POLITEKNIK MALAYSIA

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PROJECT 1 FULL REPORT

TIGER PRAWN HATCHERY MACHINE

MECHANICAL ENGINEERING DEPARTMENT

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Last but not least, any attempt at any level can't be satisfactorily completed without the support and guidance of our family, especially our parents who helped us a lot from time to time in making this project.

ABSTRACT

The suggestions that we intend to make about tiger prawn hatchery machine (TPHM) is for made a effective and genuise machines for prawn breeder. The aim of our study was to prevent this shrimp from extinct in the future if it was not properly bred. The current technology used by shrimp breeders cannot fully guarantee shrimp breeding and even require improvement. As such, we will be implementing new innovations in the process of breeding shrimp. Our group plans to provide a water pump / reservoir with a water pump that can function to process a cleaner water cycle. In addition, we will also be using the system running on electric water pump which will be able to operate more quietly than the current livestock shrimp process. We have also come up with another new idea where we will set a vibration every time it is set so that it can make it feel as though it is contained and feels safer.

ABSTRAK

Cadangan yang kami ingin lakukan ini merangkumi serta mengkaji mengenai perkembangan teknologi untuk pembuatan mesin penetasan udang galah (*TPHM*) yang lebih cekap dan berkesan kepada pengguna yang akan menggunakannya. Matlamat kajian kami ini adalah untuk menghindari udang galah ini daripada pupus pada masa akan datang sekiranya ia tidak diternak dengan baik. Teknologi yang sedia ada pada masa kini yang digunakan oleh perternak udang galah tidak boleh menjamin sepenuhnya penternakan udang galah malahan memerlukan penambahbaikan. Justeru itu, inovatif baharu yang akan digunakan dalam proses perternakan udang galah ini akan kami lakukan. Kumpulan kami telah bercadang untuk menyediakan kolam/kolah yang mempunyai *water pump* dimana *water pump* itu boleh berfungsi untuk memproses kitaran air yang lebih bersih. Selain itu, kami juga akan menggunakan sistem *running on electric water pump* dimana ia mampu beroperasi dengan lebih senyap berbanding dengan proses ternakan udang galah yang sedia ada pada masa kini. Pihak kami juga telah mencipta satu lagi idea baharu dimana kami akan set satu getaran setiap masa yang ditetapkan supaya ia mampu membuatkan telur galah itu berasa seolah olah berada di dalam kandungan dan berasa lebih selamat.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Shrimp is a valuable aquatic food resource high in protein and commands good export markets. It has become the main target commodity for aquafarming in recent years. Traditionally, tiger prawn are trapped and held in ponds and later collected by shrimp gatherers for stocking in grow-out ponds. With increasing demand for tiger prawn, supply of wild fry for the increasing number of shrimp farms has become insufficient and inconsistent. The breakthrough in the completion of the life cycle of commercially important shrimps in captivity, such as the tiger shrimp *(Penaeus monodon*), the Japanese kuruma ebi *(P. japonicus*), the eastern shrimp (*P. orientalis*) and the banana shrimp (*P. indicus* or *P. merguiensis*), has greatly enhanced mass production of shrimp fry under hatchery conditions.

This is why we are planning and decided to create a more effective and efficient tiger prawn hatchery machine (TPHM). Basically, there are two hatchery systems being adopted. The large-tank hatchery which was developed in Japan is still the popular system applied in many Asian countries such as Taiwan, Thailand, Philippines and Indonesia. The small tank hatchery which originated from Galveston USA, has been applied in the Philippines and to same extent in Malaysia and Thailand. Recently a modification of the above systems has been developed which combined the beneficial characteristics of both systems taking into consideration the limitation of spawner supply.

There are three determinants in designing a hatchery viz: target species, production target and level of financial inputs. Although multi-purpose hatchery design for shrimps and finfish may not necessarily be the same. In any case, the target species must be clearly identified before designing the hatchery.
Hatchery design is aimed at achieving the production target which determines the size of the hatchery. The tank capacity is based on an approximate ratio between algal culture tank and larval rearing and nursery tanks. Desirable algal tank capacity is 10–20% of the larval rearing tank capacity. The capacity of maturation tank depends on the number of spawners needed.

1.2 PROBLEM STATEMENT

Based on our observation, the tiger prawn hatchery machine (TPHM) have a few issues.

Firstly, the tiger prawns hatchery machine (TPHM) caused a loud of noise. The operation of this machine will run with the existence of sound, to make the prawns afraid and move to another sections. This is why there are sound pollution in the area.

Secondly, the maintenance of this tiger prawn hatchery machine is expensive. As example changing water pump. For the one water pump cost RM200 at one time and water pump need to change frequently to make sure the clean water will always be pumped.

Next, this tiger prawn hatchery machine will use a lot of water for artificial breeding, hatching and rearing. Without sufficient amount of water this tiger prawn hatchery machine will not operate functionly.

Then, this machine need a spacious place for it to be operating. This can limit the usage of this machine. This can impact the breeder with small place to use this machine.

1.3 RESEARCH OBJECTIVE

The objectives to this research are:

- Reducing the sound pollution
- To invent a reasonable and cheaper product
- To create more efficient machine
- To produce a suitable size for the machine to make it more effective

1.4 RESEARCH QUESTION

This study will answer the following research questions:

- Do you think tiger prawns is efficient ?
- What would the effects of the machine have on the prawns?
- Do you agree this machine would significantly increase the production of tiger prawns
- Do you prefer tiger prawn or regular prawn ?
- Do you think it would decrease cost for minor businesses using this machine ?
- Does it create a huge increase in profit in small industries ?

1.5 SCOPE OF RESEACRH

The scope of this project is about the improvement of the tiger prawn hatching machines. This tiger prawn hatching machines can help prawn breeder to breed a lot of tiger prawn and help increase the population of tiger prawn.

The scope and limits to this research are:

- This hatching machines can help the tiger prawn breeder
- Can increase the population of tiger prawn

1.6 SIGNIFICANT OF RESEARCH

We have to create and design a project that accomplish our objective and give an impact to the user. Through this tiger prawn hatchery machine, it will make job easier and more efficient. It can help the tiger prawn breeder to breeding the eggs in a very simplicity way. This can help the breeder to produce a lot of tiger prawn and gain the population of tiger prawn. It also can help our country finance by exporting tiger prawn to another country.

