

# Carrier Bag Design with Inner Bag Compartment for Novice Mountaineer

*By Swesti Anjampiana Bentri*



# Carrier Bag Design with Inner Bag Compartment for Novice Mountaineer

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## Abstract

Mountain climbing can be categorized as a sports activity that is popular. This activity requires a person to explore a forest that has many challenges, resulting in climbers carrying equipment to be able to survive along the climbing route. Mountain climbers need transport bags to carry large amounts of equipment. Improperly setting the bag will affect the climber's weight and balance when walking and this has the potential to be detrimental to climbing safety, so the arrangement of the items inside must be done correctly and the knowledge of arranging items is often unknown to novice climbers. The aim of this design is to create a mountain bag that can be used by beginner climbers to make it easier for them to organize their belongings when climbing. The methods used in this research are literacy studies and interviews. Other data is taken from SWOT analysis to determine bag design ideas. The result of this design is a bag with a capacity of 70 L which is equipped with an inner bag compartment feature to help organize items made from parachute satin fabric which is resistant to hot and rainy weather, as well as Gore-tex fabric which is resistant to friction/scratches.

## Keywords

Carrier bag · Inner bag · Compartment · Climbing · Novice mountaineer

## 1 Introduction

Climbing is a walk to the mountain peak that is very much by most people in Indonesia. This activity is generally in the interest of nature lovers and is already part of the sport, profession, or recreation that includes giving inspiration in survival activities and also exploration. The survival process of this climber can be accomplished if supported by equipment that requires preparation for it (Agustin 2020).

The climbing process should be supported by equipment and equipment specially designed for climbing activities. It should be understood, that not all things have to be owned to be able to climb the mountain, because there are kinds of things that are personal and kinds that are shared, so the selection of equipment has to be very selective. This selection also has to be matched with the bracelet or what is often called the carrier bag used. The equipment to carry all the goods when walking or climbing the mountain is a Bracelet (Gilang 2007). Compatibility between the goods carried with the carrier bag capacity is important so that the climbers do not carry excessive loads that can make them feel uncomfortable.

The comfort of carrying a drawer depends on the packing of things in it (Mukholid 2007). The function of a mountain bag or carrier bag is not only to carry climbing goods and equipment to cross dangerous terrain but also to help maintain the body balance of the climbers. Given the importance of these carriers, the selection and arrangement of climb equipment on the bag is important. The selection and the arrangement can be done efficiently when we know the right way, such as grouping them according to their functions. Classification of goods by function and weight

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is necessary to determine the position of the goods when packing or packing into a drawer (Irwansyah 2007).

One way to choose a carrier bag that suits your needs is to know the amount of cargo capacity to carry and the estimated duration in the journey plan. The types and requirements in using a carrier bag suitable for 1 person are when the weekend (1–3 nights) the bag capacity to be carried is 35–50 L, for multi-days (3–5 nights), the bag capacity is 50–80 L, and lastly, for a long day (5 nights more) the luggage capacity that should be used is 70 L above. A more effective way to choose the right carrier bag size is to adapt it to the user's body. As a standard, your maximum weight should not exceed 20% of your body weight (Nourse 2023). The weight of the carrier bag is also influenced by the material used, so choosing a carrier with a light but strong material is the right decision. Everybody knows carrying a backpack on your back means struggling with a heavy burden (Agustin 2020). The burden on the shoulder muscles and back of the climbers will be reduced if the carrier bag can be adjusted, so the process of climbing will be much more comfortable.

The importance of the carrier bag in mountain climbing has prompted the emergence of various design alternatives in the middle of society. The fact that the carrier bag includes a product needed for climbing cannot be ruled out. The large number of carrier bag users triggered innovation in the manufacture of such products. Designers play an active role in combining art, science, and technology to create new works that can attract consumers (Akmal and Prihatin 2020). Carrier bags have quite a complex design, so beginner climbers spend time and experience long enough to understand how to use them. The important components of the carrier bag have special functions that can be used during the climbing process. Innovation is needed in the carrier bag product to make it possible for the user to arrange the goods properly. The selection of the Inner Bag Compartment innovation is the right choice for the packaging system in the Carrier Bag. The Innerbag Compartment has a boundary seal whose function is to facilitate the arrangement of goods according to the size and type of the goods. This makes it easy for the climbers not to have to tear their bags to pick up items that are underneath other items.

The problem that can be drawn from the previous explanation is related to the ineffective arrangement of goods and climbing equipment in the carrier bag, which can affect the user's comfort and balance and can trigger injury during climbing. The description above explains that innovation in carrier bag design is necessary to assist in the arrangement of the goods needed in the climb. This is because the correct arrangement of the goods will affect the comfort of its use, given that mountain climbing is a rather high-risk activity. The purpose of the design of the Carrier Bag

with Inner Bag Compartment is to be a solution to make it easy for climbers, especially for beginners who are new to learning the basics of climbing in the arrangement of the climbing equipment so that they can feel comfortable when making climbs because the goods carried are well arranged and accurately according to the need. This design is not just the latest feature innovation, but also a means of educating beginner climbers to put equipment into a carrier bag efficiently and easily. The objective can be achieved by designing a bag with a 70-L capacity cabin system measuring a height of 765 mm × length 220 mm × width 350–368 mm for 1–2 nights (weekends) trips and using PE foam partition material coated with satin fabrics as well as Coretex fabrics.

