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SMART MULTI-PURPOSE DISASTER MANAGEMENT KIT CONFIGURED BY DESIGN THINKING APPROACH FOR COMMUNITY USE

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ABSTRACT

A disaster is natural or man-made phenomenon that adversely affects life, property, living things, structures, or industries that often lead to lasting changes in human societies, ecosystems, and the environment. It may be impossible to avoid disasters, but it is possible to plan how to minimize the impact that any given disaster might have on a family's health, safety, and property. Disaster preparedness is an ongoing and integrated program that comes from a variety of activities and resources like increasing efficiency, effectiveness, and impact of emergency response measures at community, national, and organizational levels. Now everyone saw a flood situation in Maharashtra. In such an emergency, the right supplies must be on hand. The Disaster Management kit can help people survive after a disaster occurs. Disaster Management Kit is invented first time in India. This innovation will replace the locally available kit with a manufactured smart multi-purpose disaster management kit. The Disaster Management Kit is the concept of various higher Disaster Management Authority. The designing process has taken into consider the time after the disaster, the nature of the disaster, and the intensity of the disaster. Disaster Management kit is an innovative bag to accumulate more than 13 no's compartments. Kit has one fully water-tightened compartment for keeping documents safe. The person who carries kit is tracked by using a GPS at any time at any location in the World. One important aspect is the first aid box is covered with advanced tablets and medicine whose expiring date must be periodically checked. Disaster Management Kit is a lightweight and compact kit for multipurpose use during a disaster. This kit perfectly analysis the volume and the load concerning a person carrying the load, distributing the weight evenly across the body is key to finding a backpack that is comfortable to carry. During an emergency, it can be crucial to have your hands free. The Disaster Management Kit offers this benefit, allowing you to focus on important tasks without being hindered.

Keywords: Disaster kit, emergency preparedness, Multipurpose kit

INTRODUCTION

India is susceptible to numerous natural and human-made calamities. About 58.6 percent of its landmass is exposed to moderate to very high intensity earthquakes.; Over 40 million hectares (12 percent of the earth) are under risk of flooding and river erosion, and about 5,700 kilometer of the 7,516 kilometers of shoreline are in danger of storms, earthquakes and tsunamis. Drought threatens 68 percent of the agricultural land, and landslides and avalanches threaten steep terrain. Disasters may not be preventable, but they can be planned for to have the least amount of negative effects on property, society, and safety. Everyone is now aware that Maharashtra has experienced flooding for the past three years. The appropriate supplies must be available in such an emergency. Floods and river erosion can occur on over forty million hectares (12 percent of the world's land area); there are 7,516 km of shoreline and nearly 5,700 km of rivers.

The process of designing and developing is outlined in the study of The Disaster Management Kit. The Disaster Management kit can help people survive after a disaster occurs. Being ready helps lessen the stress, grief, and fear that comes with calamities. Proper preparation can help you, your family, and your property stay as safe as possible. These steps include getting the right types of insurance, setting up a set of disasters and necessities, planning a disaster and practicing with society, and staying informed.

OBJECTIVES OF THE INVENTION

In order to boost involvement, awareness, and preparedness in emergencies and to improve people's chances of survival, this study will create a disaster management kit for them. The study specifically seeks to

1) To understand and design a kit after discussion with Disaster Management Authorities such as MCGM, and BMC for local, rural, State, and National level requirements.
2) To design economic disaster management kit models for different requirements at Offices, Homes, Industries, Public places, etc.
3) To design a lightweight, compact, multi-purpose reusable, sustainable, and eco-friendly Disaster Management Kit using engineering tools (multi-purpose tools) and techniques.
4) To identify and analyze content in the disaster management kit for disaster risk reduction strategy**.**
5) Objective of the survival kit is not used only in disasters but also in our daily life, the example we all are dealing with a construction site, in case of emergencies, we can use a survival kit also.
6) Adding a life jacket to the kit is very useful in floods and makes the kit Portable.
7) To design a kit with a GPS tracking system.
8) To choose the optimal design in light of this assessment.

