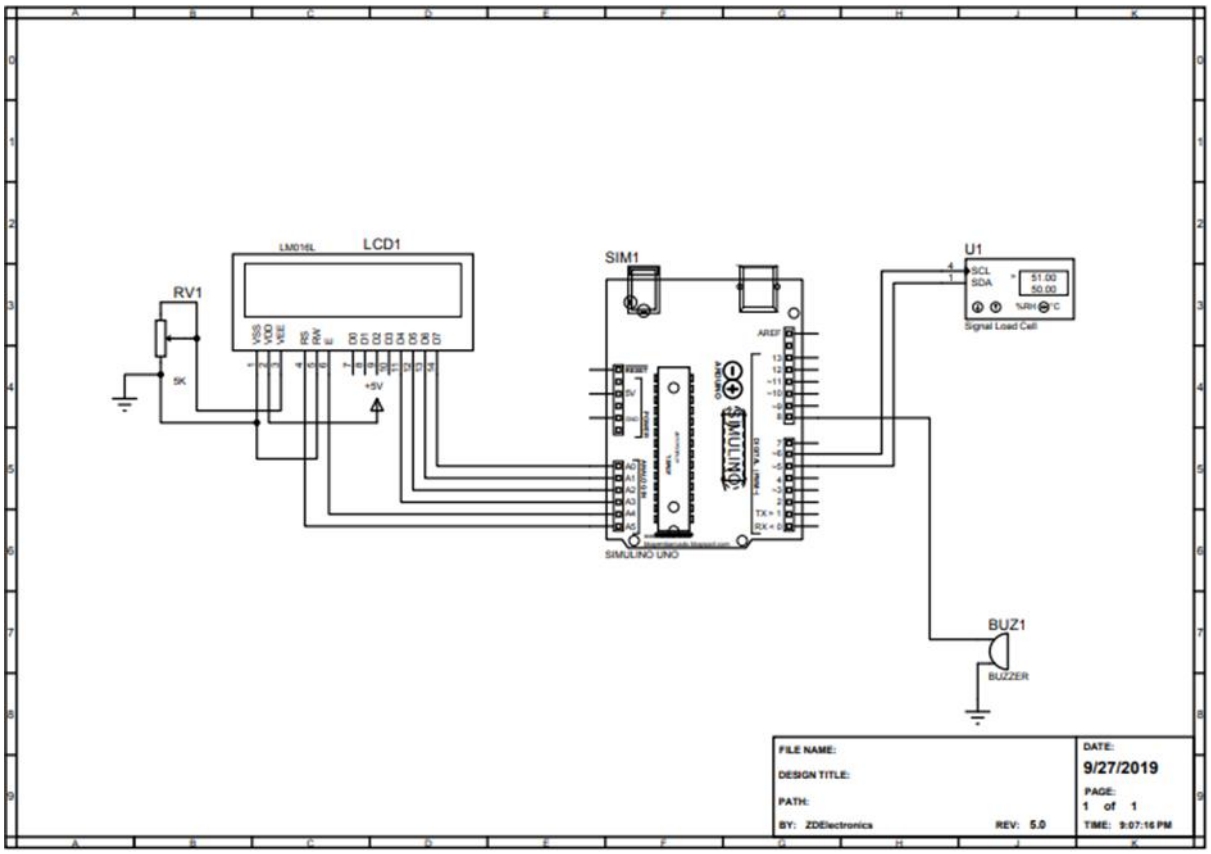


Figure 4.9 shows a schematic diagram for sound censor

4.3.2 THE PROGRAM FOR SOUND SENSOR

```
#include "HX711.h"

HX711 scale(6,5); //HX711 scale(6, 5);
#include <LiquidCrystal.h>
LiquidCrystal lcd(A5, A4, A3, A2, A1,A0);

float calibration_factor = -320;
float units;
float units_1;

void setup()
{
  Serial.begin(9600);
  Serial.println("HX711 weighing");
  scale.set_scale(calibration_factor);
  scale.tare();
  Serial.println("Readings:");
  lcd.begin(16, 2);
  lcd.print("     Weight   ");
  lcd.setCursor(0,1);
  lcd.print("   Measurement  ");
  delay(5000);
  lcd.clear();
}

void loop()
{
  Serial.print("Reading:");
  units = scale.get_units(),10;
```

```
 if (units < 0)
 {
   units = 0.00;
 }
units_1 = units /1000;
 Serial.print(  units_1);
 Serial.println(" Kg  ");


 lcd.setCursor(0,0);
 lcd.print("Weight =   ");
 lcd.setCursor(8,0);
 lcd.print(units_1      );
 lcd.setCursor(12,0);
 lcd.print(" Kg   ");
 delay(1000);
}
```

