JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DEVELOPMENT OF MULTIFUNCTIONAL HOMEDECOR PRODUCTS USING TERRACOTTA

Logitha Varshini Ramesh, Nirmala Varghese, Sally Moll
Student, Associate Professor, Assistant Professor
Department of Apparel and Fashion Design
PSG Institute of Advanced Studies, Coimbatore, 641014, India

Abstract: Terracotta is an age old craft that is rapidly gaining importance in recent times. Diverse products were made out of terracotta in the past and it is still being used to develop new and innovative products. Terracotta products are sustainable, eco friendly and low cost products. Over the years, the techniques have evolved and the traditional methods have undergone some changes to become what it has become now. The basic technique of shaping products on hand spun wheel is now motorized. The project aims to develop innovative products using the conventional methods of terracotta craft. Three different types of multifunctional planters were developed using terracotta.

Index terms: Terracotta, Sustainable, Eco-friendly, Planters, Multifunctional.

1. Introduction

A ceramic made of clay without a glaze, terracotta is known in Italian as "baked earth" (from the Latin terra cotta). It has been utilized historically for bricks, roof shingles, art, and pottery. Its natural, brownish orange tint and objects produced of it are both referred to by this word. Man has used clay to convey his emotions and aesthetic for over ten thousand years. According to legend, information that clay hardened on rings was discovered thanks to an unintentional fire. Given its deep, rust red/orange coloration, terracotta is one of the most distinctive forms of clay that is now encountered. The iron concentration in terracotta's clay body combines with oxygen to produce a distinctive color that runs through reds, oranges, yellows, and even pinks. Terracotta clay may be easily moulded into a variety of shapes. It is heated to 1,000–2,000° F to harden once it has been shaped. Then, terracotta can be made impermeable with just a thin layer of glaze. [1]

2. Literature Review

2.1. Historical Information about the craft

Terracotta, a ubiquitous material in history, spans all seven continents. Its origins trace back to prehistoric times, with artifacts dating to 24,000 BC, primarily figurines rather than utilitarian vessels. The Venus of Dolni Vestonice, circa 26,000 BCE, stands as the oldest known terracotta piece, discovered in the Moravian basin near Brno, Czech Republic. Measuring 4.5 inches tall and 1.7 inches wide, it resides in the Vienna Natural History Museum. Fired in a kiln fueled by locally sourced clay and bone powder, it reached temperatures nearing 700 degrees Celsius. Notable terracotta figurines from the Neolithic era include the Enthroned Goddess from Anatolia and The Thinker of Cernavoda from Romania's lower Danube region. [3]

2.2. Evolution of the craft

One of the oldest art mediums continuously used in the present period, terracotta has left its imprint since the prehistoric eras. People all across the world have been using it for millennia. It has played a crucial part in the evolution of art throughout the years, from China's amazing terracotta army to the stunning figurines discovered in the ruins of ancient Rome. As a result of its synthesis of four of the five essential elements—air, Earth, fire, and water—it is traditionally regarded as a magical substance. People in the past and the present have shown to enjoy terracotta things very much. Terracotta is still utilized in pottery and other household and decorative arts today. It is a preferred material for artists and architects due to its exceptional durability, brilliant colors, and malleable nature. It is a surprisingly adaptable material that works well with a variety of interiors. In a modern context, color is employed to liven up the modern and monochrome motifs. On the other side, terracotta can be seen in traditional settings as decorations, flower pots, floor tiles, and embellishments. In India, terracotta goods are widely utilized. They come appear as being highly hospitable and kind, which has played a significant role in both historical and contemporary Indian society. [2]

2.3. Importance of the craft

2.3.1. High durability

The substance can sustain a lot of pressure and successfully fend off breakage and chipping. It may survive for years without degrading and is unaffected by the corrosive effects of the weather. It is also fire and water resistant. In addition, terracotta is immune to the formation of germs and mold. Therefore, in addition to having a cheap initial cost, it can also enable you to save money on maintenance and replacement costs. [7]

2.3.2. Superior aesthetics

The earthy tone that terracotta adds to the interior of the home makes the space more calming and visually attractive. Bright orange, red, or yellow hues may add just the perfect amount of contrast to any space. Additionally, the material is simple to mould into various patterns, producing fascinating formations and imaginative designs that may be used in the kitchen, bathroom, or living room. [7]