1.7 DEFINITION OF OPERATIONAL TERMS

- Tiger prawn hatching machines : used to breeding tiger prawn more efficiently

1.8 CHAPTER SUMMARY

Summarization that can be made in this chapter are, tiger prawn need to be nurtured in a very genuise way. By improving hatchery machine can help those breeder prawn to hatching tiger prawn. We also know with this hatchery machine we can gain the population of tiger prawn in Malaysia. This hatchery machine can be used not only in our country but worldwide. In Vietnam that still depends at pond as their breeding tiger prawn can change to use this hatchery machines to improve their nurture of tiger prawn.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

A literature review is a comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. The review should enumerate, describe, summarize, objectively evaluate and clarify this previous research. A literature review creates a "landscape" for the reader, giving her or him a full understanding of the developments in the field. This landscape informs the reader that the author has indeed assimilated all (or the vast majority of) previous, significant works in the field into her or his research.

In writing the literature review, the purpose is to convey to the reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. The literature review must be defined by a guiding concept (eg. your research objective, the problem or issue you are discussing, or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries.

This chapter contains the different types of materials to meet the necessary features of this project. As stated this project needs to meet the objective features in order to solve the problem. It will also state the materials selected for the project. Each material we choose is the best and meets the requirements.

TIGER PRAWN HATCHERY MACHINE(TPHM)

In thi project we going to do a tiger prawn hatchery machine which is also called as TPHM. A **prawn hatchery** is a place for artificial breeding, hatching, and rearing through the early life stages the Tiger Prawn. Hatcheries produce larval and juvenile fish, shellfish, and crustaceans, primarily to support the aquaculture industry where they are transferred to on-growing systems, such as fish farms, to reach harvest size. Some species that are commonly raised in hatcheries include Pacific oysters, shrimp, Indian prawns, salmon, tilapia and scallops.

The value of global aquaculture production is estimated to be US$98.4 billion in 2008 with China significantly dominating the market; however, the value of aquaculture hatchery and nursery production has yet to be estimated. Additional hatchery production for small-scale domestic uses, which is particularly prevalent in South-East Asia or for conservation programmes, has also yet to be quantified.

The are certain design and dimension that are going to be made,because it depends on someone who going to buy it,because our target is not only for a huge industries.We decided to enhance the scope of our marketing strategy by making the product to have a variety of choices so that the related industry will buy this product and its not only bounded to huge industries.By making this decision,the small industries that just started to growth can also buy this product because the price is reasonable depends on the size that they want.

THE HISTORY OF SHRIMP HATCHERIES

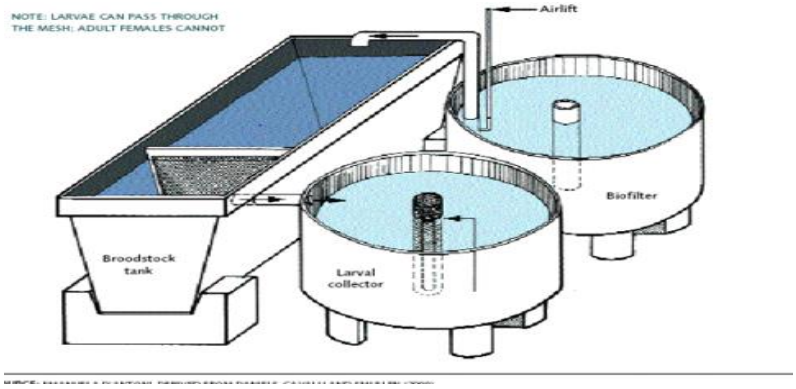
The history of shrimp hatcheries can be divided into the start-up era, the hatchery era and the breeding era.

Start-Up Era (1980-1987): During the start-up era, nearly all shrimp seedstock was gathered from the sea. In Asia, farms raised mostly giant tiger shrimp, Penaeus monodon, along with a handful of other penaeid species. In the Western Hemisphere, the Pacific white shrimp, P. vannamei quickly became the most popular species.

Hatchery Era (1988-1996): During the hatchery era, postlarvae (PLs) were produced in hatcheries. Genetically, they were wild animals because their parents were collected from the sea. Shrimp disease moved through the industry with the hatchery-produced PLs because the hatcheries paid little attention to biosecurity. Diseases carried by wild broodstock were passed to PLs in the hatcheries and then introduced to farms when the PLs were stocked.

Breeding Era (1997-2007): Rapid industry growth was primarily driven by the domestication, breeding and worldwide spread of P. vannamei from the West into Asia. World shrimp farming production using vannamei expanded from only 10% of total production in 1998 to 75% of total world production in 2006. Thailand's shrimp revolution, characterized by the use of domesticated vannamei bred for faster growth and disease resistance, typifies the worldwide white shrimp phenomenon.

PRODUCT IMPROVEMENT



(TIGER PRAWN HATCHERY MACHINE)
Figure 2.1

Product improvement is the process of making meaningful product changes that result in new customers or increased benefits realized by existing customers. The two most popular ways to make product improvements are to add new product features or improve existing ones.So we did our research more about shrimp hatchery and we trying to fulfill the requirement from any aspects and also from industries perspective to make sure that this product going to hit a big market when it's 100% done .

1.NEW FEATURES

-A vibration mechanism that will vibrates with a 5 seconds delay,which means the vibrator going to vibrates from time to time.The mechanism going to be put on the larval collector surfaces(refer the arrows below).This mechanism are going to work as the lifesaver for the breed/larva to stay alive and to make the growth rate to be increased by 5-10%.

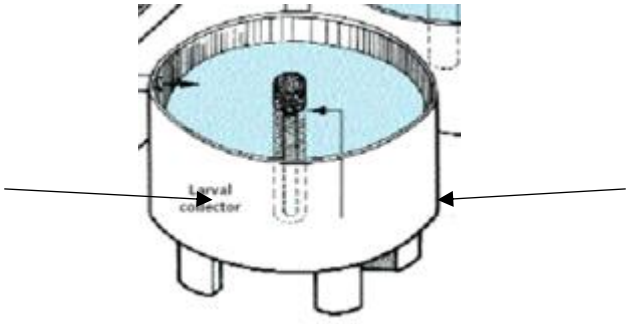


Figure 2.2

By adding new features expands the scope of the existing product, often making a big marketing splash, getting a version bump, and resulting in some press releases. Often the fanfare attracts new customers and new use cases for the product. Typically, new features are the only improvements that outsiders (i.e. non-customers) will ever hear about.

New features are risky. We have to be very confident they will be valued, as they're like children; you have to love them and support them no matter what.We really sure that this new feature going to make a huge difference in this industry and to our product too,that's why we are confident to add this new feature to this product.

2.IMPROVING EXISTING FEATURES

-Separator as system to separate the tiger prawn and the larva.Its used to make sure that its well separated from the tiger prawns so that it can stay alives. Macros do not actively chase down their young but will display aggression toward their young over time which can stress out and kill the young. Macros are opportunistic hunters so they will eat any small shrimp, including their own young, if the opportunity arises. With lots of cover many young macros will survive in the same tank as their parents, but it's best to raise young macros in a separate tank from the adults. Palaemonid shrimp with larval stages, inluding many macros and shrimp sold as "glass" or "ghost" shrimp, will actively hunt down and eat the larvae once the larvae get close to the ground or the sides of the tank. It's best to rear the larvae of such shrimp in separate tanks.