4.4 CONCLUSION

In conclusion, this chapter explain about the research that we want to carry out. This chapter also presents and analyses the study data. The findings of the study are related to the results of a study. The finding should contain analysis results that need to be systematically reported, clearly reviewed, and interpreted well based on objectives, question and hypotheses of the study. Every result being analysis to ensure that we produce a product that can be used by users comfortably. The result that we get is based on the questionnaire that distributed to the users. The priority of our product is followed by our target market. Chapter summary is meant to summarize by writing the most important keywords from the study findings. It needs to show continuity in the next chapter.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 INTRODUCTION

This chapter is the final chapter of this study and in general this chapter will discuss in more detail the findings of the study analyses in chapter 4. The results of this finding are supported by opinions that may strengthen the results of the analysis. Description also explain unexpected scientific result, reasonable international explanations of the findings and limitations of the study. Description are also relevant to the discussion of how the data obtained is related to the research question or topic of study. The description also link result of the study with the previous studies by previous researches in the review of the work. In conclusion. It is based on the discussion of the findings obtained and some suggestions are also put forward for future studies.

5.2 DISCUSSION

This discussion is made by us in order to make sure that the product is in good quality. Every product must going through a few discussion to gain an accurate result. We were discuss about improvement of the product and in progress of finishing the report in chapter 4 and chapter 5.

Figure 5.1 shows a discussion in group

5.3 CONCLUSION

The ‘Motoriz Barrow’ project was designed and manufactured to meet the requirements in the Diploma in Building Services syllabus. During the process of making this product, we have a wealth of knowledge of the field in expertise we are working on. Collaboration from lectures and experts involved in the development of this Motoriz Barrow product such as a big help to us.

With this project, it will provide consumers within time, energy and money. The objectives of this product is to identify the wheelbarrow with sensor sound to determine the maximum load the wheelbarrow can handle. Then, to design the absorber installed on the wheelbarrow to facilitate more control and handling and to protect sap and bearing stems. Lastly, to identify the brake system installed on the wheelbarrow to enable users to stop the wheelbarrow easily and quikly, especially through sloping roads.

At the end of this project, we hope it brings benefits to consumers. Although it is a innovation product, the benefits will be feel by everyone.

5.4 SUGGESTION

To address the weaknesses of this project, several suggestions have been made:

I. Add a sponge to the handles

II. Tighten the tire area at the bush

III. Physical design that are more attractive to buyers.

IV. Add security features to ensure the security of your users.

5.5 CHAPTER SUMMARY

This chapter explains the problems encountered & discuss before making a decision as the project progresses. In addition, safety features and product design also play an important role as it is the first consumer view of our product. After that, finished project need to be identified for improvement process in order to produce better quality product.

REFERENCES

Bruno, G. (21 9, 2017). A short history of wheelbarrow. Retrieved from gardenguides: http://www.gardenguides.com/86752-history-wheelbarrow.html

Mays, J. (30 1, 2014). Wheelbarrow Walking. Retrieved from thermotorstory: http://thermotorstory.org/org/2014/01/30/wheelbarrow-walking

wheelbarrow ' how products are made'. (19 january, 2019). Retrieved from encyclopedia: https://www.encyclopedia.com/science-and-technology/technology/technology-termsand-concepts/wheelbarrow#2896900109

(n.d.). Retrieved from Force and simple machine: http://met510.weebly.com/wheelbarrow.html

Abolghasemi, M. (23 november, 2015). *Advantages of Pneumatics over Hydraulics*. Retrieved from https://www.linkedin.com/pulse/advantages-pneumatics-overhydraulics-mohammad-abolghasemi

Agung Kristanto, N. U. (2014). Ergomomic Tricycle Whellbarrow Redesign. *Simposium Nasional Teknologi Terapan (SNTT)2*.

azrol. (7 december, 2012). Retrieved from Absorber Minyak Vs Absorber Gas: http://azroleverythingsinfo.blogspot.com/2012/12/absorber-minyak-vs-absorber-gas.html

Collom, L. (2017). *WHAT ARE PNEUMATIC TIRES, AND WHY ARE THEY USED FOR MANY OUTDOOR APPLICATIONS?* Retrieved from Toyota Forklifts Blog: https://www.toyotaforklift.com/blog/what-are-pneumatic-tires-and-why-are-theyused-for-many-outdoor-applications

DeadNuts. (n.d.). *Electric Wheelbarrow*. Retrieved from Insturctables: https://www.instructables.com/id/Motorized-Wheelbarrow/

