



SAFETY HELMET COMMUNICATION

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**JABATAN KEJURUTERAAN MEKANIKAL
DIPLOMA KEJURUTERAAN MEKANIKAL (PEMBUNGKUSAN)**

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POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SAFETY HELMET COMMUNICATION

**Laporan ini dikemukakan kepada Jabatan Kejuruteraan Mekanikal
sebagai memenuhi sebahagian syarat penganugerahan Diploma
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**JABATAN KEJURUTERAAN MEKANIKAL
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AKUAN KEASLIAN DAN HAK MILIK

TAJUK : SAFETY HELMET COMMUNICATION

SESI : JUNE 2019

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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal Pembungkusan, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

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

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

Diperbuat dan dengan sebenar-benarnya diakui

Oleh yang tersebut;

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Nowadays, Twenty two million workers are exposed to potentially damaging noise at work each year. Last year, U.S business paid more than \$1.5 million in penalties for not protecting workers from noise. While it's impossible to put a number to the human toll of hearing loss, an estimated \$242 million is spent annually on workers compensation for hearing loss disability. Exposure to loud noise kill the nerve ending in the inner ear. More exposure will result in more dead nerve endings. The result is permanent hearing loss that cannot be corrected by surgery or medicine. OSHA Technical Manual (OTM) Chapter-noise. OSHA Directive TED 01-00-012, (August 15,2013).

Short-term exposure to loud noise can also cause a temporary change in hearing or a ringing in your ears called tinnitus. These short-term problems may go away within a few minutes or hours after leaving the noisy area. However, repeated exposures to loud noise can lead to permanent tinnitus, hearing loss, or both. Noise-induced hearing loss limits your ability to hear high frequency sounds and understand speech, which seriously impairs your ability to communicate. Hearing aids may help, but they do not restore your hearing to normal.

In 2012, 775 fatalities were recorded, and many more were injured at construction sites in the United States. Of these, 415 fatalities (54%) were due to fall, slips, and trips as well as being struck by falling objects. In order to decrease fatalities at construction sites to these types of events, the Occupational Safety and Health Administration (OSHA) provides Fall Prevention and OSHA-10 trainings to construction workers. Moreover, safety personnel monitor whether the workers use personal protective equipment (PPE) properly. Data shows that construction fatalities have decreased by 2% annually since 1994 (Kishor Shrestha, et al, 2015).

Year	Fatal falls to lower levels	Roof	Ladder	Scaffolds and staging	Subtotal	Percentage
2012	570	124	133	58	315	55.3
2011	563	109	122	64	295	52.3
2010	522	117	132	44	293	56.1
2009	518	109	122	53	284	54.8
2008	593	123	119	68	270	52.3
2007	746	161	132	88	381	51.0

Table 1.1: Fatal fatality percentage by type of work. Bureau of Labor Statistics, Rate of Fatal Work Injuries, 2006-2012 Department of Labor 2012.

<http://www.bls.gov/iif/oshwc/foi/cfch0011.pdf>

In most of the fall incidents, the workers fall from heights and hit their heads on hard floors. An investigation report showed that half of the fall incidents were recorded from a height of less than equal to 3m; moreover, the origins of 57% of the fall incidents were from ladders, roofs, buildings under construction, and platforms or scaffolding. Hard hats are designed to resist shock and penetration by objects as well as contact with electrical hazards. If workers wear hard hats properly, half of the fatalities due to falls and a significant number of fatalities due to slips, trips, and struck by falling objects could be expected to decrease. In one study that investigated the number of construction fatalities and the use of PPEs, the results showed that 47.3% of fatally injured victims either had not used PPEs or had not used them properly (Y.-S. Ahn, et al, 2004).

The National Institute for Occupational Safety and Health [9] investigated fatal injuries due to falls at construction sites. Data showed that, from 1980 to 1994, falls were the leading cause of occupational fatalities. At construction sites during that period, falls from ladders, scaffolding, and buildings and other structures as well as falls from one level to another were 12.3%, 13%, 34.7%, and 16.6%, respectively, during 1980 to 1994; from 1982 to 1997, they were 8.8%, 18.7%, 63.8%, and 8.8%, respectively. From 1980 to 1994, the dataset of fatalities due to falls was compared 3

among 11 divisions (e.g., construction, agriculture, mining, manufacturing, and transportation). The data in this study showed that the fatalities due to falls were 49.9% of the total fatalities, for a fatality rate of 3.89. To decrease injuries by enforcing work-related safety rules, the US government established the Occupational Safety and Health Administration (OSHA) in 1970. OSHA prepares guidelines for work safety and offers grants for safety training to construction workers in order to train them about the importance of using PPEs properly [12]. In addition, OSHA monitors construction sites to make sure that contractors and owners follow the safety rules to avoid injuries at the site. Due to various reasons, workers at construction sites sometimes fail to obey the OSHA rules and regulations, for example, under extreme weather conditions or due to stress in meeting work deadline.