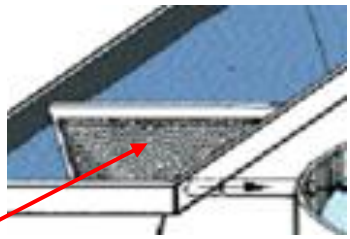


Figure 2.3

SEPARATOR

The material that we going to use as the separator is fabric mesh.It's to make sure that the tiger prawn and their eggs are well separated.The reason why we choose a fabric mesh are because of the reasonable price and the quality,and to make sure that the eggs wont get hurt by the mesh itself rather than we use a metal mesh.

3.IMPROVING AND RECONSIDERED THE SCALE AND DIMENSIONS FOR THE PRODUCT.

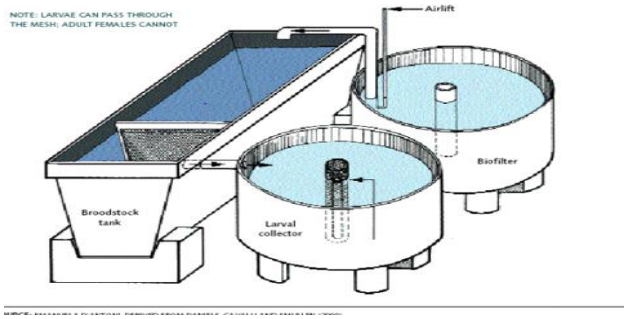


Figure 2.4

-A major rescale are going to be done because our targets are small and large industries that going to be use this machine,so it wont be bounded to a specific industries only. The bigger the better. prawn need good water parameters to thrive. The larger the tank, the less it is susceptible to worsening water parameters. A minimum size tank of 10 gallons is recommended. The larger the shrimp species and/or your population, the more space the shrimp should get.There will be 2 sizes that will be manufactured so that it will fulfill the customers requirements whether they are from small or huge industries,because the larger the tank the more costly it is and more expensive the product is.So our product can be manufactured by the requirements from the industries itself.

MATERIAL

The material selected must be in accordance with the required features such as product durability, reasonable cost, guaranteed product safety level and more.The material that we going to use in this project are

a)HATCHERY TANK

- Hatchery tank is also a place for artificial breeding, hatching, and rearing through the early life stages of animals—finfish and shellfish in particular.

- Polyethylene or “poly” tanks as they are called are very economical and practical for a wide variety of tank applications in hatcheries and recirc systems.

Figure 2.5

b)PVC (POLYVINYL CHLORIDE) /CPVC (CHLORINATED POLYVINYL CHLORIDE)

-PVC is a white plastic pipe commonly used for plumbing and drainage. PVC stands for polyvinyl chloride, and it’s become a common replacement for metal piping. PVC’s strength, durability, easy installation, and low cost have made it one of the most widely used plastics in the world.

-You can think of CPVC as PVC’s cousin. They are similar in many ways, but they shouldn't be used interchangeably. Both are made of the same basic elements with one distinguishing factor. CPVC is altered by a free radical chlorination reaction that effectively increases the chlorine content of the material. CPVC is also a thermoplastic that is molded into many of the same products as PVC.

(PVC)

Figure 2.6

(CPVC)

Figure 2.7

c)MESH(AS A SEPARATOR)

-A **mesh** is a barrier made of connected strands of metal, fiber, or other flexible or ductile materials. A mesh is similar to a web or a net in that it has many attached or woven strands.There's a lot of types of mesh in the industries such as polypropylene, polyethylene, nylon, PVC or PTFE.

Figure 2.8

d)AIR PUMP

An **air pump** is a pump for pushing air. Examples include a bicycle pump, pumps that are used to aerate an aquarium or a pond via an airstone; a gas compressor used to power a pneumatic tool, air horn or pipe organ; a bellows used to encourage a fire; a vacuum cleaner and a vacuum pump. All air pumps contain a part that moves (vane, piston, impeller, diaphragm etc.) which drives the flow of air. When the air gets moved, an area of low pressure gets created which fills up with more air.

Figure 2.9

e)WATER PUMP

A simple aquarium-style pump uses a centrifugal fan to pull in water and push it up a tube, similar to a propeller in air. These have ratings as to how far they can pump water, because if too much pressure is applied, the water will simply come to a standstill, or even backwash.

A more complex pump used for higher-pressure applications uses a system of cylinders and valves to push water without backwash.

Figure 2.10

CHARACTERISTICS

CHARACTERISTICS & THE ADVANTAGES OF THE MATERIAL			
POLYETHYLENE HATCHERY TANK	PVC(POLYVINYL CHLORIDE)	POLYESTER MESH	WATER PUMP
*<u>*Ease of Handling and Installation*</u> -**Poly tanks** are relatively light in weight and are extremely durable, transporting them is easy.	*<u>*Lightweight*</u> -PVC Pipes offer a **tremendous weight advantage** over alternative piping materials. -PVC Pipe is so light that a single person could easily move a long piece.	*<u>*Good heat resistance*</u> -Polyester is the most heat-resistant fabric in synthetic fabrics. It is thermoplastic and can be made into pleated skirts with long pleats.	*<u>*It's easier*</u> -Supplying water to all facilities (houses, hospitals, …etc)
*<u>*Ease of Maintenance*</u> -Unlike tanks made of other materials, poly storage tanks require almost no maintenance.	*<u>*Flexibility*</u> -PVC Pipes are made from rigid PVC compound, the PVC Pipe itself has the ability to yield under loading without fracturing.	*<u>*Light resistance*</u> -Polyester fabrics have better lightfastness, and their lightfastness is better than natural fiber fabrics except for acrylic fibers.	*<u>*It's faster*</u> -Fast, high-pressure fluid transfer
*<u>*Lifetime Cost Effectiveness*</u> -Rotational-moulded polyethylene storage tanks are leak resistant because they are moulded, one-piece construction without seam	*<u>*Safe Material*</u> -PVC pipe is **a non-toxic and safe material** that has been used for more than half a century. It is also the world's most researched and tested plastic.	*<u>*Corrosion resistance*</u> -Resistant to bleaches, oxidants, hydrocarbons, ketones, petroleum products and inorganic acids. Resistant to dilute	*<u>*It's less work intensive It's out and out more fun/useful*</u> -Before water pumps was created; 1- People used to carry water buckets from nearest streams

		alkali, not afraid of mildew.	everyday for household usage.
*<u>*Leak Resistant*</u> -Rotational-moulded polyethylene storage tanks are leak resistant because they are moulded, one-piece construction without seams.	***<u>Lower cost</u>*** -PVC pipes offer significant cost savings for projects, even more so when installation, low breakage rates and life cycle costs are taken into consideration.	*<u>*Good flexibility*</u> -The elasticity is close to that of wool, and when it is stretched by 5% to 6%, it can be almost completely recovered.	

