USING THE QFD AND TRIZ IN INNOVATION DESIGN AT THE PORTABLE FOLDABLE TABLE

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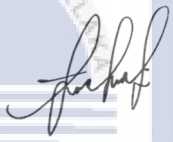
DECLARATION

I declare that this Choose an item. entitled " using the QFD and TRIZ in innovation design at the portable foldable table" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

Signature : 

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APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Manufacturing Engineering Technology (BMMW) with Honours.

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DEDICATION

To my beloved mother and father thank you for always supporting me throughout this Final year project.

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ABSTRACT

Nowadays there are a lot of foldable tables that have been designed by many designers. The purpose of this foldable table is literally to save space in the small or limited space. But there are a lot of foldable tables that was not easy to carry around and cannot be move easily. Basically, the night market worker have face this kind of problem which the table that they bring take a lot of space in their vehicle with all other belongings and market's goods. This work will be more effective and can help the night market worker if we design the table which is not only can be folded but also easy to be carry around without putting a lot of effort on it. The portable foldable table needs to withstand all the load that being put on it. The process of making this portable foldable table is by focussing on the user need and what they prefer. The reason in designing the product is to make sure to fulfill all the requirements that the user wants. As a result, the portable foldable table should follow all the specification, function or design that have been decide and being take note so that we can solve the problem statements. To ensure that the design of the portable foldable table is in accordance with the target market, the designer will use a survey questionnaire. when making a survey questionnaire we will be able to know various things such as basic information and also the requirements that the user wants. After get all the requirement that user want then the designer can start make the HOQ and find the negative correlation so that the negative correlation can be solve by using Theory of Inventive Problem-Solving (TRIZ) method. The both QFD and TRIZ method have their own role. After get the negative correlation, the designer then use two famous tools in TRIZ which is 39 Parameters and 40 inventive principle. The designer need to find the parameters that suits both correlated criteria then after that will need to find the principle. From 3 or 4 principle there will be 1 or 2 principle that suits the portable foldable table. Then designer will start make the design direction. After we analyse the data of the questionnaire we can start make the design which fit the requirement given in design direction. In order ti choose the final design the designer will use pugh matrix to compare the 3 design that being sketch with the actual portable foldable table that available in market. After make the design validation its shows that both criteria which is "Easy to store" and "Function" have the highly satisfaction which is 80% of the respondents satisfy with both criteria. This shows that it fulfill all the objective of this project which want to save space and to overcome the difficulties due to the existing traditional furniture and the current portable foldable table by improving the function and attributes of the portable foldable table. This shows that this portable foldable table have solve the problem statement of this project In this project we could see that the integrated of both method can achieve the user needs and improvement of the design concept as both method is the main steps that could lead the designer to have the design direction and gain the final design of the product. Lastly, from this project also we could see that space saving, easy to convey by hand and other details design is what the businessman who works in night market are concerned about.

Keywords: Portable Foldable Table, Quality Function Deployment (QFD), TRIZ, Innovation Design

ABSTRAK

Pada masa kini terdapat banyak meja lipat yang telah direka oleh ramai pereka. Tujuan meja lipat ini secara literal adalah untuk menjimatkan ruang dalam ruang yang kecil atau terhad. Tetapi terdapat banyak meja lipat yang tidak mudah dibawa ke mana-mana dan tidak boleh dialihkan dengan mudah. Pada asasnya, pekerja pasar malam itu menghadapi masalah seperti ini yang mana meja yang mereka bawa mengambil banyak ruang di dalam kenderaan mereka dengan semua barangan lain dan barangan pasar. Ini akan lebih berkesan dan boleh membantu pekerja pasar malam jika kita mereka bentuk meja yang bukan sahaja boleh dilipat malah mudah untuk dibawa ke mana-mana tanpa perlu bersusah payah di atasnya. Meja lipat mudah alih perlu menahan semua beban yang diletakkan di atasnya. Proses membuat meja lipat mudah alih ini adalah dengan memfokuskan kepada keperluan pengguna dan perkara yang mereka suka. Sebab dalam mereka bentuk produk adalah untuk memastikan untuk memenuhi semua keperluan yang pengguna inginkan. Akibatnya, meja boleh lipat mudah alih harus mengikut semua spesifikasi, fungsi atau reka bentuk yang telah diputuskan dan diambil perhatian supaya kami dapat menyelesaikan penyataan masalah. Bagi memastikan reka bentuk meja boleh lipat mudah alih mengikut sasaran pasaran, pereka bentuk akan menggunakan soal selidik tinjauan. apabila membuat soal selidik tinjauan kita akan dapat mengetahui pelbagai perkara seperti maklumat asas dan juga keperluan yang dikehendaki oleh pengguna. Setelah mendapat semua keperluan yang dikehendaki pengguna maka pereka bentuk boleh mula membuat HOQ dan mencari korelasi negatif supaya korelasi negatif dapat diselesaikan dengan menggunakan kaedah (TRIZ). Kedua-dua kaedah QFD dan TRIZ mempunyai peranan mereka sendiri. Selepas mendapat korelasi negatif, pereka bentuk kemudiannya menggunakan dua alat terkenal iaitu 39 Parameter dan 40 prinsip inventif. Pereka bentuk perlu mencari parameter yang sesuai dengan kedua-dua kriteria berkorelasi kemudian selepas itu perlu mencari prinsipnya. Kemudian pereka akan mula membuat arah reka bentuk. Selepas kami menganalisis data soal selidik, kami boleh mula membuat reka bentuk yang sesuai dengan keperluan yang diberikan dalam arah reka bentuk. Untuk memilih reka bentuk akhir, pereka akan menggunakan matriks pugh untuk membandingkan 3 rekabentuk yang dilakarkan dengan meja lipat mudah alih sebenar yang terdapat di pasaran. Selepas membuat pengesahan reka bentuk menunjukkan bahawa kedua-dua kriteria iaitu "Mudah disimpan" dan "Fungsi" mempunyai kepuasan yang tinggi iaitu 80%.Ini menunjukkan bahawa ia memenuhi semua objektif projek ini yang ingin menjimatkan ruang dan untuk mengatasi kesukaran akibat perabot tradisional sedia ada dan meja lipat mudah alih semasa dengan menambah baik fungsi dan sifat meja lipat mudah alih. Ini menunjukkan bahawa meja lipat mudah alih ini telah menyelesaikan penyataan masalah projek ini. Hal ini, menunjukkan kedua-dua kaedah dapat mencapai keperluan pengguna dan penambahbaikan konsep reka bentuk kerana kedua-dua kaedah adalah langkah utama yang boleh membawa kepada pereka bentuk. untuk mempunyai hala tuju reka bentuk dan mendapatkan reka bentuk akhir produk. Akhir sekali, daripada projek ini juga kita dapat melihat bahawa penjimatan ruang, mudah disampaikan dengan tangan dan reka bentuk butiran lain adalah perkara yang dibimbangkan oleh ahli perniagaan yang bekerja di pasar malam.