As an attempt to approach sustainable design, it is done with the selection of the main material Gore-tex so that the bag is durable and not easily damaged, so it can be used many times over a long period. Gore-tex is also chosen to buy the product effectively (related to long service life) so that it is possible to inherit to the next generation, of course with proper care. The strong material ensures that the bag lasts longer, which means that you don't have to spend more on repairs or replacement with a new one, and it reduces the use of natural resources. In addition, this bag is equipped with a size adjustment feature that can be adjusted to the height of both male and female users. This allows the bag to be used by anyone without having to buy another product to fit based on the difference in height between men and women so that with one product alone, the needs of males and females can be met. The balance is also related to the effectiveness and maximum use of the design of this bag.

#### 4

### 1.1 Research Questions and Objectives

#### Research Question

**How to design** a Carrier Bag Product with an Inner Bag Compartment for novice climbers that can facilitate the setting up of climbing equipment so that climber feels comfortable in the climb process?

#### Objective

This carrier bag with compartments system is designed with a 70-liter capacity using sized height of 765 mm × length 220 mm × width 350–368 mm for a 1–2 night (weekend) journey. This carrier bag has cabin compartments with PE foam partitions coated with satin fabric as the inner material. For the outer material, Gore-tex is used as a strong and rough main material for outdoor products. The choice of this material was obtained from the results of a SWOT analysis relating to the materials of conventional bags. The

materials mentioned above are considered stronger than the nylon material used in conventional bags. This statement is based on a search for written literature regarding the durability of Gore-tex materials compared to Nylon. Nylon has good strength, is very strong, and is resistant to heat, but low water resistance and is not resistant to chemicals (Julianti 2017). The Gore-tex material is considered to be more water-resistant, which can extend usage time. Gore-tex was introduced for the development of rainy-season clothing, keeping you dry and waterproof (Osterwalder 2023).

## 2 Methods

### 2.1 Research Methods

Qualitative approaches through interviews and SWOT are employed to collect the main data. There are 2 informants for the interview. The first informant is Imam Suprayitno the owner of Kesatria Outdoor Official Store who sells all outdoor equipment types he also has thrifting stores at Kediri and Lamongan. He is an experienced expert climber and has explored almost all the mountains on the island of Java. This interview gives information about the importance of packing techniques to support the statement of the problem. The second informant is Chaterina Tjoe an entrepreneur of local bag craft production in Surabaya. The purpose of this interview is to know the bag production process from the material selection materials, inner materials, straps, foam, and other supporting components—until the final step. Following this, 2 carrier bag brands, IRCO and INFICLO, are analyzed by SWOT approach to obtain the advantages and disadvantages of both products to find the

unique selling point. The analysis result is shown below: Table 1. SWOT analysis of IRCO and INFICLO carrier bag, is the result of the analysis between IRCO and INFICLO bags which is presented in table form.

Based on observations on the shape, color, and material of existing bags, it was found that the designs of the two bag brands above can only be used by one gender. The colors used are usually black, red, blue, orange, and a combination of these colors. The shape of the bag is designed with an opening system from the top so it is troublesome if you want to take items from the bottom. The material used is Nylon fabric which can absorb water but is susceptible to damage because the material density is less than optimal. The SWOT analysis above encourages the emergence of ideas for creating carrier bag designs that can be used longer by selecting better materials with the same function. The design must also make it easier for users to separate items and retrieve them by placing the opening system from the top to the side, with a divider on the bag, which can be adjusted to the level of equipment needs. Another strength of this idea is that it offers designs that can be used by both men and women. The design of this bag aims to ensure that the bag can be used across generations, both men and women.

### 2.2 Design Method

In this design process, design thinking methods are employed and a designer tries to understand and redefine the problems. The design thinking process is a human-centered characteristic to do a strategic innovation in creating values in the dynamic world, or change radically (Hussein 2018). Design thinking is utilized in approaching problems, realizing ideas in brainstorming, creating prototypes,

**Table 1** SWOT analysis IRCO and INFICLO carrier bag. (Source personal documentation)

SWOT	
Carrier bag IRCO	Carrier bag INFICLO
Using Nypon material Bag design without dividers The opening system is above the bag The design cannot be used by all genders Colors used: black, red, orange	Using Nypon material Bag design without dividers The opening system is above the bag The design cannot be used by all genders Colors used: black, blue, red
Strengths – Affordable price – Attractive design	Strengths – more affordable price – variety options
Weaknesses – No custom or special design	Weaknesses – Poor product material quality
Opportunities – Attractive branding can compete with other products	Opportunities – Affordable price increases online market selling
Threats – Competing with other celebrated brands	Threats – Competing with other celebrated brands

and doing trials. It includes ongoing experiments such as sketching, prototyping, doing trials, and applying concepts and ideas. The design thinking process stages are:

#### 1. Empathise

The first step of the design thinking process is to get an empathic understanding in resolving the problems. In the design process, empathy is required to understand novice climbers' needs (particularly the carrier bag) while climbing.

