



Fenestration Industry Report

India, February 2019

Table of Contents

Letter from CEO	04
Fenestration Industry: An Overview	
Fenestration defined	06
Key components	07
Major stakeholders	10
Growth drivers	12
Fenestration Industry: A look at the developed nations	13
Fenestration Industry in India	
An Introduction	18
Evolution	19
Governing Bodies	20
Growth Drivers	22
Issues & Challenges	24
Recommendations	25
Acknowledgements & Authors	26

Foreword



ANUJ PURI

Chairman
ANAROCK Property Consultants



Innovation has become a new constant of change. In today's scenario, diverse developments and experiments are trending in almost every sector, demanding innovation at regular intervals. With the country's rising economy and real estate and infrastructure industry growing by leaps & bounds, demand for facade and fenestration industry is on a rise.

Glass facades and architecturally designed buildings existed only in the western countries and were exclusively made to receive enough light and heat for efficient and comfortable building performance. Eventually, this trend came into India towards the end of the last century and high-rise buildings clad with glass facades became prominent.

The modernization in construction industry evolved the design patterns and transformed the structural forms of the buildings. As a result, the fenestration industry started to gain momentum making glass as one of the most preferred material due to its features such as light-weight, load-bearing ability, transparency, and aesthetics. Eventually, with the economic development of the nation and growth in office space, look and form of the buildings changed making it an important structural element in the design of office buildings and economic centers.

This report provides insights into the façade and fenestration industry, major components along with materials and technology imbibed for its development. The major stakeholders of the industry are also highlighted in this report. Subsequently, growth drivers and influencing factors such as sustainability, energy efficiency amongst many others are also mentioned.

The evolution of façade and fenestration industry in the developed economies has also been highlighted. A look at the global practices serves as guiding principles to incorporate the best practices in the construction and ramping up the Indian façade and fenestration industry in an organized manner. Concurrently, information pertaining to the Indian market scenario, the evolution of the market in terms of best practice, materials used, the technology involved, fabricating techniques, and others have been enclosed.

While the upside for the façade and fenestration industry in India is surely phenomenal, it is unorganized as of now and there is a dire need to amend the ways & means of doing business, set up industry bodies and incorporate multiple codes of practice so as to grow the businesses in a better manner.



Fenestration Industry: An Overview

1.1 Fenestration defined

The term fenestration is derived from the Latin word “Fenesta”, which means an opening in a building.

The arrangement of definite and planned openings in a building such as windows, doors, louvers, vents, wall panels, skylights, storefronts, curtain walls or slope-glazed systems, as per the building functionality, is known as fenestration. The fenestration arrangement in any building helps to develop a visual connection between the indoor and outdoor environment, improves the visual appeal of the building and influences the image and purpose of the built environment or the constructed space.

Fenestration is an integral part of building design and considers various aspects such as energy efficiency, aesthetics and eco-friendly nature of development. The purpose of fenestration is

to allow free flow (and in required quantity) of desired elements such as light, air, access and connectivity in the required quantity and restrict the excessive flow of air, water, light, dust, and other elements.

Efficient building energy performance primarily depends upon the type of glazing and other design elements, considering the climatic conditions and the architectural design aspects. For e.g., generally, high glazing is avoided on the southern side of the building to avoid excess heat gain over the day which leads to excessive usage of cooling systems, which in turn leads to carbon emissions as well as operating cost escalations.

The major factors affecting the efficiency of facade design include...



Material



Placement



Design

1.2 Key components

Windows and doors have been the oldest and most prominent forms of fenestration components. However, different types of openings have evolved over the last few decades, based on the type and functionality of a building. A few key components are detailed below:



Windows

Windows are the links to communicate with internal and external spaces and facilitate ventilation, light, and sight. They are also capable of altering the visual aesthetics of the space considering that windows come in different shapes and sizes. They can also become an instrument for reference of scale on the external surfaces to enable assessment of the height and width of the building. At times they are also used as facade modulators based on their size, form, number, placement, and articulation. Their placements in the structure are governed by the internal layout of the space, requirement of light and ventilation. In fact, windows can totally alter the perception of the building, as evident from several monuments built in the ancient times as well as modern structures built recently.