PROBLEM STATEMENT

- Now everyone saw a flood situation in Maharashtra for the last few months. In such an emergency it is necessary to have the right supplies on hand.
- The disaster management kit can help people survive after a disaster occurs. Being ready reduces the stress, worry, and losses that come with calamities.
- People are able to reduce the effects of disasters if they are prepared for extreme weather conditions or any disasters that may occur in their area, that include cyclones, earthquakes, flooding, and landslides.
- A person must be ready to survive on their own for at least three days (72 hours). This could entail being responsible for one's own shelter, healthcare, food, water, and hygiene.
- For days or even weeks, basic services including water, gas, electricity, sewage treatment, and telephones may be disrupted.
- During an emergency, we may not have time to go shopping or look for the things we need. You and your family can stay safe and survive a disaster with the aid of emergency survival kits.

DESIGN INPUTS

The study takes into consideration of the vital elements of the disaster management kit and assesses the volume of the load per person to carry the burden. The disaster management kit should have 3000 ml of water, food, essentials, safety comfort, sanitation, cooking/paper utensils, a first aid box, tools and supplies, and other miscellaneous items, according to recommendations. All of these products will together weigh about 6200 grams.

PROJECT DEVELOPMENT

Fig. 1 depicts the project creation procedure and lists the goals, limitations, requirements, and functions of the design. The load capacity of the bag must correspond to the highest lift capacity per person. The cheapest and most long-lasting material on the market can be produced as fabric. For simple use/lifting, it should feature a backpack or cross belt.

The research aims to determine what is required in the kit and how we can offer it to the field of preparedness kits. Building a disaster management kit using cost-effective methods and resources is the second phase. The

specified disaster management kit is constructed in the third step, and the design is assessed using a variety of criteria (cost effective, safety in the environment, and psychological aspects) in the fourth. This stage comprises giving information on production costs, accounting for energy consumption over the course of the product's life, considering the safety of the materials, and considering the item's lifting capacity. Selecting the best design based on assessments is the project development process's final and fifth phase.

