

**PERFORMANCE ANALYSIS OF THE SELECTED FLOORING
MATERIALS**

**BY
SUGANYA.S
(11PIR10)**

**A THESIS SUBMITTED TO THE
AVINASHILINGAM INSTITUTE FOR HOME SCIENCE
AND HIGHER EDUCATION FOR WOMEN – DEEMED UNIVERSITY
COIMBATORE – 641 043**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN RESOURCE MANAGEMENT**

MAY – 2013

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CERTIFIED AS BONAFIED RESEARCH WORK

**SIGNATURE OF THE
HEAD OF THE DEPARTMENT**

SIGNATURE OF THE GUIDE

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“A thankful heart is not only the greatest virtue, but the parent of all other virtues”

–Cicero

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“Gratitude is the most exquisite form of courtesy” - Jacques Maritan

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INTRODUCTION

“DWELLING” is the essential property of human existence

-Martin Heidegger

House is the nerve centre of the family life and all activities of the family are centred around it. House is a building or structure that has the ability to be occupied for habitation by humans. The term house includes many kinds of dwellings ranging from rudimentary huts of nomadic tribes to complex structure composed of many systems (Holl, 2007). It is the place where economic, physical, social and psychological and safety needs of the family are met. When man stopped wandering, he felt the necessity of a settled life for his family. The earliest settlements were in the form of small clusters of houses but as the sizes and numbers of these clusters increased the need for more organised settlements were felt. Man felt the needs to regulate these settlements and lead a more civilized and organized life which in turn led to formation of villages and later into towns and cities.

The house grew out of man's need for shelter and also out of his ability to symbolize for identity. The divergent origins of the house distinguish “house” from “home”. “House “refers to an object, possession, or measurable space, while “home”, describes an “emotionally based and meaningful relationship between dwellers and their dwelling places”. The first thing a house needs in order to create a sacred space no matter how big, small, fancy or shabby, it is, making a home to that particular person. There is an old expression; **“Home is where the heart is”**. It is often a reflection of the people who live within that home and the ones that create space.

“We Shape our home and then our home shapes us”, said Winston Churchill. Home is not just the house to live in but an irreplaceable centre of significance (Singleton, 1997). Home is the foundation of our identity as individuals and members of the community and a structure serving as a dwelling for one or more

persons, especially a family. Varghese et al.,(1994) opines that Whether it is an elaborate building or a cottage, a major portion of our time is spent at home, and thoughtfully decorated home should provide the needed comfort and pleasant surroundings. Most of the conventional houses contain a bedroom, bathroom, kitchen or cooking area and a living room (Neilson et al., 2002).

Interior design is a discipline that looks after designing all the interiors of a space. This can include flooring, walls, windows, doors, lighting, furniture, and miscellaneous design pieces. The goal of Interior Design is generally to make a space that is both comfortable and aesthetically pleasing, often catered specifically to the needs of the inmates (Gibbs, 2005). Interior design includes scope of services performed by professional design practitioner, qualified by means of education, experience and examination to protect and enhance the life, health, safety and welfare of the public. Neilson Taylor (2002) states that Interior design concerns itself with more than just the visual or ambient enhancement of an interior space; it seeks to optimize and harmonize the uses to which the built environment will be put. It is practical, aesthetic, and conducive to intended purposes or improving life style. Interior Design draws attention on the aspect of environmental psychology, architecture, product designing in addition to traditional decoration (Chaudhari, 2003).

Fehrman and Fehrman (2009) define design, as any aspect of life that cannot exist in vacuum. It relies heavily on what has gone before and influences what will follow. Hiring an interior designer is therefore more than just a good idea one has to build a new house, remodel or renovate the existing one (<http://WWW.kwika.org/resources/the-art-of-interior-design.html>). Pile (2005), avows that Interior Design touches the lives of all in a direct way. Interior design is not just about the looks of the building's interior but it also plays a key role in its functionality. The house's interior must be aesthetically appealing and practical at the same time. The Interior Designer may work on the project from the initial planning stage or work on remodelling of an existing structure (Mitton and Nystuen, 2011).

The standard architectural plans rarely meet the client's needs and therefore a good interior designer should be hired to design an interior that will consider the user's needs and lifestyle as the interior of a home should not only look good but should be functional (<http://www.transedit.co.uk/>). "For a house to be successful, the objects in it must communicate, respond and balance one another" said Andre Putman.

Building material is any material which is used for construction purposes. Many naturally occurring substances, such as clay, rocks, sand, and wood, even twigs and leaves, have been used to construct buildings. Apart from naturally occurring materials, many man-made products are in use, some more and some less synthetic (Duggal, 2009). The manufacture of building materials is an established industry in many countries and the use of these materials is typically segmented into specific specialty trades, such as carpentry, insulation, plumbing, and roofing work (www.Wikipedia.com).

A material is that out of which anything is, made, may be made use of for any purpose. Interior materials are intended to be employed in interiors for various purposes (Miller et al., 2009). Materials used for Interior design have played a great role in the development of this discipline of design as an interest, obsession and way of life for many people today and historically (www.buildnew.com). Any space big or small could be made lively and personalised by the forms, finishes and materials used. Right from the foundation level to the final painting in a construction, there has always been confusion as to what materials one has to choose.

Flooring constitutes the major role in designing interiors says Sarkar, (2009). Flooring gains growing importance in construction and all the activities in the room are performed on floors (Yadavilli, 2007). A floor is the walking surface of a room or vehicle. A continuous, supporting surface extending horizontally throughout a building having a number of rooms, apartments, or the like, constitutes one level or stage in the structure (<http://dictionary>.

reference.com/browse/floor). Floors vary from simple dirt in a cave to many-layered surfaces using modern technology. The floor of a house provides a horizontal sanitary surface for residents, the furniture and equipment (The Hindu, 2005). The floor is quite literally the foundation of the room, and, aside from the ceiling, is its single largest surface (*Dk Millennium*, 1999). All good floors should provide strength and stability, resistance to dampness, excellent appearance, and freedom from maintenance. The main aim of the floor is to provide a level surface for the occupants to support furniture, equipments, partition walls etc.

A floor needs to have adequate strength and its stability should be fire resistant. It should have good insulation and damp proof. The thermal insulation is also an important factor in floor construction. The floor consists of two components, one which is designed as a structural component and the other finishing on the floor. The floors resting directly on the ground surfaces are known as ground floors and floors on each storey which are above the geared level are known as upper level. The shimmering floors add spice to the décor of the house. The décor of the home finds a new expression with the choice of appropriate flooring materials blending well with its interior architecture. Hence, it is always necessary to use the right kind of flooring to give home an enhanced look. It is basically the architect who chooses the right type of materials to be used as flooring for every room like living room, bed room, kitchens or bath rooms during the period of construction (Sanjeev Sarkar, 2009).

Flooring goes a long way in giving a neat look and adds enrichment to the home. Flooring is not only a background but also a material that will provide years of satisfaction in terms of beauty, durability and upkeep (Karla, 2002). The flooring material is selected considering the traffic, sunlight, and other wear and tear it will get. Flooring materials greatly vary, and the price for the various types of flooring directly relates to the type of materials used. Flooring materials should be suitable for the condensation or moisture level of the room. Flooring really needs to be viewed as an investment and there are a number of options

available to suit all levels of budget. The first thing to decide upon is whether to go for hard or soft flooring (www.Flooring buying guide.com).

Flooring forms the base of any interior scheme and with the many choices available people are carried away and forget about the practical aspects that need to be taken into consideration. By their very nature floors are subject to the most use and therefore need to be able to stand up to knocks, spills and furniture in addition to human and animal traffic. The purpose of a floor is to provide a level surface capable of supporting the occupants of a building. Floor is the element of the interior which represents the largest shares of area (Pile, 2000). The floor structure must be strong enough to bear super imposed loads. The strength of floor depends on the type of flooring one uses (<http://www.gharexpert.com/>). Floor should meet the requirements of design, colour and material. Flooring should be comfortable to use, easy to maintain, durable and cost effective.

“Flooring has come to occupy a prominent position because of its visibility unlike brick or cement, which is hidden, and is for everybody to see. So, buyers pay a great deal of attention to have good flooring,” says Mohanraj of New Premier Constructions and State Secretary of the Federation of Civil Engineers’ Associations of Tamil Nadu. People consider flooring to be as important as overall architecture.

Flooring not only lends beauty to home but also bears most of the wear and tear. Therefore, the selection of the type of flooring is a very critical step while building a dream home. Strength, appearance and ease of maintenance are the important aspects to be considered while laying the floor (<http://EzineArticles.com>). Though other types of flooring like wooden flooring, rubber flooring and laminate flooring are also available, in a country like India, floorings range from plain cement to granite. Irrespective of the type of flooring, certain factors such as the colour and workmanship should also be kept in mind. The shade of the floor is a key factor in balancing the light in a room. Darker shades should be preferred only when there is ample lighting in the room

(Yadavilli, 2008). On the other hand, dirt marks may be more pronounced on lighter shades. Inaccurate slopes and joints in the flooring, especially in the bathroom, will lead to stagnation and seepage of water (The Hindu, 2008).

Flooring has evolved incredibly since cement-finish days when, form and function were nothing more than just basic. Be it a show room or a living room, each has a precise demand in terms of flooring. While designing a showroom, pedestrian traffic plays a vital part in defining the floor type. Similarly, for bathrooms it is advisable to go for anti-skid flooring. And for labs or processing plants, flooring that is acid/chemical resistant is the answer. Smooth surfaces could give walking comfort, especially in areas where one might have to walk barefoot.

The building materials market is today barraged by choices, due to rapidly changing tastes of the consumer. It's not just the local manufacturers who offer exciting choices, but plenty on offer through imports as well. With consumers approaching design with open minds and designers are ready to experiment any leash on creativity. However, a lot of thought has to go into the selection of the right flooring material, given the wide assortment in terms of colour, finish, size, thickness etc. that's available in the market. To understand the nuances of these, one has to have an idea of the range that's broadly polished surface, natural surface, ceramic surface and special surface.

Before making choice, it's important to consider the fundamental aspects; the purpose of the space, circulation pattern, type of users, size and shape of the room, furniture arrangement, wet and dry area, natural and artificial lighting conditions, scale and proportion, basic theme, style and concept of the interior. The next step is to analyse the complete character of the materials available, porosity, thickness, scratch-resistance, sizes, colours and patterns that create specific moods, fixing method, time and of course the cost. It doesn't stop here. One has to go beyond and look deeply at the strengths and weaknesses of the materials as well (Vivekanandan, 2004).

This sequence of logical reasoning will result in ideal flooring solutions for particular spaces. Mindset relating to sentiments, status symbol, personal taste

and opinion might interfere with good design. However, fine flooring is not just about aesthetics; it's about function as well says Vivek, 2004 chief architect and interior designer.

The choice should be based on specific needs that interior demands. With many flooring options available it is required to know which is best suited to house interiors. Selection of the right material depends on the location; mostly the locally available material works out to be more economical. Selection of material is mostly determined by the cost factor and usage. There are wide ranges of flooring materials available and each one is marked with distinguishing features. The common types of flooring include marble flooring, tile flooring, laminate flooring, ceramic flooring, hard wood flooring and granite flooring.

As there is a paucity of research data available related to flooring materials and its importance in making the residential spaces efficient, the investigator envisaged interest to take up a study entitled **“Performance Analysis on Selected Flooring Materials”** to investigate the depth of this vast subject with the following objectives:

- To assess the views of the selected households on the impact of flooring materials.
- To analyze the preference of flooring material for residential spaces.
- To examine the benefits and problems encountered by the users.
- To find out the extent of awareness on the availability of the flooring materials and
- To get the feedback from the users on flooring materials.

It is hoped that this study would throw light on important aspects of flooring material. This knowledge would also strengthen the theoretical approach in the study of flooring material in order to provide residential spaces that would be comfortable to work in, be productive in nature and aesthetic and appealing. Besides, providing opportunity to young Interior Designers, to gain confidence in taking up responsibility and to face clients.

II. REVIEW OF LITERATURE

The literature pertaining to the study entitled **“Performance Analysis of the Selected Flooring Material”** is reviewed under the following headings.

- A. Interior Design a Pleasant Retreat
- B. Trends and Popularity in Flooring Material.
- C. Visual Appeals and Effects of Flooring in Interiors.
- D. Flooring as an Aesthetic Factor in Designing Interiors.

A. INTERIOR DESIGN A PLEASANT RETREAT

Life of human and their standard of living depends on the house in which one lives. House has several large rooms with specialized function and several small rooms for various reasons (Riley and Howard, 2002). Ideally, architects design rooms to meet the needs of the people who will live in the house. Such designing is known as “Interior designing”, has become a popular subject in the universities (Marshal and Worthing, 2006).

Nielson and Taylor (2002) define Interior decoration or décor as the art of decorating a room so that it is attractive, easy to use, and functions well with existing architecture. Brooker and Stone (2007) give a fuller and more comprehensive definition as the art of decorating Interior spaces or rooms to impart a particular character that fits well with existing architecture. The goal of Interior decoration is to provide certain for the room; it encompasses floors, walls, furniture and fittings (http://www.ehow.com/facts_5002958_history_interior_decorating.html). The British Interior Design Association BIDA defines Interior design as an aspect of architecture, product design and furniture design in addition to traditional decoration.

In the developed world, energy conservation has grown in importance in house-design. Housing industry produces a major portion of carbon emissions (30 per cent of the total in India). Development of a number of low-energy building types and techniques continues (cook 2009). Thus it is necessary to choose material which would save energy. In houses there are various

components, and the most important component is floors because it has to withstand the stress, strain, wear and tear.

Good flooring will bring in a pleasant atmosphere. Floor is a major part of a room like ceiling. Even without a proper ceiling a living can be done, but without proper floors, living cannot be done. Flooring is the vital component in a building. Floor is to provide horizontal clean surface to support the occupants of a building, furniture and equipments. The floor structure must be strong enough to bear super imposed loads. Floors take a lot of wear and tear. So the flooring should be water resistant, durable, fire proof, Bacteria free and easy to wash (Deplazes 2006).

“Good design combines usefulness with at least one of the following: beauty, comfort, efficiency, economy or durability” -Michael Maurer. Flooring is major factor when it comes to designing. Floor should meet the requirements of design, colour and material. Flooring should be comfortable to use, easy to maintain, durable and cost effective (Kasu, 2005). The strength of floor depends on the type of flooring used. Traffic influences the type of flooring. Flooring contributes greatly to the ambience. A beautiful floor can elevate ones spirits and confer status to even ordinary interiors (Ranjani govind, 2005).

“Flooring has come to occupy a prominent position because it is visible unlike brick or cement, which is hidden, and is for everybody to see. So, buyers pay a great deal of attention to have good flooring,” says R. Mohanraj of New Premier Constructions and State secretary of the Federation of Civil Engineers’ Associations of Tamil Nadu. The value of the flooring lies in its beautiful appearance, as it eliminates unsightly joints. With many flooring options it is necessary to choose the floors which are best suited to house interiors.

B. TRENDS AND POPULARITY IN FLOORING MATERIAL

“Décor can have a beneficial Influence on our life” said Albert Hadely. Flooring not only lends beauty to home but also bears most of the wear and tear.

Present trends and popularity has brought in varieties of flooring material. Even so many researches have been taken up in flooring materials to bring in easy maintenance. There are lots of flooring materials available. Therefore in the present trends, proper guidance and knowledge is required to select the proper flooring material. The selection of the right type of flooring is a very critical step while building a dream home (The Hindu, 2008). Strength, appearance and ease of maintenance are the important aspects to be considered while laying the floor. Any space big or small could be made lively and personalized by the forms, finishes and materials used. Right from the foundation level to the final painting in a construction, there has always been confusion as to what materials one has to choose.

Catharine 2008, the tendency of home maker in selecting materials is usually to select by appearance and personal preference. The tendency of many architects is to select the materials which are functional and proper in terms of wear ability and maintenance. Too often usage of the material may turn out to be dull and lacking aesthetic value. The interior designer must be familiar with the intrinsic practical values of materials and at the same time have the sensitivity, taste and aesthetic judgment to select the appropriate material.

Selection of the right material depends on the location; mostly the locally available material works out to be more economical. Selecting right choice of material will reward in many hours of comfort and pleasure (Raymon, 1961). With regard to flooring, there is a wide range of materials available. Selection of material is mostly determined by the cost factor, but in some cases as in kitchen, which needs stain-resistant materials, usage also plays a role. Natural stones are generally preferred, and synthetic tiles are catching up. The type of the material selected for flooring will depend on its use, expected traffic, the time taken to complete the work and cost. In residences time taken for laying and polishing has forced people to adopt the material which can be used as soon as it is laid without further work like polishing. In any case, considerations should be given to the working life of each material while selecting the floors (<http://www.ghar>

expert.com/). As costs are escalating, repairs of floors at later years will always prove to be very costly. So it is necessary to choose the right type of flooring.

