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# Using Cost Effective Natural Fibre to Build Environment Friendly Brick

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**Abstract** Now-a-days the world is having immense threat of global warming due to bad impact of CFC emission in the earth. It is a well know fact that air conditioner plays a crucial role in this development. Fortunately, there is a growing trend of corporate-social responsibility to mitigate this problem by designing more environmentally sustainable product. In this paper, we provide the theoretical analysis of making an environment friendly brick by the use of natural fibre, jute, which is as strong as normal brick and a possible competitor to the air conditioner. Our proposed product, jute based brick can help in the movement of reduced CFC emission, which is also very cost effective.

**Keywords** Chlorofluorocarbon, Global warming, Environment friendly, Natural fibre, Jute, Innovative Product development

## 1. Introduction

During the process of developing a new product, consciously or unconsciously, a number of decisions are made that affect the environment, thus making a product not only for the technical performance and economic performance but also for the environmental impact of a product. The greenhouse gases i.e. carbon dioxide, methane, nitrous oxide, ozone and chloro-fluoro-carbon (CfC) are responsible for altering the global climate. Scientists believe that this effect may be the result of the temperature rise of 1.5 to 5.5 degree Celsius by the middle of this century. The necessity [1] of environmental friendly product is a crying need in the world. Now a days the world is having immense threat for the global warming effect so, we need to produce those kind of product which will be environmental friendly and sustainable. As a matter of fact we are focusing to produce our product by natural fibre to compete against the air condition in the global market. Previously we have got the knowledge about the emission of green house gases for the use of [2] air conditioner and refrigerator.

**Reason behind using jute fibre to form our product:**

As per the previous and recent resources we have known that after the Coir fibre Jute is the most cost effective natural fibre [3] in the world but the use of jute fibre in the modern aspects is hardly be seen.Reasons behind the selection of [4] Jute fibre:

- Jute fiber is 100% bio-degradable and recyclable and thus environmentally friendly.
- It is the cheapest vegetable fiber procured from the bast or skin of the plant's stem.
- It is the second most important vegetable fiber after cotton, in terms of usage, global consumption, production, and availability.
- It has high tensile strength, low extensibility, and ensures better breathability of fabrics.
- It helps to make best quality industrial yarn, fabric, net, and sacks. It is one of the most versatile natural fibers that has been used in raw materials for packaging, textiles, non-textile, construction, and agricultural sectors. Bulking of yarn results in a reduced breaking tenacity and an increased breaking extensibility when blended as a ternary blend.
- Advantages of jute include good insulating and antistatic properties, as well as having low thermal conductivity and a moderate moisture regain. Other advantages of jute include acoustic insulating properties and manufacture with no skin irritations.
- Jute has the ability to be blended with other fibers, both synthetic and natural, and accepts cellulosic dye classes such as natural, basic, vat, sulphur, reactive, and pigment dyes. Jute can also be blended with wool. By treating jute with caustic soda, crimp, softness, pliability, and appearance is improved, aiding in its ability to be spun with wool. Liquid ammonia has a similar effect on jute, as well as the added characteristic of improving flame resistance when treated with flame proofing agents.

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**Relation of eco- friendliness and the corporate social responsibility:**

Previously we have mentioned that our intention is to produce an environmental friendly and cost effective product. The word environment friendly is very much close towards the word [5] ECO friendly. Eco-friendly means the things which is not harmful for the earth or the product which is really environmental friendly. It is uniformly refers to the items that intend to green living and that helps to conserve the resources like water and energy. Environmental friendly items also contributes to air, water and land pollution. We can engage in environmental friendly practices by being extra conscious of how we use our resources. In our product we tried to find out the advanced use of jute fibre with a high technological impact. Our product will be much more cost effective and environmental friendly than air condition. Currently the use of bricks in the building hardly be seen to secure the impact of global warming effects for the future generation but we have always in our mind to produce a product, which will be able to decrease the global warming impact from the world to achieve the environmental sustainability. Our intention is to show that corporate social responsibility that defines the [6] environmental sustainability.