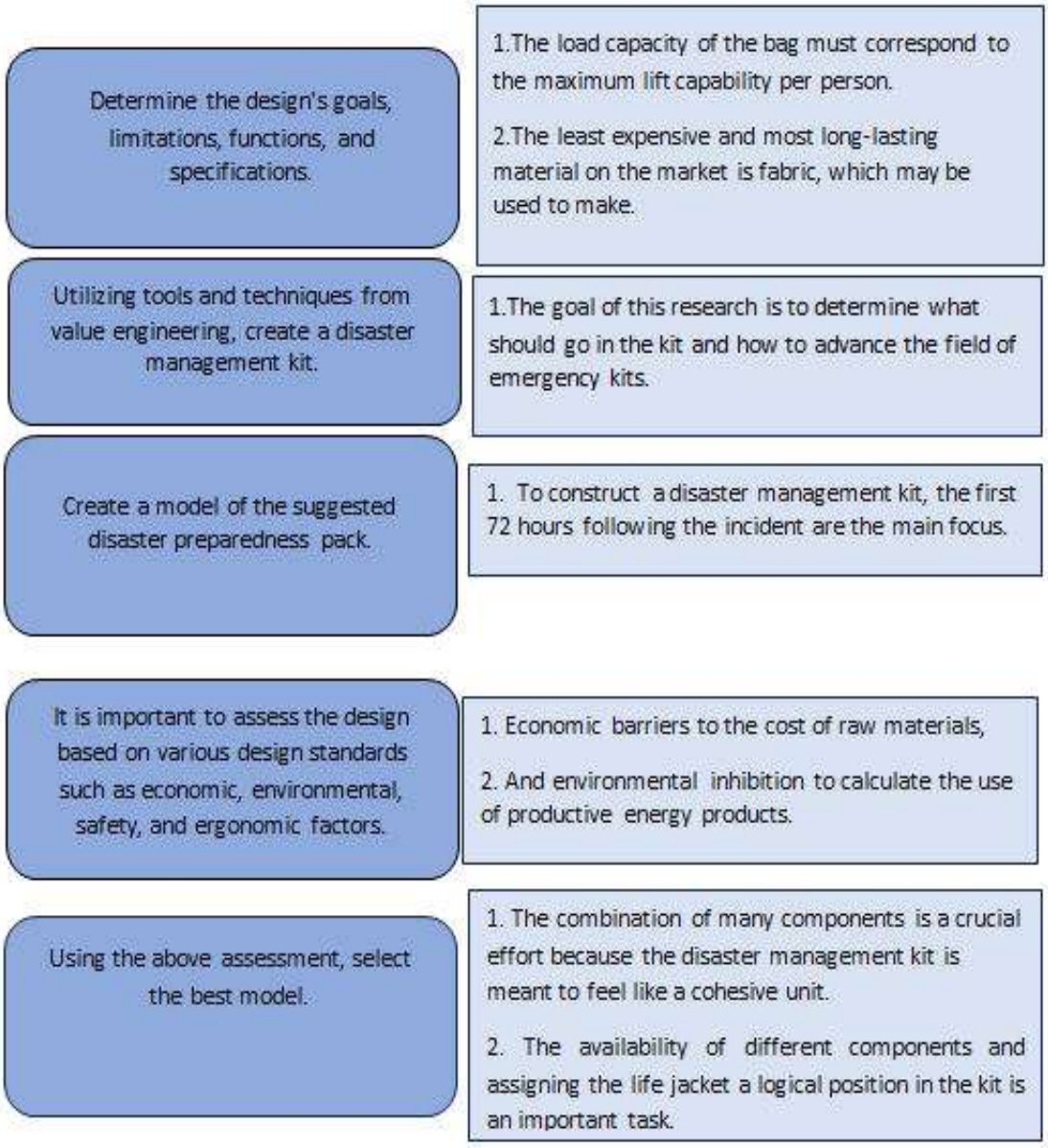


Fig 1: Process for Project Planning and Implementation

METHODOLOGY

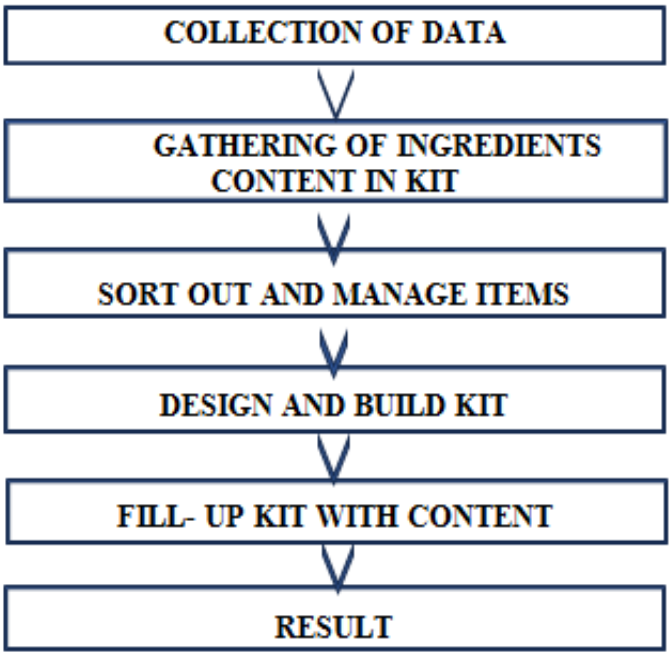


Fig 2: Proposed Methodology

COLLECTION OF DATA

For investigating more specific detailed information about the Disaster Management Kit concept like current emergency kits, Life jackets, elements, and other subcategories of Disaster Management Kit items

For the gathering of data collection, visited the City Institute of Disaster Management, disaster control canter of BMC, Director of the Disaster management cell of BMC, and also various District Disaster Management Organizations (DDMOS).