2.3.3. Cost effective

The fact that terracotta is an affordable material is another crucial quality. It has a significantly lower starting cost than the other traditional materials, albeit the price does depend on the design and the overall material quality. [7]

2.4. Domestic and Export Scenario of craft

2.4.1.Domestic scenario

Terracotta items are back to gaining importance among all levels of the society due to it's sustainability factor. There is a steady demand for terracotta products in India starting from small planter pots for household purposes to sculptures for temple and home decorations. Various art exhibitions, cultural festivals, trade fairs across India provide platforms to increase the demand for these products by showcasing them. [5]

2.4.2. Export scenario

According to Volza's data on Indian exports, 1.8K metric tons of terracotta clay were sent out of India by 88 exporters to 183 buyers.The majority of India's terracotta clay is sent to the United States, the United Kingdom, and Canada. India is the world's top exporter of terracotta clay.India, Vietnam, and China are the top 3 exporters of terracotta clay, accounting for 1,143, 679, and 272 shipments, respectively. [4]

2.5. Existing Schemes to Promote the craft

Government has been extending it's support to terracotta artisans with respect to subsidies, finance, exhibitions and trade shows.

2.5.1. Gramudyog Vikas Yojana scheme

The program's objectives are to increase pottery artisans' incomes through increased production, improve their technical expertise through skill development training and modern equipment, lower production costs, and create market connections with export markets and significant buyers.[6]

2.5.2. Ambedkar Hastshilp Vikas Yojna

This program's Dastkar Shashktikaran Yojna component supports community empowerment by organizing craftsmen into self-help organizations. The implementing agency will next put up a diagnostic study report (DSR) to suggest additional treatments for the cluster.[6]

2.5.3. Mega cluster scheme

The goals include creating jobs and raising the living conditions of current craftspeople. The Handicrafts Mega Cluster Mission (HMCM) or central/state businesses will be tasked with developing the mega clusters as needed and in accordance with the diagnostic report, as well as any further announcements made in the Union Budget.[6]

2.5.4. Marketing support and services scheme

In this section of the program, artisans get interventions for local marketing events, such as cash support for organizing or taking part in marketing events in India. Additionally, support is given when renting out built-up space for functions put on by other institutions. In addition, programs for craft awareness and demonstrations are held.[6]

2.5.5. Research and development scheme

The program was launched to solicit opinion on the financial, social, and marketing facets of different crafts and craftsmen in the industry. On certain crafts about which sufficient information is not readily available, on issues relating to the supply of raw materials, on issues relating to technology, and on other topics, surveys and studies are done.[6]

3. Methodology

3.1.Product innovation and designs

The design process started with the idea of developing products that are both household and multifunctional using terracotta, since the products already available in the market made of terracotta are known to be of single purpose only. The inspiration board was derived from terracotta, since it is one of the most ancient craft that is still prevailing. Ancient meant antique which gave the idea of a black and gold palette, from which all the products are designed.

3.1.1.Mood board

The mood board shown in Fig.3.1 is inspired from a very classic and elegant theme of black and gold. This represents the antique feel of terracotta. This also brings in the concept of "The age old factor" of terracotta. The antiquity is represented using the old buildings and especially a clock which captures time.

Fig.3.1 Mood board

3.1.2.Colour board

The colors chosen from the mood board and their pantone shades in specific are given in Fig.3.2. Black is seen to be the major color with hints of golds and peach shades. Hence the chosen color shades are toast, clarified butter and gold coast. Brown is seen in the shadows of all the images which provides the perfect undertone.

Fig.3.2 Color board

3.1.3.Material board

The major products that were used to develop the products includes the basic raw material, i.e. clay and water followed by cotton cloth, thread and raw talc. For the value addition, products like paint, paint brushes, coir wire and 3D outliner were used. All the above mentioned materials are shown in Fig.3.3.

Fig.3.3 Material board

3.2.Product Ideas

The five developed products were inspired by a multifunctional aspect. The ideas were developed to suite the current trend of being minimalistic. People of this era like the idea of space saving and being sustainable, organic and eco-friendly. These two main aspects were combined to come up with the following multifunctional planter designs. The 2D view of the multifunctional planters are shown in Table 1.