**Purpose and the approach of the project:**

- To form a new innovative product by a eco friendly and natural material.
- To introduce a new eco-technology for maintaining the room temperature constant on 25 degree Celsius.
- To decrease the use of existing technology against controlling the temperature.
- To be a leader in the market position.
- To introduce a cheap but productive material against the highest innovation of technology.

**Objectives:**

- To make economical and eco-friendly product by Jute fibre.
- To reduce the use of machine and the reduction of CFC.

The word environment is very much close towards the word [5] ECO friendly. Eco-friendly means the things which is not harmful to the earth or the product which is really environmental friendly. It is uniformly refers to the items that intend to green living and that helps to conserve the resources like water and energy. Environmental friendly items also contributes to air, water and land pollution. We can engage in environmental friendly practices by being extra conscious of how we use our resources. Usually air condition is the competitive product and it is very much famous for those countries whose are having the high temperature and at a stake very low temperature. If we want to define this product then it can be called as the process or a device that lower or higher the temperature to achieve more favourable conditions to an occupied space to feel comfort.

**Content of our paper:**

In our report there are two major sections like product development section and cost calculation. PDS is made of idea screen, conceptual design and rating calculation of technology and cost effectiveness of the product. In the cost calculation section we have decorated the costing in three different tables like: table 1 (fabric consumption), table 2 (material cost) and table 3 (Cost of manufacturing). In the product development section we have tried to show how to develop our product and in the costing section we have tried our best to make a cost comparison of our product with the competitive product air conditioner.

## 2. Related Works

Now-a-days people who belong the world gradually facing a great problem i.e fast depletion of our natural resources due to mechanization and high demand of materials for construction. If it continues like this it will really become a great problem and it is affecting our environment to a great extent i.e. drastic climate change. Hence it is high time to go for alternate building materials especially for sand, stone aggregates, stone, brick etc. In the recent past the Spanish and Scottish researchers have added wool fibres to the clay material used to make bricks and combined these with an alginate, a natural polymer extracted from seaweed. The result is brick that are stronger and more environmentally-friendly, according to the study published recently in the journal Construction and [7] Building Materials. We all know wool is a natural fiber but which is much more expensive than jute fibre. In the recent research of Spanish and Scottish researchers there was no information of the bricks to be used with more technological index.

Previously we have got the idea of making [8] Green Building. There people tried to reduce the use of power to achieve environmental sustainability which is very much important for corporate social responsibility. One of the famous e-retailer Alibaba is an example for the buying and selling place of fibre made jute brick. Alibaba made us much more enthusiastic to know the marketing and selling knowledge [9] from itself. World Academy of Science, Engineering and Technology has made a research in the ground of natural fibre inclusion in clay bricks and the author was Mr. Chee-Ming Chan in 2011. This study examined the physical and mechanical properties of clay bricks made by adding two natural fibres to a clay-water mixture with baked and non-baked conditions. In 2013 there was a publication by Hindawi for the experimental behavior of natural fiber based composites used for strengthening masonry structures. That gives us the knowledge of how to strength a fibre to form [10] strong product. Recently in a reputed online news journal called "The Constructor'' has published "ECO Friendly building materials" for the betterment of the future development of civil engineering. Here we have the knowledge of how we can differentiate the eco friendly materials, categorization, source of materials and also with

the [11] environmental impact. Here we have also the knowledge of using bamboo which is a natural material. Using of bamboo encourages us to use Jute as a natural fibre to make our product.

In our report we tried to make our product by jute fibre and which is a natural fibre also the brick which to be made has also a great technological index. These bricks can perform also as the alternative use of air condition in the building inner face. Our jute made brick will much more environmental friendly because it is made of one of the most [3] cost effective natural fibre and it also reducing the emission of CFC. Our intention is not only to make a product which has a great cost effectiveness and technological index but also to maintain the corporate social responsibility that defines the [6] environmental sustainability.