1.2 PROBLEM STATEMENT

Construction sites can have very hazardous noise levels, and they often are transient situations where different trades come to the site for short periods of time to perform their work. Depending upon the type and stage of construction, this work may be indoors, outdoors or both.

Each of the different trades use very different equipment to perform their jobs, and therefore, the noise created may vary. These tasks often overlap, so workers performing jobs that are relatively quiet may be exposed to noise from the other trades working around them. Although noise levels on construction sites often can exceed 90 dBA, construction employees do not always wear hearing protection. Some of their most common complaints are that hearing protectors are uncomfortable, hot and create a situation where they cannot hear warning signals or fellow workers. In addition to employees finding it a nuisance to wear the appropriate hearing protection, other common issues that prevent workers from wearing their HPDs are that they are not trained properly, do not have access to the appropriate HPDs or simply are unaware of the need for hearing protection.

According to Dayang and Gloria (2011), from the year 2005 till 2008 major accidents occurred in the Malaysian construction site annually. They reported in the year 2007, the death of two workers and severe injuries of ten workers at a construction site where the cables of the workmen's lift at the posh condominium and shopping complex project snapped and plummeted 15 metres to the ground. In addition, it also has been reported that two Malaysian construction workers were buried alive by excavated sand pile in a construction site in 2008. All the accident cases contribute to the rise of statistics of accidents happening in Malaysia. Records of DOSH (2014) indicated there is a total of 187 construction workers died due to accidents at construction sites in Malaysia during the period of 2011 to 2013.

The major problem related to the safety issue at construction sites is the attitude of the workers (Mohd Khairolden et al., 2008). Krishnamurthy (2006) found that most of the workers did not wear Personal Protective Equipment (PPE) properly due to ignorance, negligence, carelessness and over-confidence. Therefore, the aim of the 5

study is to identify each hazard to which a person at a construction site is likely to be exposed, assess the risk of injury or harm to a person resulting from each hazard and consider the means by which that risk may be reduced. If that risk may be reduced by personal protective equipment such as a helmet.

1.3 RESEARCH OBJECTIVES

The objectives to this research are:

- To upgrade an existing construction helmet.
- To measure the sound clarity level of actual walkie-talkie between using the headphone.
- To identify the usability of upgrade product to workers.

1.4 RESEARCH QUESTIONS

This study will answer the following research questions:

- i. This safety helmet communication can protect the user's hearing?
- ii. What are the maximum of height the user can use to communicate with others?
- iii. How long the walkie-talkie battery can be use?

1.5 SCOPE OF RESEARCH

The scopes and limits to this research are:

- I. This product could not be exposed to water frequently.
- II. This product can be used at all project places that need to communicate while protecting their hearing and head.
- III. Not suitable for other use such as riding .
- IV. Could last for a long time with a good care.

1.6 SIGNIFICANCE OF RESEARCH

The research study could provide information on the issues of Construction Safety Helmet. Further this study would also be a review on the injury. Head injury accident in one kind of the major occupational accidents, particularly in the site of construction. We also want to solve the misunderstanding to deliver the instruction among each other. To effectively reduce the risks of injury, an appropriate type of safety helmet should be provided. The safety helmet selected should satisfy certain performance requirements including shock absorption, resistance to penetration, be adjustable to fit, wireless communication like walkie-talkie and make comfortable to the user. To the future researcher, this study can provide a good safety helmet construction.

1.7 CHAPTER'S SUMMARY

In this chapter, the studies were explained about its origin of ideas and inspirations. All the objectives were made out of all the problem statements. The objective for this project along with the important thing is to upgrade the existing helmet so that it becomes easier to use with walkie-talkie and this project does not spend expensive cost. In addition, this project maintain the existing quality of durability. Thus, this new safety helmet communication could be used for a longer lifetime with really good care.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Previous researches were reviewed by the researcher. The literature review was mainly focusing on design an existing construction helmet, measure how long the frequency of walkie talkie and modify the existing safety helmet.

