

Airbag Bag Design For Rock Climbing Sports Activists Using The Quality Function Deployment (Qfd) Method Approach As A Safety Product

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Abstract

Consumer protection is an inseparable part of healthy business activities. The absence of balanced protection puts consumers in a weak position. Rock climbing or its foreign term known as Rock Climbing is one of the many outdoor sports and is one part of mountain climbing that cannot be done by walking but must use certain equipment and techniques to be able to pass it, and the potential danger is quite high for activists when doing rock climbing which will result in accidents or near misses, such as slipping from the cliff also because the climbing point is slippery due to not using a chalk bag, and experiencing minor injuries such as abrasions and body impacts to the climbing wall. While bags are one of the complementary fashion products that cannot be separated from a person's self-image. People are willing to spend money beyond their income capacity just to get a bag product that suits their needs. From the results of the study, a safety product was designed for rock climbing sports enthusiasts, namely an airbag bag that can minimize the risk of injury and nermis for rock climbing sports enthusiasts, with the presence of bag attributes such as soft back pads, airbag bags with comfortable waist straps, using strong materials and weather resistant, comfortable airbag bags, ribbon straps on the front of the bag to carry equipment, safety chest straps that are interconnected with shoulder straps, ease of use because they use a pulling system so that the airbag inflates.

Keywords: *Airbag bag, Design, Quality Function Deployment, House of Quality*

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I. Introduction

Rock climbing or the foreign term known as Rock Climbing is one of the many outdoor sports and is one part of mountain climbing that cannot be done by walking but must use certain equipment and techniques to be able to pass it. In general, rock climbing is done in areas with cliff rock contours with an angle of inclination reaching more than 45° and has a certain level of difficulty. Basically, rock climbing is a sport that prioritizes flexibility, strength/endurance, ingenuity, teamwork and the skills and experience of each individual to get around the cliff itself. (Nasution, 2019)

This is because sport climbing activities have a fairly high potential for danger, which will result in work accidents or near misses. According to an initial survey conducted and interviews with trainers and rock climbers themselves, rock climbers at FPTI (Indonesian Rock Climbing Federation). Central Java have experienced near misses such as slipping from a cliff due to safety hardness that is not up to standard and not used properly, also because the climbing point is slippery due to not using a chalk bag, and experiencing minor injuries such as abrasions and body impacts to the climbing wall. (Rizani, 2013).

Bags are one of the fashion accessories that cannot be separated from a person's self-image. People are willing to spend money beyond their income capacity just to get a bag product that suits their taste. The higher the price paid for a bag, the higher the level of appreciation from the community who considers the owner of the bag as a classy person. Here comes a lot of inspiration from bag designers in the world to produce bags with materials, quality, and even models with such limited edition production only to produce super quality bags that will be hunted by many people. Until finally various tasternama brands emerged that were so popular and sought after by the public. (Yanuarsari, 2015).

Consumer protection is a part that No canseparated from healthy business activities. The absence of balanced protection causes consumers to be in a weak position. Occupational safety is safety related to machines, work tools, materials and their processing, the foundation of the workplace and its environment and how to do the work. (Ridley, 2004). Occupational safety and health (K3). Philosophized as a thought and effort to

ensure the integrity and perfection of both the physical and spiritual workforce in particular and humans in general, their work and culture towards a prosperous and prosperous society. While the scientific understanding is a science and its application in an effort to prevent the possibility of accidents and occupational diseases. (Armanda, 2006). Occupational safety and health (K3) cannot be separated from the production process, both services and industry. The development of development after Indonesia's independence has the consequence of increasing work intensity which also results in an increased risk of accidents in the work environment. (Drenth & Ming, 2012)

II. Meetodo Research

2.1 Place and time of research

The place of this research was conducted at UKM MAPALA UMI Makassar. This research lasted for 1 month in October to November 2021.

2.2 Population and sample

The population in this study were rock climbing sports enthusiasts at UKM MAPALA UMI Makassar totaling 1750 people, the sample used in this study was 95 people. The sampling technique used was purposive sampling technique with criteria including (1) age over 18 years (2) experience in rock climbing for approximately 1 year. (3) gender of rock climbing sports enthusiasts at UKM MAPALA UMI Makassar.

2.3 Product design

The design of the product design in this study is an airbag bag. This study creates a design for a bag that has an airbag feature in it that can minimize the effects when an accident occurs based on the results of the problems and requests of the activists.