## 3. Product Development

At first we have to select the yarn which will be perfect for our product. For our product we have selected Jute fibre to produce the yarn. After having the yarn from Jute fibre we have to produce the fibre as a woven fabric from weaving procedure. Then we can use epoxy resin in the produced fabric and add the thermal conductive materials called silver flakes with the fabric. Then we will have the finishing of the fabric and laminate the fabric to add the phase changing material Parafin. At the last we have to shape the fabric to make our product and further marketing aspects.

Here is the flow chart of our product development:


**Figure 1.** Product development procedure before marketing

For the innovation of new product development we have selected the jute yarn because it is famous as a cost-effective natural fibre. We also focused for the environmental impact of our product. We used the natural weaving process as a concern of cost effectiveness of our product. To increase the strength we have used the epoxy resin because we are not only focusing the environmental impact but also the physical strength of our product as a brick. Silver flakes as a thermal conductive material we can have the performance of thermal productivity. For finishing we are using laminating process because it has both cost effectiveness and technological index. We are also using paraffin as a phase changing material for the better insulation system. Shaping of the product as like as brick is also important for us. At last we can have our product and via intellectual knowledge and with the promotional activity we can launch exceptionally a very good product which have also an excellent eco-friendly impact. Environmental friendliness is also a special identification of our product. We hope our product will be the most innovative product in the upcoming market and hope that we launch it very soon.

**Idea Screening:**

With list of the potentiality of the new product ideas are required to decide which ideas to select and which to discard. In relation to the competition, existing products, their shortcomings, and the existing needs of the market. Drawing the list of customer needs need to be developed and the areas for product improvement very much needed to make sure in the identification. For calculating the idea screening we have selected seven new product success factors. We have selected the

relative importance of the factor as per our assumption and the sum of the all importance factor is 1.0. Company strategy selected the importance 0.2, market chances 0.2, financial resources 0.15, Distribution channels 0.1, Production capabilities 0.15, R&D 0.1, Supplier assistance 0.1. On the other hand the fit between product idea and company capabilities chronologically 0.0 towards 1.0. The lowest level not to cross the limit for Company strategy 0.5, market chances 0.6, financial resources 0.4, Distribution channels 0.2, Production capabilities 0.5, R&D 0.1, Supplier assistance 0.

The Idea ratings= A*B (Relative Importance *Fit between Product idea and Company capabilities) and the summation of the Idea rating = 0.765 for our product.

| New product | (A)Relative Importance | (B)Fit between product and company capabilities | | | | | | | | | | | Idea Ratings (A*B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | |
| Company strategy | 0.2 | | | | | | ⇨ | | ⊗ | | | | 0.14 |
| Market chances | 0.2 | | | | | | | ⇨ | | ⊗ | | | 0.16 |
| Financial resources | 0.15 | | | | | ⇨ | | | | ⊗ | | | 0.12 |
| Distribution channels | 0.1 | | | ⇨ | | | | | ⊗ | | | | 0.07 |
| Production capability | 0.15 | | | | | | ⇨ | | | | ⊗ | | 0.135 |
| Research and Development | 0.1 | | ⇨ | | | | | | ⊗ | | | | 0.07 |
| Supplier assistance | 0.1 | ⇨ | | | | | | | ⊗ | | | | 0.07 |
| Total | 1.0 | | | | | | | | | | | | 0.765 |

**Figure 2.** Idea rating of new product

## Conceptual design:

The conceptual design and the solution principal of the new product is given below chart description. We have tried to identify the sub-tasks with solution principals of our conceptual design. We have mentioned the sub-tasks with relative importance. We have made our choice from the solution principals then we connected with the choice solution principals by drawing lines. We have made 2 choices like BBACABD & BDBADDA.