Flat Free, Air-Filled, Semi-Pneumatic, and Foam-Filled Comparison. (n.d.). Retrieved from marathon: https://www.marathonind.com/FAQ/tirecomparison.aspx

Gillespie, C. (11 4, 2018). *Advantages & Disadvantages of Hydraulic Systems*. Retrieved from SCIENCING: https://sciencing.com/advantages-disadvantages-hydraulicsystems-7198601.html

GRABIANOWSKI, E. (n.d.). *How the Tweel Airless Tire Works*. Retrieved from HowStuffWorks : https://auto.howstuffworks.com/tweel-airless-tire1.htm

Laio, J. (4 3, 2018). *Landscaping: Wheelbarrow Types and Wheelbarrow Tires*. Retrieved from networx: https://www.networx.com/article/landscaping-types-of-wheelbarrows

Mia Monasari, R. A. (2006). Karakteristik Ergonomis Rancang Bangun Wheelbarrow. *Jurnal Teknik Industri*, vol 8, no 1. Retrieved from htttp://jurnalindustri.petra.ac.id/index.php/ind/article/view/16504

Moore, S. (1, 2016). *Who Invented the Wheelbarrow*. Retrieved from Farm Collector:

https://www.farmcollector.com/equipment/tools/evolution-wheelbarrowzmlz16janzhur

OSMOND, C. (n.d.). *WHEELBARROW*. Retrieved from Backyard Boss : https://www.backyardboss.net/wheelbarrow-plastic-vs-steel/

Pneumatic adjust. (n.d.). Retrieved from Standing Desk Nation: https://www.standingdesknation.com/collections/pneumatic-adjust

Pneumatic Standing Desk. (23 3, 2017). Retrieved from Stand up desk store: https://www.standupdeskstore.com/standing-news/blog-pneumaticdesk/

Pneumatic VS Semi-Pneumatic Wheels. (n.d.). Retrieved from Douglas Equipment: https://www.douglasequipment.com/hand-trucks/pneumatic-vs-semi-pneumaticwheels-2/

Secrest, R. (n.d.). *Wheelbarrow*. Retrieved from encyclopedia.com: https://www.encyclopedia.com/science-and-technology/technology/technology-termsand-concepts/wheelbarrow

SHOCK ABSORBERS EXPLAINED. (n.d.). Retrieved from https://www.monroe.com.au/what-are-shocks/shock-absorbers-explained.html

Solid Tires. (2018). Retrieved from RightTurn: https://www.rightturn.com/

Sunni, H. (2016). Individual Characteristic Relation and Frequncy of Hand Gesture of Waist Pain in Worker warehouse production of sugar Factory Kwala Honey PTPTN 2.

Susan E. Kotowski, M. K. (01 January 2009). Investigation of Select Ergonomic Interventions for Farm Youth. Part 2: Wheelbarrows. *Journal of Agromedicine*.

THOMAS, G. (5, 2018). *advantages and disadvantages of pneumatic*. Retrieved from https://www.lorecentral.org/2018/04/advantages-and-disadvantages-ofpneumatics.html

WHAT IS A HYDRAULIC SYSTEM? DEFINITION, DESIGN, AND COMPONENTS. (23 july, 2017). Retrieved from Convergence Training: https://www.convergencetraining.com/blog/what-is-a-hydraulic-system-definitiondesign-and-components

monasari, r. a. (2006). karakteristik ergonomis rancang bangun wheelbarrow. *jurnal teknik industri*, 82-96.

n s m nawi11, b. m. (2015). conceptual design of semi-automatic wheelbarrow to overcome ergonomics problems among palm oil plantation workers. *iop conference series: materials science and engineering*, 3.

nurmianto. (2004). *ergonomi: konsep dasar dan aplikasinya*. surabaya: edisi kedua, guna widya.

APPENDIX

i. GANTT CHART

ii. QUESTIONNAIRE / GOOGLE FORM

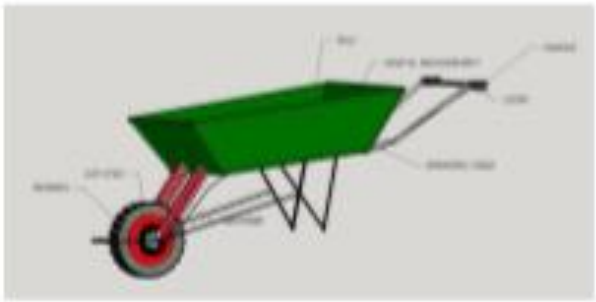
POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