Table 2.1

METHOD OF TIGER PRAWN HATCHERY MACHINE(TPHM)

- Project Assembly

There are several methods for making a tiger prawn hatchery machine(TPHM). First we have to prepare all the materials and the electrical components that we going to use in this project.

- POLYETHYLENE HATCHERY TANK
- PVC(POLYVINYL CHLORIDE)
- POLYESTER MESH
- AIR PUMP
-ARDUINO
-MOTOR DRIVER 15AMP
-MOTOR(FOR VIBRATION)
-WIRES

- **General Management**

Tanks for holding postlarvae (PL) are a form of indoor nursery. However, their purpose is not really to grow the PL to a larger size before stocking but simply to be able to maintain them before sale. Sometimes hatcheries use holding tanks to acclimatize their PL to the pH and temperature of the rearing facilities where they are to be stocked. True indoor nurseries contain tanks where PL are intentionally reared to a larger size before transfer to outdoor nurseries or grow-out ponds.

Nursery tanks require aeration and may be operated as flow-through or recirculating systems, like hatcheries. Siphon the tank bottoms regularly to remove food wastes, faeces, and decomposing organic matter. Some nurseries

allow organic matter to accumulate to enable PL to graze on 'lab-lab' but this may be difficult to manage without getting into water quality problems. Between cycles, you should dry out the tanks, disinfect them (the same way as hatchery tanks), and leave them to dry out for at least 48 h to minimize problems with pathogens. Do not forget to flush them out well to remove all traces of chlorine.

- **Keeping the water quality good**

General water quality requirements for indoor nurseries are similar to those for freshwater in hatcheries. Maintain the optimum temperature (27-31°C) by heating the water in the system or the building in which they are housed, if necessary. If you are operating a recirculation nursery system, a turnover rate through the biological filter of 12 times a day is suggested.

- **Feeding strategy**

Feeding once or twice per day is sufficient. You should adjust the quantity of feed based on observing the actual consumption. It should normally be about 10-20% of the total weight of the prawns in the tank. Grow-out feeds can be used but enhanced results may be obtained by supplementing them with other materials, such as beef liver, egg custard based diets (EC), or minced fresh fish. However, you must take great care if you use fresh feeds. Fresh feeds, which usually break down more easily than pelleted diets, may rapidly cause water quality problems. This could overload recirculation systems or mean that you would need to have a much greater water exchange in flow-through systems (this is not such a problem as in hatchery systems, because nursery water is not brackish; however, it would increase pumping and other costs). Adult Artemia (Artemia biomass) have also been used as a nursery feed for Macrobrachium rosenbergii in countries where it is readily available as a fresh (live) product from salt farms. Recently (2000), a freeze-dried version of this product has also become commercially available.

❖ **Multi-phase nursery systems**

A number of multi-phase nursery systems have been developed for research and commercial systems. The simplest system, developed in Israel, involved stocking ponds with newly metamorphosed PL at 1 000 to 10 000/m3 in the first phase. 15 to 30 days later they were transferred into second phase ponds at 100 to 200/m2 for a further 60 day period. Survival rates of 92% (phase 1) and 85% (phase 2) were achieved. Other multiphase systems have been modelled or commercially applied but are not described here because they are complex and/or their true value has not been adequately demonstrated. Further details can be found in Alston and Sampaio (2000).

❖ **Harvesting juveniles**

You can use dip nets (3 mm mesh) for catching juveniles from indoor nurseries. Estimates of the numbers of juveniles present must be made, using the technique given in Annex 6. Estimates of average weight should also be recorded. It is only by keeping records like this that you can compare the success (or failure!) of different batches and your management procedures. The method of transporting animals to ponds has been discussed earlier in this manual.

THE ADVANTAGES BY USING THIS METHOD

- Huge potential in saving space, labour, feed and cost
- It is much cheaper to replace a poor batch of PL at this stage than not to realize the problem until grow-out harvest time
- To minimize the losses that occur through frequent animal transfer and handling
- Maintain the optimum temperature (27-31°C) by heating the water in the system or the building in which they are housed, if necessary

THE DISADVANTAGES BY USING THIS METHOD

- Greater risk of disease problems in high-density culture.
- Nursery tanks require aeration and may be operated as flow-through or recirculating systems
- Fresh feeds, which usually break down more easily than pelleted diets, may rapidly cause water quality problems
- Could overload recirculation systems or mean that you would need to have a much greater water exchange in flow-through systems

MATERIAL SELECTION

1. HATCHERY TANK(POLYETHYLENE)

-Spawning, hatching, larval rearing and nursery tanks are basic requirements in any hatchery and preparation of such tanks prior to operation are accomplished in two ways. Hatchery tank is also a place for artificial breeding, hatching, and rearing through the early life stages of animals—finfish and shellfish in particular . Hatcheries produce larval and juvenile fish, shellfish, and crustaceans, primarily to support the aquaculture industry where they are transferred to on-growing systems, such as fish farms, to reach harvest size. Some species that are commonly raised in hatcheries include Pacific oysters, shrimp, Indian prawns, salmon, tilapia and scallops.

- Polyethylene or "poly" tanks as they are called are very economical and practical for a wide variety of tank applications in hatcheries and recirc systems.

(HATCHERY TANK)
Figure 2.11

a. Newly constructed hatchery

Tank facilities especially concrete ones in a newly constructed hatchery must be conditioned first before any hatchery operation is done. Alum (Potassium aluminum sulphate), a cheap chemical, can be used to neutralize tanks. The newly constructed tanks are first filled up with sea or freshwater, small pieces of alum are then broadcasted into the tanks at a rate of 250 g/cubic meter and allowed to stand for about one week. Fiberglass or wooden tanks can be conditioned by filling up with water until the pH of the water in the tanks are stabilized.

b. Operational hatchery

Occasionally, larvae in operational tanks get infected by diseases. To deter such occurences, tanks must be properly cleaned with freshwater, dried and exposed to the sun for at least one day prior to stocking. After every run or every other run of operation, the tanks should also be disinfected with 12% sodium hypochloride solution at the rate of 200 ppm for 24 hours.

When the tanks are ready, filtered fresh/seawater is introduced and aeration is checked especially in the spawning and hatching tanks. Strong aeration is necessary to float shrimp eggs owing to its demersal nature. If aeration isnot strong-enough, eggs will sink and mix with the scum at the bottom resulting in low hatching rate.