| Sub task | Relative importance | Solution principles to sub task | | | | First choice | Second choice |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| Yarn material | 0.2 | Carbon | Jute | Flax | NettleFibre | B Jute | B Jute |
| Type of fabric | 0.1 | Nonwoven | Woven | Weft knitting | Warp knitting | B Woven | D Warp knitting |
| Fabric strength increasing material | 0.1 | Epoxy resin | Gorilla glue | Elmer's | Title bond | A Epoxy resin | B Gorilla glue |
| Thermal conductive material | 0.2 | Copper | Aluminum | Silver | Concrete | C Silver | A Copper |
| Finishing of fabric | 0.1 | Laminating | Polyurethane coating | Traditional hydrophobic finishing | Nano finishing | A Laminating | D Nano finishing |
| Phase changing material | 0.2 | Heneicosane | Parafin | Nonadecane | Eicosane | B Parafin | D Eicosane |
| Shaping | 0.1 | Moulding | Soldering | Auto tailoring | Glue | D Glue | A Moulding |
| Summation | 1.0 | | | | | BBACABD | BDBADDA |

**Figure 3.** Conceptual design of new product

**Calculation of the rating for cost effectiveness:**

Here we have selected two options and we will try to find an option is relatively greater than another option for the cost effectiveness factor. Here Option 1>Option 2 and Option 1 holds the assumption of value for Jute 0.9, Woven fabric 0.7, Epoxy resin 0.8, Silver flakes 0.7, Lamination 0.7, Parafin 0.7 and Glue 0.8. Here option 1 indicates with green color and option 2 indicates with blue color. Option 1 = BBACABD and Option 2 = BDBADDA. The subtask are the previous selected yarn material, type of fabric, fabric strength increasing material, thermal conductive material, finishing of fabric , phase changing material, shaping.

| Sub task | Relative importance K | Rating calculation of solution principles for **(Cost effectiveness)** | | | | First choice (Rating calculation = Rating *K) | Second choice (Rating calculation = Rating *K) |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| Yarn material | 0.2 | Carbon 0.7 | Jute 0.9 | Flax 0.6 | NettleFibre 0.6 | B Jute (0.9*0.2)= 0.18 | B Jute (0.9*0.2)=0.18 |
| Type of fabric | 0.1 | Nonwoven 0.5 | Woven 0.7 | Weft knitting 0.7 | Warp knitting 0.6 | B Woven (0.7*0.1)=0.07 | D Warp knitting (0.6*0.1)=0.06 |
| Fabric strength increasing material | 0.1 | Epoxy resin 0.8 | Gorilla glue 0.6 | Elmer's 0.7 | Title bond 0.5 | A Epoxy resin (0.8*0.1)=0.08 | B Gorilla glue (0.6*0.1)=0.06 |
| Thermal conductive material | 0.2 | Copper 0.7 | Aluminum 0.5 | Silver 0.7 | Concrete 0.5 | C Silver (0.7*0.2)=0.14 | A Copper (0.7*0.2)=0.14 |
| Finishing of fabric | 0.1 | Laminating 0.7 | Polyurethane coating 0.5 | Traditional hydrophobic finishing 0.6 | Nano finishing 0.5 | A Laminating (0.7*0.1)=0.07 | D Nano finishing (0.5*0.1)=0.05 |
| Phase changing material | 0.2 | Heneicosane 0.5 | Parafin 0.7 | Nonadecane 0.6 | Eicosane 0.5 | B Parafin (0.7*0.2)=0.14 | D Eicosane (0.5*0.2)= 0.10 |
| Shaping | 0.1 | Moulding 0.6 | Soldering 0.7 | Auto tailoring 0.6 | Glue 0.8 | D Glue (0.8*0.1)= 0.08 | A Moulding (0.6*0.1)=0.06 |
| Summation | 1.0 | | | | | BBACABD =0.76 | BDBADDA = 0.65 |

0.76>0.65

**Figure 4.** Rating calculation of cost effectiveness

Here, option 1 BBACABD > option 2 BDBADDA. So, for the cost effectiveness perspective view we can say our option 1 is holding much more positive index than 2nd best option.

In this chart we have tried to prove that our product having more cost effective index but having a successful product development we will also have to prove our option contains greater technological index than other option. When we will able to show both index contain more index than we ill able to say our chosen option for producing the product is relatively better than 2nd option. Now we will go forward to calculate the technological index. For that reason we have selected same criteria like, Jute, woven fabric, epoxy resin, silver flakes, laminating paraffin and the adhesive material normal glue for the attachment.