2.2 EXISTING PROJECT STUDIES

- 1) Review of existing safety helmets
 - Research is done on existing safety helmets. This is to prove that safety helmets need to be upgraded or modified for the convenience of user from the current circulation.
- 2) A study of walkie talkies
 - Walkie talkies that are often used on construction sites are often used and held all the time by users. With this, employees no longer need to carry them all the time because this project will combine walkie talkie with safety helmets. Problem left behind the walkie talkie can be avoid.

2.3 PROBLEM WITH PRODUCT AVAILABLE

Referring to the products available in the market, there is no doubt that these products provide many benefits to consumer, but the products is still unsatisfactory due to the slightly larger size of walkie talkie on the safety helmet and not suitable to wear on the head. Even the size of the walkie talkie will affect the limits of movement and require a large space to use it.

2.3.1 Problems with existing product.

- Lack of suitable position
- Small complex construction
- Moderately high cost
- Difficult to find because production is a limited
- lighten safely helmets that need to be worn on the head of the employee

2.4 MARKET STUDY

A market study is a study of a demand or purchase of a good.

2.4.1 Product market location

Our market focus is on construction site workers or jobs that require the use of safety helmets in order to be able to have a communication safety helmet and continue to be developed.

Market potential

We get an average production of communication safety helmets per month of around 100 units through our study, it is found that this increase in sales every month is increasing. So, it is not a problem for us to produce and market this product in the market.

Price promotion

The sale of new product requires attraction to attract buyers. At the initial stage, price promotion is offered to consumers in order to further introduce this product to consumers. Consumers can also own quality product at affordable prices. Price promotion is not done continuously, it is as product introduction and will held to the original price but still at an affordable price.

Catalogue promotion

Safety helmet communication will be promoted in the catalogue provided at any relevant and selected companies. This is one of the ways we spread information about our products to grow faster. Even a catalogue is a great medium to convey information to buyers who want to know about this product information.

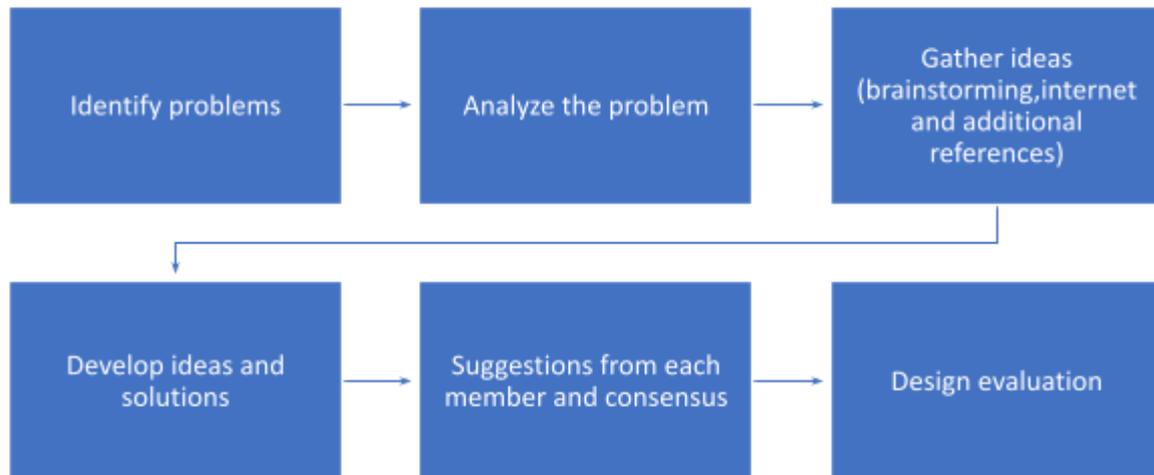
Online marketing

In addition to providing advertising videos on the internet, we also provide an online sales process or known as e-Commerce. Among the websites that can be used at Shoppe or Mudah.my. It aims to facilitate the purchase process by costumers and save the buyer time. We also accept online reservations if they want to display our products.

2.5 DESIGN STUDIES

Design research is important to produce something new. It covers various aspects including physical, environmental and environmental aspects. This is important because the production must meet the characteristics. That suit the needs off consumer. The aesthetic values used are absorbed in this project according to consumer demand such as designing a simpler and smaller product. Next, we will provide tools that do not provide functionality to tools to further lighten the weight of the product so that it is suitable to wear on the head while working. Next, we emphasize tools that have a long lifespan. The components that we will add must be high and get confirmation from the sirim. In conclusion, consumer is more likely to choose products that have reasonable prices, special feature, easy to use, easy to carry and most Important are not complex. So, the design study conducted covers all the following aspects

2.6 PROJECT IMPLEMENTATION STUDY



2.7 CONNECTION BETWEEN STRUCTURAL MEMBERS

The strength of a structure depends on the condition or the way the structure is connected. The selection of each of these connections depends on the shape of the structure, the design function, the surrounding conditions and so on.