The flooring materials available in the market, should suit its use, be economical and easy to maintain. The types of flooring materials selected tend to be dependent on the type of room. The flooring used in a bedroom may not be appropriate for a bathroom, just as the flooring in a living room may not be ideal for a kitchen. Flooring materials greatly vary, and the price for the various types of flooring directly relates to the type of materials used. Generally, flooring materials are selected based on how much would be spent, the purpose of the room where the flooring will be installed and the overall look of the amount of wear and tear the floor needs to be endured. Living rooms typically see heavy foot traffic and must withstand the weight of large pieces of furniture, and hence tile may not be ideal and require suitable flooring (Kathleen, 2005).

Materials suitable for the condensation, or moisture level of the room should be selected. Hardwood may not be ideal for bathroom floors, since these materials may warp with the constant presence of heat and water. Tiles and stone are suitable materials for this type of room. Hardwood, tile and stone flooring may be visually appealing, in lounge areas such as bedrooms or dens, these materials may be too rough or hard (http://www.gharexpert.com/articles/Flooring2076/Flooring_0.aspx). A large number of alternative materials are, nowadays, available for construction of floors. Choice for floor materials will depend on many factors such as the use of the floor, the traffic expected, finance available and the time available for construction.

There are various factors in which play an important role in the selection of floor materials. The initial cost is very important factor which needs to be taken into consideration because the cost of the material should be in conformity with use made of the floor. The flooring material used should give pleasing appearance. The flooring should be resistant to corrosion humidity disintegration to have a long life, because durability of flooring is an important factor. The flooring material should require the least maintenance. The flooring should be

easily cleaned. For the purpose of maintaining healthy conditions in the house flooring should offer sufficient resistance against dampness. The flooring should be non- absorbent and should be capable of being drained easily. The flooring should provide maximum fire resistance.

Flooring is required to make the surface of the room even. The choice of the material becomes important as cleaning and maintenance is integral part of the flooring (Lyons, 2010). Karla, 2002 says it is wise to select the flooring according to the beauty, harmony, graceful aging, subfloor preparation, upkeep, durability and safety. Beauty is good design, merit and integrity. Flooring should be appealing even if there were no other furnishings in the interior. Harmony gives a background for a variety of furnishings over time. It is better to look for neutralized colours, subtle textures and lack of definite pattern. Graceful ageing is in the form of patina, or mellowing of the finish through continued use. Permanent flooring is often in place for 10 or 20 years, and many historic interiors that have stood time of test feature hard materials that have continued to be beautiful, for a century or more. Subfloor preparation supports and enhances the finishing material. Heavy materials require a sturdy subfloor, which may raise the floor level. Upkeep of the flooring means maintenance frequency and ease of cleaning. Hard flooring materials generally require less care. Natural materials are superior at camouflaging tracked in soil. Durability is the ability to withstand heavy traffic.

Smooth hard resilient flooring without added textures are slippery, especially when wet. To avoid confusion, flooring should avoid glare and create a depth illusion. Extremes of rugged textures and highly polished surfaces should be avoided.

C. VISUAL APPEALS AND EFFECTS OF FLOORING IN INTERIORS

Visual appeal of the floors depends on the type of material used for flooring. The individuality expressed in home is partly the result of materials used (Raymon et. al 1961). Materials once considered suitable only for industrial or commercial use have found a new, expressive role in the modern home, says Elizabeth Wilhide,

2004. “Materials may seem to have a mind of their own, for they engage all the senses”. Material selection has to be done with an overall perception of the whole building whether a rustic setting or a posh and contemporary ambience. Blending them together in the right proportion and quantity is a tough balancing act; one has to keep in mind the practicality and the maintenance factor as well; says Murali, Chief Architect. The different types of commonly used flooring material are tile, Marble, Granite, Wooden and terracotta.

Tiles are a type of hard flooring and are available in a wide range of natural and man-made materials. Ceramic tiles, Vitrified tiles are some of the choices available and each come with their own pros and cons. The main advantage of tiles is that they are extremely hard wearing and if well maintained will last a very long time. As they are waterproof they are well suited to areas such as bathrooms and utility rooms and being easy to clean it is also ideal for kitchens (Catharine, 2008). However, tiles can be cold underfoot and can be slippery when wet so are not suited where older people or children are present. They are also noisy and require other softer surfaces to reduce the amount of echo in a room (Harold, 2009). Synthetic tiles like the vitrified tiles and ceramic tiles come in various sizes and shapes; some even simulate a natural stone effect. They are also available in non-slip finishes for toilet floors. One of the fastest growing trends in the flooring, tiles comes in various designs, sizes and materials. Numerous brands are available in the market.

- **Strength:** Tile floors are extremely strong. They have a breaking strength of about 350-400 kg/cm².
- **Stain free:** Tile floors are easiest to clean. They are stain free and, acid and alkali resistant.
- **Scratch resistance:** Tiles have a very high scratch resistance and their hardness is about 6-7 on Moh's scale (A measure of a mineral hardness and its resistance to scratching).
- **Easy washing:** Tiles have very low water absorption and are very easy to clean. These floors being electro statically and neutral do not attract dust.

- **Bacteria free:** Tile floors are bacteria free since no bacteria can grow on them. This is an excellent flooring for hospitals, operation theatres, industrial kitchens, deep freezing go-downs etc.
- **Insulation:** Tiles are very good insulators. Moreover specific heat is about 0.12 which improves efficiency of air-conditioning.
- **Fire proof:** Tiles are fired at 1900C and are completely fireproof.
- **Acoustics:** Tiles have a very high sound factor which helps in elimination of echoes-ideally for auditoriums and big halls.
- **Easy lying:** Tiles are easy to lay and ready for live-in use within 48 hours after lying. These are available in various shades.
- **Anti-slip:** Unlike white glazed tiles, new floor tiles are salt glazed and are anti-slip and non-skid (Wicks, 2009).

With innumerable combinations available in terms of design, colour and finish, a designer can extend his imagination by creating unique wall and floor design using tiles. Also, they can be laid in place faster and easily maintained.

Marble flooring is a descendent of limestone and is hard. It comes in a number of shades and hues, ranging from off-white to brown, grey or pink. Stone with different coloured streaks is termed statuary marble (Simmons, 2011). Although hard, marble is softer than granite and is therefore, more prone to stains and scratches. This can easily be repaired and corrected by polishing. Marble flooring can have one of two finishes, polished or honed. Polish is a highly reflective finish and brings out the stone's natural shades and marking. This type of finish will not last in areas that have a flow of traffic. Honed is a matte finish (non-reflective) and is better suited in areas where there is a greater flow of traffic. It is also difficult to see scratches on this type of surface finish. The material itself comes in the form of tiles that are usually found in two dimensions: 12" by 12" and 12" by 18" and the thickness usually averages around ½ an inch (Campbell, 2010).

There are many other Indian stones available in different colours. There is a range of brown stones, such as Mandana, Agra stones and the Andhra variety. Another favourite of the architects is Jaisalmer stone, which is used alone or in combination with green Baroda marble. Indian marble is definitely stronger, less porous and economical. But today there is more demand for the beautiful shades of Italian marble that is softer and more porous (Villegas, 2003). Despite this, the sheer pleasure of seeing a beautifully polished Italian marble surface makes people go in for it, compared to the Indian ones. Not all Indian marbles achieve the same glossy, glitzy look of the Italian variety. There are many marbles coming from all over the world such as Nepali, Yemeni, and Iranian that look very similar to the Italian marble (http://www.gharexpert.com/articles/Marble-Flooring-1133/Which-various-types-marble-flooring-_0.aspx).

Marble is usually found as rectangular, square tiles or as whole slabs. One side is normally smooth and the edges are bevelled (sloping). Marble tiles provide beauty for years and functionality to home with low maintenance. These tiles are durable and available in varieties of colours such as white, pink, green, grey etc (Rangwala, 2006). These tiles come in plain as well as textured form. This flooring provides an elegant, royal and decorative look to the room. They are suitable for almost any place. White marble stones of good quality are used. These stones have uniform veins and are spotless.

Wooden flooring is basically of three types: natural hard wood, engineered wood and compressed wood. Compressed wood is that made of either saw dust or sugarcane waste. These are compressed, treated, and metal-laminated. Most of the branded products come with a warranty. In the case of hardwood, the entire panel is made of wood. In engineered wood, it is plywood topped with natural wood, and demand maintenance (Peters 2000). The compressed panels are eco-friendly and are laminated Mithradas 2007, explains that in the case of compressed wood, the manufacturing process is basically the same. Variations come in thickness, texture, finish, colour range, aberration class and compression ratio (Shaw 2000). About 80 per cent of domestic consumers approach an architect in metro cities now. This is mainly due to paucity of time.

In tier-two cities to, a large number of home-constructing consumers now a days take the services of an architect. Such customers prefer wooden flooring at least for the main rooms since it endows aesthetics. Tiles, with the porous nature, make the flooring cold. The wooden flooring market is growing. Flooring is what catches the eye to anyone entering the house or any building and therefore the customers give more importance to them. In the case of wooden flooring, the smaller the panel size, the better it is (Botannini, 2011).

Wooden floors are also classed as hard flooring but being softer than tiles they are also warmer underfoot. With the huge range of natural tones available they can help create a warm and homely feeling. The downside of wooden floors is that they are usually manufactured from softwoods and therefore can dent easily especially by the heels of shoes. Wooden floors are therefore best suited to rooms that do not receive heavy wear such as bedrooms. Wood is the oldest material used for construction (Caleb,1991).Wood flooring looks great and is durable with proper care. Although they are susceptible to scratches, dents and moisture, hardwood floors can be refinished multiple times, often lasting the lifetime of a home. Less expensive engineered wood flooring is also durable, but isn't as long-lasting since the top layer of wood can only be refinished one to three times. Though initially expensive, wood floors can add to the value of to the home.

Laminate flooring seems to appear as hardwood flooring. There are so many colours, sizes, and trends that are available in the laminate flooring. Laminate flooring is generally available in planks with several layers. To display the pattern and look of the laminate flooring, the first layer of plank has to be provided with apparent solid covering followed by fuse of two layers together utilizing a high density core. To make the laminate flooring tough and moisture enduring, the backing will be placed on the plank. Laminate flooring is resistant to both food and dirt stains as well as moisture (Bingelli, 2011), so that stains can be easily cleaned up. Laminate flooring reproduces the look of more expensive wood or stone flooring, but costs much less. Laminate flooring has a fiber board core with a photographic layer on top, and is covered on top and bottom by a

layer of plastic. It comes in long planks that snap together and is easy to install (www.wedidwood.net). Laminate floors are durable and wear well, but they cannot be refinished and must be replaced when damaged, because it has a fiber board core with large spills that can damage a laminate floor.

Consumer Reports make specific recommendations for brands of laminate flooring. The New York Times reports on the improvements made in laminates, including a more lifelike sound underfoot Better Homes & Gardens. Lowes. Com, 2009 offers a helpful buying guide geared toward educating the customer

Natural stones such as granite are popular choices for flooring. As one of the hardest materials, natural stones are long lasting and very durable. They elevate the quality of a home or office by their mere presence and never go out of style. The key to retaining the natural beauty of these stones over time is proper maintenance. When cared for properly, natural stones will hold their beauty longer than any other surface on earth (Bokalders, 2010). Granite is a natural stone that is hard and can be polished only at the cutting factory. They are costly and so is the process of re-polishing. Some shades of granites can cost as much as Rs. 550 per sq.ft

The stones are natural and have a wide range of colour, design and pattern choice. The stone flooring has to be done with a special mortar. The flooring can last ten years without maintenance. Sealant is a type of covering that is put on the stones to make them last. The covering protects the stones from scratches. The sealant has to be applied every ten years (Chan, 2008). The American Standard for Testing and Materials (ASTM) tests the stone for water absorption, durability, sustainability, abrasiveness, etc. The testing of stones by ASTM for huge projects is important and it is a must for green buildings while for residential purposes it is not necessary.

Most people, however, assume that granite require no care at all or can be dirt-free with common household cleaning products. Most stones are sensitive to cleaners that are acidic, alkaline, or ammoniated. For example, an acidic cleaner

will etch many stones while ammoniated cleaners, such as glass and shower cleaners will actually fade the stone over time. Therefore, selecting the proper pH-balanced line of cleaner, sealer and polish is the key to successfully caring for granite and natural stone surfaces (www.buildnew.com).

Terracotta literally means "baked earth". It is made from burnt clay that is red in colour. "Terracotta is not only weather-proof, but also water-proof to a certain extent. The designs available include checks, tiger skin, flowers, leaves, tribal motifs etc," Mallappa, 2009 says. In market, basically three types of terracotta tiles: vitrified terracotta, clay vitrified terracotta and ceramic vitrified terracotta have come. "These are cost-effective". Terracotta tiles need to be cleaned regularly either by dusting or wiping with a damp cloth. The price of terracotta tiles ranges from Rs. 20 to Rs. 150 per sq. ft. Though the tiles do not need any special maintenance, they do need to be cleaned or dusted at least once a week. And terracotta tiles are finding place even inside homes, not just outside. However, Gopalan 2011 says since it is not completely water-resistant, it is not a good option indoors, especially for places like bathrooms. With the increasing pollution in the city, the tiles may lose their original colour (Clair, 2011). The durability of coloured terracotta is three to four years, whereas plain terracotta is more durable. But coloured terracotta needs to be cleaned with a primer first and then with steel patti. The steel patti is used to cover the pinholes and the pores. Terracotta looks beautiful and old from the first day of laying and improves in character and texture over the years Says Raghavan Nair, 2010 an executive engineer, working at Costford, "terracotta tiles have withstood the test of time". Decades after they were laid, they still look good in many houses.

A. Effects of flooring in Interiors

The effects of flooring in Interiors depends on the maintenance of the floors, because the effect and beauty of the floor will be long lasting only when it is properly maintained. There are 4 main reasons for maintenance of floor surfaces. They are: Protection, Safety, Ease of Cleaning and Appearance. While

the order of importance shifts in some situations, the fundamentals always remain the same.

The primary reason for maintaining any surface is to protect it. Most often this is accomplished by applying a protective, maintainable wear layer. Traffic wears down the protection, but it can be easily maintained and even replaced without damaging the surface itself. Clean, well maintained floors are safer, more slip resistant than dirty floors. Dirt, liquids, spills of many types reduces the slip resistance of floor finishes, making them less safe. A thorough and well defined program will help prevent slip and fall accidents before they happen. Well maintained floors require less effort to clean, they are easier to clean. Almost all floors have some degree of porosity, which means soil can get trapped, dirt builds up and cleaning becomes increasingly difficult. Sealing and finishing floors smoothes out the surface, filling in the pores and makes cleaning easier. Maintenance improves gloss and overall appearance ((<http://www.franklintechnology.com/training/floorcare/default.asp>)).

D. FLOORING AS AN AESTHETIC FACTOR IN DESIGNING INTERIORS

Flooring is the major part of the room, and it is the element which cannot be avoided. Beauty of a room depends majorly on the floors; hence flooring is an important aesthetic factor in interiors, so it is necessary to clean the stains of the floors, if not would spoil the interiors. Floors need caring too. The fine air-borne dust brought in mostly by footwear leaves scratches on the floor when not cleaned periodically and may cause health allergies. The efficiency of brooms vary from 35 per cent to 60 per cent and brushes with soft bristles would have 70 per cent effectiveness. Vacuum cleaners, however, when used with care, would prove to be 95 per cent efficient. Depending upon the nature of stains, proper chemicals should be used to remove the dirt (Gopinatha Rao, 2009).

Water will remove water-based stain. Stain due to acid or alkali has to be neutralised by using alkali or acid respectively. Stain due to ink can be removed by applying ammonia water on cotton. Alternatively, a 6 mm thick paste made with a strong solution of sodium carbonate in hot water can be applied and allowed to dry for some time. Other chemicals that can be used to remove ink stains are 10 per cent solution of oxalic acid or citric acid or 1 per

cent solution of potassium permanganate, followed by 10 per cent solution of sodium bisulphate. To remove stain due to oil, hydrated lime or white cement with petrol can be applied.

The problem spot in marble can be done with a lemon, cut in the middle, sprinkled with a dash of salt on it and rub it over the stain. Run the lemon over the spot slowly few times and wash off with soap and water. For scratches on glass, using toothpaste for it does come to aid in making them disappear. Sprinkle some baking soda on a cloth and run away crayon marks. Stains are a common problem in every household. They keep appearing all over the place. Simple measures can ensure stain-free walls (Stewart, 2007). Stains come in all colour, shape and size. However much well maintained the home could be, ugly blemishes stand out and despite one's best effort, keep attracting the attention.