**Calculation of the rating for technology:**

Here we are finding the technological comparison of two options. For option 1 the assumed technological index for Jute 0.6, Woven fabric 0.7, Epoxy resin 0.7, Silver flakes 0.9, Laminating 0.8, Prafin 0.6 and for good glue 0.7. We found that option 1 is having the in total technological index of 0.71 and the 2nd option which is having the total technological index of 0.66. That does mean that our option 1 is much more technologically sound than the 2nd option. So, Option 1 > Option 2 in technological index.

| Sub task | Relative importance | Rating calculation of solution principles for (**Technology**) | | | | First choice (Rating calculation =Rating *K) | Second choice (Rating calculation = Rating *K) |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| Yarn material | 0.2 | Carbon 0.8 | Jute 0.6 | Flax 0.7 | NettleFibre 0.6 | B Jute (0.6*0.2=0.12) | B Jute (0.6*0.2=0.12) |
| Type of fabric | 0.1 | Nonwoven 0.6 | Woven 0.7 | Weft knitting 0.6 | Warp knitting 0.7 | B Woven (0.7*0.1=0.07) | D Warp knitting (0.7*0.1=0.07) |
| Fabric strength increasing material | 0.1 | Epoxy resin 0.7 | Gorilla glue 0.6 | Elmer's 0.5 | Title bond 0.8 | A Epoxy resin (0.7*0.1=0.07) | B Gorilla glue (0.6*0.1=0.06) |
| Thermal conductive material | 0.2 | Copper 0.6 | Aluminum 0.6 | Silver 0.9 | Concrete 0.6 | C Silver (0.9*0.2=0.18) | A Copper (0.6*0.2=0.12) |
| Finishing of fabric | 0.1 | Laminating 0.8 | Polyurethane coating 0.9 | Traditional hydrophobic finishing 0.5 | Nano finishing 0.9 | A Laminating (0.8*0.1=0.08) | D Nano finishing (0.9*0.1=0.09) |
| Phase changing material | 0.2 | Heneicosane 0.6 | Parafin 0.6 | Nonadecane 0.8 | Eicosane 0.7 | B Parafin (0.6*0.2=0.12) | D Eicosane (0.7*0.2=0.14) |
| Shaping | 0.1 | Moulding 0.6 | Soldering 0.5 | Auto tailoring 0.8 | Glue 0.7 | D Glue (0.7*0.1=0.07) | A Moulding (0.6*0.1=0.06) |
| Summation | 1.0 | | | | | BBACABD = 0.71 | BDBADDA = 0.66 |

0.71>0.66

**Figure 5.** Rating calculation of technology

**Solution:**

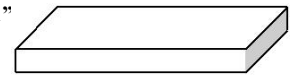
Here, as per the rating of cost effectiveness: BBACABD = 76%, BDBADDA = 65%. So, relatively BBACABD is the better option for cost effectiveness. The rating of technology is: BBACABD = 71%, BDBADDA = 66%. So, BBACABD is having more technology rating. Now it is very much clear that BBACABD is the better option for cost effectiveness and also for the technology index. Actually we selected the jute yarn because it is the famous as a cost-effective natural fibre. We also focused for the environmental impact of our product. We used the natural weaving process as a concern of cost effectiveness of our product. To increase the strength we have used the epoxy resin because we are not only focusing the environmental impact but also the physical strength of our product as a brick. Silver flakes as a thermal conductive material we can have the performance of thermal productivity. For finishing we are using laminating process because it has both cost effectiveness and technological index. We are also using paraffin as a phase changing material for better insulation system. Shaping of the product as like as brick is also important for us. At last we can have our product and via intellectual knowledge and with the promotional activity we can launch exceptionally a very good product which have also an excellent eco-friendly impact. Environmental friendliness is also a special identification of our product. We hope our product will be the most innovative product in the upcoming market and hope that we launch it very soon.

# 4. Cost Calculation

The length of the brick is 10”x 1” and the width of the brick is 12”x 1”.