2.4 Research procedures

2.4.1 Research studies

The first stage carried out before the research was by conducting a literature study and field study, with this collecting supporting references for the research, surveying the population, determining the number of samples, conducting a direct survey at UKM MAPALA UMI Makassar and conducting interviews with rock climbing sports activists.

2.4.2 Data collection

Primary data in this study by conducting direct interviews with farmers which were then classified the results of the interviews and made into a questionnaire. Secondary data in this study came from journal references on rice fields, product design, stainless steel and the Quality function deployment (QFD) method.

2.4.3 Data processing

Data processing in this study uses the Quality Function Deployment (QFD) method to find out the needs, desires and values of consumers translated into technical provisions. The steps for data processing in this study using the Quality Function Deployment (QFD) method begin with (1) Validity testing is carried out to determine the extent to which this research questionnaire can measure what should be measured, (2) Reliability testing is used to determine the consistency of the questionnaire in its use (3) Importance To Customer shows how much desire there is for each variable of the airbag bag design (4) Customer satisfaction Performance is a response to a product or service that can meet consumer needs (5) Goals are set to determine the targets to be achieved by researchers, namely by assessing how far researchers want to meet the needs of rock climbing sports activists by considering whether the needs of these activists can be met or not (6) Improvement Ratio shows how much effort the company must make to achieve the Goal (7) Gap Reduction of targets and satisfaction levels (8) Sales point Sales point shows how much influence infulfildemand for rock climbing sports activists for products (9) Raw Weight is the overall level of importance value of the needs of the activists (10) Normalization of Raw Weight is the Raw Weight value made on a scale of 0 to 1 or in percentage (11) Determining technical response and consumer needs can be shown with a symbol that represents how strong the relationship is between technical response and consumer needs.

III. Results and Discussion

a. Descriptive statement

In the interview process to obtain information on the airbag bag problems experienced by activists at UKM MAPALA UMI Mkassar, 9 points have been classified. The results of the value of each stage of making a quality house are the level of importance, the level of satisfaction, the target value, the sales point gap, the increase ratio value, the line weight value, the normalized raw weight value, the technical response value. The 9 points can be seen in the table below.

Table 1. Descriptive statements

No	Variables	ITC	CUSP	Goal	Sales point	GAP	Improvement ratio	Raw weight	Normalized raw weight
1	convenient bag	4,516	4,179	4	1.5	0.179	1,081	7,320	0.115
2	Comfortable waist strap	4,589	4,137	4	1.5	0.137	1,109	7,637	1,120
3	Minimalist bag design	4,242	3,863	4	1.5	-0.137	1,098	6,987	0.110
4	Attractive bag design	4,105	3,905	4	1.5	-0.095	1,051	6,473	0.102
5	Attractive bag design	4,337	4,179	4	1.5	0.179	1,038	6,751	0.106
6	Chest strap that can be connected with shoulder strap	4,337	3,863	4	1.5	-0.137	1,123	7,303	0.115
7	Strong bag material	4,589	4,389	4	1.5	0.389	1,046	7,198	0.113
8	Ease of using airbags because it uses a pull system	4,379	4,126	4	1.5	0.126	1,061	6,971	0.109
9	Additional ribbon strap on the front of the bag for carrying equipment	4,316	3,958	4	1.5	-0.042	1,090	7,059	0.111

b. The relationship between technical response and consumer needs

The relationship between technical response and needs is how big the relationship is with the activist's desires, then symbolized to find out whether there is a strong relationship, a possible relationship or no relationship at all, as can be seen in the table below.

Table 2. Relationship between technical response and consumer needs

<i>Product Requirements</i>	<i>Product Characteristic</i>	<i>Importance of Customer</i>	<i>Waterproof</i>	<i>Strong Material</i>	<i>Comfort awake</i>	<i>The stability of the position of the bag is maintained with the body</i>	<i>Easy to use</i>	<i>minimalist</i>	<i>Minimize the risk of cedar activists</i>
Soft back cushion		4,516	△	⊙	⊙	⊙			⊙
airbag bag with belt comfortable		4,589	△	⊙	⊙	⊙	⊙		⊙
Using bag materials that are strong and resistant to weather conditions		4,242	⊙	⊙	△				△
Convenient airbag bag in Use		4,105	⊙	⊙	⊙	⊙	○		
Hook strap on the front of the bag for carrying equipment rock climbing activist		4,337		⊙	△		⊙	○	
Interlocking safety chest strap connected to the shoulder strap		4,337			⊙	⊙	⊙		⊙