In battle with stains, easily available baking soda could be a great lieutenant. It can be used alone or put into formulation with other cleaning agents. Using a damp cloth, dip pad in baking soda can wipe away the stains caused by markers on wood. It can be used on any surface and also act as a perfect deodoriser in kitchen and bathroom. Baking soda also comes handy in removing tea and coffee stains from cups, counters and dining table surface. Baking soda remedies though require a bit of surface scrubbing, offers very cost-effective solution when compared to the commercial cleaners available in the market. It is non-toxic and can also be used as a polish for plastic, enamel, steel and also glass.

This is the one aspect of home that needs to be constantly cared, cleaned and maintained. Clean and shiny floor is not an easy task and whatever is the floor type, some time, energy and effort is called for. Sweeping, vacuum and mopping are part of regular regimen. And to top them, here are some tips that can help in regaining that new and shiny look for the floor. Clean the tiles at regular intervals with a good detergent. Never forget to place a doormat at the entrance. Vinegar can be a good soldier in the battle with stains and grime on floor. Mix a few drops in the cleaning water and this will ensure that most of the accumulated dirt and stains are washed out (Wilson, 2008).

III. METHODOLOGY

Flooring forms the base of any interior scheme and with the many choices available it can be easy to get carried away ignoring its practical aspects that need to be taken into consideration. Floors are subjected to most use and hence needs to be viewed as an investment and forms a vital role in any building. Hence a research study entitled on “**Performance Analysis of the Selected Flooring Materials**” was undertaken to find out the best and suitable flooring for households. The study consisted of three phases namely

PHASE I : Conduct of Survey.

PHASE II : Executing of Laboratory experiment on the Selected Flooring Material.

PHASE III : Feedback of the Customers.

PHASE I: CONDUCT OF SURVEY

Groves (2009) avows that a “Survey” is a systematic method of gathering information from a sample of entities for the purpose of constructing quantitative descriptors of the attributes of a large population of which the entities are members. Three individual surveys were done for the study,

- A. Household Survey.
- B. Market Survey.
- C. Engineer’s Survey.

A. Household survey

For the research study, the investigator conducted a household survey in order to obtain details of the study regarding Performance Analysis of Flooring material. The procedures adopted for the study are based on following steps.

1. Selection of Area.
2. Selection of Sample
3. Research method Applied
4. Formulation of the Schedule
5. Data Collection
6. Interpretation of the collected data.

1. Selection of Area

Households located in Saibaba Colony, Vadavalli, Ganapathy, Pelameedu, Ram Nagar and Thudiyalur were selected by the investigator due to convenience and easy accessibility for obtaining the desired information.

2. Selection of Sample

One Hundred High Income and Upper Middle Income group households were selected by the investigator based on Purposive sampling technique. In Purposive sampling the researcher uses his own judgement to choose respondents and pick out only the best to meet the purposes of the study, tells Bastio and Sharma (2002). The sampling technique allows the researcher to select the sample for the study for a particular purpose (Alston and Bowles, 2003). Income is the financial gain earned or unearned accruing over a given period of time (www.wordnet.princeton.edu/perl/webwn). The investigator specially chose only the High Income and Upper Middle Income group households as she felt only these groups of people could afford to change the flooring material.

3. Research Method Applied

Personal interview cum Observation method was applied by the investigator for this survey. Face to face interview between an interviewer is referred to Personal interview ([www.learnmarketing.net/Primary research](http://www.learnmarketing.net/Primary%20research)). The investigator selected the interview method due to various advantages that is given below:

- In-depth answers possible ([www.learnmarketing.net/Primary research](http://www.learnmarketing.net/Primary%20research)),
- The sincerity, frankness, truthfulness and insight of the interviewee can be better judged through questions.
- Interviewers have the flexibility to use their knowledge, expertise, and interpersonal skills to explore interesting ideas or themes raised by participants (<http://ag.arizona.edu/fcs/cyfernet/cyfar/Intervu>).

- Visual stimuli to which the informant may react can be presented (Patnaik, 2001).
- Interviewer can obtain supplementary information ([www.hrguide.com /data](http://www.hrguide.com/data)). Observation is a method under which the investigator is personally required to go to the field and also personally observe the situation with his or her own eyes (Reddy 2004). The investigator observed flooring material used in each room of the selected households and made a note of it.

4. Formulation of the schedule

Reddy (2004) noted that schedule is generally filled out by researcher or the enumerator who can interpret the question when necessary. The investigator framed the schedule for the household survey. The questionnaire consisted of questions to collect general information of the family members, income, and details on the flooring.

The prepared schedule was pretested in ten households, for its ambiguity and the schedule were modified. The finalized schedule of household survey is presented in Annexure I.

5. Data Collection

Data are the basic input in any decision making process. The processing of the data gives statistics of importance of the study suggests Paneerselvan (2005). For household survey the needed data were collected from the selected houses by the investigator. The households were explained the purpose of the study and gathered the information through personal interview. The investigator created a good rapport with the members which was very conducive for obtaining desired data. Plate 1 represents the investigator interviewing household members.



PLATE 1
INVESTIGATOR INTERVIEWING THE HOUSEHOLD MEMBERS

6. Interpretation of the collected data:

Interpretation is unavoidable as research is concerned. In fact it is an important step as far as conclusion of research labour goes (Reddy, 2004). The data thus collected were consolidated and tabulated. Jain (2000), views the purpose of table is to simplify the presentation and to facilitate comparison.

B. MARKET SURVEY

The word “survey” means to view comprehensively and in details” (Denscombe, 2000). The investigator found market survey was essential to find out the latest fast moving flooring material. The survey included following aspects:

1. Selection of the Study Area
2. Selection of Sample
3. Selection of Research Method
4. Formulation of the Research Tools
5. Collection of data
6. Consolidation of the collected data.

1. Selection of the study area

Coimbatore, also known as Kovai, is the second largest metropolitan city and urban agglomeration in the Indian state of Tamil Nadu .It is the capital city in the Kongu Nadu region and is often referred to as the Manchester of South India ([www.Kovai.com/ index](http://www.Kovai.com/)). The city is located on the banks of river Noyyal surrounded by Western Ghats and is administered by the Coimbatore Municipal Corporation ([www. Kovaicity .com](http://www.Kovaicity.com)). Coimbatore has been ranked fourth largest metropolitan in South India. Coimbatore city is administrative capital of Coimbatore district ([http://en.wikipedia.org/wiki/ Coimbatore](http://en.wikipedia.org/wiki/Coimbatore)). Coimbatore has lots of outlets for tile, ply woods and natural stones and it is a developing city where lots of construction is taking place. Hence the investigator selected Coimbatore. The investigator selected outlets which catered to different types of flooring materials to suit various income groups.

2. Selection of sample

A sample, as the name implies is a smaller representation of a large whole. When some of the elements are selected with the intention of finding out something about the population from which they are taken, that group of elements is referred as a sample express (Groves, 2011). The outlets were chosen for the study based on purposive sampling technique. Purposive sampling is referred to as judgmental sampling ([http:// www.mathsisfun .com/data/survey-conducting.html](http://www.mathsisfun.com/data/survey-conducting.html)). Mohan and Elangovan (2007) states that Purposive sampling is one that is selected based on the knowledge of a population and purpose of the study. The investigator visited the shops and contacted the owners to get the desired information at their convenient time. The need for the study was explained and the questions from the questionnaire were administered and the information was recorded instantly and carefully.

3. Selection of Research Method

In order to gather information from the market, survey was found essential by the investigator. Survey is the process of collection of data and this is the first step for any statistical enquiry opines (Engel and Schutt 2009). Malhotra,(2008) points out survey research as the method of collecting data by asking a set of preformatted questions in a predetermined sequence in a structured questionnaire to a sample, so as to be the representative of a defined population.

Interview is the oral version of questionnaire or schedule in which the subject supplies the needed information in a face to face relation says Thakur (2006). According to Gupta (2000) interview method is a face to face contact with the person from whom the information is to be obtained .Thus the investigator selected interview as the research method in order to get the relevant and full details required for the study. Plate 2 represents the investigator interviewing the shop owners and collecting required information.

4. Formulation of the Research tools

Gupta (2000) opines that, Schedule is the name usually applied to a set of questions which are asked and filled in a face to face situation with the other person. The investigator prepared a questionnaire that was based on market survey to obtain the data on general information of the shop, details of flooring

material, information about customers and their preferences and the process and different types of flooring material. Based on the response from the shop owners necessary modification was made and questionnaire was finalized. The finalized schedule of market survey is presented in Annexure II.

5. Collection of Data

The investigator approached the shop owners to get an in depth information for the study with regard to flooring materials. The investigator contacted the informants in person and explained the purpose of the study. A good rapport was established between the interviewer and interviewee. The investigator visited the outlets personally, and also administered the question one by one and filled up the schedule on the basis of information supplied by the respondents. The necessary information was gathered for the study.

In addition, observation was also made by the investigator on the flooring materials in the showroom and recorded it carefully. Observation means viewing or seeing. Observation may be defined as a systematic viewing of a specific phenomenon in its proper setting for the specific purpose of gathering data for the particular study. Observation as a method includes both “seeing” and “hearing”. It is accompanied by perception as well, says Krishnaswami (1999). Kothari (2004) opines that, in the observation method, the information is sought by way of investigator’s own direct observations from the respondent.

6. Consolidation of the collected data

The collected data were consolidated and tabulated. Mohan and Elangovan (2007) informs that analysis of data involves a number of closely related operation that are performed with the purpose of summarizing the collected data and organizing them in such a manner that will yield answers to the research question. After the transcription of data is over, the data were summarized and arranged in compact form for further analysis. This process is called tabulation (Krishna swami, 1999). It involves the orderly and systematic presentation of numerical data in a form designed to elucidate the problem under consideration (Devi,1998). Thus tabulation is the process of summarizing raw data and displaying them on compact tables for further analysis. The result of the data was analyzed and presented under Results and Discussion.



PLATE 2
THE INVESTIGATOR INTERVIEWING THE SHOP OWNERS

C. ARCHITECTS/ENGINEER'S SURVEY

For further information, the investigator approached the engineers and architects and obtained details regarding Flooring material. The procedure adopted is presented below.

1. Identifying the Target
2. Selection of sample
3. Collecting information
4. Consolidating and analysing the collected data

1. Identifying the Target

The investigator identified the area experts, the engineers/architects who have done successful projects in Coimbatore, in order to know, their views and trends in flooring materials. The investigator met the engineers and architects at their convenient time to collect the required details on the flooring. Besides, explained the purpose of the study, which gave an opportunity to introduce the investigator as a P.G.graduate student undergoing Interior Designing programme.

2. Selection of sample

Twenty Five active Civil Engineers and Architects were selected to know their preference and suggestions on suitable flooring material for high income group. Civil Engineers and Architects were selected by investigator using convenience sampling method. Sekran (2006) points out convenience sampling refer to the collection of information from members of population who are available to provide the best information quickly and effectively. Hence, the investigator chose the engineer and architects and collected the required and relevant information on flooring materials.

3. Collecting information

For collecting information a third schedule was formulated Annexure III to elicit required information. To get the in depth information the investigator met the experts in person and collected the necessary information regarding flooring materials and their preferences and reason behind it.

4. Consolidating and analysis of the data

Blaxter, (2000) says all research involves collection and analysis of data, whether through reading, observation, measurement, asking questions or a combination of these or other strategies. The collected data were checked for its ambiguity, consolidated and presented under Results and Discussion.

PHASE II: EXECUTION OF LABORATORY EXPERIMENTS ON THE SELECTED FLOORING MATERIAL

The experiments executed involved testing the selected flooring material with different types of stains. Experiment is a test, or tentative procedure; an act or operation for the purpose of discovering something unknown (<http://dictionary.Reference.com/browse/experiment>). The experiment involved

1. Selection of selected flooring materials and
2. Testing with different stains.

1. Selection of selected flooring materials

The flooring materials which rated first five in the phase I, II, III the household survey, Market survey and engineer/architect survey, in all the three survey, were selected as the materials that will undergo the Experiment. Because first phase would clearly tell us about the materials which house members are satisfied , engineer's preference and also fast moving material in selected outlets and hence materials were selected. Phase I, II and III helped to identify the materials to be selected for conducting stain resistance tests.

2. Testing with different stains

Stains cause discolour due to the application of foreign matter; (<http://av1611.com/kjbp/kjv-dictionary/stain.html>).The investigator chose elements that are normally responsible for causing stain on flooring that would destroy the aesthetics and in turn involve in the process of changing the material. Stain creating products such as food products, cosmetics and cleaning products were used. Food products and beverages such as lime, turmeric, milk, tomato, coffee, tea, oil were selected and in cosmetics Lipstick, Nail polish, eye liner were

selected and in cleaning products Lizol, and surf were taken. Two samples of the same flooring materials were selected; one was kept standard without any test and the other was put to stain testing. The experiment conducted is presented in Plate 3. The procedure involved two aspects

- a. Cleaning the stain immediately and
- b. Allowing the stain to remain for 24hrs.

a) Cleaning the stain immediately

Immediate test is in which the stain producing element mentioned above is poured on one sample and other sample left as standard. Immediately it was cleaned to find out how fast the material absorbs the stains and how difficult, it is to remove the stain even when it is immediately cleaned. Each and every step was recorded.

b) Allowing the stain to remain for 24hrs

24hr test was carried out, where the stains was poured on the sample and made to remain for 24hrs and then cleaned to find out the materials resistance to the stains and difficulty, to remove the stain. The investigator recorded each and every step carefully and presented the result in Chapter IV.

PHASE III: FEEDBACK OF THE CUSTOMERS

Feedback is a process in which information about the past or the present influences the same phenomenon in the present or future (<https://en.wikipedia.org/wiki/Feedback>).The investigator collected the feedback of the customers who have used the selected flooring material for more than 3yrs, from selected outlets and also collected through website which would help to know more pros and cons of the flooring material. The feedbacks of the customers are presented under Results and Discussion.



TOMATO



EYE LINER



LEMON

PLATE 3
INVESTIGATOR EXPERIMENTING MATERIALS ON
STAINS

IV. RESULTS AND DISCUSSION

The findings of the study on “**Performance Analysis of the Selected Flooring Material**” are discussed under the following headings.

PHASE I: Findings of the Survey

PHASE II: Outcome of the Stain Resistant

PHASE III: Feedback of the Customers

PHASE I: A. Findings of the Household Survey

B. Findings of the Market Survey

C. Findings of the Architect and Engineer Survey

A. FINDINGS OF THE HOUSEHOLD SURVEY

This phase of findings presents the data received from the selected 100 households. They are presented under the following topics

1. General family background.
2. Details of the house.
3. Details regarding the flooring material.
4. Rooms under constant strain.
5. Place of purchase and reasons.
6. General awareness.

1. General family background

The details on general family background of the selected families are presented below.

a. Age

The age of the heads of the families, homemakers, children (Male and Female), and elders (Male and Female) are discussed in Table 1.

TABLE 1
AGE OF THE FAMILY MEMBERS

Details	Percentage (N=100)					
	Heads	Homemaker	Children		Elders	
			Male	Female	Male	Female
1-10	-	-	3	4	-	-
11-20	-	-	30	45	-	-
21-30	8	38	28	8	-	-
31-40	34	28	16	-	-	-
41-50	28	24	-	-	-	-
51-60	20	10	-	-	6	18
61-70	8	-	-	-	12	12

Among the surveyed families a majority of 34 per cent of the heads of the families and 28 per cent of homemakers belonged to 31-40 years, and 28 per cent of heads and 24 per cent of homemakers belonged to 41-50 years, whereas 38 per cent of homemakers and 8 per cent belonged to 21-30 years, 20 per cent of heads and 10 per cent homemakers belonged to 51-60 years and 8 per cent of heads belonged to 61-70 respectively. The table clearly reveals that the heads of the family and the homemakers belonged to the most energetic and active years of their life. A majority of 45 percent female and 30 percent of male children belonged to 11-20 years, while a majority of 18 percent female and 6 percent male belonged to 51-60 years, 12 percent female and 12 percent male belonged to 61-70 years.

b. Educational qualification

The educational qualification of the homemaker, heads of the families, children and elders of the selected families are discussed in Table 2.

TABLE 2
EDUCATIONAL QUALIFICATION

Details	Percentage (N=100)					
	Heads	Homemaker	Children		Elders	
			Male	Female	Male	Female
Pre school	-	-	1	2	-	-
1- 5	-	-	2	2	-	10
High School	-	-	6	8	-	8
Higher Secondary	-	-	16	16	-	-
Undergraduate	38	18	20	18	-	4
Post graduate	16	58	10	8	6	2
Professional	46	24	22	3	12	6

A majority of 58 per cent homemakers and 16 per cent of heads were post graduates, 46 per cent heads and 24 per cent of homemakers were professionals and 38 per cent of heads and 18 per cent of home makers were Undergraduate by qualification. A majority of 18 per cent female and 20 per cent male children were undergraduates, a majority of 12 per cent male and 6 per cent female elders were professionals. This indicates the trend towards importance and need for education for a holistic living.

c. Occupational status of the families

The Occupational status of the homemakers, heads of the family, children, and elders are discussed in Table 3.