**Table 1.** Consumption of the total fabric used to develop our product

**Material cost:**




Part discussion of consumption :

| | | | | |
|---|---|---|---|---|
| a) | 10”x 12” | = 0.25x0.31m | = $0.078m^2$ + $0.078m^2$ | = $0.15m^2$ x $340g/m^2$ |
| | | | | = 51g/Part(2) |
| b) | 12”x 1” | = 0.31x0.025m | = $0.008m^2$ + $0.008m^2$ | = $0.016m^2$ x $340g/m^2$ |
| | | | | = 5.44g/ Part(2) |
| c) | 10”x 1” | = 0.25x0.025m | = $0.006m^2$ + $0.006m^2$ | = $0.012m^2$ x $340g/m^2$ |
| | | | | = 4.08g/ Part(2) |
| Total= (51+5.44+4.08)g/material | | | = 60.52g/material | = 60.52g |

Total fabric for the product will be (60.52/1000)Kg = 0.06052 Kg for per product. Then we will have to calculate cost of the product.

**Table 2.** Material cost calculation

| | | | | |
|---|---|---|---|---|
| a) | Fabric Cost | 0.06kg x 0.5 €/kg | | = 0.03€ |
| b) | Overhead cost | 50% | | = 0.015€ |
| c) | Epoxy resin | 3.48 €/Kg | 100g | = 0.35 € |
| d) | Silver Flakes | 333.3€/ton | 200g | = 0.066€ |
| e) | Paraffin | 962.9€/ton | 300g | = 0.288€ |
| Total material cost (0.03+0.015+0.35+0.066+0.288) | | | | = 0.75€ |

So, the total material cost of our product is 0.75€. Now we will calculate the cost of manufacturing of our product in the below chart. Serial production of 500,000 materials/per year (As per assumption from marketing point of view.) So, the cost of manufacturing will the total fabric volume/year divided by the machine production per day. As per assumption we have selected the personal cost for a machine is 24000€/year. So, the personal cost per month is 2000€.

**Table 3.** Cost of manufacturing part 1

| | | | |
|---|---|---|---|
| Fabric volume/year | : 0.18 $m^2$x 5,00,000 | | = 90,000 $m^2$/year |
| Fabric construction | : 40picks/cm | | = 40 Picks/cm |
| Weaving Machine | : 500 rpm | | =500 Rpm |
| Weaving time 1 | : $\frac{500\text{rpm}}{40\text{picks/cm}}$ | | = 12.5 cm/min |
| Weaving time 2 | :12.5cm/min × $\frac{60}{100}$ | | = 7.5 m/min |
| Machine width | :2m | = 2m x 7.5m/h | = 15 $m^2$/h |
| Production per day | : 8 h x 15 $m^2$/h | | = 120 $m^2$/day |
| Production days | : $\frac{90{,}000\ m^2 m2}{120\ m^2/\text{day}}$ | | = 750 (1 m/c) |
| Labor cost for 1 machine in 12 months | : Personal cost | | = 24000€/year |

Here, we have received that our per month PM= 24000/12= 2000€/year. Separately we can assume that for a) weaving=3PM b) Shaping = 2PM c) Finishing =2PM d) Miscellaneous = 2PM so, total= 9PM Then 9PM= 9*2000 €/year = 18000€/year. Now for 50,0000 machine the labor cost will be = 18000/50,0000 =.0.036€/material. For the 50% overhead the manufacturing cost will be = 0.036€/material/2= 0.018€/material

12PM= 24000€/year

**Table 3.** Cost of manufacturing part 2

| | | |
|---|---|---|
| **Finishing:** | We have assumed that 15 €/kg can be the average current cost of finishing. | |
| 15 €/kg | Previously we have known the fabric consumption 0.06052 Kg for per product | |
| Fabric weight | (Assumed) | =340g/$m^2$ |
| Finishing cost | : 0.06 x 15€/kg | = 0.9€/material |
| **Manufacturing cost** (0.75+0.036+0.018+0.9) | | = ***1.704***€/material |
| Administrative overhead | : 40% | = 0.6816€ |
| Marketing overhead | : 20% | = 0.3408€ |
| Administrative overhead | : 20% | = 0.3408€ |