The appearance of the airbag design according to function and attractive	4,589	⊙	⊙	△			⊙	
Ease of use because use pull system	4,379			⊙	○	⊙		⊙
Products with great minimalist designs	4,316				△		⊙	

3.3 Target specifications

Specification targets are a result developed from the development of technical characteristics obtained from consumer identification. The following is a table of specification targets to be achieved.

Table 3. Target specifications

LEVEL OF IMPORTANCE	TARGET SPECIFICATIONS
Waterproof	waterproof material
Strong material	Using polyester fabric
Convenience	The design of the product matches the functionality of the box-shaped bag and soft sponge foam on the back and shoulder straps
The stability of the bag and body position is maintained	On the shoulder and waist straps there are straps that can be buttoned
Easy to use	Easy way to use by using a pull system on the handlebar so that the airbag inflates

3.4 Ergonomic analysis

Ergonomics in this design makes extensive use of engineering science. Among them are anthropometry, which is a field that studies the physical dimensions of the human body, including age, height, weight, arm span, sitting height and so on. Anthropometric data is widely used in the design of products, equipment, and workplaces.

Table 4. Anthropometric data (source: Indonesian anthropometric data)

Dimension	Man			Woman		
	5th	50th	95 years old	5th	50th	95 years old
Shoulder width	35.35	44.45	53.55	31.68	36.33	40.49
Upper shoulder width	28.16	36.68	45.21	25.07	30.73	36.38
chest thickness	16.92	19.7	22.48	14.38	20.3	26.22
belly thickness	16.25	22.13	28.02	8.89	19.4	29.91

3.5 Material aspect analysis

The material aspect in the design process is very necessary. Generally, the selection of materials is in the design standard. The number of materials available is very large but with the standardization has reduced the number. Most new materials appear with better properties than previous materials. In this design, the materials used adjust to the needs of the user so that they will be right on target when used.







No	picture	Information
1	 Goretex	The fabric is made of several layers that are designed to stay dry and provide good breathability so it won't feel hot
2	 Polyester	Famous as a bag-making material. It is a waterproof material with a synthetic polyester material.
3	 Webbing	Woven cloth with a flat surface with varying widths. Webbing is commonly used as a material for making bags.
4	 Buckle	Used on bags as a hook or lock system.
5	 Sponge foam	Sponge foam is used in certain parts of the bag to provide user comfort.
6	 Airbag launcher handle	The airbag launcher will expand when the handle of the airbag launcher is pulled. It is made of nylon rubber.