2.7.1 Other factor that need to be taken into account

SIZE

- The size of the walkie talkie used for the safety helmet is not too big and easy to handle

STRUCTURE AND STABILITY

- The connection structure on this machine is strong because it uses adhesive connection technique (straps).
- The sticker used are of high quality. The selection of types of patches is according to the use and ability of the walkie talkie to bear the load.

TEXTURE AND COLOUR

- The texture and colour chosen must be appropriate for use in the workplace and look attractive and not overly decorative. Finishing the project is our main goal.

2.8 ANALYSIS

Analysis is the process of using all kinds of technological methods to perfect the design. Some preliminary ideas that have been selected and been studied in detail and develop. Then drawn on a scale drawing. Design size is determined and critical measurements are made. The implementation of the project can be completed in a timely manner smoothly. The proposed sequences are as follows:

- 1) Prepare a proposal paper on the proposed project,
- 2) Make a complete engineering sketch (Autocad) of the project.
- 3) Make a survey of the materials that need to be used such as sources, specifications, prices and other alternatives.
- 4) Identify the problems to be faced and find solutions through discussions and assistance with advice from experienced groups such as mechanical, public and electrical lecturers.
- 5) Preparation of necessary materials for each identified information and screening from each member.
- 6) Provide the tools needed for projects installation.
- 7) Perform installation according to the discussion.
- 8) Perform renovation work so that it looks more systematic and finished.
- 9) Experiment with the project and do the final installation.

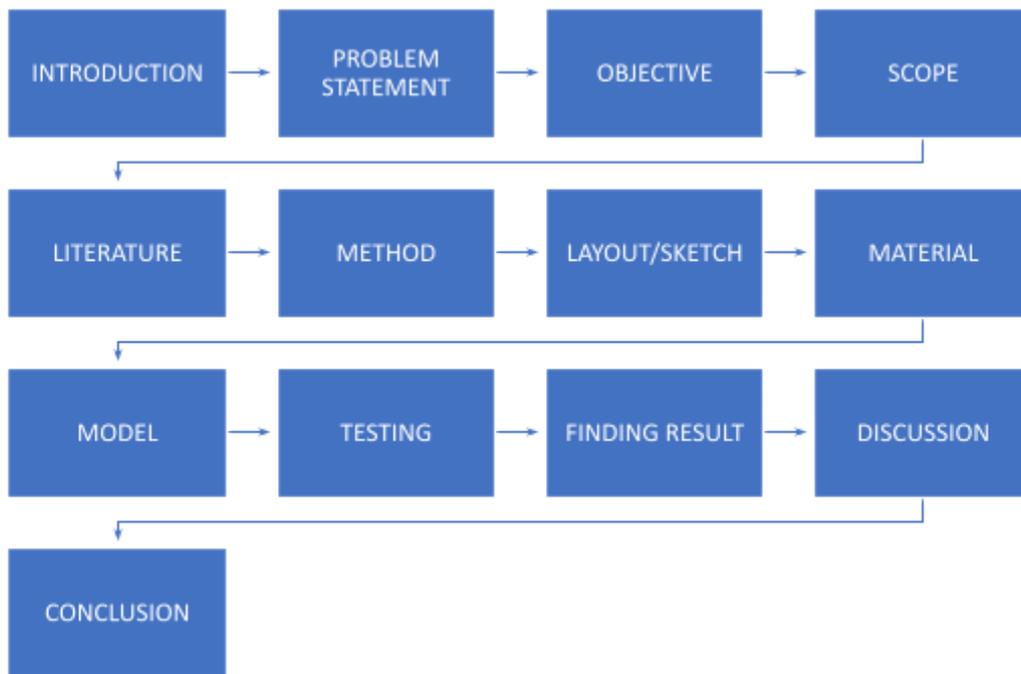
CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Methodology can be the analysis of the principles of method, rules, and postulates employed by a discipline. The systematic study of methods that are can be or have been applied within a discipline or a particular procedure or a set procedure. Methodology includes a philosophically coherent collection of theories, concepts or ideas as they relate to a particular discipline or field of inquiry. Methodology refers to more than a simple set of methods, rather it refers to the rationale and the philosophical assumptions that underlie a particular study relative to the scientific method. This is why scholarly literature often includes a section on the methodology of the researchers. Each step of the project is a process to complete the project. Every step must be followed one by one and must be done carefully. If some error occurs, it can make a project probably could not operate or do not look neat and perfect. Before the project finish, various process need to be done according to the proper produce to ensure the projects do not have any problems. Among the measures the work done in preparing this project.