TABLE 3
OCCUPATIONAL STATUS OF THE FAMILIES

Details	Percentage (N=100)					
	Heads	Homemaker	Children		Elders	
			Male	Female	Male	Female
Business	22	2	1	-	-	-
Teachers and Professor	4	24	-	-	-	-
Doctors	18	20	-	-	4	2
Engineers	20	12	10	2	-	-
IT professionals	20	10	8	6	-	-
Architect	12	6	4	2	-	-
Bank	4	2	-	-	-	-
Retired	-	-	-	-	10	8
Housewife	-	24	-	-	-	8
Student	-	-	24	32	-	-

A majority of 22 per cent of the heads of the families were businessmen followed by 20 per cent engineers and doctors respectively. The other professions being engineers (12 per cent), IT (10 per cent) and architects (6 per cent). With regard to homemakers a majority of 24 per cent were in teaching as the professors and teachers followed by doctors (20 per cent). However 24 per cent expressed contentment staying up at home and taking care of household activities. A majority of 56 per cent the of children were students, 12 per cent were engineers, 14 per cent were IT professionals, and 6 per cent were architects Only one per cent was involved in business.

d. Income of the family

i) Monthly income

Tamil Nadu Housing Board (2010) classifies Higher Income group as the citizens earning Rs. 7501 and above per month. Table 4 and Figure 1 shows monthly income of the selected families.

TABLE 4
MONTHLY INCOME OF THE FAMILIES

Monthly Income (in Rs.)	Percentage (N=100)
30,001-40,000	8
40,001-50,000	18
50,001-60,000	6
60,001-70,000	8
71,000-80,000	16
81,000-90,000	14
90,001-1,00,000	16
1,00,001-2,00,000	6
2,00,001-3,00,000	8

Source: (<http://tnhb.gov.in/citizen.aspx>).

Though all the selected families belonged to the High Income Group, it was seen that there was a lot of disparity in their income. A majority of 18 per cent of the selected families earned an income between Rs.40, 001 and Rs 50,000 monthly. Amongst the surveyed households six per cent each belonged to the income range between Rs.50, 001 and Rs.60,000 and Rs. 1, 00,001 and Rs. 2, 00,000. Sixteen per cent belonged to the income range between Rs.70,000 to Rs.80,000 and Rs. 90,001 to Rs. 1, 00,000 respectively. Eight percent of the selected samples had the highest income which ranged between Rs. 2, 00,001 and Rs. 3, 00,000.

ii) Others sources of income

While 34 per cent of the selected samples had no other source of income other than the income from their main occupation, 26 per cent earned from interests from savings and deposits, 12 per cent from dividends, shares and debentures, 18 per cent from properties as rent and the remaining 10 per cent from mutual funds.

2. Details of the house

i) Ownership details, year of construction, type of the flooring

The details of the house on Ownership details, type of the house is presented in Table 5 and type of the flooring is given in Figure 2.

TABLE 5
OWNERSHIP DETAILS, TYPE OF THE HOUSE AND FLOORING
MATERIALS

Details	Percentage (N=100)
Ownership details	
Owned	62
Rented	38
Type of the house	
Individual houses	100
Type of the flooring material	
Natural	42
Man made or artificial	58

A majority of 62 per cent owned the house, while 38 per cent were in rented house; all the houses were individual, owning a house is considered a status symbol.

FIGURE 1: INCOME OF THE FAMILY

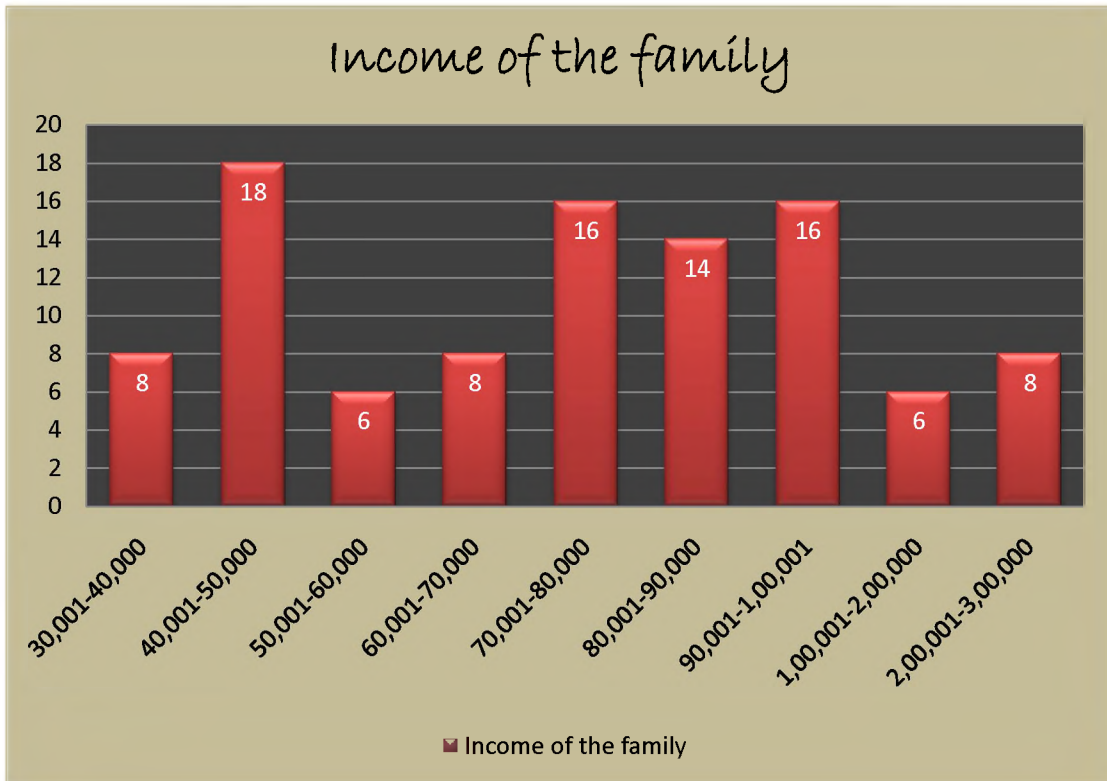
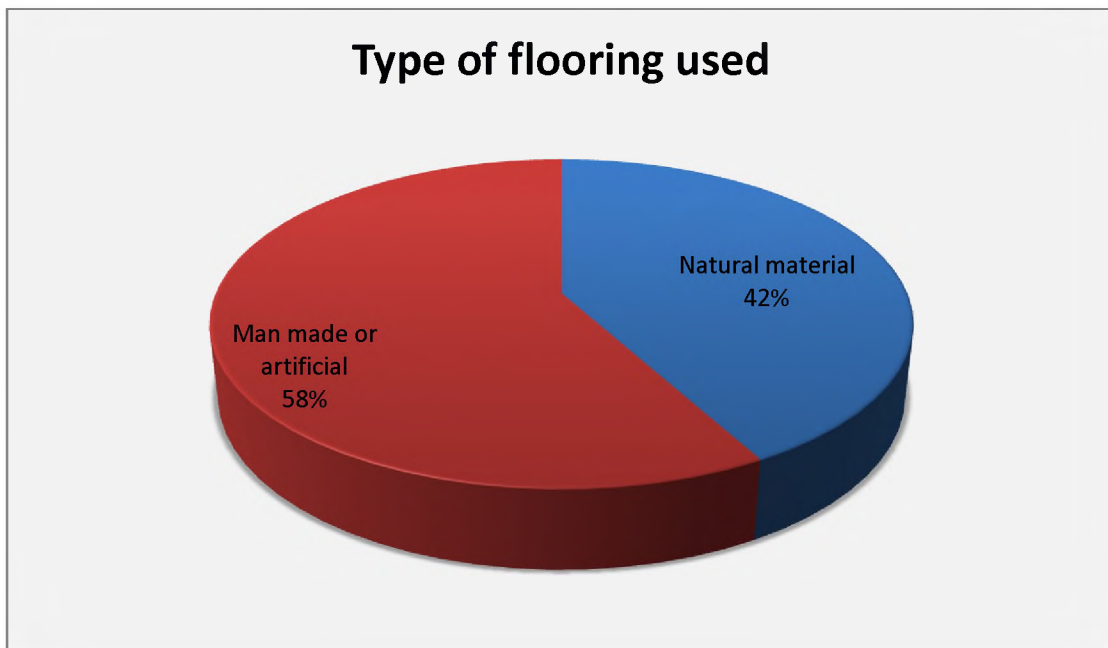


FIGURE 2: TYPE OF THE FLOORING MATERIAL USED



ii) **Year of construction**

Table 6 and Figure 3 present the details on year of construction.

TABLE 6: YEAR OF CONSTRUCTION

Details	Percentage (N=100)
2007-2008	32
2008-2009	24
2009-20010	22
20010-2011	16
2011-2012	6

All the surveyed houses were constructed between 2007 and 2012. Among them, a majority of 32 per cent were constructed between 2007 and 2008, 24 per cent of the houses between 2008 and 2009, 22 per cent between 2009 and 2010, 16 percent between 2010 and 2011 and 6 percent of the houses were constructed between 2011 and 2012. A gradual decrease was witnessed in the number of houses constructed in spite of the advancement in construction. Probably the cost of construction could be the reason for taking up construction.

3. Details regarding the flooring material

a) Reasons for selecting the specific flooring material

The main reasons for selecting the specific flooring materials are discussed in Table 7.

TABLE 7: REASONS FOR SELECTION OF FLOORING MATERIAL

Reasons	Percentage (N=100)
Durability	100
Appearance	100
Easy to clean	100
Maintenance free	84
Cost	76
Resistance to Wear and tear	64
Resistance to damp	46
Smoothness	36
Resistance to fire	34
Thermal Insulation	28
Resistance to sound	26
Variations in size, colour and textures	14

***Multiple Responses**

The general reasons as mentioned by the respondents are discussed below. All the respondents expressed durability, appearance, and easy to clean, as the main reason for selecting the specific flooring materials. The other main reason being maintenance free (84 per cent), cost (76 per cent) and resistance to wear and tear (64 per cent) resistance to dampness (46 per cent), smoothness (36 per cent), thermal insulation (28 per cent), resistance to fire (34 per cent), resistance to sounds (26 per cent) and variations in size, colour and textures (14 per cent) also were mentioned indicating their knowledge and awareness towards flooring material.

b) Criteria for selecting flooring materials

The criteria for selecting the flooring materials are discussed broadly under the Table 8 and Figure 4.

TABLE 8
CRITERIA FOR SELECTING FLOORING MATERIAL

Criteria	Percentage (N=100)
Safety	100
Durability	99
Appearance	98
Architects choice	96
Beauty	92

As mentioned by the household members; durability, appearance, safety and beauty were considered common and important criteria. However the architects played an important role in selecting the flooring materials based on the criteria mentioned by the households.

FIGURE 3
YEAR OF CONSTRUCTION

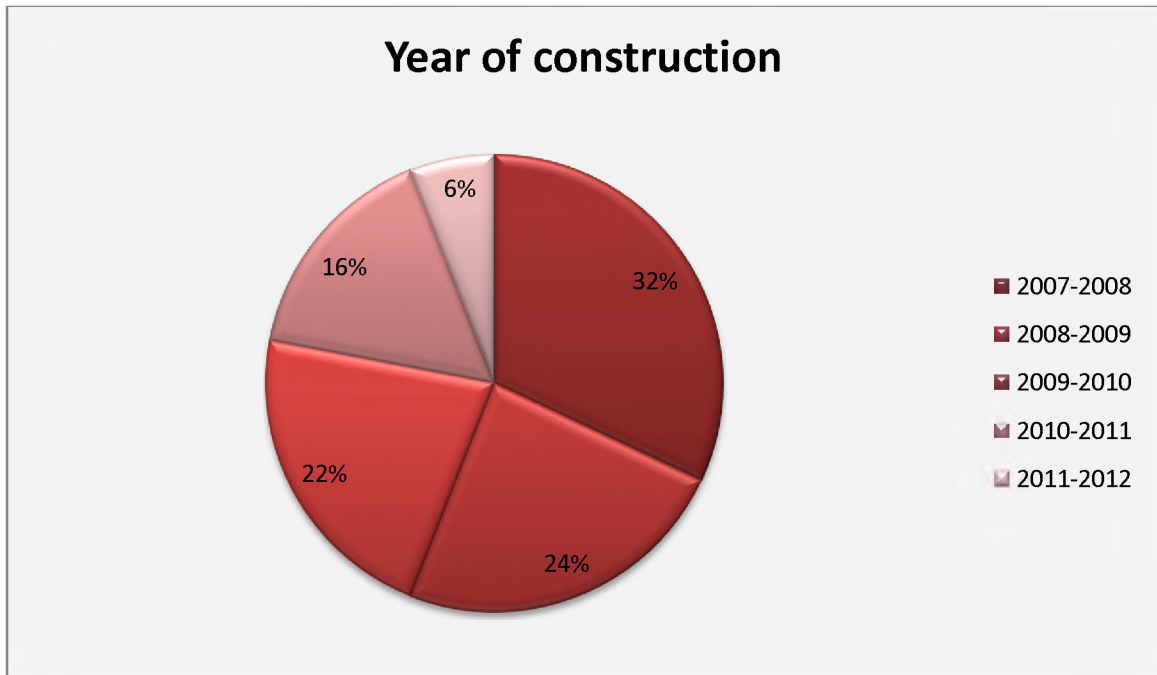
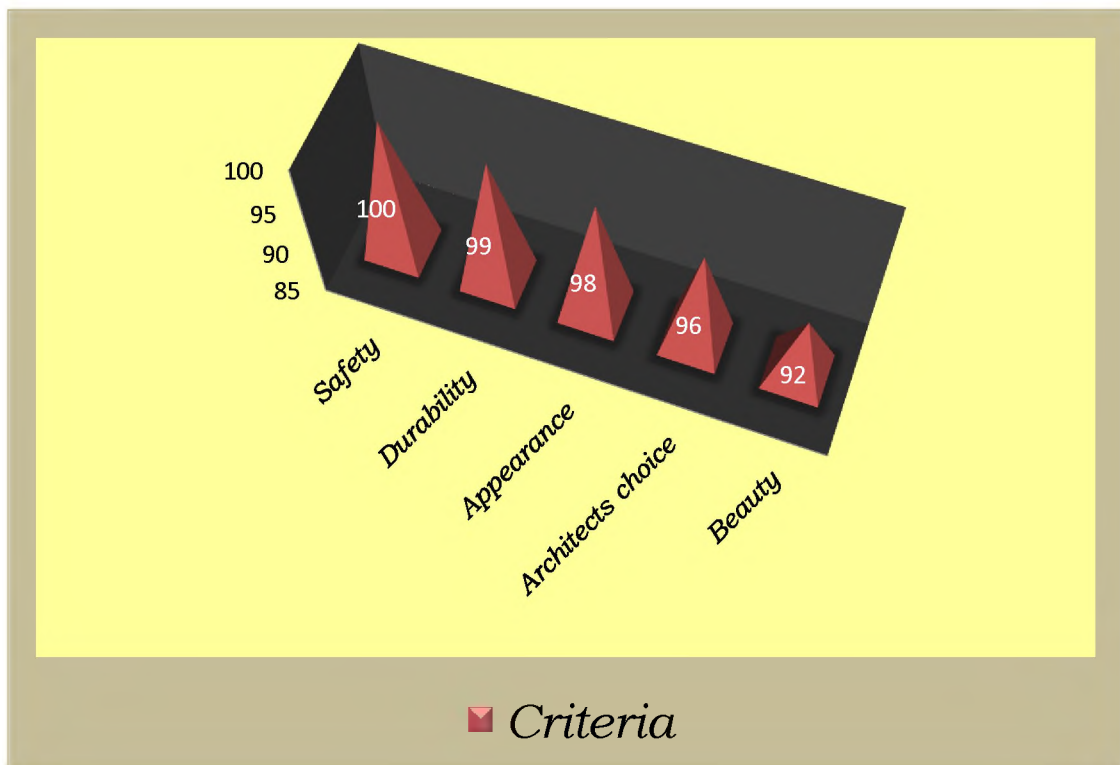


FIGURE 4
CRITERIA FOR SELECTING FLOORING MATERIALS



c) Materials used for flooring

Table 9 and Figure 5 shows the different materials used as flooring in selected households.