Keywords: Portable Foldable Table, Quality Function Deployment (QFD), TRIZ, Innovation Design

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QFD	-	Quality Function Deployment
TRIZ	-	Theory Inventive Of Problem Solving
HOQ	-	House Of Quality
CWCQ	-	Company Wide Quality Control
VOC	-	Voice Of Customer
CRs	-	Customer Requirements
DFSS	-	Design for Six Sigma
	-	

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will show you the background of this project and the problem statement that designer could face in making this project. There also objective, scope and limitation of this project that will be put in this chapter.

1.2 Background

In the subject of production engineering, product design is critical in terms of geometrical criteria such as size, shape, and user convenience. People will purchase various products for various purposes, such as a chair for sitting, a dining table for keeping food, a drawing table for drawing sheets, and so on. This table would benefit an individual in a variety of ways, the most important of which is that it is inexpensive in comparison to the total cost of the services it will deliver. As a result, it is a money saver. Also, it is long-lasting, so there is no need to replace the entire table(Khan et al., 2014).

However, the more design that is searched for, the more issues that can be discovered, such as the fact that a large number of furniture and products on the market are not at all sustainable, that they would take up a lot of living space without actually serving a purpose, and that their ostentatious ornaments make the product expensive without substance. With the rapid changes in the world, it is more important than ever to incorporate societal and environmental issues in the design process. To study the enhancements in design and

modifications in existing design which after the market survey designer have accomplished a design of a table that can withstand with varieties in a single table(Khan et al., 2014).

When a house has a narrow space and not enough to place a lot of furniture, they need furniture that can be opened and closed to be stored easily. Portable foldable table is definitely a top choice for families with small homes. Different from small house, larger homes are thought to have more appliances as they have big space than small houses.(Khajehzadeh & Vale, 2017). We were able to take a methodical approach to design thanks to the design process. Identifying the client demand is the most important stage in the design process. As we all know, there are a variety of tables on the market, but many customers seek out the folding table since they require a versatile table that can be folded simply, transported, and carried by only one person(Hussin, 2009).

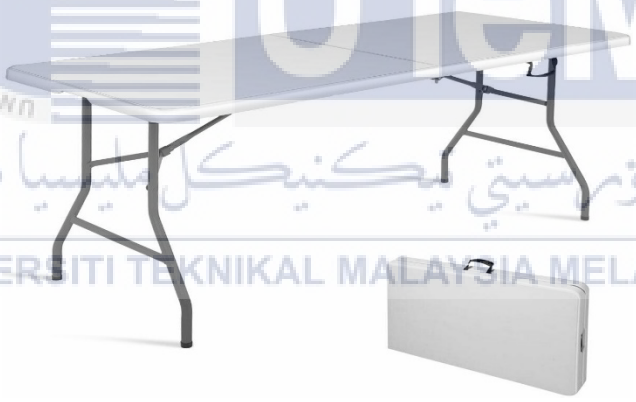

Figure 1.1 6’ Folding Table Portable Plastic Indoor Outdoor Picnic Party Dining Camp Tables

Source : https://www.walmart.com

In addition, workers at night markets or farmers markets are very happy to store their belongings in their cars or trucks if the space usually used to place tables can be used to place their business items if they use tables that are easy to fold and does not take up much space. Figure 1.1 shows example of table that can be use either in house or for night market worker to sell their goods. As we know, a table is one of the furniture that is not unfamiliar used

everywhere such as a restaurant, house, bedroom, living room, recreation park and so on. The many uses of this table make many people want to choose a table that can meet all the desires of every buyer. The limitation faced in using the table is that most of the tables use a lot of space and also use heavy materials that do not allow for users to move the table wherever they want according to the design of their home.

In most markets, all tables were large and difficult to shift to another location or transport. So many designs are now becoming foldable tables that are easier to use, fold, move to another location, and transport. A foldable table is anything that can be folded from a large to a small size, such as a briefcase or a box. People who are used to camping and picnics will find the foldable table the most appealing because it is easy to transport. When manufactured by different manufacturing companies, many products on the market have distinct specifications, shapes, and types(Hetreed, 2008). As a result, however, the weight of the table increases making them more difficult to carry and move. Figure 1.2 shows one of example table that can be move around easily without need to use full strength just to move it.

Figure 1.2 Foldable table with wheels

Source : https://www.apresfurniture.co.uk/confair-folding-tables

In conclusion this background shows the issue and problem that being faced by other people when use the portable foldable table. The background of this portable foldable table