DIPLOMA KEJURUTERAAN PERKHIDMATAN BANGUNAN

PENYELIDIKAN RESPONDEN PROJEK TAHUN AKHIR

Pengenalan: Tajuk penyelidikan ini ialah **"Motoriz Barrow"** yang merupakan inovasi daripada kereta sorong sedia ada. Borang kaji selidik ini dilakukan untuk mendapatkan maklumbalas setelah segala pelaksanaan awal dilakukan serta menerima penambahbaikkan daripada aspek rekaan, fungsi, bahan dan sebagainya. Objektif kami ialah menambah baik kereta sorong sedia ada dengan menambah absorber, brek dan sensor pemberat. Sila jawab semua soalan dengan lengkap berdasarkan arahan yang diberi. Kerjasama daripada pihak tuan/puan amatlah dihargai. Sekian, terima kasih.

GAMBAR KERETA SORONG YANG TELAH DI INOVASI



BAHAGIAN A: BEBAN

1. APAKAH JENIS TANAH DI KAWASAN TEMPAT ANDA?

TANAH LIAT

☐

TANAH PASIR

☐

TANAH LOAM

☐

TANAH GAMBUT

☐

TANAH KAPUR

☐

KAWASAN BERSIMEN

☐

2. PENAMBAHAN ABSORBER DAPAT MENGURANGKAN GETARAN PADA KERETA SORONG APABILA MELALUI PERMUKAAN JALAN YANG TIDAK RATA.

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

3. DENGAN ADANYA SENSOR PEMBERAT INI, MEMUDAHKAN PENGGUNA UNTUK MENGETAHUI HAD LIMIT BEBAN YANG BOLEH DIBAWA BAGI MENGURANGKAN RISIKO SAKIT BELAKANG, BAHAGIAN TANGAN DAN BAHAGIAN PINGGANG.

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

4. ADAKAH ANDA BERSETUJU SEKIRANYA ABSORBER DITAMBAH PADA KERETA SORONG INI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

MENGAPA? BERIKAN SEBAB ANDA.

_____

_____

5. ADAKAH ANDA BERSETUJU SEKIRANYA SENSOR PEMBERAT DITAMBAH PADA KERETA SORONG INI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

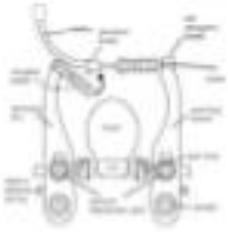
MENGAPA? BERIKAN SEBAB ANDA.

_____

_____

BAHAGIAN B: KESELAMATAN

1. JENIS BREK YANG MANAKAH SESUAI DIGUNAKAN?



BREK V / BREK RIM ☐

BREK JENIS HIDRAULIK ☐

BREK JENIS MEKANIKAL ☐

MENGAPA? BERIKAN SEBAB ANDA?

_____

_____

2. DENGAN ADANYA PENAMBAHAN SISTEM BREK INI, IA DAPAT MEMPERLAHANKAN KELAJUAN TERUTAMANYA KETIKA LALUAN DALAM KEADAAN CERUN.

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

3. PENAMBAHAN SISTEM BREK INI DAPAT MENGAWAL KERETA SORONG SEMASA DALAM PERJALANAN DAN BOLEH MEMBERHENTIKAN KERETA SORONG DENGAN CEPAT APABILA DIKEHENDAKI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

4. ADAKAH ANDA BERSETUJU DENGAN PENAMBAHAN SISTEM BREK PADA KERETA SORONG INI?

☐ SETUJU ☐ SANGAT SETUJU ☐ TIDAK SETUJU ☐ SANGAT TIDAK SETUJU

MENGAPA? BERIKAN SEBAB ANDA.

_____

_____

5. CADANGKAN SEBARANG PENAMBAHBAIKAN PADA KERETA SORONG INI.

_____

_____

_____

6. BERIKAN KOMEN ANDA.

_____

_____

_____

BAHAGIAN C

SILA LENGKAPKAN UNTUK PENGESAHAN DAN BUKTI. SEKIAN, TERIMA KASIH.

_____ _____

TANDATANGAN COP SYARIKAT (JIKA ADA)

iii. MATERIALS AND COSTING

NO	NAME	QUANTITY	PRICE PER UNIT	PRICE
1.	GAS SHOCK ABSORBER	2	RM 80	RM 160
2.	LOAD SENSOR 200KG	1	RM249	RM 249
3.	BRAKE BICYCLE	1	RM 50	RM 50
4.	WHEELBARROW	1	RM 150	RM 150
TOTAL			RM 609	

iv. PROJECT COMPONENTS LIST

COMPONENT :

1. GAS SHOCK ABSORBER
2. LOAD CENSOR
3. BRAKE BICYCLE
4. WHEELBARROW