Table 1 2D View of Multifuntional Planters

S.No.	Product	Picture	Explanation
1.	Multifunctional lamp		This lamp was designed based on the idea of creating a product that provides light to both indoor plants and for the surrounding. Few special plant varieties require sunlight or artificial light for optimum growth, hence the product was designed.
2.	Multifunctional vase		A vase is known to provide subtle fragrance due to the flowers kept in them. A multipurpose vase which can alternate as a bushy plant holder can be used in kitchens to hold everyday shrubs in them.
3.	Multifunctional table		This idea was based by giving a earthen feel to the interiors of households. A table with plants will provide more oxygen to the surrounding. This makes up for a good garden table.
4.	Multifunctional clock		This was designed to accommodate indoor plants that does not require much water like cactuses.

5.	Multifunctional bird feeder		The idea of this planter is to attract birds and feed them, while serving the purpose of a normal planter. Birds are usually seen in places where there is more greenery, hence the product attracts birds.

3.3.Chosen Product Designs

Among the five multifunctional planters (lamp, vase, table, clock, birdfeeder), three products were chosen to develop and the digital illustrations of the products are shown in Table-2. The products clock, vase and birdfeeder were chosen and developed after critical understanding on the development procedure, it's durability and functionality. The lamp and table were rejected due to it's dense structure and massiveness.

Table 2 Digital Illustrations of Multifunctional Planters

S.No.	Product	Explanation
1.		The clock was chosen due to it's versatility and uniqueness. This can be used in places where there is more greenery like gardens. This product can help in bringing the room together based on the theme.
2.		This vase can act as a holder for both long stemmed plants and for growing shrubs. This product can act as an entry point into the terracotta market for multifunctional products.

3.		A planter that acts as a bird feeder can be found helpful in most places where there's not enough space to accommodate plants. This can hang plants on the ceilings which can attract birds and save space. This product can also act as an entry point into the multifunctional planter products because small modifications can help in making of the product.

The specifications of the products are shown in Table-3, Table-4 and Table-5.

Table 3 Product Specifications - Clock

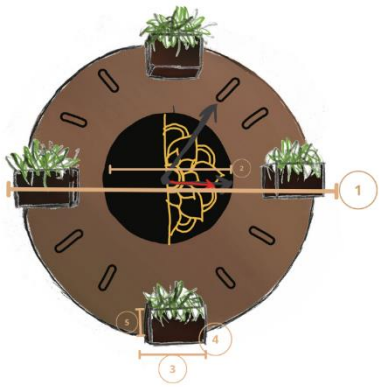
Product 1: CLOCK			
CODE	MEASURMENTS	INCHES	
1.	Diameter of the clock	12	
2.	Diameter of the inner circle	5	
3.	Length of the plant holder	1.75	
4.	Width of the plant holder	1.25	
5.	Depth of the plant holder	1	
Embellishment- 3D glitter glue is used to outline a mandala inside the inner circle. Planter to be attached using nut and bolt, clock hands are to be smaller than usual size.			

Table 4 Product Specifications - Vase

Product 2: VASE			
CODE	MEASURMENTS	INCHES	
1.	Length of vase	6	
2.	Length of base	3.5	
3.	Diameter of vase	4.5	
4.	Diameter of upper opening	2	
5.	Diameter of lower opening	1.25	
Only inner edges are to be painted gold.			

Table 5 Product Specifications – Bird Feeder

Product 3: BIRD FEEDER			
CODE	MEASURMENTS	INCHES	
1.	Diameter of cup	5	

2.	Length of cup	4
3.	Diameter of saucer	6
4.	Length of saucer	1.25
5.	Length of wire	12

Embellishment- 3D glitter glue is used to outline. Coir wire to be knotted on the inside.