#### 2. Define

In this stage, a designer collects all data from previous stages. The data will be analyzed to define the core problem and to decide the solution which is to design a carrier bag for novice climbers. Also, designers begin to collect ideas to build functions, features, and other elements in solving the problem.

#### 3. Ideate

Following this, the idea development process starts with observing pre-existing carrier bag designs and analyzing them using SWOT to obtain the design value. After all data are collected, the next step is the brainstorming process to identify a new solution for the problem. The solution relates to carrier bag needs for novice climbers.

#### 4. Prototype

Carrier bag alternative prototypes as samples are made in the trial process to give the best solution to the problem. In this step, designers receive inputs to complete prototypes for the final design.

#### 5. Test

The final step is using carrier bag prototypes in a real climbing condition where novice and expert climbers pack their needs and take the bags to climb. The obtained results during the testing phase are used to redefine problems and the objective achievement of the bag design; from packing speeds to item arrangement processes. This step helps the designer to conclude the entire design process.

### 3 Literature Review

#### 3.1 Carrier Bag

Mountain climbing requires a lot of equipment one of the most important ones is the carrier bag (hiking) (Jauhari et al. 2019). Carrier bags can accommodate a wide variety of outdoor equipment such as ropes, nesting, stoves, tents, gas, drinking water, food and so on that climbers need to

meet their needs at the time of the climbing site. The carrier bag is also in a special design by having a fairly large size and height but still has features and design that are ergonomic when used during climbing. The carrier bag design is supported by a lot of supporting components that will make it easy for climbers to carry their equipment. The type of carrier bag is determined by the size of its volume. In a few different volumes, the carrier bag has different features anyway. In general, the carrier bag has several main types, namely the Summit Backpack (25–30 L), Carrier Bag Low (35–50 L), and Carrier Bag Mid (60–70 L). (75–80 L). The role of this bag is selected with a widely used capacity is 70 L, with features of size adjustment that allow men and women to use it so that in one type of product the fulfilment of the needs of men as well as women can be met.

#### 3.2 GORE-TEX Fabric

Gore-Tex is a versatile fabric that can be used as equipment material for all kinds of activities, from outdoor activities to everyday clothes. The material is very strong and lightweight, windproof, waterproof, and breathable. Gore-tex was developed by W. L. Gore-tex in 1969 as the world's first water-resistant and waterproof fabric (Osterwalder 2023). This type of fabric is much better than the Nylon fabric used by most carriers today. Gore-tex has a texture of a small density so that air can still enter through the cracks, unlike Nylon which has a rubber that has fewer chances of air entering, this is related to the level of moisture inside the bag. The material that provides little airway will tend to be moist, which can damage the bag in the long term. Gore-tex fabrics are also thicker when compared to Nylons so Gore-tex can last a long time if compared with Nylone. This type of fabric with such specifications is perfectly suited for the main material in the manufacture of carrier bags that require resistance to various weather conditions especially when it rains, so that the equipment in it is well awake and not damaged. This selection is also based on the durability of the material, easy to repair, and easy to maintain so the life of the bag will also be much longer than the current mountain bag.

#### 3.3 Satin Fabric

In general, satin is made from silk filament threads or artificial fiber like rayon, nylon, etc. Satin that is made from cotton thread and merseered is called sateen or satine (Suliyanthini 2021). Certain advantages of using satin as an inner carrier bag material are not easily eroded, does not easily absorb water, affordable price, aesthetic shiny surface material.

### 3.4 PU Foam

PU Foam has a low-density level and high damping level. This material is used as an inner material for back pads, shoulder straps, and hip belts. Moreover, the foam's memory volumes protect the pressure point on body parts while climbers carry the bag. Within  $\pm 12$  mm of foam thickness, it gives a strong and firm impression (Aksa 2012).

### 3.5 Typography

In general, typography serves legible, readable, and visually appealing letters and words in such a manner to deliver information to the audience (Rustan 2009). Typography types that will be used are thick, flexible, and readable fonts, thus, Orbitron typeface will be used in this project. Orbitron has bold, flexible, and readable characteristics that are represented by its rounded corner sans-serif uppercase letters. Orbitron font styles are perfect to represent the carrier bag as its logo brand.

### 3.6 Colors for Carrier Bag

Most carrier bag colors are natural colors like black, green, and gray. These colors are adapted from military attribute colors to camouflage users from wild animals or crimes. Green corresponds to mountain atmospheres which are synonymous with trees. Black is considered as masculine and mysterious (Savitrie 2011). These impressions are combined with gray—a combination of black and white to add dynamic style.