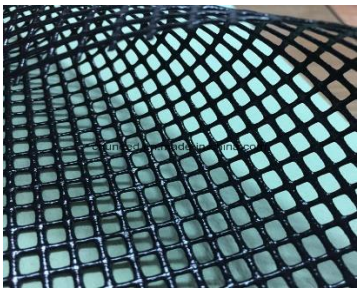
2. PVC(POLYVINYL CHLORIDE)

-You're probably familiar with PVC pipe. It's the white plastic pipe commonly used for plumbing and drainage. PVC stands for polyvinyl chloride, and it's become a common replacement for metal piping. PVC's strength, durability, easy installation, and low cost have made it one of the most widely used plastics in the world. PVC is a thermoplastic material that is molded into different shapes to create pipes, fittings, valves and other liquid handling supplies. It's recommend the use of PVC for recreational use/building, cold water systems, vent systems, and drainage systems,because it's not very suitable for a hot water applications which exceed more than 140 Degree Ferenheit.

PVC(POLYVINYL CHLORIDE
Figure 2.12

3. POLYESTER MESH

-A **mesh** is a barrier made of connected strands of metal, fiber, or other flexible or ductile materials. A mesh is similar to a web or a net in that it has many attached or woven strands. A plastic mesh also may be extruded, oriented, expanded, woven or tubular. It can be made from polypropylene,polyethylene,nylon.PVC OR PTFE. Metal and nylon wire mesh filters are used in filtration.The one that we use is a Polyester mesh.For this product,it is use as a separator for the tiger prawn and their babies so that it wont eat them.



(POLYESTER MESH)
Figure 2.13

4. AIR PUMP(AQUARIUM AIR PUMP)

An **air pump** is a pump for pushing air. Examples include a bicycle pump, pumps that are used to aerate an aquarium or a pond via an airstone; a gas compressor used to power a pneumatic tool, air horn or pipe organ; a bellows used to encourage a fire; a vacuum cleaner and a vacuum pump. All air pumps contain a part that moves (vane, piston, impeller, diaphragm etc.) which drives the flow of air. When the air gets moved, an area of low pressure gets created which fills up with more air.

(AQUARIUM AIR PUMP)
Figure 2.14

5. WATER PUMP(12DCV)

A simple aquarium-style pump uses a centrifugal fan to pull in water and push it up a tube, similar to a propeller in air. These have ratings as to how far they can pump water, because if too much pressure is applied, the water will simply come to a standstill, or even backwash.

A more complex pump used for higher-pressure applications uses a system of cylinders and valves to push water without backwash.

(DC 12V WATER PUMP)
Figure 2.15

Uses of aquarium-style pumps:

- Aquarium filter systems (These pumps are known as 'Power Heads'),
- Fountains,
- Automatic plant watering systems (mostly DIY Arduino ones),
- Low-pressure fluid transfers,
- ETC.

Uses of High-Pressure pumps:

- Fast, high-pressure fluid transfer,
- Power washers,
- Water driven turbines/tools
- Hydraulics
- City Infrastructure/water supply
- ETC

CHAPTER'S SUMMERY

In conclusion, after conducting a study on the materials and components needed to build this project, it was found that components with appropriate specifications should be used to prevent accidental accidents. In addition, the projects can give a big impact to any industries that are related to tiger prawn hatchery because it is able to increase their production rate and directly increase their profits in marketing too . It also primarily to support the aquaculture industry where they are transferred to on-growing systems, such as prawn farms, to reach harvest size. At the same time, it can Reduce dependence on wild-caught juveniles.In 2008 aquaculture accounted for 46% of total food fish supply, around 115 million tonnes.Although wild caught juveniles are still utilised in the industry, concerns over sustainability of extracting juveniles, and the variable timing and magnitude of natural spawning events, make hatchery production an attractive alternative to support the growing demands of aquaculture.It's very important to expand this kind of marketing to global because it can bring a lots of benefits to the world and to the species itself.By adapting this hatchery method and process it can help to grow and increase the production rate of Tiger Prawn or any kind of fish ,therefore it can make sure that the Tiger Prawn species wont be endangered.

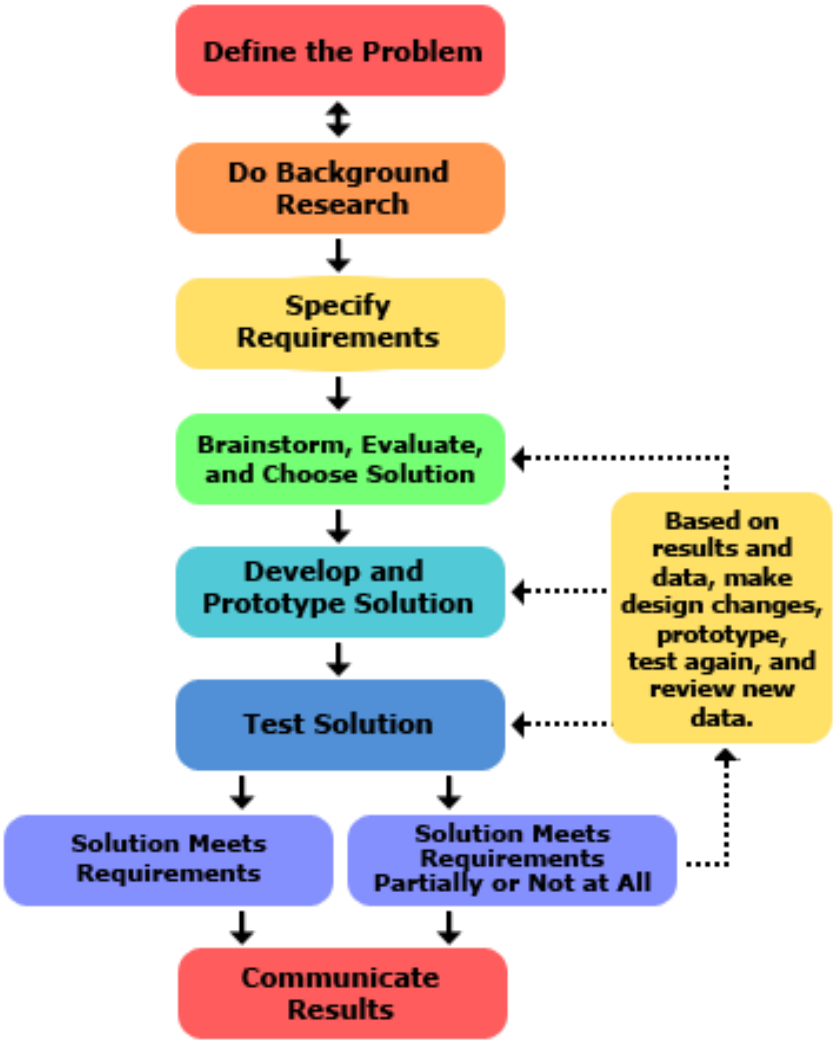
CHAPTER 3

METHODOLOGY

3.1-INTRODUCTION

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It includes the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Typically it consists concepts such as paradigm theoretical model, phases and quantitative or qualitative techniques.