3.4.Production process

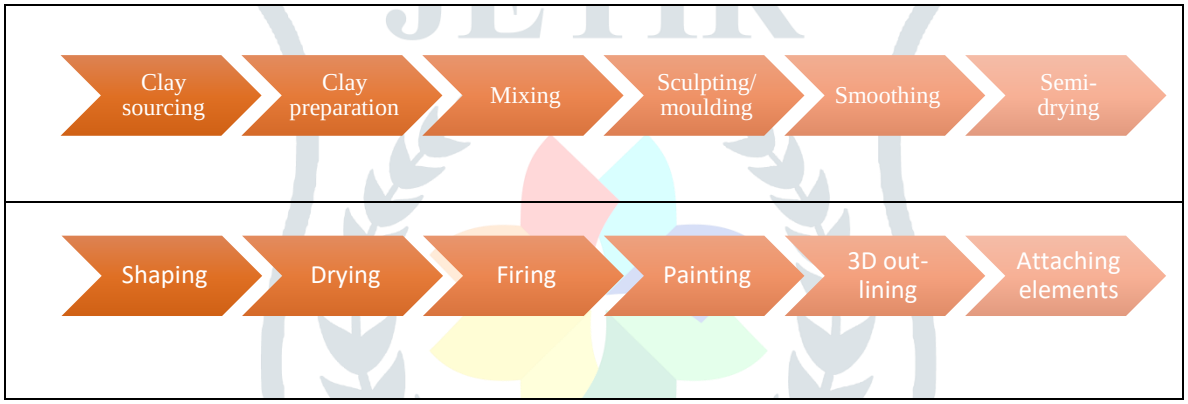


Fig.3.4 Production process

Figure 3.4 shows the flowchart of processes involved in the making of the terracotta products.

3.4.1.Clay sourcing

The clay was sourced from local artisans. These artisans procured raw clay from river banks and few artisans got the clay from commercially manufacturing units.

3.4.2.Clay preparation

The clay is initially cleaned by eliminating any dirt particles and other impurities. It is filtered and hand picked to remove any larger impurities.

3.4.3.Mixing

The procured clay is dry and hard to mould and knead. Hence it is mixed along with water to make the dough easier to work with.

3.4.4.Sculpting/moulding

For the plant holders on the clock, clay is taken in equal quantities and moulded using hand to give a rough square shape. For the vase, base is made out of clay first. This base is then sculpted along the edges using tubular rods of clay pieces to form a cylindrical shape. The made cylinder is smoothly cut using a thread to make a curved opening in the front. The top part of the vase is made by once again sculpting tubular pieces of clay and is moulded to be broad at the bottom and narrow at the top. Where as for the bird feeder, the base plate (saucer) is separately sculpted and the edges covered with tubular pieces of clay to give the raised plate effect. The cup is made by creating a clay base and working on it by sculpting all around it using tubular pieces, the handle is separately made and is left to dry in a specific shape with wire inserted on either sides.

3.4.5.Smoothing

The built shapes are then smoothened on the inside and outside to cover any lines that are visible using water and cotton cloth.

3.4.6.Semi-drying

The made pieces are dried for 2-3 hours to let the outer edges dry out.

3.4.7.Shaping

The semi drying helps in shaping the edges, giving it a smooth look and giving sharp edges to the products. The square planters for the clock are slammed onto a base to provide sharp edges.

3.4.8.Drying

After shaping the products are completely let to dry for 2-3 days.

3.4.9.Firing

The products are then fired at 1000 degree Celsius to harden the clay and retain the shapes of the products.

3.4.10.Painting

All the finished products are roughly sanded using sanding paper to obtain smoothness and then completely painted using black color. The vase is painted using black on the inside and outside and then design is traced using golden paint to show differences and the vase edges are painted golden. For the bird feeder with the plant holder and the clock, it is painted with black paint inside and out. For the clock, a part of its base, i.e., the inner circle of 5inches is painted in black.

3.4.11.3D Out lining

For the bird feeder a simple creeper design is drawn and outlined using 3D glitter. For the clock, half of the painted inner circle is designed with mandala art and then outlined.

3.4.12.Attaching elements

The vase is already in two pieces, hence there is no need for any attachment. For the cup and saucer, they are attached before firing, coir wire is passed through the holes created to hang the feeder. The planters are attached to the clock using super glue and the clock hands and battery is fixed by making a hole through the wooden clock and fixed using nut and bolt.

3.5.Developed Terracotta Multifunctional Products

3.5.1.Clock

The developed multifunctional planter and clock is shown in Fig.3.5. The design on this is inspired from the Mardi gra mask that is seen in the mood board. Hence a very similar mandala art is done on to the product.

Fig.3.5 Developed multifunctional planter and clock

3.5.2.Vase

The final vase is inspired from the golden leaf which gives a very elegant and aesthetic look with major black background and a touch of gold as shown in Fig.3.6**.**

Fig.3.6 Developed multifunctional planter and vase

3.5.3.Bird feeder

The bird feeder is designed to be inspired from the creepers found in the clock and the Mardi gra mask. The design is depicted using minimal 3D gold work as shown in fig.3.7.