## 4 Framework for Carrier Bag

The design of this work aims to make it easy for beginner climbers to arrange all the goods and equipment in the carrier bag properly without fear of risks when carrier bags are brought to climb. This product is the hope of society to become more and more easy and interested in the activities of climbing so that humans will be more careful of nature and the environment. Public climbers no longer need to worry if they don't understand how to pack or carry things when going for climbing activities. This work can be a solution to give instructions on how to pack and lay the items to be carried according to the compartment information contained in the design descriptions. This carrying bag also uses support bars made of foam and aluminum so that it is sturdier and more comfortable to use when climbing. The level of comfort in using the bag is tested to achieve the

goal of designing the bag. The design process is carried out through the design thinking approach; Empathise, Define, Ideate, Prototype, and Test.

### 4.1 Empathise

The first step is to gather information from a problem that is considered interesting for finding a solution. The information is obtained from observations on products already on the market to get a strong problem. The products on the market are generally made with confessional forms that do not have a seal to separate the equipment, while the arrangement of the equipment on the bag is very important for novice climbers, as already presented in the background. In addition, the data search was also conducted through interviews with sources to find out the problems faced by climbers, especially novice climbers, as well as the materials and structures of carrier bags commonly used by Indonesian society, to get the best solution in the form of ideas. The idea is a mountain bag that makes it easy for the user to arrange the cargo, with strong materials, not easily broken, and can be used by both men and women, to get an effective design as an approach to sustainable design.

### 4.2 Define

The second phase of this design is the determination of the concepts used as the basis of the design sketch. Through this phase, the concept and design features that accompany the carrier bag design process are obtained. It is also an effort to determine the fusion of each design element used, based on the data that has been acquired. The concept is as follows.

#### 4.2.1 Carrier Bag Concept

The carrier bag is designed for 70 L of capacity with dimension: height 765 mm  $\times$  length 220 mm  $\times$  width 350–368 mm and provided with buckle lock strap and additional external hanger slots. The main components are:

- Carrier bag body: Coretex fabric—height 765 mm  $\times$  length 220 mm  $\times$  width 350–368 mm
- Loading compression strap: bisban straps with velcro. Height and tightness can be adjusted
- Inner bag compartment: metallic silver satin parachute fabric with PU foam and fiber as reinforcement materials.
- Shoulder strap: shoulder strap is the primary part of the bag.
- Side fastening straps: bisban strap with adjustable buckle lock.

**Fig. 1** Chosen scheme colors.  
Source personal documentation



f. Sternum Strap and Hip Belt: bisban straps with adjustable buckle lock.

#### 4.2.2 Color Concept

The first color or the main color for the body back is black #010102 which will give a strong impression of the product. Black also gives camouflage to nature if there is a wild animal attack. Other production reasons are black fabric is easily found and the dark tone disguises blemishes. Following this, gray #b3b3b3 as the secondary color is chosen to give a contrast harmonization in supporting the main color. The third color is blue for the rain cover which serves its purpose as a spotlight, especially during an emergency, so that the other climber can trace its location Fig. 1. Chosen Scheme Colors is the color palette used in making bags.

#### 4.2.3 Ergonomics Concept

To find the suitable size of the carrier bag, users must measure the size of their backs. The size of one's back determines the strength and the limit of how big a carrier bag one can carry. To accurately measure the height of the carrier bag, users must measure the length of the C7 spine to the waist. Most of the weight is supported by the waist, so the base of the bag cannot be lower than the waist Fig. 2. Ergonomic Studies Illustration is an illustration used to explain the ergonomic approach to making bags.

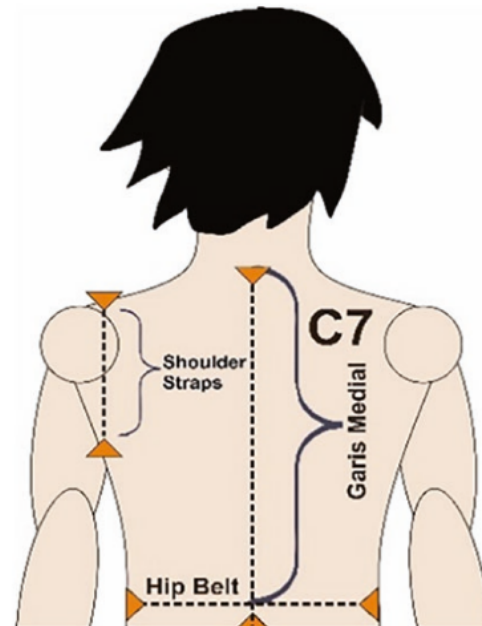
The basis of the measurement and the production of the bag is human anatomy. Based on anthropometric data from 2000–2018, climbers with the age range of 17–23 represent novice climbers (high tendency to try new things), with an average height of 162,15 cm. A competitor study from IRCO and INFICLO, shows that the bestselling size is the 60 L bag and above. Using the data as a consideration, the bag was made using height: 765 mm × length: 220 mm, width: 368 mm. Shown below is the digital illustration of the bag's ergonomic concept for men and women. The illustration shows the fronts and the sides of the bags while being used and stored Fig. 3. Ergonomic Illustration on Human Anatomy is an illustration used to support the

explanation of the ergonomics of the human body to help determine bag dimensions based on male and female body calculations.