3.2-FLOW CHART



3.3-FLOW CHART EXPLANATION

1) DEFINE THE PROBLEM:-

The problem is defined to set the parameters that has to be met by the end product. This will also help us to avoid unnecessary processes that would cause a hindrance in our process to achieve the end product.

2) DO BACKGROUND RESEARCH:-

By doing background research, we could find previous products that were created to overcome the similar problem. This would be beneficial because we could learn more from these products and create a whole new design that would overcome the problem in a more efficient way or to improvise previous designs to increase the productivity of the product.

3) SPECIFY REQUIREMENTS:-

Requirements are specified to make sure the end product would overcome the problem. If the requirements are not set , then the design process would be sloppy and this will directly impact the end product in a negative manner.

4) BRAINSTORM, EVALUATE AND CHOOSE SOLUTION:-

Brainstorm is the act of collecting the ideas to either create a new product or to improve on the design of a product that already exist from group members. After brainstorming , the ideas are then evaluated to separate the usable ideas from the pile of ideas collected. Then these usable ideas are compared to each other and the best possible working solution is chosen.

5) DEVELOP AND PROTOTYPE SOLUTION:-

From the solution, we began to develop the prototype of the product. The prototype is made in a smaller scale compared to the product designed. This is done to minimize cost and time spent developing the prototype.

6) TEST SOLUTION:-

The solution is then tested by placing the prototype under simulations that imitate the problem. This would show us whether the prototype functions and meets the requirements specified.

7) COMMUNICATE RESULTS:-

The results acquired are then communicated with the group members. If the solution meets the requirement then the product will be developed. If the solution does not meet the requirements then the process would move on to #8.

8) CHANGES BASED ON THE RESULTS:-

Based on the results and data, changes would be made accordingly to the design of the prototype, then the new prototype will be tested and the new data obtained would be analyzed then it will loop back to #7

3.4-INTERVIEW AND RESEARCH

QUESTIONS ASKED:-

- Do you think TPHM(Tiger Prawn Hatchery Machine) is efficient?
- What would the affects of the machine have on the prawns?
- Do you agree this machine would significantly increase the production of tiger prawn?
- Do you prefer tiger prawn or regular prawn?
- Any suggestions?
- Do you think it would decrease cost for minor businesses using this machine?
- Does it create a huge increase in profit in small industries?