TABLE 9
MATERIALS USED FOR FLOORING

Materials	Percentage (N=100)
Ceramic Tile	25
Vitrified Tiles	23
Marble	18
Granite	16
Wood	12
Terracotta	6

A majority of the households used Ceramic Tile (26 percent), Vitrified Tiles (24 per cent), Marble (18 per cent), Granite (16 per cent), Wood (12 per cent) and Terracotta (6 per cent) as flooring for their houses. It was noticed that the use of wood and natural stone were avoided in Kitchen, the reason being affected by the spills that take place. Different materials used are presented in Plate 4.

a) Merits of the material

This heading comprises of pros and cons of different materials in the households. Merits of the flooring materials are discussed in Table 10.

Table 10: Merits of the flooring Materials

Merits	Percentage (N=100)					
	CT	VT	M	G	W	T
No absorption of Water	26	18	-	-	-	-
Elegant and stylish	26	16	16	14	10	-
Cost-effective	26	-	-	-	-	6
Low Maintenance	26	-	-	-	-	-
Durable	26	-	16	8	-	-
Hygienic	20	-	-	-	-	-
Colours, textures	16	18	14	-	-	-
Tough	14	-	-	-	-	-
Strong	-	-	14	-	-	-
Compact	-	-	18	-	-	-
Variations	-	-	4	-	-	-
Hard	-	-	-	-	12	-
Natural Material	-	-	-	12	12	-
Aesthetic look	-	-	-	16	8	-
Renewable	-	-	-	-	6	-
Does not trap dust	-	-	-	-	8	-
Pleasant atmosphere	-	-	-	-	10	2
Easy cleaning	-	24	-	14	8	-
Available in different sizes	-	-	-	12	-	-
Moisture Protective	-	-	-	6	-	-
Utility	-	22	-	-	-	-
Natural colour	-	-	-	-	-	6
Weather Resistant	-	-	-	-	-	4

CT-Ceramic Tiles; VT- Vitrified Tiles; M- Marble; G-Granite; W-Wood; T-Terracotta.

*Multiple Responses

Elegant and stylish was mentioned as an important aspect for all the selected flooring material. Hygienic, cost effectiveness, low maintenance, utility, durability and easy cleaning were the other merits mentioned regarding the flooring materials by the selected households.

b) Demerits of the material

The demerits of the material are discussed in Table 11 and Figure 6.

TABLE 11
DEMERITS OF THE FLOORING MATERIALS

Demerits	Percentage (N=100)					
	CT	VT	M	G	W	T
Slippery	26	-	-	-	-	-
Chip	14	10	6	-	-	-
Cannot bear heavy traffic	22	12	-	8	-	-
Stains	-	-	18	-	-	6
React with acids	-	-	14	-	-	-
Easily Breakable	-	8	12	-	-	-
Holes	-	-	4	-	-	-
Moisture	-	-	-	-	10	-
Attacked by Termite	-	-	-	-	4	-
Expensive	-	-	-	16	12	-
Warp	-	-	-	-	-	4

CT- Ceramic Tiles; VT- Vitrified Tiles; M- Marble; G-Granite; W-Wood; T-terracotta.

Slippery, chip, stains and cannot bear heavy traffic were the various demerits mentioned for the flooring material by the selected households.

f) Different Brands of the flooring material

The different brands used in the households were also collected in which 78 per cent of homemakers were ignorant about the brands that was used. However it was encouraging to know that 10 per cent used Kajaria, 6 per cent RAK, 4 per cent Marbitto and 2 per cent Regency for ceramic flooring. Five per cent used Italian Marble, 2 per cent Rajasthan marble and Indian marble; 8 per cent used Kajaria, 6 per cent RAK, 6 percent Marbitto and 4 per cent Regency for vitrified tiles.

FIGURE 5
MATERIALS USED FOR FLOORING

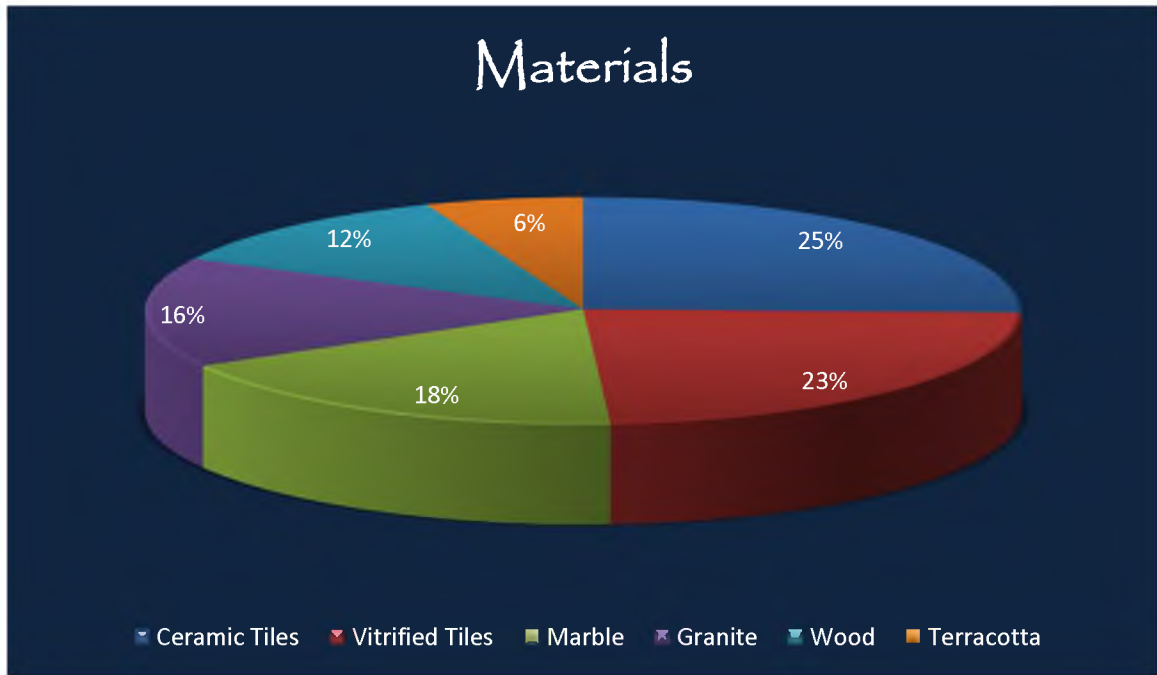
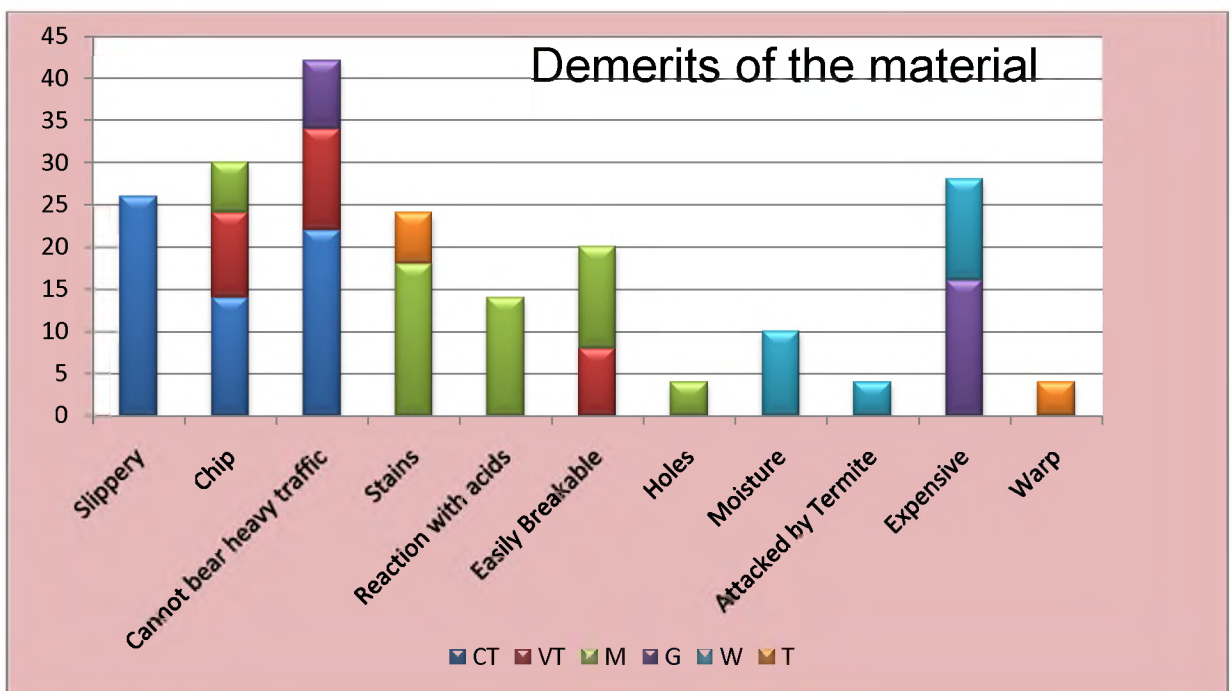


FIGURE 6
DEMERITS OF THE MATERIAL





WOODEN FLOORING



VITRIFIED TILES



MARBLE FLOORING

PLATE 4
DIFFERENT MATERIALS USED IN HOUSEHOLDS

g) Colour of the material

This heading comprises of the different colours of the flooring material and selection of colour.

h) Colours used

Colours play a vital role in bringing aesthetic look. The information on the colours used in the flooring was necessary for the study to find out the maintenance problem. The different colour used for flooring is discussed under Table 12 and Figure 7.

**TABLE 12
COLOURS USED**

Colours	Percentage (N=100)
White/Cream	50
Grey	12
Brown	12
Green	8
Yellow	6
Red	6
Pink	4
Black	2

A majority of 50 per cent of the households preferred cream or white colour mixed with some colour as they felt it gave a rich look to the room. The preference of grey and brown was mentioned by 12 per cent of the households and 8 per cent for green colour. The other colour preferences were yellow and red (6 per cent) of the households, (4 per cent) pink and black (2 per cent).

FIGURE 7
COLOURS USED

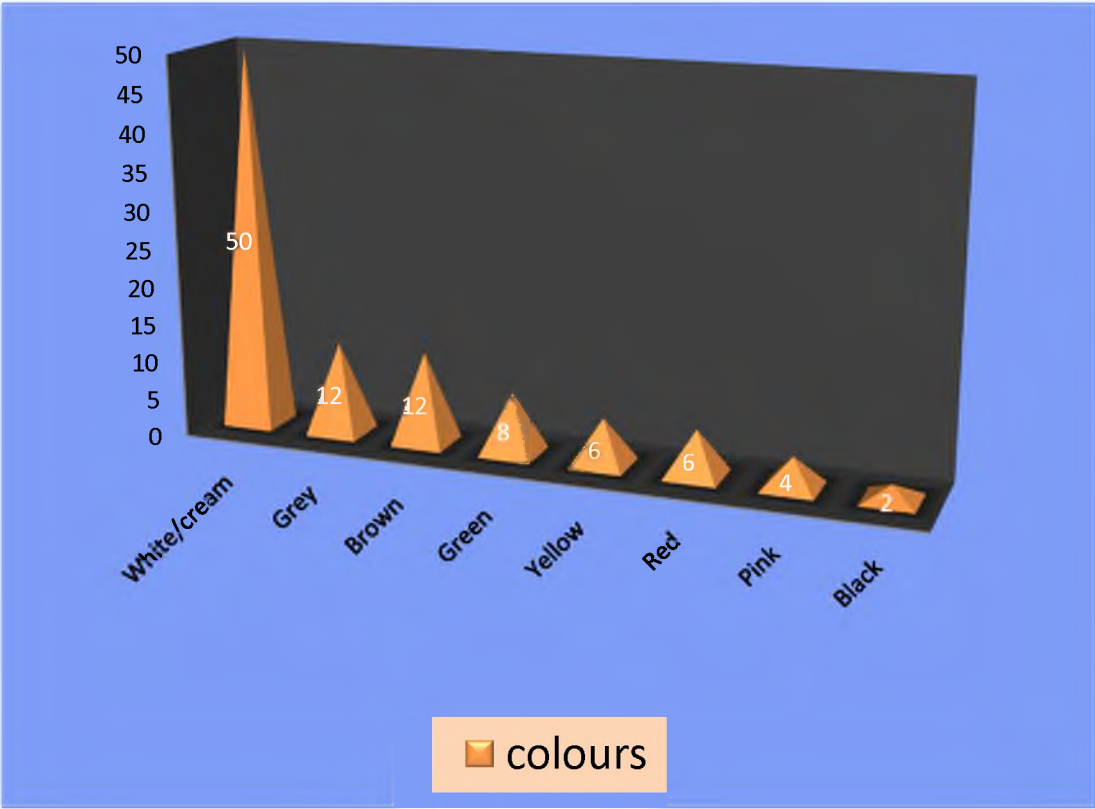
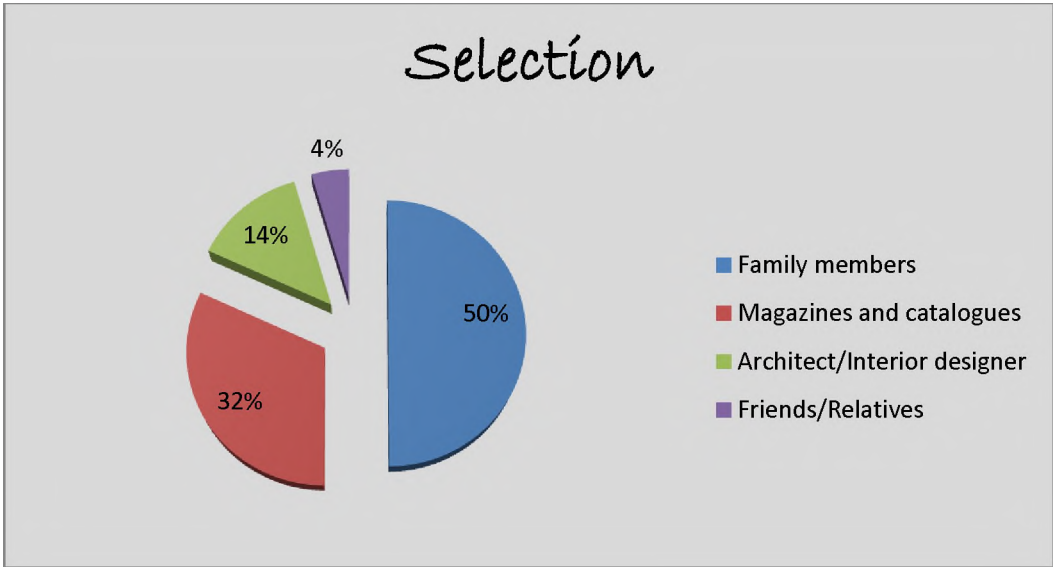


FIGURE 8
MEMBERS RESPONSIBLE FOR THE SELECTION OF THE COLOURS



i) Members Responsible for the Selection of the colours

Table 13 and Figure 8 represent the persons who play an important role in the selection of the colour for the floor tiles for their respective households.

TABLE 13
MEMBERS RESPONSIBLE FOR THE SELECTION OF THE COLOURS

Details	Percentage (N=100)
Family Members	50
Magazines/Catalogues	32
Interior designer/ Architect	14
Friends/ relatives/Neighbours	4

The colour of the flooring was chosen by the family members and their personal preference in a majority of 50 percent of the households. Next in line, 28 percent were the households where the colours were chosen by referring the magazines and catalogues. Twelve per cent consulted interior designers or architect or engineers to choose the colour. The colour were chosen by the themes (10 per cent), influenced by the choice of relatives and neighbour (4 per cent).

j) Maintenance

This heading which comprises the type of maintenance, difficulty in maintenance and detergents used for cleaning, are presented in Table 14 are discussed below.

**TABLE 14:
MAINTENANCE**

Details	Percentage (N=100)
Frequency of cleaning:	
Sweeping and mopping	
Daily	24
Alternate days	26
Weekly	50
Difficulty in Maintenance:	
Yes	28
No	72
Kinds of Difficulties	
Removing stains	10
Oil or ink cannot be removed because of the porosity	11
Slippery	7
Detergents used in cleaning:	
Dettol	17
Lizol	12
Phenol	11
Soap powder	4
Phenlight	4
Nofdet	1

*Multiple response

i) Duration of cleaning

A majority of 74 per cent swept floors daily, while 26 per cent said they swept on alternate days mentioning the presence of grown up and lack of paid help made them to accept this method. Besides 24 per cent alone swept and mopped daily, while 26 per cent and 50 per cent practised this habit alternate

days and weekly. Besides 28 per cent expressed maintenance of the floor was difficult and the rest did not consider maintenance as an issue.

Stains caused by oil, food spills and other items such as lipstick, nail polish were the items that caused stains followed by slippery floors were expressed as problem of the modern flooring materials.