Figure 1. Material aspects

3.6 House Of Quality (HOQ)

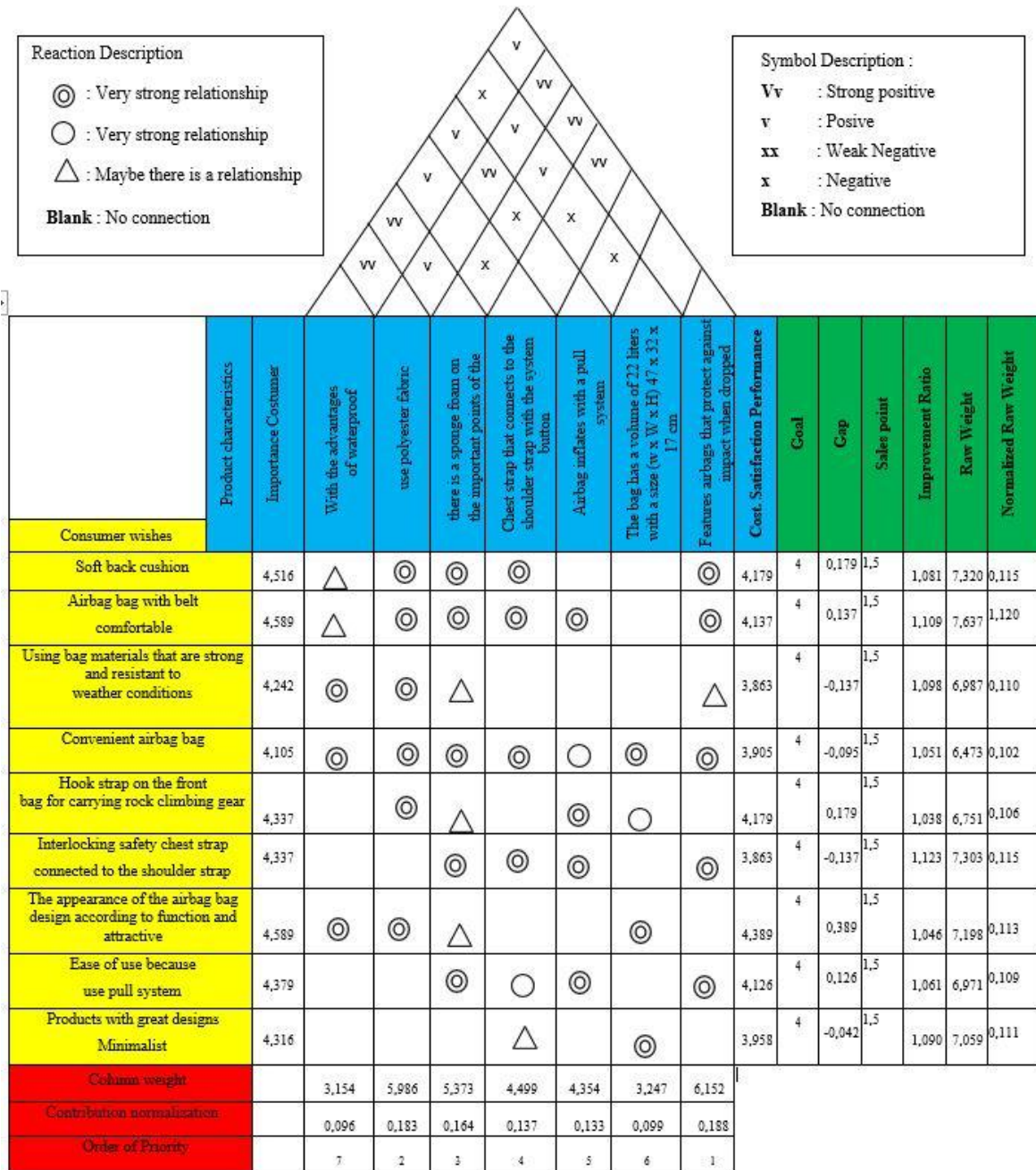


Figure 2. House Of Quality

3.7 Product design

3.7.1 The design of this airbag bag is a square bag made of polyester fabric with dimensions (pxlxt) 47 x 32 x 17 cm, equipped with the advantages of Gore-Tex, and an airbag made of nylon rubber. And the airbag launcher handle located on the shoulder strap of the bag that accesses the airbag so that it can inflate with a pulling system. The design process of this airbag bag design uses SketchUp, AutoCad, PhotooShop software. The design of this product is based on 9 variables that are