Fig.3.7 Developed multifunctional planter and bird feeder

3.6.Costing

The products were costed based on the raw material cost. The clay was sourced from a local artisan who lives in Thadagam, Coimbatore. The clay is usually sold in bulk, which costs around Rs.200 per kg. The firing was outsourced from the same local artisan since firing larger terracotta products at home was not possible. Other products such as paint, 3D outliner, coir wire were all sourced from local markets. The costing process includes all the raw materials used, the outsourced firing process, overheads, labor and a 10% profit which adds up to the final value of the product. The costing of the products are shown in Table 6.

Table 6 Costing of Multifunctional planters

S.No	Particulars	Clock	Vase	Bird feeder
		Amount (in Rs.)		
1.	Clay	35	70	75
2.	Firing	50	50	50
3.	Paint	25	40	25
4.	3D out-liner	25	-	25
5.	Clock (battery+hands+wooden base)	455	-	-
6.	Coir wire	-	-	30
7.	Labor	200	200	200
8.	Overheads	10	10	10
	Sub total	800	370	415
9.	Profit (10%)	80	37	41.5
	Total	880	407	456.5

4. Results & Discussion

A survey was conducted using the help of google forms which helped in knowing the consumer preference towards multi-functional planters. six **1**The google forms were circulated among friends and relatives. The forms were shared to around 200 people through direct messages and groups. Among the 200 people who the forms were sent to, 80 people showed interest in participating in the survey. The objective of the survey and analysis were explained in the mail while sending the link of the google forms, few were contacted on the phone as well.

4.1.1.Gender

Through the help of forms, it was found that the majority (83.3%) of the people that were interested in planters were women. This is shown in Fig.4.1.

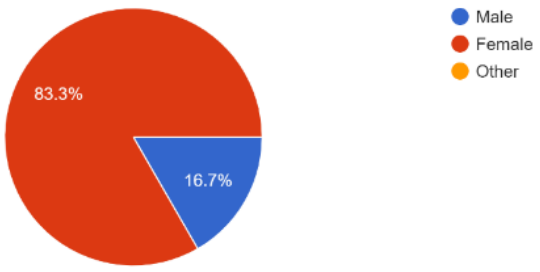


Fig.4.1 Gender

4.1.2.Age

Most of the respondents were between the age group of 15-25 (77.8%) as shown in Fig.4.2 followed by people at the age of 35-45, which shows that working class is not ready to spend time on gardening. But the survey shows that GenZ are willing to spend on gardening which shows that they are more eco friendly.

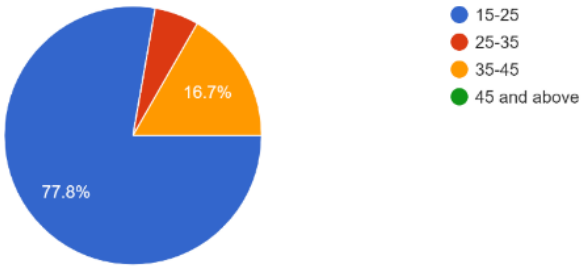


Fig.4.2 Age

4.1.3.Profession

Most of the respondents who were interested in planting were part of the student community consisting of 76.5% followed by working citizens and home makers as shown in Fig.4.3. The response of homemakers were found to be surprisingly less and they have shown less interest towards multifunctional planters. This might be because homemakers already have enough work in and around the house, few also like to maintain a whole separate garden and few might find it a burden to clean.

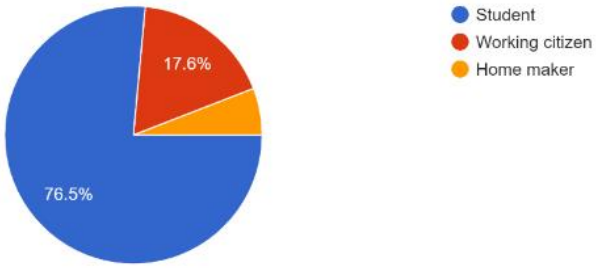


Fig.4.3 Profession of interested people

4.1.4.People interested in multifunctional planters

When asked on whether they are interested in multifunctional planters, almost 84% 0f the respondents gave a positive feedback. This group consisted mostly of working class and student strength.