#### 4.3 Ideate

This stage is used to obtain a degree of uniqueness from the design of the bag compared to the carrier bag already existing. The Unique Selling Point of this carrier bag design is as follows:

- Inner Bag Compartment to facilitate users in tidying and picking items inside the bag.
- Bag zippers located on the sides make the emergency process of putting items fast.



**Fig. 2** Ergonomic studies illustration. Source personal documentation

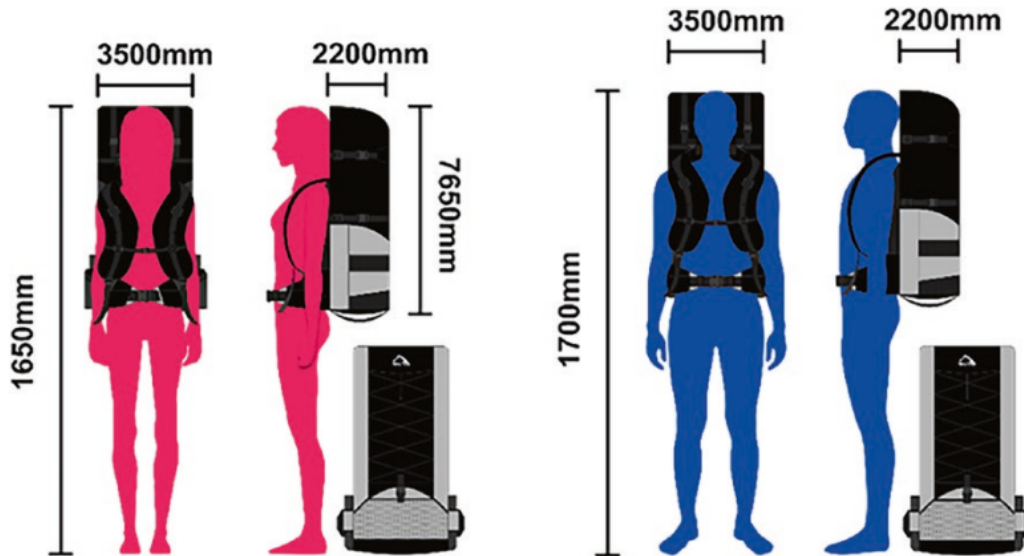


Fig. 3 Ergonomic illustration on human anatomy. Source personal documentation

- Holding nets to hold items when the zippers are opened.
- Visual and text instructions in every compartment.
- Strap external compartments on top and bottom of the bag to hold the tent and mattress respectively.
- Furring net external compartments in front of the bag to keep wet items.
- Rain cover storage on the bag bottom.

#### 4.4 Prototype

The design sketch is based on ideas and concepts, as well as the determination of unique values at the previous stage. It also helps to explain the use of materials and design elements in each piece of the bag. This phase is also the final stage of the design to be tested for the resulting design.

##### 4.4.1 Sketch Design

This sketch is a reference to produce the digital bag design for the final physical bag. A combination of black and light gray with 2 zippers on the right and left sides is applied to facilitate the usability of the bag. There are 2 horizontal buckle locks to adjust the zippers. 2 supporting straps at the bag surface support the external belongings Fig. 4. Carrier Bag Sketch Design is an illustration of the initial stages of making a bag.

##### 4.4.2 Carrier Bag Digital Design

After the drawing sketch, the colors and details of the bag are given in the digital sketch to get an image of the final product. It can be seen that the design elements

combination is correct or has to be changed. This process provides information regarding the material application in each bag part Fig. 5. 3D Digital is an illustration of a bag design in digital form, to provide information on each part of the bag.

##### 4.4.3 Carrier Bag Final Design

The carrier bag is fitted with a load lifter adjuster on the shoulder straps or height adjusters. Users can adjust the backpack height according to users back size, 158–184 cm for men and 147–178 cm for women. The load lifter adjusters have 6 Brisbane straps made of 25 mm Brisbane with 3 heights small, middle, and high. Using this feature will increase the wearability of this bag as it can meet the needs of both male and female users through a single design Fig. 6. Load Lifter Adjuster Digital Illustration is an illustration of a bag feature that allows users to adjust the height of the bag according to their body height.