RESULTS OBTAINED:-

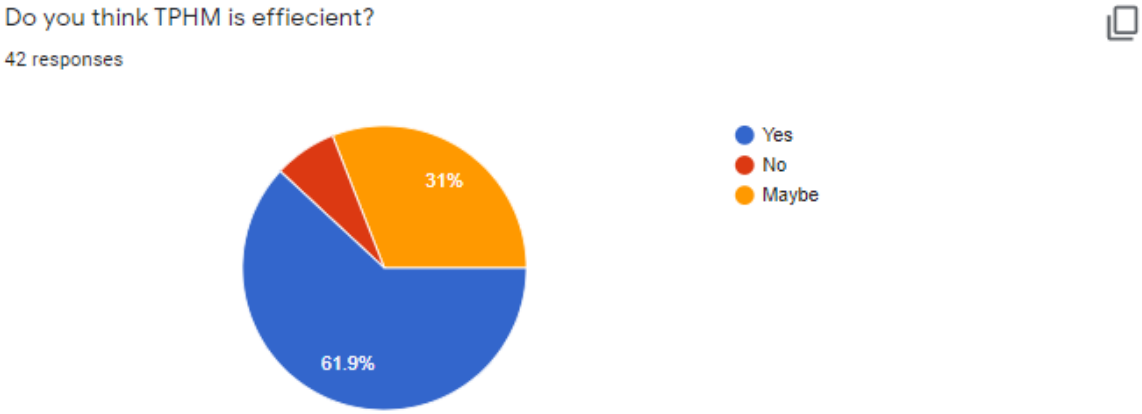


Figure 3.1

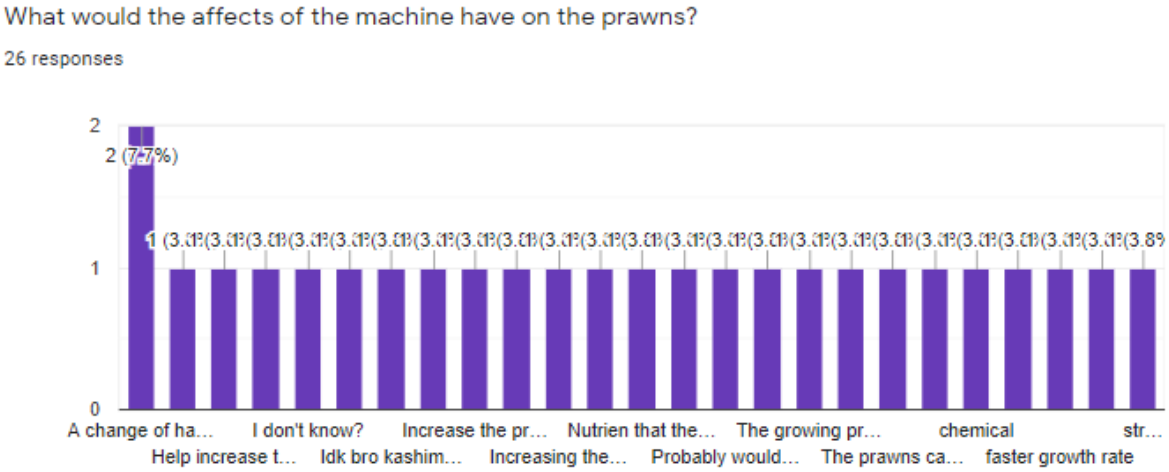


Figure 3.2

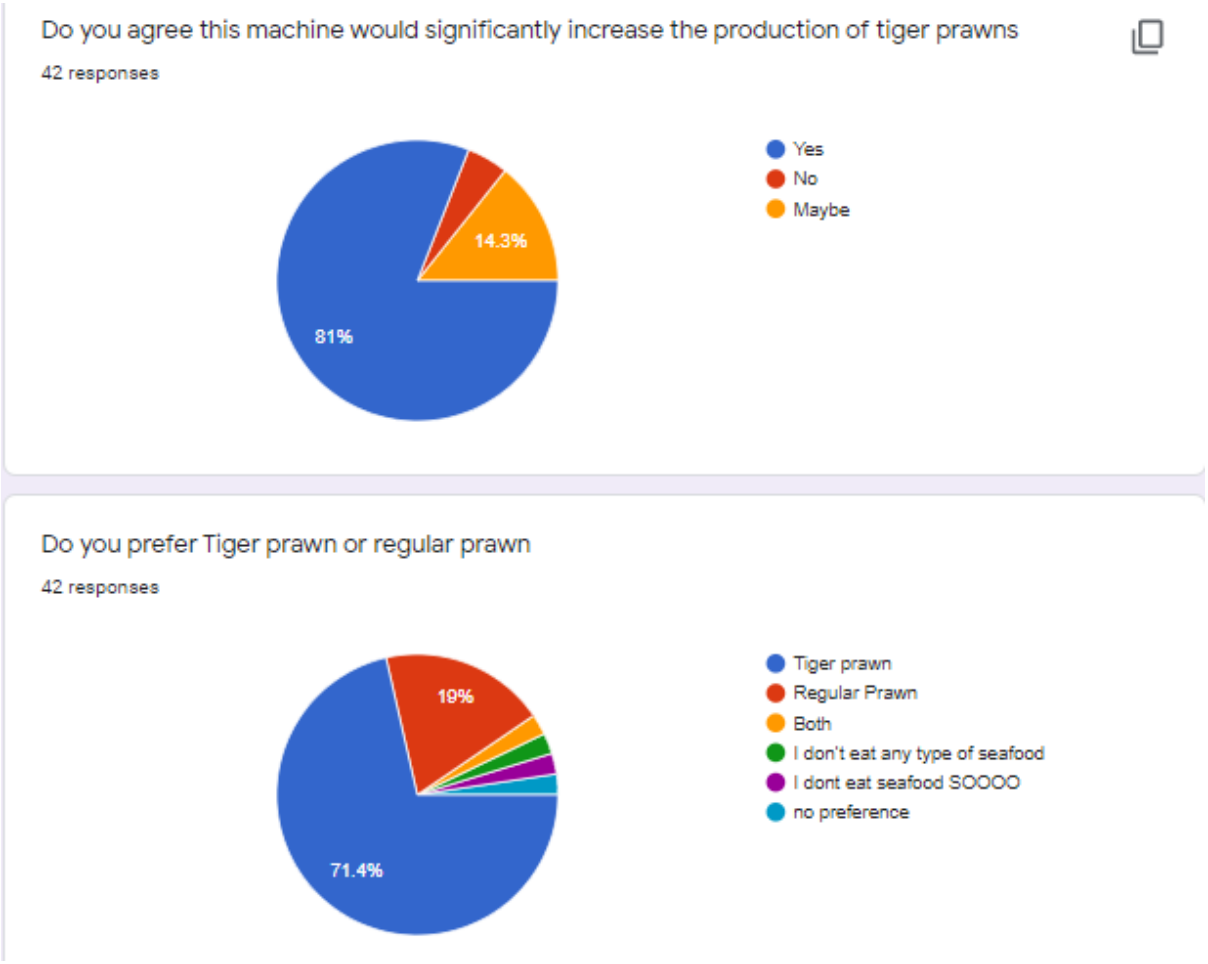


Figure 3.3

Figure 3.4

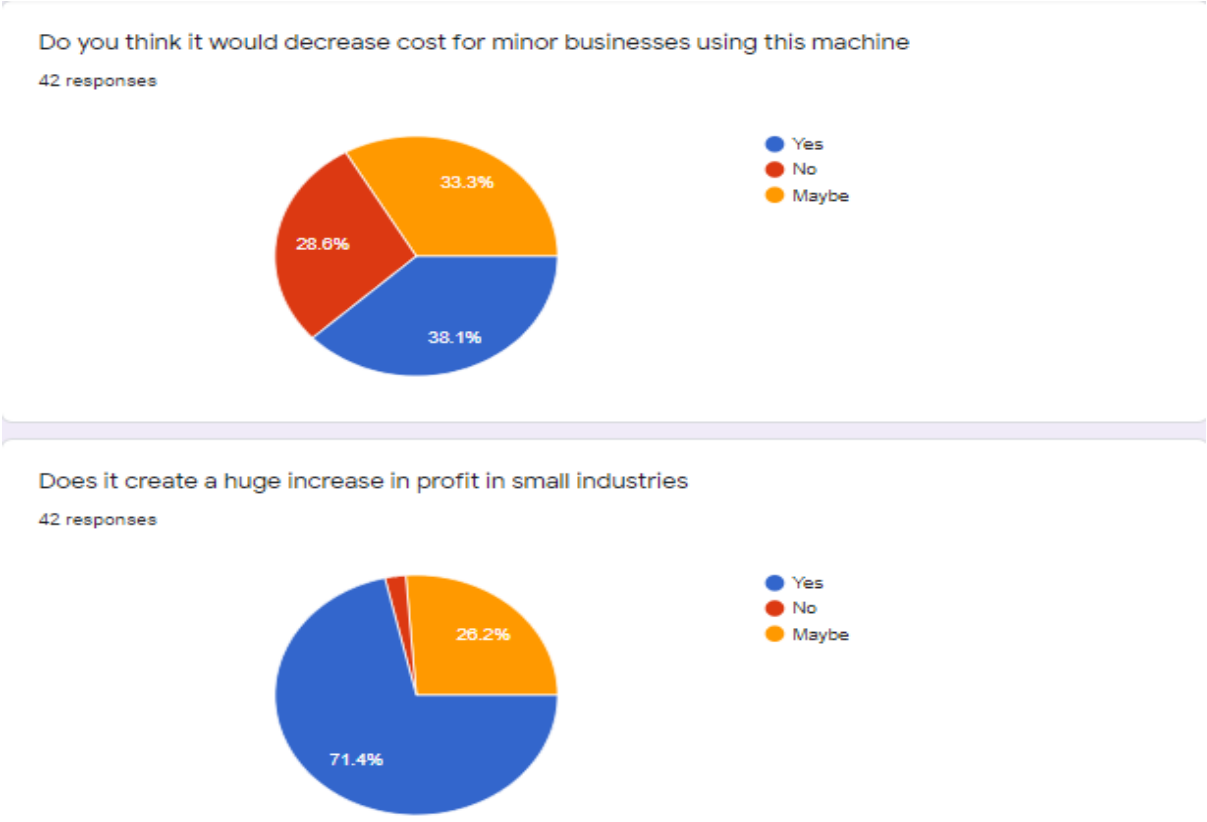
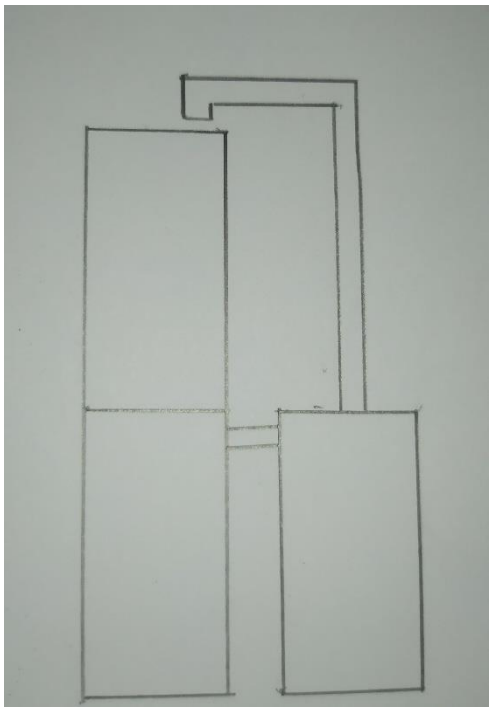