A majority of used dettol (17 per cent), lizol (12 per cent), phenol (11 per cent), Soap powder and phenlight (4 per cent) and nofdet (1 per cent) were the other detergents used for cleaning the respective floors

ii) Defects on the material

This heading consists of percentage of how many have found defects on the material, on which material, and what were the complaints. These are discussed under Table 15 and Figure 9.

TABLE 15
DEFECTS OBSERVED ON THE MATERIAL

Details		Percentage		
Materials	Scratches	Holes	Cracks	Stains
Marble	8	4	-	7
Wood	4	-	3	-
Ceramic Tiles	2	-	2	-
Terracotta	-	-	-	10

A majority of people had defects with marble and few had defects with wood and most of them expressed that terracotta is not stain resistant.

iii) Rooms under constant strain:

Rooms under constant strain are discussed in Table 16 and Figure 10.

Table 16: Rooms under constant strain

Details	Percentage (N=100)
Living Room	72
Veranda	48
Kitchen	38
Dining Room	26
Bed Room	14
Bath Room	12
Pooja Room	10
Recreation	8

FIGURE 9: DEFECTS OBSERVED ON THE MATERIAL

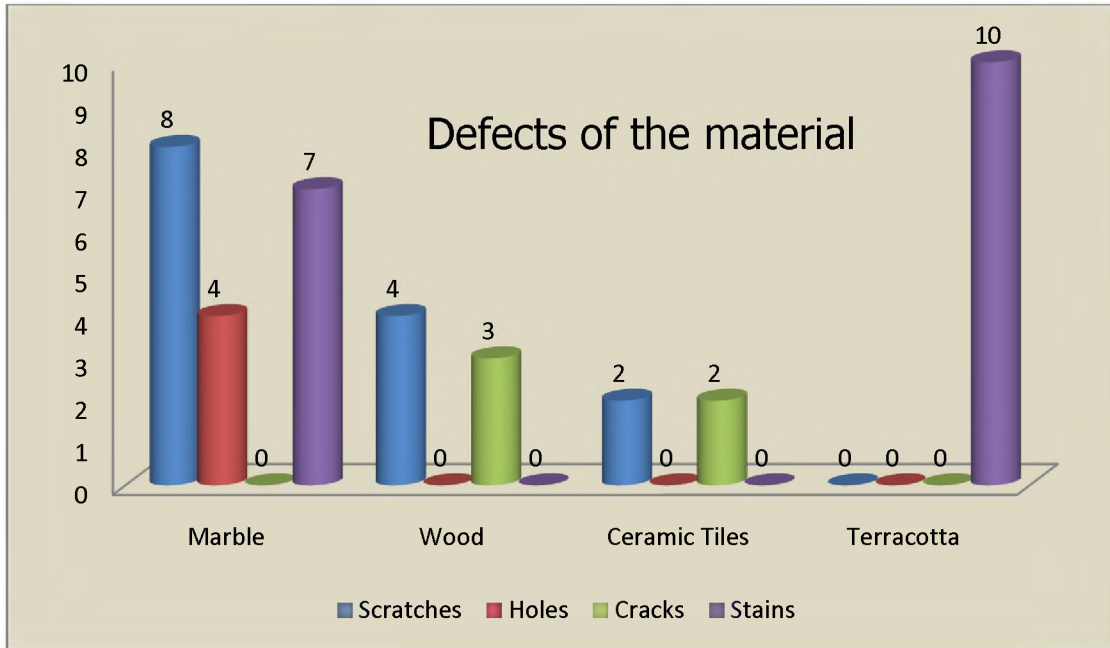
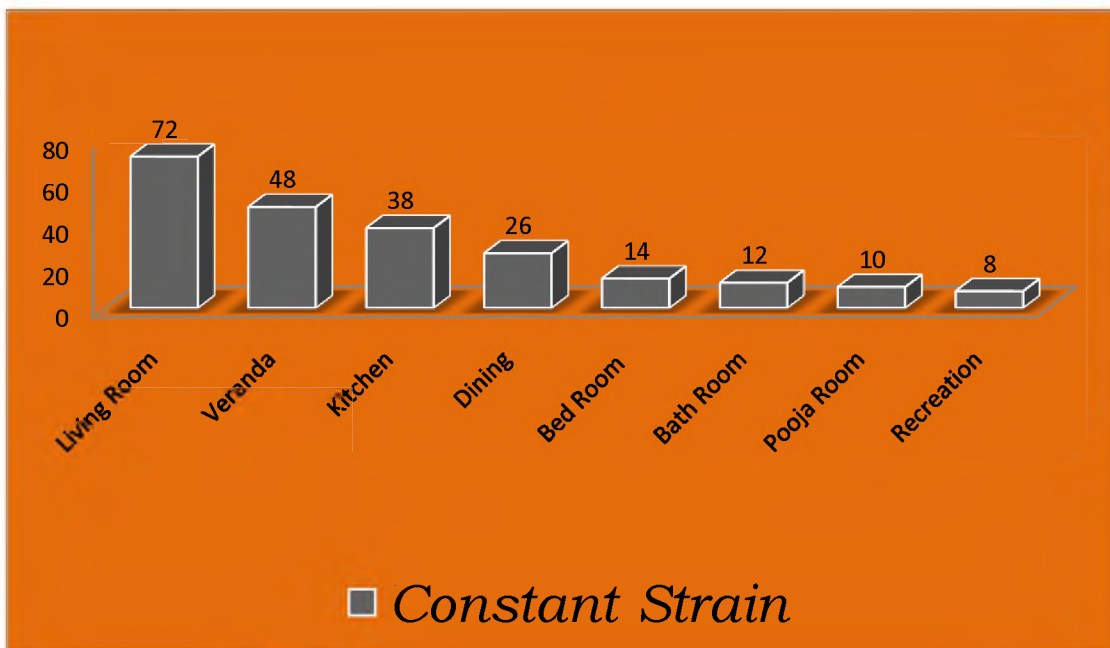


FIGURE 10: ROOMS UNDER CONSTANT STRAIN



A majority of Living room (72 per cent), veranda (48 per cent), kitchen (38 per cent), Dining room (26 per cent), Bed room (14 per cent), Bath Room (12 per cent), Pooja room (10 per cent) and Recreation (8 per cent).

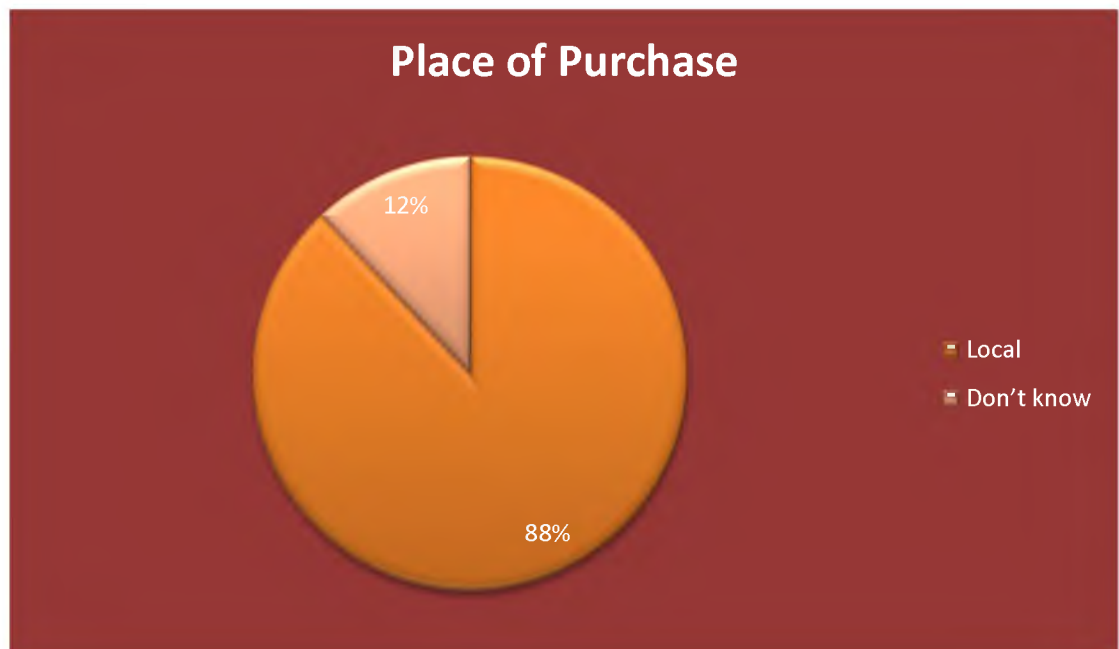
6) Place of Purchase and Reason

The place of purchase and reasons are discussed under Table 17 and Figure 11.

TABLE 17: PLACE OF PURCHASE AND REASON

Details	Percentage (N=100)
Local	88
Don't know	12

FIGURE 11: PLACE OF PURCHASE AND REASON



A majority of people have purchased materials locally (88 percent), and 12 percent of people did not have any knowledge where the materials were purchased.

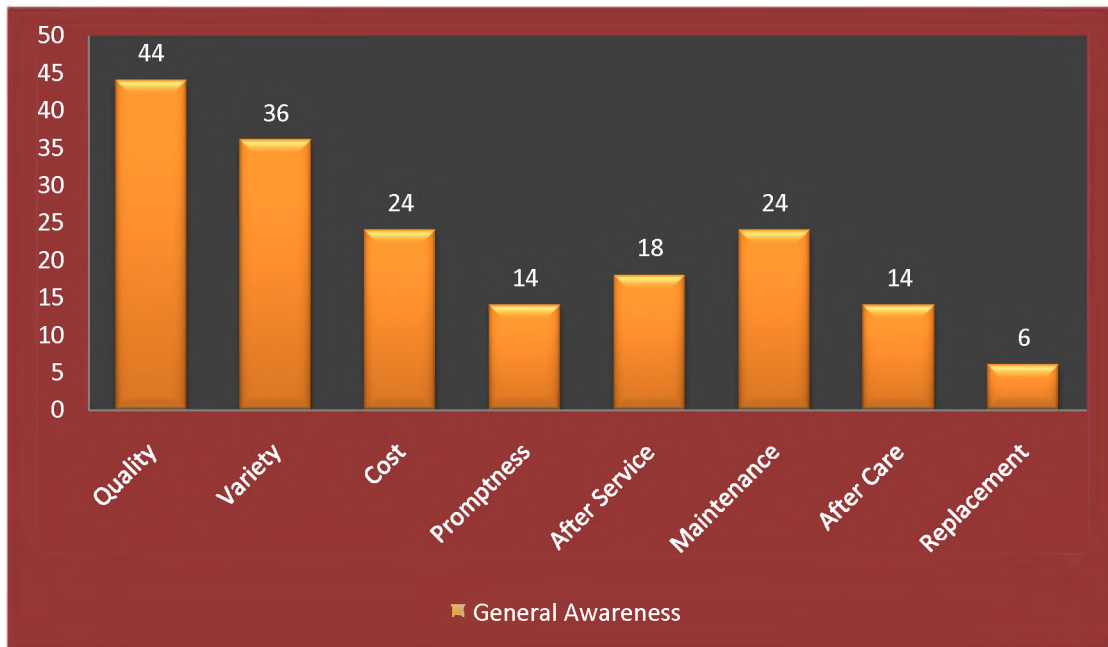
7) General Awareness

The general awareness on the material is discussed in the Table 18 and Figure 12.

Table 18: General Awareness

Details	Percentage (N=100)
Quality	44
Variety	36
Cost	24
Maintenance	24
After Service	18
Promptness in laying	14
After care	14
Replacement	6

FIGURE 12: GENERAL AWARENESS



A majority of people had general awareness on Quality (44 per cent), variety (36 per cent), cost and maintenance (24 per cent), service (18 per cent), promptness and after care (14 per cent), Replacement (6 per cent).

B. FINDINGS OF THE MARKET SURVEY

The outcome of the findings of the market survey presents the data received from the selected 50 shops. They are presented under the following topics

1. General details of the shop.
2. Details regarding flooring material.
3. Awareness on laying process.

1. General details of the shop

The selections of flooring materials play an important role, and hence it was necessary for the investigator to find out the information from shops. General details include the name, address, materials available and customers feedback or impression on the flooring materials. All the selected shops had a wide range of building materials especially the various types and brands to suit the taste of the customers. The shops selected were well established and were dealing with building materials more than their dealers.

a. Display Details

It was interesting to observe that each shop tried their best to exhibit the materials to attract the customers. The flooring materials were of different category and displayed suitably. Starting from light weight to heavy flooring materials with colour, design and texture variations, was well displayed. It was astonishing to feel the texture of the material especially by touch and the effect vision was of extremes. The different methods were stacking, wall display, revolving stands, filing etc.

i) Stacking

The Marbles and granites which are heavy were arranged by stacking on a wall with the sides protruding slightly exhibiting the colour, material grains along with the brand name and other details. The stacking on the wall had little variation depending on the aesthetic sense of the shop owners. The stacked marble and granite in Plate 5.

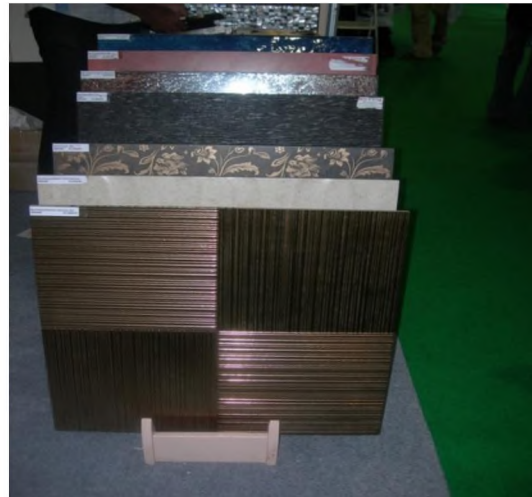


PLATE 5
STACKING OF TILES

ii) Wall Display

Some of the tiles were plastered on walls in an aesthetic manner. The methods of display on walls are presented in the Plate 6.

Revolving Stands

Smaller tiles were put on the revolving stand. Besides, a few shops had the tiles and marbles on a stand which could be turned like a book leaf.

Live Setup

Some of the tiles were displayed to exhibit a real set up. Example a kitchen unit, bath or toilet provide visual retreat and exhibit a true set up. This enables the customers to have a real feel to purchase the materials.

Catalogue

The catalogue formation was the method adopted for wooden items along with veneer and laminated wood. However the variety nowadays seems to be possible by the application of polish or paint to give a real feel and look of the material. The catalogue way of display are presented in Plate 7.

Filing Method

Design, size, shape, colour, visual, texture etc., can be viewed without difficult by this method. The shops were also very careful in arranging the display so as to make the customers to have a clean look around without any disturbance or hurdle. Care was taken to provide ample movement along the path comfortably. Even the flooring material used in the shops seemed to be an exhibit in natural set up display and advertisement. The grouping of the materials exhibited the interest shown by the owners of the shop. They are presented in Plate 8.

Lighting

Lighting which was put in shops added beauty to tiles, emphasized the texture effect and gave an aesthetic effect, which impressed many people. The lighting effect on materials are presented in Plate 9.

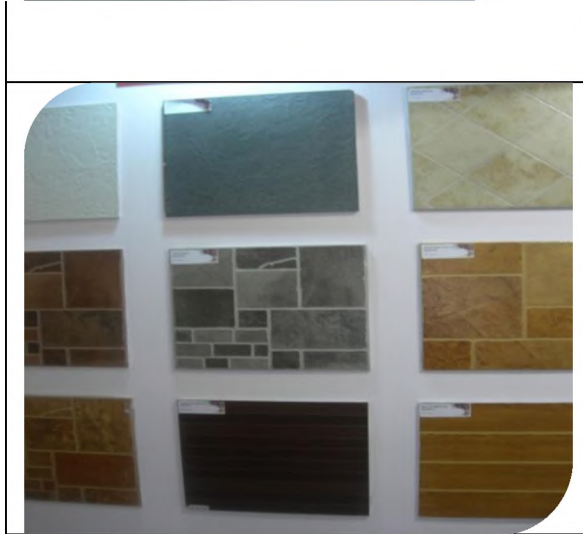


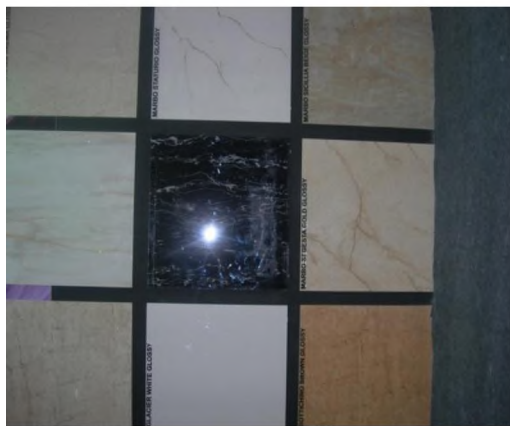
PLATE 6
WALL DISPLAY OF MATERIALS



PLATE 7
CATALOGUE DISPLAY OF WOOD



FILING OF MATERIALS



**PLATE 8
LIGHTING EFFECT ON THE MATERIALS**

Terazzo warranties



- To be covered, "Wear" must be through the decorative print. Gloss reduction is not wear.
- To be covered, "Fade" must be due to exposure to sun or electrical light.
- To be covered, "Stain" must be substances normally found in domestic environment

LIMIT 30

- Scratch-proof
- UV resistant
- Temperature resistant (-20°C and 100°C)
- Easy to clean
- Simple to install
- Chemical resistant
- Low noise levels
- Waterproof
- Antiallergenic
- Reusable
- German R&D



- 9µ mm Special Fire Retardant and moisture resistant
- 9µ mm High wear resistant layer made from Al2O3
- Decorative paper layer
- HPL Substrate
- Balancing bottom layer



PLATE 9: BULLETINED INFORMATION

Bulletined Information

In few shops the information about the companies merits and details on the material was put up, so as customers can read and know about the material. The bulletined information are presented in Plate 10.