Figure 7 Carrier Bag Front Side is a picture of the overall front view of the bag. The front side bag has an elastic strap with a crossed stopper to carry external equipment. At the back side, there are haul loops, shoulder straps, hip belts, sternum straps, external straps buckle locks, and rain cover storage guides. Following this, there is a PU foam pad at the waist part to reduce the pressure point when the carrier bag is carried on a hike. At the both right and left sides, 2 compression straps and buckle locks to tighten the bag and hang things. Also, there is an external storage under the bag made from furring fabric to keep clothes or other wet things so they will dry during the climbing. What is more, there are 2 dividing load points of the bag at the



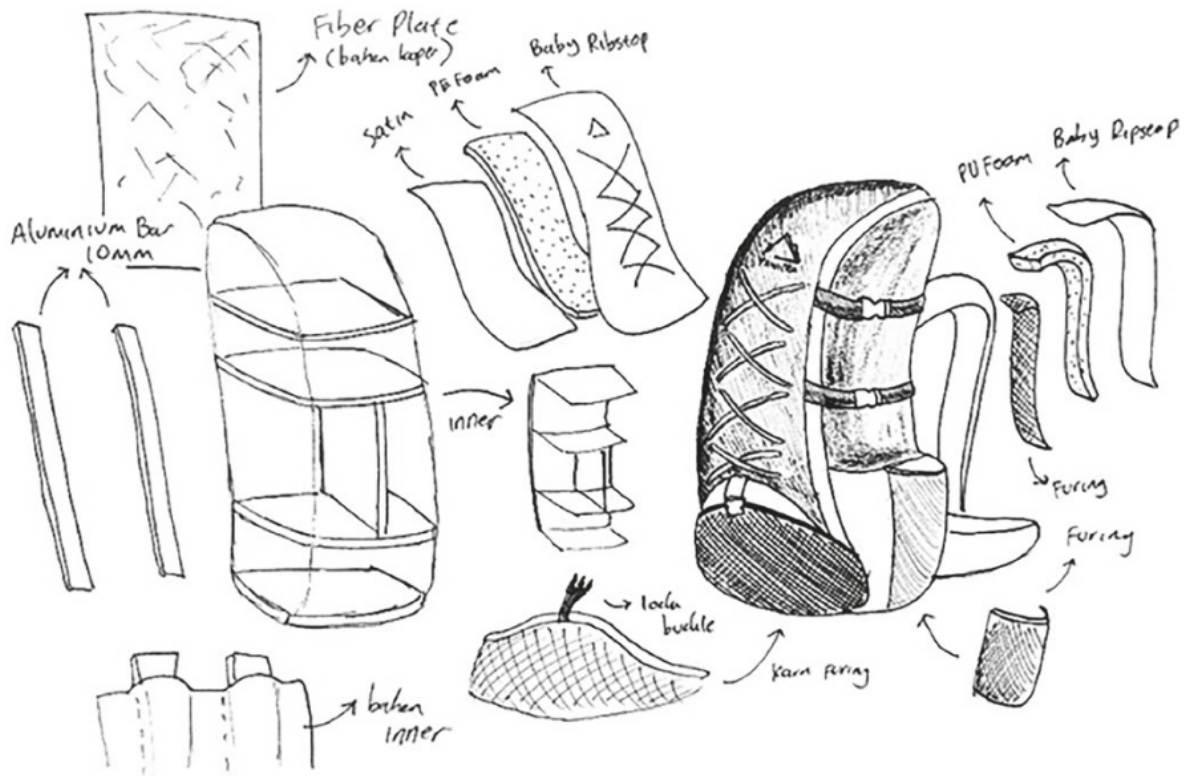


Fig. 4 Carrier bag sketch design. Source personal documentation

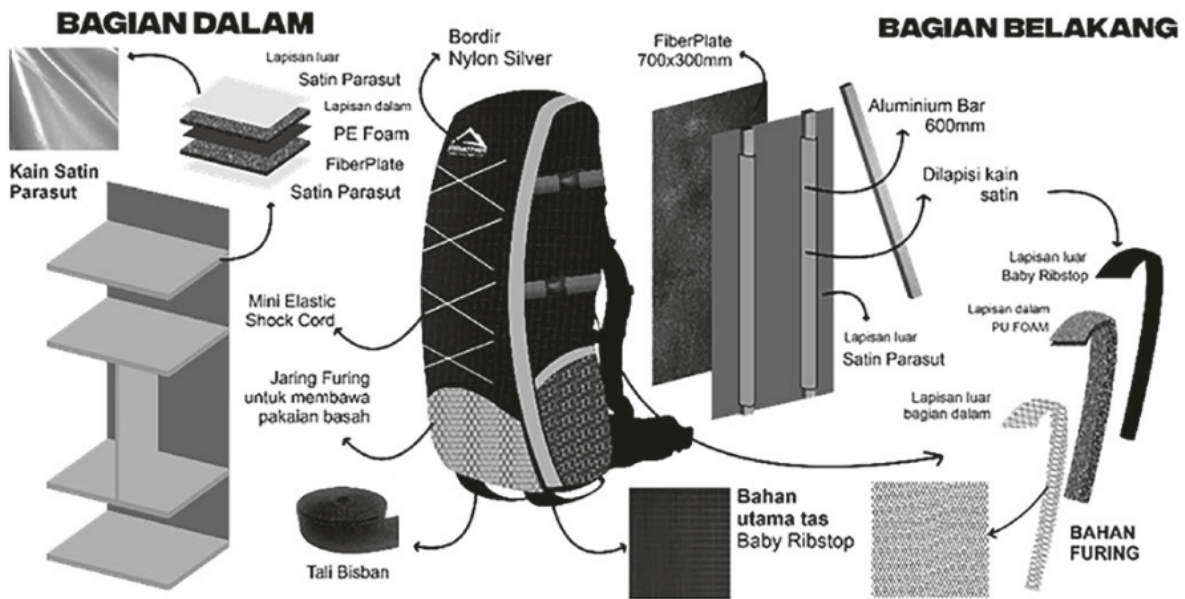
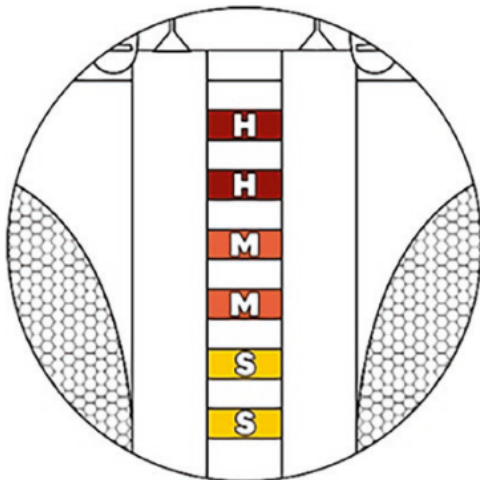