3.2 METHODOLOGY PROJECT



3.3 PROJECT INTRODUCTION

Project methodology can be defined as a systematic activity reference to solve a problem by developing a programming application. A methodology will use a technique used for development that can be used in developing a system application. Each approach chosen should be appropriate to the project

3.4 METHODOLOGICAL APPROACH

There are two types of prototype methodology approaches, namely evolutionary prototypes and necessity prototypes.

Prototype of evolutions

- Evolution prototypes are system application development methodologies that can be realized with user needs that are clearly understood prototypes are built and evaluated until their specifications are met before being implemented as a final application.

Prototype requirements

- A need prototype is a prototype that will be remove at the end of the implementation of a system and only the actual system will be implemented with other tools and techniques.

3.5 DISCUSSION

In this methodological process, several methods or procedures for the implementation of the project are very necessary and studied to smooth the work journey and complete a project. Discussion is a method used in the early stages of the plan. There are several work procedures that need to be implemented including:

IDENTIFY THE MAIN PROBLEM

Problems encountered

- In making this project requires the necessary key to identify the problems faced by employees and choose a project

Inner

- This problem can be obtained through research conducted on existing products as well as questionnaires conducted to employees.

Germination of ideas

- Once we know the problem, the next process is to get an idea from the supervisor, we have selected the best idea through some existing ideas.

Title selection and discussion

- Title selection and discussion is a method used at an early stage. Title of choice after discussion related to group members and supervisors conducted. Before choosing a topic or project, fill in more information and use for employees.

- Discussion is a method in the early stages of planning. There are several work procedures that need to be implemented such as problems encountered, proliferation of ideas and choice of ideas.

Development Ideas

- Through discussions, research through internet brainstorming, and questionnaires conducted, some ideas have been listed. Upon request, communication safety hats have been selected in this idea. This is because its concept is portable and its use is very simple and ideal working community to workers wearing safety helmets or workers on construction sites.

3.6 PROJECT DESIGN

Shape

In the design of this innovative project production, it was found that some parts of the safety cap need to be modified to allow the project design to be customized according to sketches and planning. Among the modifications that need to be done is to remove the pad on the inside of the safety cap to place

Internal

In addition, experiments on the strength to place the walkie talkie on the hat should also be carried out so that the walkie talkie does not fall.

Analysis

Once the design process is completed, the analysis needs to be done to find out the pros and cons of the project. The analysis is divided into two parts, namely, done by study and chart. Analysis must be done carefully to obtain accurate information about a material to be used.

Prototype

Construction of the prototype begins by providing the materials, hardware and components to be used. It begins by purchasing the necessary items and making the construction of the frame and then installing the equipment according to the position specified on the frame.

3.6.1 Picture of completed projects

Front view



Right view



Side view



Left view



3.6.2 Project drawing



3.7 DATA COLLECTION PROCEDURE

The type of data collection begin after a research problem has been define and research design chalked out. While deciding about the method of data collection to be used for the

study. The primary data are those which are collected through result of the testing the model. The secondary for this project were collected from internet and library.

3.8 DATA ANALYSIS

The data after collection has to be processed and analyses and accordance with the outline laid down for the data purpose at the time of developing the research plan. By analysis we mean the computation of certain indices or measures along with searching for patterns of relationship that exist among the data group.

3.9 CONCLUSION

The purpose of this chapter was to describe the research methodology of this study, explain the sample of selection, describe the procedure used in designing the instrument and collecting the data and provide an explanation of the statistical procedures used to analyze the data. Methodology of this project was shown in this chapter. In the next chapter, results of the methodology were shown.

CHAPTER 4

FINDING AND ANALYSIS

4.1 INTRODUCTION



Figure 1: SAFETY COMMUNICATION HELMET

A Safety Communication Helmet is a combination of safety harness and communication devices that ease the workers to communicate with others in the construction area. This product can reduce the possibility of workers involve in an accident because of miscommunication between the workers.

4.2 SOUND LEVEL TEST

4.2.1 Introduction

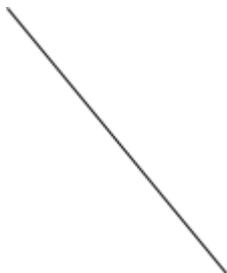
The purpose of this test is done to determine the sound clarity level by using the actual walkie-talkie between the communicative safety helmet.