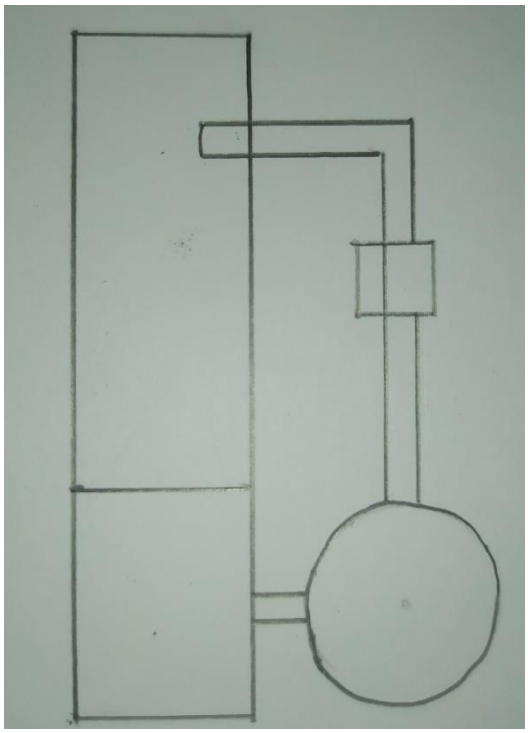
Figure 3.5

3.5-PRODUCT DESIGN

Front View



Top View



Isometric View

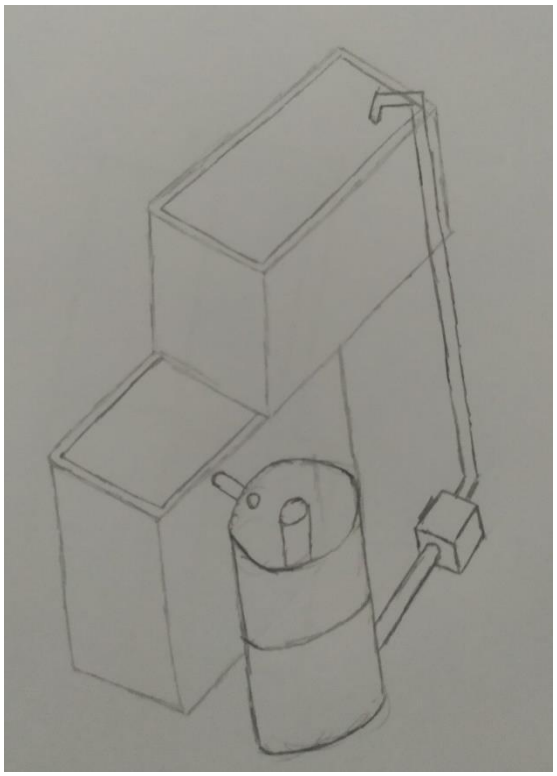


Figure 3.6

3.6-OPERATIONAL METHODOLOGY

1. This machine is a miniature version of a method to harvest prawns called drain harvesting. It uses the same idea of harvesting prawn using the flow of water.

2. The the first phase is when the tiger prawns are allowed to breed in the top tank and when the hatchlings turn to larvae thew will swim into the bottom tank through a mesh filter in between the overlapping sections of the top tank and bottom tank.

3. This is done by making sure the flow of water is continuous but at a suitable rate that does not disrupt the breeding of the tiger prawns. This must be done to avoid the parent tiger prawns from eating their own hatchlings which would decrease productivity

4. This process continues until phase 2 where the larvae are ready to be harvested to be placed into bigger tanks or ponds. This is done by placing a blocker on the mesh filter to stop the flow of water from the top tank to the bottom tank. Then the sealed lid of the bottom tank is remove and workers will harvest the larvae.

5. The cycles of this machine revolves on phase 1 and phase 2. The water supply is continuously filtered as the water from the bottom tank will flow into the bio-filter then to a water pump that regulates the flow rate of water to the top tank. In between the bottom tank and the bio-filter , a miniature harvesting sump and and a micro-fiber filter is placed to avoid the larvae from going into the bio-filter.

3.7-BUDGET CALCULATION

NECESSITIES	QUANTITY	PRICE	TOTAL PRICE
Metal sheet	2	RM130.00	RM260.00
Aluminium mesh sheet	30cmX40cm	RM125.00	RM15.00
Bio-filter	1	RM150.00	RM150.00
Water pump	1	RM200.00	RM200.00
Pipe (diameterXlength-2inchX120inch)	1	RM30.00	RM30.00
Rubber seal	1	RM20.00	RM20.00
Silicone (tube)	1	RM15.00	RM15.00
Clamp	4	RM5.00	RM20.00
Micro-fibre	1	RM3.00	RM3.00
Man-power	16(hrs)	RM13.80	RM220.80

Table 3.1

3.8-PROJECT ACTIVITY

PROJECT ACTIVITY	WEEK													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing about the project														
Collecting ideas and finalizing the ideas														
Discussing the problem, objective and scope														
Gathering the information about the mechanism of the project														
Research about the project														
Design mechanical base and detail drawing of the project														
Calculations of budget														
Proposal writing														

Table 3.2

3.9SUMMARY

The whole process of this project has been a new learning experience and helped us to develop new skill-sets required to be an excellent addition to any engineering workforce. The brainstorming session to gather ideas as well as the discussion and material price survey helped us enhance our social skills. Research and gathering information for this project also has helped us gain more knowledge that is not traditionally taught in class. Designing the project allows us to be creative but also efficient to boost productivity of the product we are designing in this project and decrease cost required to conduct this project. Overall the experience gained will be very useful in the future and also gives us a whole new perspective on how products are made right from the objective of the product to the mechanism, design, and costing.