Fig. 5 3D digital. Source personal documentation



**Fig. 6** Load lifter adjuster digital illustration. *Source* personal documentation



**Fig. 7** Carrier bag front side. *Source* personal documentation

shoulders and hips which are shoulder straps with sternum straps and hip belts respectively. A rain cover storage and external straps are under the bag. To highlight the brand's

identity, the logo is placed in the center, at the right side of the shoulder strap, and at the water pocket of the bag where it can be easily noticed. The use of a strong, tightly loosened Gore-tex fabric material that minimizes moisture and easy maintenance can extend the life of the bag. This allows the bag to be removed and used by the next generation, thus reducing the damage caused by the carrier bag production process Fig. 8. Icons and Symbols on Carrier Bag Design (Back, Side, Under parts) is an image that shows the bag from the back, sides and bottom to provide a more detailed picture of the bag

Figures below show the full cargo carrier bag; from the internal to the external storage. There are 4 levels of compartment division levels which have been classified according to the type of goods and the level of emergency. There is a retaining net so that items do not fall immediately when the right or left zipper is opened at a certain angle which causes items to fall and jump out of the bag. This bag is completed with a rain cover in the rainy season. There is an icon on the right side of each part of the compartment that can be used as information about the type of equipment that is arranged and mounted through the block. The rain cover protects most of the body of the bag, except for the sling of the bag, thus allowing the bag to be well protected Fig. 9. Inside Filled Pawitra Carrier Bag and the Rain Cover Application is an image that shows the details of the bag, an example of the arrangement of items according to the icons on the bag, and the appearance of the bag when using a rain cover.

#### 4.5 Test

The trial scheme was carried out by preparing respondents who performed several tests by comparing, how to fold the equipment between the conventional Carrier Bag and the carrier Bag designed. The specified extension indicator is how fast the packing process is in the carrier bag until the bag can be lifted. The result needed is to know how efficient it is when users fill up the contents of climbing goods and equipment using this Carrier Bag in a compartment system compared to conventional Carrier Bags that do not have compartments. In addition, the test is also done with the use of bags in the climbing process that relates to the level of comfort about the proper arrangement of goods. The trial was carried out by collecting a sample of users who met requirements such as age, climbing experience, gender, and the minimum weight limit for those who could use this bag. The minimum body weight that qualifies as a trial sample is 60 kg. This is obtained from the explanation that the safe limit for the weight of a bag that a climber is allowed to carry is 20% of the user's body weight, whereas this bag, when filled, weighs 12 kg. Table 2 Trial Scheme are the

**Fig. 8** Icons and symbols on carrier bag design (Back, Side, Under parts). *Source* personal documentation



**Fig. 9** Inside filled Pawitra carrier bag and the rain cover application. *Source* personal documentation



**Table 2** Trial scheme. (Source personal documentation)

No	Name	Age	Climbing experience	Time indicator		Comfort compared to conventional designs
				Conventional	New design	
1	User 1-male	17	Never	240 sc	75 sc	It's more comfortable
2	User 2-female	20	Never	217 sc	104 sc	It's more comfortable
3	User 3-male	22	Yes	192 sc	72 sc	It's more comfortable
4	User 4-male	24	Yes	200 sc	88 sc	Equal comfort
5	User 5-male	23	Never	382 sc	152 sc	It's more comfortable
6	User 6-male	39	Never	255 sc	103 sc	It's more comfortable
7	User 7-female	44	Yes	204 sc	93 sc	Equal comfort
8	User 8-male	47	Never	267 sc	162 sc	It's more comfortable
9	User 9-male	53	Yes	212 sc	77 sc	It's more comfortable
10	User 10-female	65	Never	318	178 sc	It's more comfortable

results of trials on samples of female and male climbers, novice climbers and professional climbers which are presented in the table.