2. Details regarding flooring material

This heading comprises of various details such as colours available, cost of the material, details on fast moving material, purpose of the material, type of the material, merits and demerits of the material envisaged by the clients in selection of flooring materials.

a. Colours available

Different colours of the flooring material currently available in the market are discussed under the Table 18.

TABLE 18 : COLOURS AVAILABLE IN THE MARKET

Materials	Colour available Percentage(N=50)							
	Pink	Green	Black	Yellow	White	Red	Grey/silver	Brown
Ceramic Tiles	50	50	50	50	50	50	50	50
Vitrified	50	50	50	50	50	30	36	6
Granite	50	50	40	-	50	-	50	-
Marble	50	-	-	-	40	-	-	-
Terracotta	-	-	-	-	-	20	-	-
Wood	-	-	-	-	-	-	-	30

It was observed that Ceramic and vitrified tiles were available in all the colours because they are manmade and artificial material, and there were also possibilities to produce shades depending on the choice of customers, While the rated materials such as granite and marble which cannot lend for variety in colours. The dealers experienced that among the granites; they supplied the

materials and made it possible on the request of the customers. Similarly, marble was available in pink and white colour. However the natural line on the marble was of great attention to the customers experienced the shop owners. Plate shows different flooring materials available in selected shops.

b. Cost of the material

Granite was available from Rs. 100 to Rs. 400 per sq.ft; Vitrified tiles are available from Rs. 35 to Rs. 200 per sq.ft; Ceramic tiles were available from Rs. 45 to Rs.120 per sq.ft; wood from Rs. 50 to Rs. 600 per sq.ft (depending on the type of wood); Terracotta costs only Rs. 15 to Rs.30 per sq.ft; and marble available from Rs.30 to Rs.800 per sq.ft.

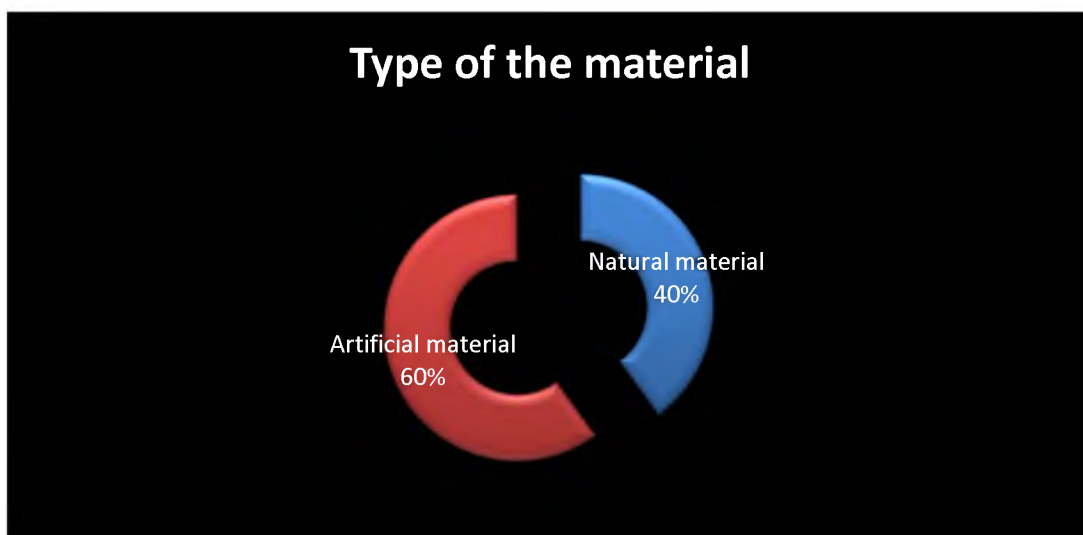
c. Types of the material

The types of the material usually chosen are shown in Table 19 and Figure 12.

**TABLE 19
TYPES OF THE MATERIAL**

Details	Percentage (N=100)
Artificial Material	60
Natural Material	40

**FIGURE 12
TYPE OF THE MATERIAL.**



Most of the people prefer artificial material because it consumes less time in laying and hence the floor can be used sooner. And there was a variety of colour and designs available to suit various levels of people of different age group, preference, and income level reported the shop owners.

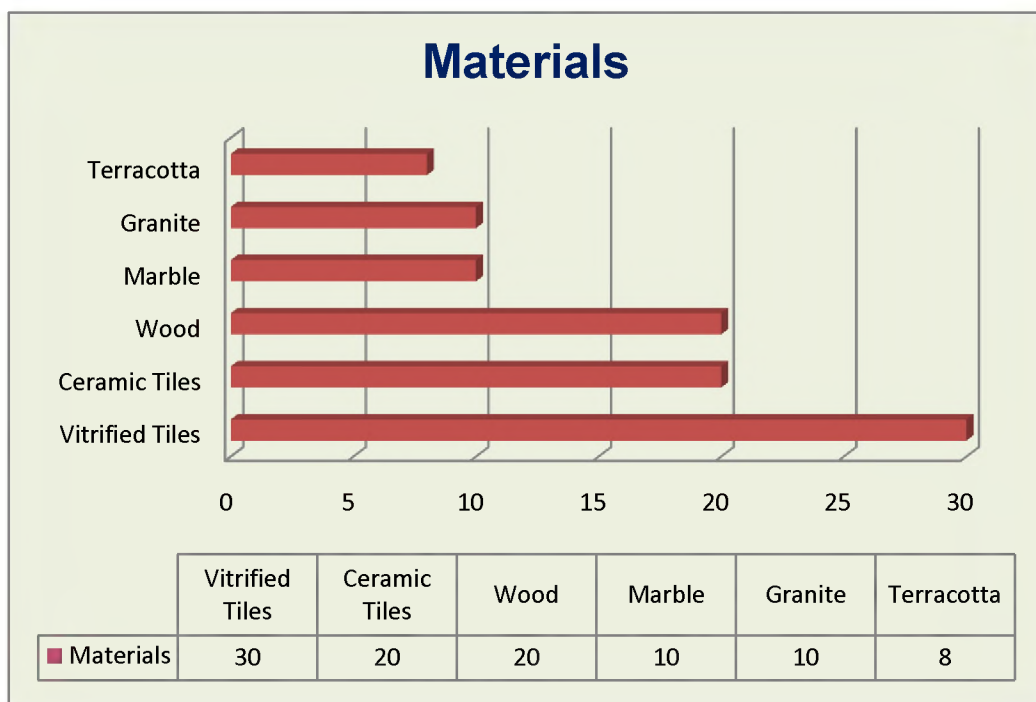
d. Details on fast moving material

The details on fast moving material are presented in Table 20 and Figure 13.

TABLE 20
DETAILS ON FAST MOVING MATERIAL

Details	Percentage (N=100)
Vitrified Tiles	30
Ceramic Tiles	20
Wood	20
Marble	10
Granite	10
Terracotta	8

Figure 13: Fast moving material



It was found that Vitrified tiles were moving fast compared to any other material because it consumes less time for laying can be used immediately. The other reasons being the much simplified procedure compared to the other materials. In addition transportation and labour was also economical. The most important reason was its possibility to use it immediately after laying.

e. **Purpose in which the material used for**

The materials which are suitable for different types of room are discussed under the Table 21.

TABLE 21
MOST SUITABLE FOR THE ROOMS

Materials		Suitability								
		V	LR	DR	KR	BR1	BR2	R	P	T
Ceramic tiles										
	10	10	10	-	8	9	10	10	-	
Vitrified tiles	10	10	10	10	8	8	9	9	-	
Granite	10	-	-	10	-	-	-	10	-	
Marble	8	10	9	6	8	9	10	10	-	
Terracotta	-	-	-	-	-	-	-	-	10	
Wood	10	10	8	-	6		10	-	-	

- V-Veranda, LR- Living room, DR- Dining room, KR- Kitchen room
- BR1- Bed room, BR2- Bath room, R- Recreation, P- Pooja room
- T- Terrace.

Vitrified tiles and marble suits for all rooms except terrace, in which only clay tiles are preferred; now in market new researches are going on to bring in a suitable vitrified tiles which can be used in terrace. The usage of flooring material is not area specific. The choices of the customers play an important role in laying the flooring material as per their convenience. However the costly materials such as granite are used for pooja area where the importance is given to deity and also the living area where it is a place for friends and relatives together at the time of celebration and hence importance was given to living area reported by the shop owners.

f. **Merits and Demerits of the material**

This heading comprises of pros and cons of different material in the households.

TABLE 22
MERITS OF THE MATERIAL

Merits	Percentage (N=50)					
	CT	VT	M	G	W	T
No absorption of Water	15	15	-	-	-	-
Elegant and stylish	12	15	-	-	10	-
Cost-effective	18	-	-	-	-	8
Low Maintenance	15	-	-	-	-	-
Durable	15	-	10	8	-	-
Hygienic	10	-	-	-	-	-
Colours, textures	8	10	-	-	-	-
Strong	-	-	15	-	-	-
Variations	-	-	4	-	-	-
Hard	-	-	-	-	8	-
Natural Material	-	-	-	12	10	-
Aesthetic look	-	-	-	15	5	-
Renewable	-	-	-	-	15	-
Pleasant atmosphere	-	-	-	-	10	2
Easy cleaning	-	-	-	-	12	-
Available in different sizes	-	-	-	12	-	-
Moisture Protective	-	-	-	6	-	-
Utility	-	12	-	-	-	-
Natural colour	-	-	-	-	-	6
Weather Resistant	-	-	-	-	-	5

CT- Ceramic Tiles; VT- Vitrified Tiles; M- Marble; G-Granite; W-Wood; T- terracotta.

Strength, durability, availability and elegance were the merits of flooring materials expressed by the shop owners. It was noticed that when household members looked in low maintenance or utility as the merits, shop owners looked for availability and elegant look as merits.

Demerits of the material

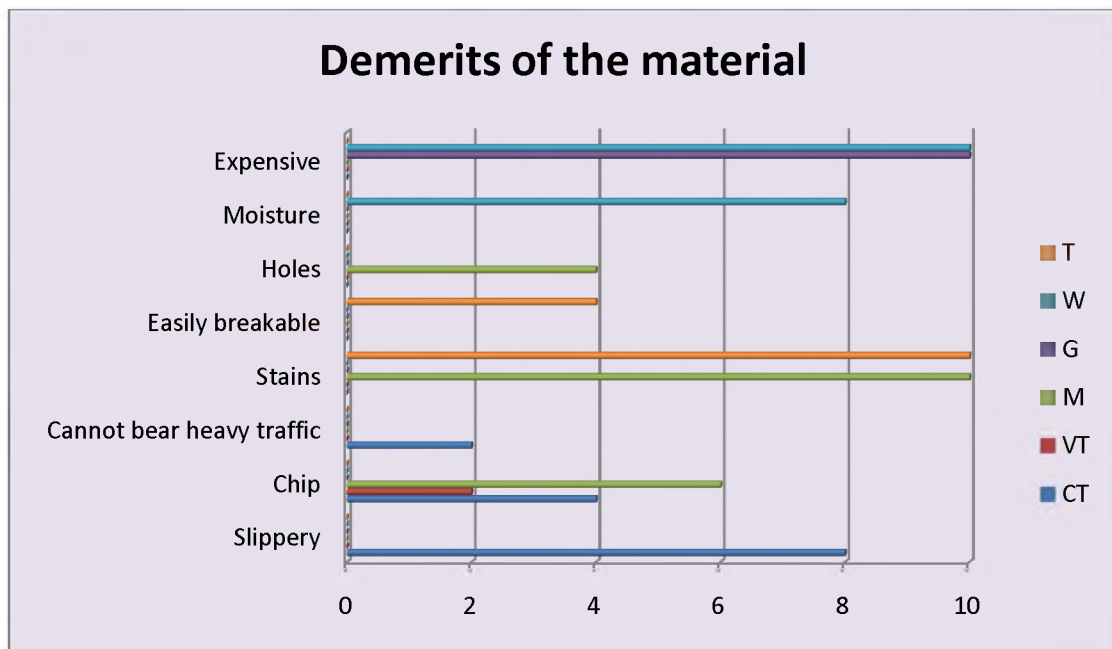
Demerits of the various materials are discussed in Table 23 and Figure 14.

TABLE 23
DEMERITS OF THE MATERIAL

Demerits	Percentage (N=50)					
	CT	VT	M	G	W	T
Slippery	8	-	-	-	-	-
Chip	4	2	6	-	-	-
Cannotbear heavy traffic	2	-	-	-	-	-
Stains	-	-	10	-	-	10
Easily Breakable	-	-	-	-	-	4
Holes	-	-	4	-	-	-
Moisture	-	-	-	-	8	-
Expensive	-	-	-	10	10	-

CT- Ceramic Tiles; VT- Vitrified Tiles; M- Marble; G-Granite; W-Wood; T-terracotta

FIGURE 14: DEMERITS OF THE MATERIAL



CT- Ceramic Tiles; VT- Vitrified Tiles; M- Marble; G-Granite; W-Wood; T-terracotta.

Cost was said to be the commonly reported as the demerits of the material mentioned the shop owners. However, the shop owners were hesitant in expressing the demerits, even if questions were asked stating complaints of the people. They said it has been rectified and no such complaints are expressed since the available flooring materials had much more merits compared to demerits expressed the shop owners.

3. Awareness of the customers

Most of the shop owners were aware about the various finishes of the material, and in few granite outlets, even observation of the process could be viewed and recorded, while few refused to tell the processes undergone by the material. It was noted that the owners had a much wider knowledge on the flooring materials compared to the salesmen, who often kept changing their occupation. However a certain such as commonly used material, colour preference and brand were as the awareness of the customers reported by the owners of the shops.

C. FINDINGS OF THE ARCHITECT/ENGINEER SURVEY

This comprises of 25 architects and engineers views to know about their preference of flooring material for high income group and the reasons for opting the same. Most of them preferred Vitrified tiles and ceramic, as so much of innovations are brought in the finishes of the material, which brings in both aesthetic appeal and utility. As it is an artificial material and range of colours and design is possible and also there tiles bring a rich decor to the room. Few suggested Wood and Granite, and of course the cost plays an important role in selection and usage of these materials expressed the experts.

PHASE II: OUTCOME OF THE LABORATORY EXPERIMENTS

The outcome of stain resistant is discussed in Table 24,

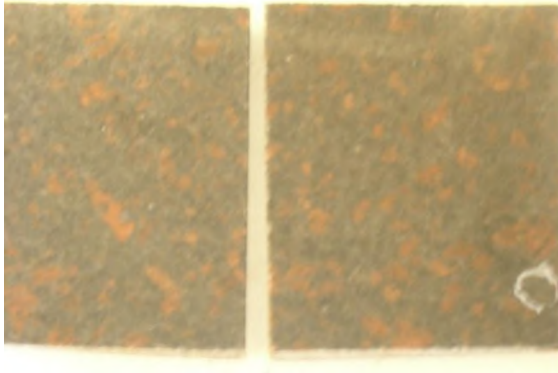
TABLE 24: OUTCOME OF STAINS

Stains	CT	VT	M	G	T
Lime					
Turmeric		✓			
Milk		✓			✓
Coffee		✓	✓		✓
Tea		✓	✓		✓
Tomato					
oil			✓		✓
Lipstick					✓
Nail polish			✓	✓	✓
Eye Liner			✓		✓

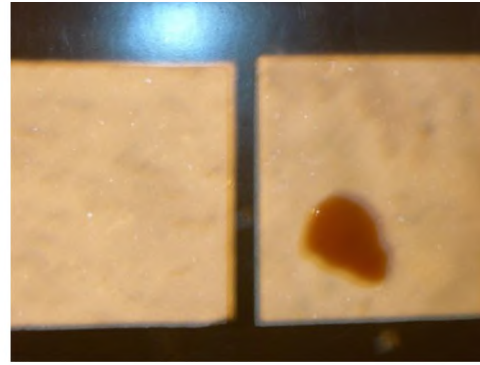
CT- Ceramic Tiles;VT- Vitrified Tiles; M- Marble; G-Granite; T-terracotta.