Figure 3. Airbag bag product design

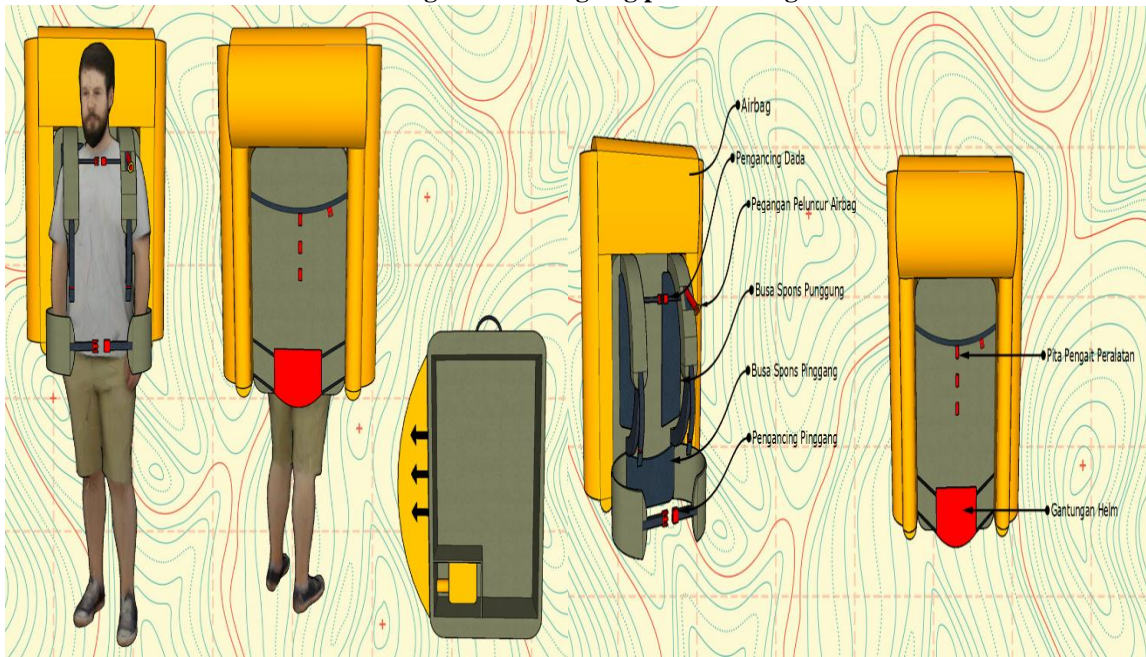
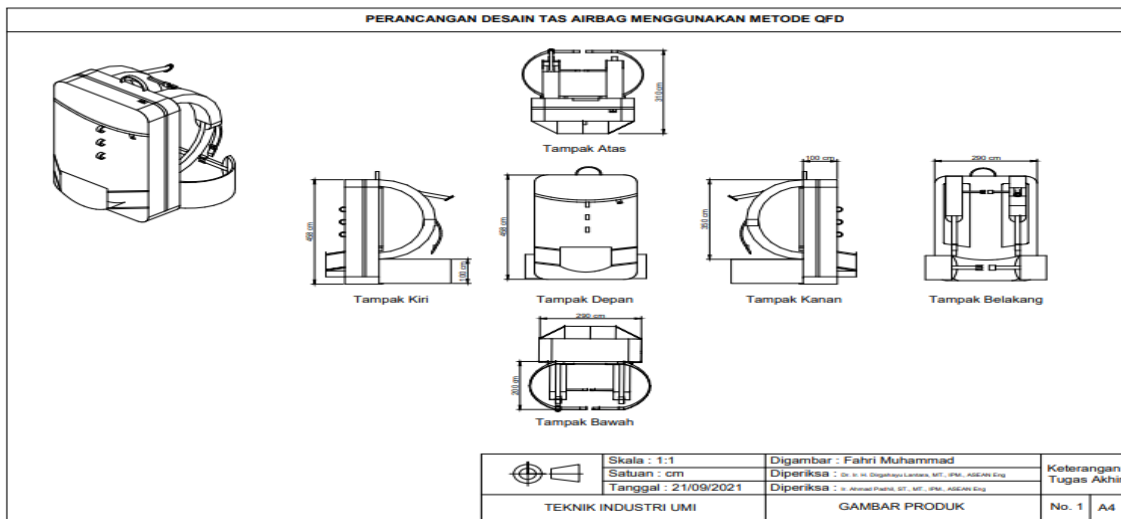


Figure 4. Airbag bag design projection



IV. Conclusion and Suggestions

a. Conclusion

Based on the research objectives for designing airbag bags for the safety of rock climbing sports enthusiasts, it can be concluded that:

1. Based on the analysis and evaluation, it can be concluded that the airbag bag has attributes that can satisfy customers, so that with the design of this airbag bag, it can display several prioritized attributes and can satisfy customers, namely: it can provide safety and minimize accidents for rock climbing enthusiasts.
2. For the attributes that are consumer needs in designing airbag bags, there are 9 attributes. Where these attributes are product attributes needed by consumers that must be met in designing quality airbag bags so that this product can be effective for its users.
3. Airbag bags can minimize the risk of injury due to falls and reduce the impact of direct impacts on rock climbers.

4.2 Suggestions

In an effort to design AirBGA bag products, there are several suggestions that can be made, including:

1. Product design Airbag bags are made at UKM MAPALA UMI MAKASSAR, can be considered by members of the rock climbing division of UKM MAPALA UMI MAKASSAR for further design.
2. From the research results, it would be better for MAPALA UMI MAKASSAR to design a product cover. Airbag bags that have been designed to help and eliminate the problems experienced by rock climbers.

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