The results of the trial showed that respondents were able to fold things in this carrier bag faster about 1 min 50 s faster than conventional carrier bags. All respondents also stated that it was more enjoyable and looked neater because of the silver-colored inner bag material, which makes it look brighter and more attractive. There is also a compartment that helps respondents understand the shape, character, and functional sequence of each mountain gear to be carried. Eight out of ten respondents feel a higher level of comfort from using a carrier bag with this compatibility because the goods carried can be customized and arranged as needed compared to a conventional bag. Two the conclusion of this test is, that the presence of an inner bag compartment on the Carrier Bag has succeeded in providing ease of filling, and comfort due to the suitability of the layout of wear equipment as well as education to people who are still familiar with the world of climbing becoming happy and faster to learn about every aspect of each carrier bag component.

## 5 Conclusion

The mountain climbing process is a rather heavy activity that is exciting for the community. Climbers who are new to mountain climbing tend not to understand the equipment and any necessary supplies. Another problem arises when novice climbers are required to put the equipment in a carrier bag. The reckless arrangement and origin allow the climbers not to maximize the usefulness of the carrier bag they own. This allows the climbers to carry excessive loads and have trouble picking up things that are arranged at the bottom. The result of this design process is a carrier

bag that has an inner bag compartment system as one of the most important Unique Selling Points (USP). This bag has a capacity of 70 L with a size height of 765 mm × length of 220 mm × width of 350 mm. This bag is also equipped with a young blue rain cover to protect the bag in the rain. On this carrier bag, some indicators can give estimated information about the goods placed on each existing block so that the climbers can follow the instructions and facilitate their preparation before mountain climbing. This design allows users to feel comfortable in the process of climbing, especially for novice climbers, as it avoids the carrying of excess equipment because each section is equipped with an icon that explains the kind of items needed. This comfort is also obtained from the neat arrangement of the equipment because the inappropriate arrangement can result in inconvenience during use especially at the level of balance which also affects the climbers when using this carrier bag. This is proven through trials that have been adjusted to the requirements for taking correspondence. The design of this bag also allows it to be used for a longer period than conventional bags. This is related to the use of materials used. The durability of the selected material allows this bag to be used for generations to come. This bag can also be used by all genders, both men and women, so that in one design, the needs of different users can be achieved, through a bag system that can be adjusted to suit the body postures of men and women.

## References

- Agustin, H. (2020). *Simpul Dasar, Cuaca Pegunungan, Perjalanan di Gunung: Panduan Teknis Pendakian Gunung*. Hendri Agustin. <https://books.google.co.id/books?id=p8DvDwAAQBAJ>
- Akmal, A., & Prihatin, P. (2020). *Metode Pengembangan Desain Produk Kriya Berbasis Budaya Lokal Desain Kriya, Kriya Tradisional & Aset Budaya Lokal*. Deepublish.

- Aksa, T. (2012). Tas Pesta. PT Niaga Swadaya.
- Ang, M. (2007). Penjasorkes SMA kls 12. Ganeca Exact. [https://books.google.co.id/books?id=xnycn\\_xrVHIC](https://books.google.co.id/books?id=xnycn_xrVHIC)
- Hussein, A. S. (2018). Metode design thinking untuk inovasi bisnis. Universitas Brawijaya Press.
- Irwansyah. (2007). Pendidikan Jasmani. PT Grafindo Media Pratama. <https://books.google.co.id/books?id=GeysAAIesaQC>
- Jauhari, A. Al, Riyanto, D. Y., & Adrianto, Y. R. (2019). Pengembangan Desain Produk Carrier Bag dengan Solar Cell yang Ergonomis Bagi Pendaki Gunung (Studi Kasus : Gunung Semeru Jawa Timur). *Jurnal Art Nouveau*, 8(1), 64–74.
- Julianti, S. (2017). A Practical Guide to Flexible Packaging. Gramedia Pustaka Utama.
- Mukholid, A. (2007). Pendidikan Jasmani Olahraga & Kesehatan. Yudhistira Ghalia Indonesia. <https://books.google.co.id/books?id=nxEHROzQDGUC>
- Nourse, A. E. (2023). Tindakan Medis Lintas Alam: Panduan untuk Pramuka, Palang Merah Remaja, Pecinta Alam dan Tim Sarung. Nuansa Cendekia. <https://books.google.co.id/books?id=oWm2EAAAQBAJ>
- Osterwalder, A., Y. P. F. E. A. S. (2023). THE INVINCIBLE COMPANY (Strategyzer Series: Business Model Generation, dll). Elex Media Komputindo. <https://books.google.co.id/books?id=CMaoEAAAQBAJ>
- Rustan, S. (2009). Mendesain LOGO. PT Gramedia Pustaka Utama. <https://books.google.co.id/books?id=JbD35k0TLfQC>
- Savitrie, S.(2011). Kamar Tidur Utama. GRIYA KREASI. <https://books.google.co.id/books?id=Rn2KCgAAQBAJ>
- Suliyanthini, D. (2021). Ilmu Tekstil - Rajawali Pers. PT. RajaGrafindo Persada. <https://books.google.co.id/books?id=iM8aEAAAQBAJ>

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