Fig 3: Emergency Kit model by BMC

Fig 4: Safety management in flooding situation with locally available kit.

Fig 5: Sample Kit model presenting at BMC office.

GATHERING OF INGREDIENTS CONTENT IN KIT

We wanted to understand more about exactly what a disaster management kit should contain after adopting the concept and conducting more research. A disaster management kit is an accumulation of essential supplies that our family might require in a time of disaster. Based on previous divisions within the lists and logical connections between items, the following categories were utilized to classify the items: food, water, medical care, sanitation, garment, everyday items, instruments, particular needs, and personal important documentation.

Table 1: Primary Item

Sr. No.	ITEM	COST	WIGHT (GRAM)
1	Water	40	2000
2	Food	200	500
3	Toothpaste/Brush	30	55
4	Whistle	20	10
5	Candle	40	250
6	Matchbox	2	20
7	Lighter	10	30
8	Flashlight	50	100
9	Emergency Contact Number Diary & Pen	20	50
10	Phone Charger	300	50

11	Extra Batteries	60	300
12	Wire Rope/Rassi	50	200
13	Cotton	40	5
14	Bandage	40	5
15	Medicine	300	15
16	Medical Tape	40	5
17	Baam	60	50
18	Sizer	50	100
19	Knife	50	70
20	Wrench	250	250
21	Screwdriver Set	200	200
22	Insulation Tape	20	20
23	Hex saw Blade	20	10
24	Cutter	60	100
25	Safety Pin	10	5
26	Rubber Band	20	10
27	Needle Thread	20	5
28	Cash	500	20
29	Towel	150	200
30	Paper Soap	20	15
31	Bag	500	300
32	Tissue Paper	150	50
33	Dust Mask	20	20
34	Hand Sanitizer	50	50
35	Paper Cup, Plate, Plastic Utensils	150	100
	Total	**1352**	**3745**

Table 2: Secondary Item

Sr. No.	ITEM	COST	WIGHT (GRAM)
1	Can Opener	10	20
2	Local Mas	50	10
3	Waterproof File Folder	80	100
4	Hand Crank Radio	1000	150
5	Rain Coat	575	300
6	Life Jacket	695	190
7	Blanket/Bedsheet	260	500
8	Gloves	50	30
9	Eye Protection Glass	100	30
10	Fevicol/Glue	10	50
11	Safety Flares	500	150
12	Safety Booklet	702	46
13	Fire Extinguisher	400	250
14	Game/Puzzles/Book	200	100
15	Foldable Tent	500	500
16	Power Bank	250	250
17	Sleeping Bag	1499	1200

18	Air Pillow	149	100
19	Life Straw	1290	46
20	Folding Stove	1153	450
21	Plastic Sheet	100	800
22	Solar Light	1882	140
23	Inflammable Boat	2250	3180
24	Magnitude Compass	190	150
25	Face Shield	50	5
26	Thermometer	150	20
27	Oximeter	699	20
28	Blood Pressure Checkup, Stethoscope	1499	100
29	Knee Support	50	20
30	Cramp Painkiller Spray	200	100
31	Creep Bandage	100	30
32	Cramp Painkiller Tube	120	50
	Total	**5382**	**2526**

Collected Items: -

1. Essential Items
2. Safety Comfort
3. Sanitation
4. Cooking/ Paper Utensils
5. Medicine / Tablets
6. Tools and Supplies
7. Other

Fig 6: Collected Item

SORT OUT AND MANAGE ITEMS

It is the only item that is taken in an emergency and gives the user peace of mind knowing they can take charge if necessary. The disaster management kit responds to particular requirements in various contexts. The basic requirements are attended to before the kit is divided into four different categories.

The time before and after setting up camp is referred known as the "move."

Discuss how to obtain and distribute information.