This test is taking to measure the minimum and maximum level of the sound.

Procedure of Sound Level Test :

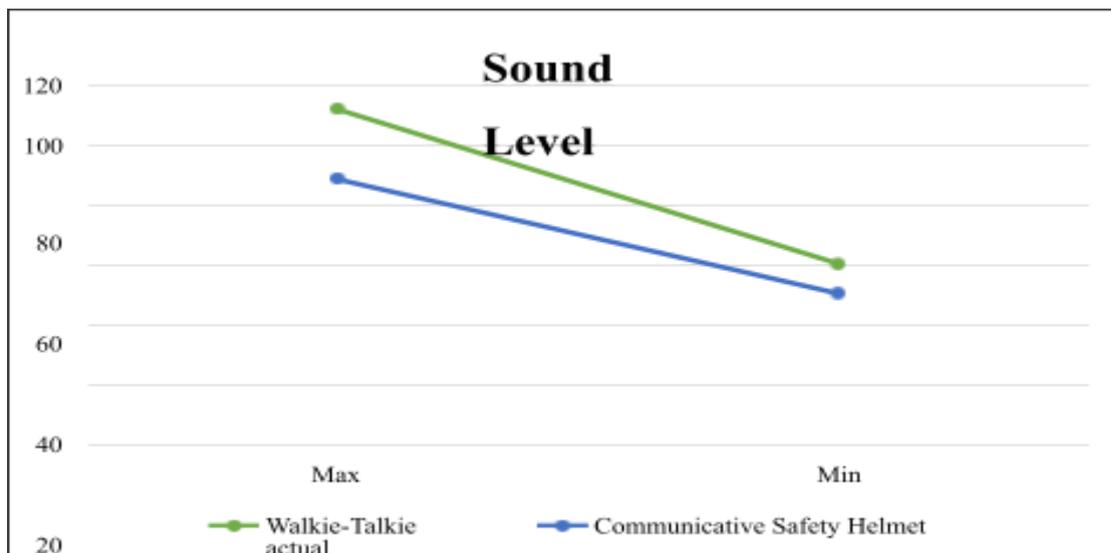
- I. Sound level meter is filled with battery and is on
- II. A pair of walkie-talkie were on with the max volume, and one of the walkie- talkie was put near the sound level meter while the other one walkie-talkie was 5m far.
- III. One person talked —Hello 1,2,3,4ll at the walkie-talkie that was 5m away from the other walkie-talkie.
- IV. Then, the minimum reading of the sound level is take first after that the maximum reading is recorded.
- V. Next, communicative safety helmet was put near the sound level meter and step III and IV are repeated. The minimum and maximum reading are recorded.

4.2.2 Results



Types	Actual walkie-talkie	Communicative safety helmet
Sound level (dB)		
Max (dB)	112.2	88.9
Min (dB)	60.4	50.6

Table 4.2: Reading of maximum and minimum of sound level meter



0

4.2.3 Conclusion

As the conclusion, the study found that after measure the minimum and maximum of the walkie talkie is higher than the communicative safety helmet which increase by 23.3dB. Which is by wearing the Safety Communication Helmet it would not harm your ears because the sound level of the product is not reach the maximum level of noise. Therefore, this product can ensure the workers recieved the clear information and construction.

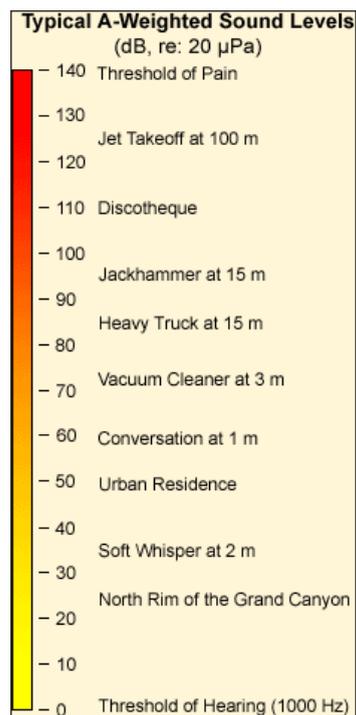


Figure : Typical A-Weighted Sound Levels

A wide variety of noise sources may exist in the workplace. The NIOSH Noise Meter provides examples of some common sources and their expected noise levels.