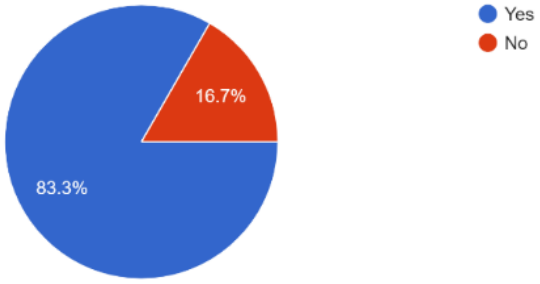


Fig.4.4 People interested in multi-functional planters

4.1.5.Most preferred product

The most preferred multi-functional aspect of planters from the respondents included birdfeeder (38.9%) and clock (22.2%) as shown in Fig.4.5. The least preferred multifunctional product was vase. This is because of its commonality and aesthetics that would have significantly influenced respondents to prefer it the least.

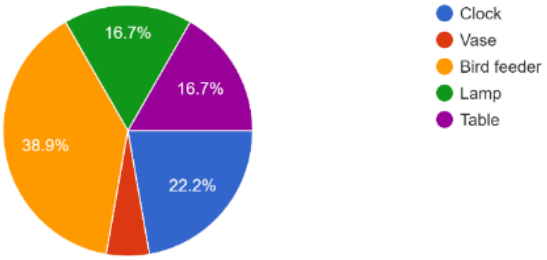


Fig.4.5 Most preferred product

4.1.6.Desirable price range

The most common response given by the respondents for preferring multifunctional planters is because they are different and they serve more than one purpose. From the analysis, the majority (44%) are willing to spend from Rs.400-Rs.700 on multifunctional planters. Following this, 33.3% of people are willing to spend in the range of Rs200-Rs.400. This shows that the respondents understand the process of making terracotta products and their value.

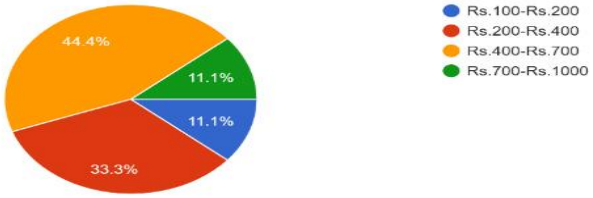


Fig.4.6 Desirable price range

The final interpretation for the survey is that most people who are into multifunctional planters are students and women. The majority of individuals are interested in planters, but nearly half of them haven't had the opportunity to own plants. Hence multifunctional planters provide a chance to experience two purposes at once, which people are ready to experience at a reasonable cost of Rs.200-Rs.700.

5. Conclusion

The craft research and training provided a deep understanding on the importance of handcrafted products, their techniques, procedures, process and advancements in terracotta craft. Terracotta is seen to be practiced in different parts of India, and each place has its own diversity when it comes to its native products. Pottery and art both employ terracotta as their primary material. Given its vast history, it is no surprise that India is a pioneer in use of terracotta. The variations in clay type and color, as well as the artist's tastes, various cultural customs, and religious beliefs, are what give the finished product in India its regional distinctiveness. Until now terracotta is only seen in its traditional form from different places across India. With the help of modern tools and designs new and creative products can be developed using terracotta.

The process of developing the product from start to end, from acquiring of raw materials to forming the product to detailing to finishing and photoshoot and presentation provided a holistic experience. The idea of both multifunctionality and aesthetics were incorporated in the developed products. Totally, five products were designed digitally, out of which three multifunctional planters were developed.

The products have been designed for the benefit of both consumers and producers. This is a new kind of terracotta product, where small modifications to the existing product manufacturing process can lead to new products. This makes it easier for the manufacturers. Today's consumers are also concerned about space, which can be solved using these products. Traditional terracotta products are less preferred by few which results in lesser sales. The utilization of terracotta in the production of modern goods will not just meet the demands of consumers, but also yield financial gains for manufacturers.

The results through the survey show that people nowadays tend more towards minimalism which reduces the number of products that they want to showcase in their house, hence they tend to choose multifunctional products which can serve the purpose of two different products in one. This ultimately results in the decrease of manufacturing of too many products and also serves the purpose of sustainability by reducing production.

6. Reference

[1] Anushthatri Sharma (06 Jan,2023). Terracotta: An Ancient Art Form

[2] Kumar Manisha (2015, May 18). Terracotta Art - From the Earth to the Soul.Dolls of India.

[3] Florek Stan (May 11,2022). Dolni Vestonice - Archaeological Site.

[4] Domestic survey.https://www.volza.com/p/terracotta-clay/export/export-fromindia/

[5] Khadi and Village Industries Commission (Ministry of MSME)

[6] Ministry of Micro,Small & Medium Enterprises (17 September, 2020)

[7] Why Terracotta Should be Preferred Over Traditional Materials (24 April, 2020)