Live describes a person's awake and active hours.

The necessities that we meet to allow the user to sleep in the shelter are referred to as sleep.

- Sort out the collected content as per primary and secondary requirements.
- In the primary case, the items that must include water, food, a first aid kit, a charger, a candle matchbox, a whistle, etc.
- Secondary ingredients depend upon types of disasters.

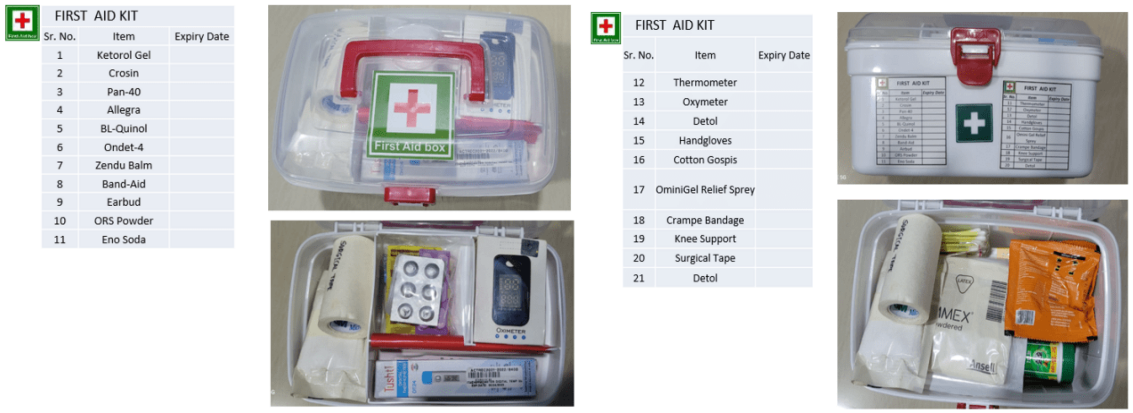
Example: Life Jacket, Raincoat, Blanket

Food/Water/Energy Drink

- Dry Fruits
- Biscuit's
- Chocolates
- Granulated Sugar
- Water – 3.5 ltr
- Energy Drinks

Fig 7: Food/Water/Energy Drink

First Aid Kit



FIRST AID KIT

Sr. No.	Item	Expiry Date
1	Ketorol Gel	
2	Crosin	
3	Pan-40	
4	Allegra	
5	BL-Quinol	
6	Ondet-4	
7	Zendu Balm	
8	Band-Aid	
9	Earbud	
10	ORS Powder	
11	Eno Soda	

FIRST AID KIT

Sr. No.	Item	Expiry Date
12	Thermometer	
13	Oxymeter	
14	Detol	
15	Handgloves	
16	Cotton Gospis	
17	OminiGel Relief Sprey	
18	Crampe Bandage	
19	Knee Support	
20	Surgical Tape	
21	Detol	

Fig 8: First-aid Kit

Personal Hygiene Item

Fig 9: Personal Hygiene Item

Tools & Tackle

Fig 10: Tools & Tackle

Plastic Utensils

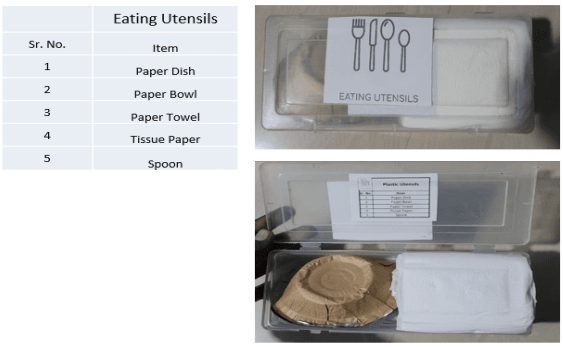


Fig 11: Plastic Utensils

Power Tools

Fig 12: Power Tools

DESIGN AND BUILD KIT

A backpack is suitable for carrying when the study takes into consideration the materials that must be included in the bag of the disaster survival kit and analyses the volume of the load in relation to the per person carrying the load.