The experiment results are presented in Plate 10 and 11.

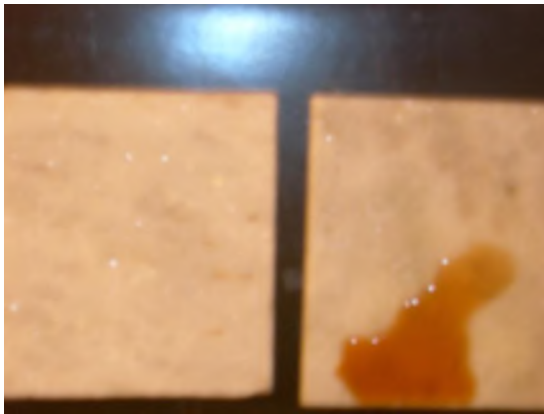
Floor is the one aspect of home that needs to be constantly cared, cleaned and maintained. It was observed that Terracotta and marble were not stain resistant, and they absorbed the stain immediately and was difficult to clean. Hence, Terracotta was suitable only to the areas like terraces which are less prone to stains like terraces. The outcome of the laboratory experiments proved that common stains at household level were due to Lime, turmeric, coffee, tea, milk, tomato, oil, lipstick, nail polish, eyeliner etc. Tea and coffee alone when left for a longer duration stained the floor. However due to availability of the latest floor cleaning agents, even these problems were solved. The stained material during experiments are presented in plate 10.



**STAIN ON GRANITE
DUE TO NAIL POLISH**



COFFEE STAIN IN MARBLE



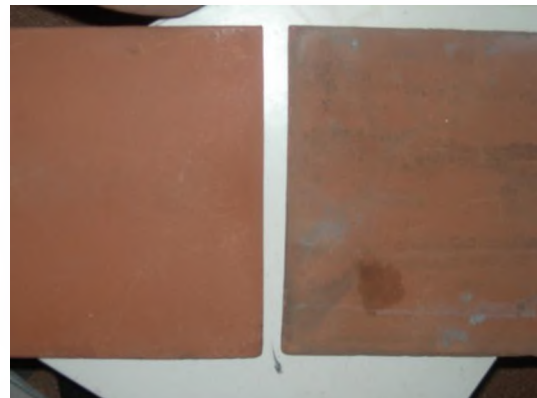
TEA STAIN IN MARBLE



OIL STAIN IN MARBLE

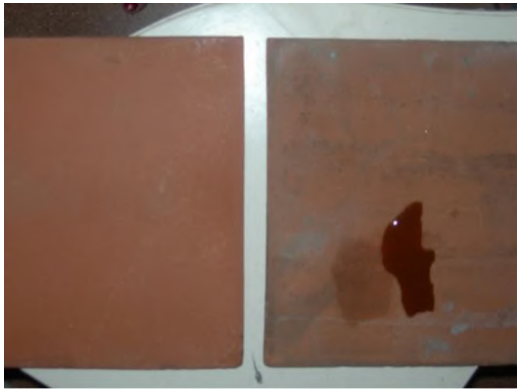


LIPSTICK STAIN IN MARBLE

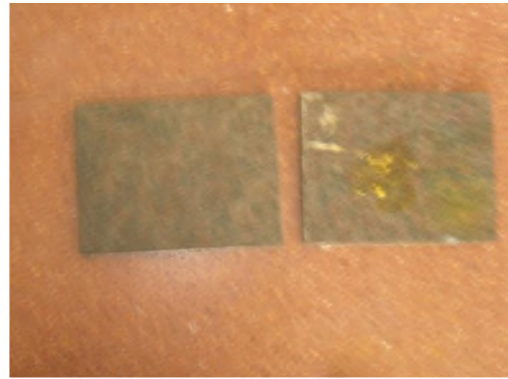


OIL STAIN IN TERACOTTA

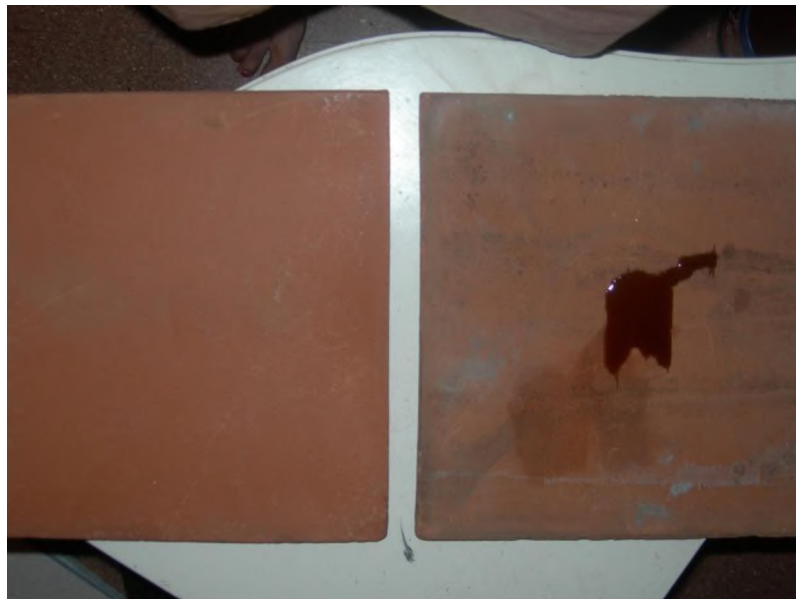
**PLATE 10
OUTCOME OF THE EXPERIMENT**



**COFFEE STAIN IN
TERRACOTTA**



**TURMERIC STAIN IN
VITRIFIED TILES**



TEA STAIN IN TERRACOTTA

**PLATE 11
OUTCOME OF THE EXPERIMENT**

PHASE III: FEEDBACK OF THE CUSTOMERS

Feedback of the customers was collected from websites and complaints were noted and even the answers given by the architects, shop owners were noted. The complaints were on marble for stains, ceramic tiles for being slippery and terracotta for being easily breakable. It was said that immediate cleaning of spills can make marble more durable, and for ceramics nowadays new finishes are given like matt finish, which can be non-slippery, which is otherwise represented as non-skid tiles. Here are some of the reports collected from website

Prem: Hello Sir, I find it difficult to remove the stains from my marble floor, please suggest few home remedies.

Expert: C.H.Gopinatha Rao, Mylapore

- Water will remove water-based stain. Stain due to acid or alkali has to be neutralised by using alkali or acid respectively.
- Stain due to ink can be removed by applying ammonia water on cotton. Alternatively, a 6 mm thick paste made with a strong solution of sodium carbonate in hot water can be applied and allowed to dry for some time. Other chemicals that can be used to remove ink stains are 10 per cent solution of oxalic acid or citric acid or 1 per cent solution of potassium permanganate, followed by 10 per cent solution of sodium bisulphate.
- To remove stain due to oil, hydrated lime or white cement with petrol can be applied.
- If the problem spot is marble, then try this. Take a lemon, cut it in the middle, sprinkle a dash of salt on it and rub it over the stain.
- Run the lemon over the spot slowly a few times and wash off with soap and water.
- If looking to clean glass tabletops, then clean them by rubbing with a little lemon juice and wipe dry with smooth paper. End the task with a polish.
- Stains come in all colours, shapes and sizes. Even before you realise, they appear on walls, woodwork, tiles, doors and even the decor.

- In your battle with stains, easily available baking soda could be a great lieutenant. It can be used alone or put into formulation with other cleaning agents.
- Take a damp cloth, dip it in baking soda and wipe away what you thought were indelible stains caused by markers on wood furniture.
- It can be used on any surface and acts as a deodoriser in the kitchen and the bathroom. You can mix it with warm water to prepare a cleaner.

Krishnakumari (Bangalore): Sir/Madam; can you please tell me about Do's and Don'ts in a stone flooring.

Experts: consultants on floor restoration and stone care works

- Do use only the proper stone care products of reputed make.
- Don't use vinegar, soft scrub, Windex or your common household cleaners, especially in showers.
- Do keep floors swept or vacuumed regularly.
- Don't use a vacuum that can cause scratching.
- Do use a coaster or gliders under chairs and other furniture.
- Don't drag heavy objects across stone floors.
- Do take care and pride of your stone and it will give you many years of performance.
- Do consult a stone restoration contractor prior to installation. These are the professionals who will suggest the proper materials and methods of installation.
- Don't hire an inexperienced contractor.

The report from the customers would help the clients to decide on the suitable flooring materials for their household.

V. SUMMARY AND CONCLUSION

Man has a strong urge to express his creative and aesthetic instincts in visual form. Since the home is the centre of all the activities, the way of life and thoughts spring from within the protective shelter. The internal space of the building must therefore be functional and comfortable to man, to perform his various functions. A comfortable house has proper composition of natural element and manmade elements where the man can perform various functions in the best possible ways and feel pleasant. By the help of good flooring we can create an environment with character and beauty.

The study entitled “**Performance Analysis of the Selected Flooring Material**” is to ascertain the importance in choosing right type of flooring which lasts longer. The objectives of the study was

- To assess the views of the selected households on the impact of flooring materials.
- To analyze the preference of flooring material for residential spaces.
- To examine the benefits and problems encountered by the users.
- To find out the extent of awareness on the availability of the flooring materials and
- To get the feedback from the users on flooring materials.

The methodology consisted of three phase

PHASE I : Conduct of Survey.

PHASE II : Executing of Laboratory experiment on the Selected Flooring Material.

PHASE III : Feedback of the Customers.

One Hundred residences in Coimbatore, that were individual houses and bungalows; constructed between 2007 and 2012 and owned by High Income Group Families were selected by purposive sampling method to assess the views of the selected household members on flooring material used, in terms of performance, maintenance and difficulties among selected households by adopting personal interview cum observation method for **household survey**.

A **market survey, architects and engineers survey** was conducted to analyze in depth about the selection of flooring material, preference of materials, merits and demerits and suggestions regarding the selection and use of the flooring material.

Based on the interaction with household members, shop owners and engineers/architects, it was found that there was a necessity to **experiment materials on its stain resisting capacity**. Further **feedbacks of customers** were collected from **website** to know about the **complaints of the people and remedies of the expert**.

The Highlights of the Study are summarized below:

PHASE I: FINDINGS OF THE SURVEY

A. HOUSEHOLD SURVEY

1. General Family Background

- Thirty four per cent of the heads of the families and 28 per cent of homemakers belonged to 31-40 years. Forty five per cent of female and 30 per cent of male children belonged to 11-20 years, eighteen percent female and six percent male belonged to 51-60 years.
- Fifty eight per cent homemakers were post graduates, 46 per cent heads were professional. Eighteen per cent female and 20 per cent male children were undergraduates, 12 per cent male and 6 per cent female elders were professionals.
- The occupation of the homemaker and head of the family is an important criterion as it will determine both the income of the family and their standard and style of living. Twenty two per cent of the heads of the families were successful and accomplished businessmen by occupation and 24 per cent homemakers were teachers and professors.
- The monthly income of the selected high income group families ranged from Rs. 30,000 to Rs. 3,00,000. Eighteen per cent earned monthly an income between Rs. 40,0001 and 50,000. Fourteen per cent of the families earned a monthly income of more than Rs.1,00,000.

2. Details of the house

- Among the selected house, sixty two per cent of the houses were constructed by their present residents or owners, while thirty eight per cent of the houses were purchased either from their past owners or land developers or lived in the rented house.
- Fifty eight per cent of the houses used man made and artificial material, whereas fort two per cent used natural material.

- Thirty two per cent of the houses were constructed between the year 2007 and 2008. A gradual decrease was witnessed in the number of houses constructed in spite of the advancement in construction.

3. Details regarding the flooring material

- The main reasons for selecting the specific flooring materials in hundred per cent of the households was durability, appearance, and easy to clean. The other main reasons being maintenance free (84 per cent).
- Durability, appearance, safety and beauty were considered common and important criteria. However the architects played an important role in selecting the flooring materials based on the criteria mentioned by the households.
- The material used as flooring in households was Ceramic Tile (26 percent), Vitrified Tiles (24 per cent).
- Elegant and stylish was mentioned as an important aspect for all the selected flooring material. Hygienic, cost effectiveness, low maintenance, utility, durability and easy cleaning were the other merits mentioned regarding the flooring materials by the selected households.
- Slippery, chips, stains and cannot bear heavy traffic were the various demerits of the flooring materials mentioned by household members.
- Seventy eight per cent of homemakers were ignorant of the branded materials..
- The colour of the flooring was chosen by the family members and their personal preference in a majority of 50 per cent of the households. Fifty per cent of the households preferred cream or white colour mixed with some colour as they felt it gave a rich look to the room. Twelve per cent consulted interior designers or architect or engineers to choose the colour.
- Stains caused by oil, food spills and other items such as lipstick, nail polish were the items that caused stains followed by slippery floors were expressed as problem of the modern flooring materials.
- The living room was under constant strain in seventy two per cent of the houses, the veranda by forty eight per cent, dining room by twenty six per cent, bed room by fourteen per cent, bath room by twelve per cent and pooja room by ten per cent.
- Eighty eight per cent have purchased the materials locally due to convenience and engineers influence. About forty four per cent had general awareness in the quality, thirty six per cent of in variety and twenty four per cent in cost and maintenance.

B. FINDINGS OF THE MARKET SURVEY

- The different styles of displaying the flooring material was stacking, revolving stands, catalogues and filing method which impressed people and helped them to choose the material.
- The artificial materials like ceramic tiles and vitrified tiles were available in almost all colours. The manmade materials can be made identical for large and bulk numbers, whereas natural material would be identical only for the particular lot, and will have at least slight variations in other lot.
- Cost of the material varied based on finishes applied, Sealer a special finish on marble, reduced the porosity and hence prevent stain, thereby increasing the cost/sq.ft
- Most of the people preferred artificial material since it consumed less time in laying and hence the floor can be used sooner. It was found that Vitrified tiles were moving fast compared to any other material because it consumed less time for laying can be used immediately.
- Vitrified tiles and marble were best suitable for all rooms except terrace, in which only clay tiles are preferred; now in market new researches are going on to bring in a suitable vitrified tiles which can be used in terrace. The usage of flooring material is not area specific. The choices of the customers play an important role in laying the flooring material as per their convenience.
- Strength, durability, availability and elegance were the merits of flooring materials expressed by the shop owners. Cost was said to be the commonly reported demerit of the material as mentioned by the shop owners.

C. FINDINGS OF THE ARCHITECT/ENGINEER SURVEY

- Most of the experts preferred Vitrified tiles and ceramic, since much of innovations are brought in the finishes of the material, which brings in both aesthetic appeal and utility. Few suggested Wood and Granite, and of course the cost played an important role in selection of the materials expressed the experts.

PHASE II: OUTCOME OF THE LABORATORY EXPERIMENTS

- It was observed that Terracotta and marble were not stain resistant, and they absorbed the stain immediately and was difficult to clean. Hence, Terracotta was suitable only to the areas like terraces which are less prone to stains.
- The outcome of the laboratory experiments proved that common stains at household level were due to Lime, turmeric, coffee, tea, milk, tomato, oil, lipstick, nail polish,

eyeliner etc, however due to availability of the latest floor cleaning agents, even these problems were solved.

- Experts expressed that finishes given to material plays a vital role, and it determines the resistance towards stains.

PHASE III: FEEDBACK OF THE CUSTOMERS

- Feedback of the customers was collected from websites, and answers from experts were noted and most of the complaints were about stains and its removal, and most valuable reply from the experts were removal of stain with house products i.e home remedy.

CONCLUSION

Homes and families have entered the threshold of the 21st century where life is neither calm nor easy. In the realm of the busy life “home” is the place where a man feels self, hence it is necessary and extremely important in choosing the flooring material to make home more comfortable, elegant and happy. Cleaning the floors regularly enhances the beauty of the house.

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**PERFORMANCE ANALYSIS OF THE SELECTED FLOORING
MATERIALS**

BY

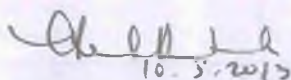
SUGANYA.S

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**A THESIS SUBMITTED TO THE
AVINASHILINGAM INSTITUTE FOR HOME SCIENCE
AND HIGHER EDUCATION FOR WOMEN – DEEMED UNIVERSITY
COIMBATORE – 641 043**

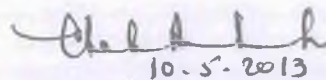
**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN RESOURCE MANAGEMENT
MA Y – 2013**

CERTIFIED AS BONAFIED RESEARCH WORK


10.5.2013

**SIGNATURE OF THE
HEAD OF THE DEPARTMENT**

(in shape)


10.5.2013

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