So, total overhead will be (0.6816+0.3408+0.3408) = 1.3632€
Cost of price = (1.3632+1.704) = 3.0672€
Profit 10 % = 0.30672€
**Total product market price = (3.0672€+0.30672€) = 3.374€**

**Result analysis:**

We have tried to calculate the actual market price of our product by few steps. At the first we have calculated the consumption of the total fabric which was used to develop our product in the table 1. Our total consumption of the product was 0.06052 Kg for per product. After having the consumption of our product we have calculated the material cost of our product in the table 2. Our total material cost was 0.75€. Then we have calculated our cost of manufacturing in the separate two tables. From the cost of manufacturing table 1 we have received over head manufacturing cost of our product and it was 0.018€/material. Then we have focused to find out the remaining finishing cost in the cost of manufacturing table part 2 and it was 0.9€/material. Then we have found our total manufacturing cost of 1.704€/material. At the last we have found the different overhead costs. In the end we have assumed 10 % profit and calculated the total product price = 3.374€.

**Comparison with existing product:**

Cost comparison of our own product against the existing product is given below:

**Air condition:** Calculation for 18*18 mtr square home. A room is area with: 18*18 = 324 square mtr.
324 square mtr room needed AC for = 700 euro (1 AC price) 1 square mtr room needed AC for
= 700/324 euro= 2.16049383 euro.

**Brick:** Calculation of the area of a brick = 12*10*1’’
= 120’’square (Ignoring the little height because of 1’’limit)
= 3.0480 square mtr (assuming)
= 3.0480*10% + 3.0480 (Add 10% allowance to solve height limit)
= 3.3528 euro. Area of 1 brick is = 3.0480 square mtr. So, As per our previous measurement, 3.3528 square mtr = 3.37392 euro
1 square mtr = 3.37392/3.3528 euro
= 1.00629 euro. (which is less than 2.16049383 euro)

So, here is a clear over view that our product is near about 2 times cost effective than air condition.

**Existing market of our product:**

We are focusing for the expanded and the rising building construction in the global world. Our product is very new and the environmental friendly. Especially focusing for those countries where the temperature is very much high but economically and geographically they have some limitations to focus for the environmental impact of the earth. Our cheap materials and unique innovation will go ahead via promotional activities towards them. Western market will also acquire this technology to justify the new innovation against global warming and to achieve the environmental friendless. Those countries who are facing the problem of high and low temperature in a stake they are in need of this kind of permanent solution. Our product will also focus to reduce the consumption of power to build a green house [8].

## 5. Conclusions

We all know that, the world is in a great threat for the global warming condition. We need to step forward for producing environmental friendly product. Actually we have selected the jute yarn because it is famous as a cost-effective natural fibre. We also focused for the environmental impact of our product. We used the natural weaving process as a concern of cost effectiveness of our product. To increase the strength we have used the epoxy resin because we are not only focusing the environmental impact but also the physical strength of our product as a brick. Silver flakes as a thermal conductive material we can have the performance of thermal productivity. For finishing we have used laminating process because it has both cost effectiveness and technological index. We also used paraffin as a phase changing material for the better insulation system. Shaping of the product as like as brick is also an important for us. At last we can have our product and via intellectual knowledge and with the promotional activity we can launch a very good product which have also an excellent eco-friendly impact. Environmental friendliness is also a special identification of our product. We hope our product will be the most innovative product in the upcoming market and hope that we launch it very soon. Our earth is getting more and more warm day by day only for us. We should try from our own position to reduce the global warming condition of the world. As a matter fact our product which is made of a natural fiber called jute with only some additional chemicals it can be a green product. We all know about the emission of CFC gases from the air condition and it is the burning question in our society. We tried our level best to make an initiative to reduce the electricity consumption and also the usage of air condition by producing a particular product which will be identified as a green product in the world.

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