Additionally, it frees up the hands, which is crucial in an emergency. With more weight, it is crucial to consider how the weight is placed in a backpack. In order to compare format, volume, and compartments, we looked at existing backpacks.

Design

It is the initial step in process of Manufacturing the bag.

We made alterations to meet the size and shape specification while keeping in mind the practical and ergonomic principles.

We decided that the optimal dimensions of the Kit are length 60 cm, breadth 40 cm, height 20 cm.

Design Requirements: -

Sr No.	Specification	Requirement
1	Required stiffness / Strength	High
2	Wight of Kit	6200 grams

3	Water Resistant	Complete
4	Tear Resistant	High
5	Estimated Lifetime	5 year
6	Allowable Cost	5500 INR

Table 3: Design Requirement

Choosing Materials: -

- Kit must support more weight and provide adequate resistance.
- The most common material chosen for this design are natural polymer fabrics polyester.

1. Polymer Fabric- Polyester (PVC coating)

Pattern- Plain Dyed

Colour- Blue

Usage – 3.2-meter square.

2. Knitted Fluorescent Green Polyester Mesh

Fiber Cross Section - Hollow Filament

Physical Feature - High Strength

Color- Fluorescent Green

Usage – 1.1-meter square.

3. Zip – Steel zip slide runners

Material- Nylon coil teeth, TPV waterproof tape

Colour- Blue/ Silver

4. Buckles Clips

Material-High quality poly propylene

Passed 5000 inserting and removing tests.

Colour- Black

5. EPE Foam

Water Resistant- 100%

Bouyancy-100 N

Colour- White

Cutting of Fabric Material: -

The polypropylene fabric is cut into shapes of specific measurements.

The specific measurements are determined by taking consideration of material inside into the kit.

The location of items by which the measurements is ensure exact length for each cut size.

Fig 13: Cutting of Materials.

Sewing

At this stage, the various pieces that different sizes including both the square and rectangular polypropylene fabric as well as the heavier lifting loop strips are put together with a sewing machine.

Fig 14: Sewing

Building the Kit with Life Jacket: -

Specification:

- Material- Knitted Fluorescent Green polyester mesh**.**
- Water Resistant- 100% EPE foam
- Size - 40''-60''
- Suitable for users aged 10 and above.
- Buoyancy- 90 N
- 3 quick-release buckles for fast dress and removal.

Fig 15: Disaster Management Kit

FILL-UP KIT WITH CONTENT

- Pack a Disaster Management kit as per primary and secondary requirements of items.
- Be sure to pack enough food, water, and supplies for each member of the family to last at least three days.
- Keep the Disaster Management kit in an easily accessible place at home, or at work.

Fig 16: Filled Disaster Management Kit

Fig 17: Front View of Disaster Management kit

RESULTS

A disaster management kit is a collection of equipment developed to assist people to cope in an emergency.

A disaster management kit, also referred to as a survival kit, 72-hour kit, or personal emergency relocation kit, is a portable kit consisting of supplies that would enable a person to escape or evacuate safely from a disaster like a hurricane, earthquake, or flood while remaining alive for 72 hours.

The most effective disaster preparedness kit gives you the ability to handle any event.

Fig 18: Disaster Management Kit

CONCLUSION

- Certain portable necessities are required in the event of an evacuation. The term "Disaster Management Kit" refers to a collection of necessary materials that may be quickly packed. Make sure that every individual has a disaster preparedness kit at home and at work.
- The right disaster management kit helps people deal with a wide range of disasters and provides emergency preparedness.
- Disasters can be prevented or their consequences reduced with the right planning and preparation, including assessment and identification of the appropriate kit items.
- Having a Disaster Management kit is an important step in preparing and protecting our family from unforeseen events
- It is a good idea to always keep the Disaster Management kit in a convenient location known to everyone at home, the office.

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