4.3 STRUCTURAL PROTOCOL REVIEW

4.3.1 Introduction

This chapter indicate and present the finding of the study conducted to determine the preception from the worker about Comunictive Safety Helmet. Respondent involved is the worker at the construction site of condominium in front of the Kolej Vokasional Gombak. The research objectives to be achieved in this study are :

To upgrade an existing construction helmet.

To measure the sound clarity level of actual walkie-talkie between using the headphone.

To identify the usability of upgrade product to workers.

4.3.2 Profile of respondent

A profile of respondent with a total of 9 male workers. The percentage of male respondents are 100%, there is no female respondent answered this interview.

<i>Background</i>	<i>Frequency</i>	<i>Percentages</i>
Gender:		
Male	9	100%
Female	0	0%
Works :		
Labour	9	100%
Site supervisor	0	0%
Contractor	0	0%

Table: Profile of respondent

4.3.3 Perceived Usefulness

The workers agree for effectiveness are 55.6%. The workers agree that this product will improve works performance 66.7%. The increase the productivity by using agreed by the workers are 55.6%. Percentage of workers agreed this product is very useful are 55.6%.

<i>Categories</i>	<i>Frequency</i>	<i>Percentages</i>
Effectiveness	5	55.6%
Improve works performance.	6	66.7%
Increase the productivity	5	55.6%
Very useful	5	55.6%

Table: Perceived Usefulness

4.3.4 Perceived Ease of Use

44.4% workers found this product is easy to use. Learning to use this product would be easy for the workers are agreed by 77.8% workers. The interaction with this product was clear and understandable for the 66.7% workers. 55.6% workers agreed would be easy for workers to manage the work by using this product.

<i>Categories</i>	<i>Frequency</i>	<i>Percentages</i>
Easy to use	4	44.4%
Learning to use this product would be easy.	7	77.8%
Interaction with this product was clear and understandable	6	66.7%
Easy to manage	5	55.6%

Table: Perceived Ease of Use

4.3.5 Intention to use

The workers intend to use this product during work are 66.7%. 88.9% workers will use this product often. The percentages of workers intend to use this product frequently are 55.6%

<i>Categories</i>	<i>Frequency</i>	<i>Percentages</i>
Intend to use this product during my work	6	66.7%
Will use this product often	8	88.9%
Intend to use this product frequently	5	55.6%

Table: Intention to use

4.3.6 Attitude Toward Using

This product make work more interesting are agreed by 44.4% of workers. 88.9% workers agreed working with this product is fun. Otherwise, 77.8% workers like using this product.

<i>Categories</i>	<i>Frequency</i>	<i>Percentages</i>
Make work more interesting	4	44.4%
Working with this product is fun	8	88.9%
Like using this product	7	77.8%

Table: Attitude Toward Using

4.3.7 conclusion

This chapter discussed and analyzed the result that are recorded. The objective to identify the usability of upgrade product to workers have been obtained by using this interview. Thematic method are used in this study for this chapter.

4.4 CONCLUSION

As the conclusion the first objective of this study have been achieved by the question that

have been answered by the workers from the interview question. The result shown that 66.7% is the highest percentage for perceived usefulness which represent the question said this product can improve works performance. The result for perceived ease of use is 77.8% the highest percentage for question learning to use this product would be easy. The result of this method shown that the safety communication helmet is a simple and portable product that can be used in construction site with any types of work. Next, this product can protect the ears from the maximum noise which can be identified for the second objective which by the sound level metre test. The result state that from the maximum sound level of this product would not harm to the workers because it is low from the dangerous and maximum sound level allowable.

The highest percentage of intention to use for the workers answer question that workers will use this product often is 88.9% which answered by 8 workers. 88.9% is the highest percentage of attitude toward using that answered by 8 workers for the question that state working with this product is fun. Therefore, This product can ensure the effectiveness and clarity of getting the orders each other.

CHAPTER 5

DISCUSSION , CONCLUSION AND UPGRADE PLAN

5.1 INTRODUCTION

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

5.2 DISCUSSION

Discussion of the findings made are obtained and some of the problems and discussion raised to make a strong solution of discussion related to all the problems that occurred. Through the discussion made one alternatives or new approaches may be put in place to give an indication as to ensure that any problems that arise can be resolved quickly and intelligently.

In doing any types of project usually there will have an advantages and disadvantage. So the solution to improve it has to be better. The same thing happened to our project but is not a major problem that can give a bad impact to our communicative safety helmet. The problem still can be overcome by doing the improvement suggestion.

The advantage of this product is the respondent give their feedback which is communicative safety helmet give them an easiest way to communicate each other in noisy area. The model of communicative helmet is very nice to each function and the walkie-talkie can be open and taped back if we want to use the helmet. Communicative helmet also help the user to avoid hearing too strong that can give negatively affect the ears.

After did the project, there are some problems that has to be faced and the disadvantage. The first disadvantage is about the thing that we used to tape the walkie-talkie to the helmet. At our tested the walkie-talkie was plucked from communicative safety helmet. Then the communicative safety helmet also did not have the cover for rain because the design is suitable in good weather for the construction workers.

5.3 CONCLUSION

Based on this through out project ,this product safety helmet communication is a combination of safety harness and communication device that ease the workers to communicate with others in the construction area. This product also can reduce the possibility of workers involve in an accident because of miscommunication between the workers.

This safety helmet communication is also a simple and portable product that can be used in construction site with any types of work. Other than that, this product can protect our ears from extra noise at the construction site. Although this product can ensure the effectiveness and clarity of getting the each others.

This study be able to practice all the knowledge that had been taught in theory and practice it in the real life. From the studies that have been done, it can conclude that the objective of the final project entitled safety helmet communication have been achieved succesfully. This study manage to propose a design for communicative device create an innovation safety helmet and the easiest way to communicate among the workers.

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APPENDIX



Model Penerimaan produk (Safety Helmet Communication) dalam kalangan pekerja di tapak pembinaan. Semua maklumat yang diberikan hanya digunakan untuk tujuan penyelidikan sahaja. Segala kerjasama dari semua pihak yang berkaitan amatlah penting dan berharga. Dengan ini kami medahului ribuan terima kasih.

Bahagian 1 : Demografi

- | | | |
|---------------------|-----------------------|--------------------------|
| 1. Jantina : | a. Lelaki (Male) | <input type="checkbox"/> |
| | b. Perempuan (Female) | <input type="checkbox"/> |
| 2. Jenis pekerjaan: | a. Buruh | <input type="checkbox"/> |
| | b. Penyelia tapak | <input type="checkbox"/> |
| | c. Kontraktor | <input type="checkbox"/> |

Bahagian 2 : Bulatkan pilihan jawapan anda.

Bil. (No.)	Pernyataan	Sangat tidak setuju (Strongly disagree)	Tidak setuju (Slightly Disagree)	Kurang setuju (Less Agree)	Setuju (Slightly agree)	Sangat setuju (Strongly agree)
Precieved Usefulness (Keberkasanan penggunaan)						
1.	Using this product would enhance any effective in works. Penggunaan produk ini dapat menambahkan lagi keberkasanan kerja saya.	1	2	3	4	5
2.	Using this product would improve any performance. Penggunaan produk ini akan mempertingkatkan lagi prestasi saya.	1	2	3	4	5
3.	Using this product is very useful. Saya mendapati produk ini sangat berguna.	1	2	3	4	5
4.	Using this product would increase my productivity in my work. Penggunaan product ini akan meningkatkan produktiviti kerja saya.	1	2	3	4	5

Perceived Ease Of Use (Kemudahan Penggunaan)

Perceived Ease Of Use (Kemudahan Penggunaan)						
1.	I found this product is easy to use. Saya merasakan produk ini mudah digunakan.	1	2	3	4	5
2.	Learning to use this product would be easy for me. Mempelajari penggunaan produk ini amat mudah bagi saya.	1	2	3	4	5
3.	My interaction with this product was clear and understandable. Penggunaan produk ini mudah dan senang difahami.	1	2	3	4	5
4.	It would be easy for me to manage my work using this product. Penggunaan produk ini memudahkan kerja saya.	1	2	3	4	5

Intention to use (keinginan untuk mengguna)						
1.	I intend to use this product during my work. Saya bercadanag untuk menggunakan produk ini semasa bekerja.	1	2	3	4	5
2.	I will use this product often. Saya akan selalu menggunakan produk ini.	1	2	3	4	5
3.	I intend to use this product frequently Saya bercadang ingin menggunakan produk ini dengan lebih kerap.	1	2	3	4	5

Attitude Toward Using (Sikap Terhadap Penggunaan)						
1.	This product make my work more interesting. Produk ini menjadikan kerja saya lebih menarik.	1	2	3	4	5
2.	Working with this product is fun. Bekerja dengan menggunakan produk ini menyeronokkan.	1	2	3	4	5

3.	I like using this product. Saya suka menggunakan produk ini.	1	2	3	4	5
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