The material used varies from hardwood to aluminium or uPVC. In India, the residential segment has observed a marked shift from the use of hardwood to aluminium and uPVC. This is mainly because of the cost implications in sourcing good quality hardwood in requisite quantities.

Doors

Doors are moving structures that provide access to internal spaces. They consist of a panel, with interior and exterior faces, which swings on hinges or slides or spins to permit access. Doors can easily be categorized based on function. While the external doors need to be strong to ensure safety and protection, the internal ones may be slimmer and elegant aimed to add to the ambience and aesthetics of the enclosed space. In high rise residential developments, there are doors for balconies which create a visual link between the external and internal space and becomes an integral part of the structure's elevation.

In India, the residential segment has been using flush doors which are factory made. They are pre-treated and possess industrially produced door frames and shutters, which gained prominence in mass developments. However, in private and high-end homes, use of teak and other forms of high-quality hardwood are preferred for door frames, with the shutters being either paneled doors with modern designs or flush doors finished with high-end materials.

Did you know...

According to the Energy Conservation Building Code (ECBC), the wall to window ratio should be 60 and skylight ratio should be 5.



Vents

Ventilation grilles, commonly known as vents, are used to introduce ambient air into space thereby controlling the indoor air quality. The pollutants inside are displaced and diluted to provide thermal comfort to the inhabitants.

the same direction as it provides constant cool illumination.

Skylight glazing is generally made of plastic or glass. While the former is economical and sturdy, it can degenerate over time and allow passage of harmful ultraviolet rays. The latter tend to cost more but offer long-lasting durability.



Curtain walls as sloped glazing systems

A curtain wall is the outer covering of a building and is considered to be a non-structural element. Hence, they are light and non-load bearing. However, they can bear the loads due to gravity and wind, which is transferred to the building structure. Since they do not bear any load, they can be made of lightweight material which optimizes cost.

Functionally they help to protect the external structure from the outdoor elements and at the same time enhance the structural integrity and aesthetics of the building. The design makes it air and water resistant and ensures that the interior of the building remains airtight.

The curtain walls are available in three main systems such as face-sealed, water-managed, and pressure-equalized. Face-sealed walls provide perfect sealing between units of the wall and frame. Water-managed systems include moisture drains to prevent the intrusion of water in the building. The pressure-equalized system blocks all forces while keeping the building's interior completely airtight.

Owing to their low weight, they offer an affordable option for protecting the building exteriors and enhancing the aesthetics. It is also capable of resisting the air and water infiltrations, which makes the interiors energy efficient. It is a versatile system which protects and offers an energy efficient, and pleasing appearance to the building.



Skylights

A glazed assembly that admits natural light from the roof may be called a skylight or a roof window. Such applications are widely used in industrial, commercial and residential buildings. Real estate developments benefit from such structures and offer a functional solution to provide natural lighting to the indoor spaces and at times may also be openable like a window to permit airflow. Skylights also enhance the building's aesthetics.

The direction of placing the skylight has unique functional benefits. If it faces east, the indoor space receives the warmth and light during the morning, while if it faces west, similar benefits are reaped in the afternoon. It is particularly important in buildings facing north to place a skylight in



Storefronts

Storefronts are the facades of a retail store that are located on the street level of a commercial building. These have large display windows to attract the visual attention of the passers-by towards the merchandise or special offers. In the case of commercial buildings, they are substantially altered keeping the other architectural elements intact. The storefronts have evolved as a concept from being awnings or bay windows in the earlier days to include glass and steel being extensively used in the present. A considerable amount of thought and detailed study is made these days on the design, material and the lighting used in the shopfronts.

Louvers

Louvers are a system of cladding on the surface of the buildings which are primarily meant to allow airflow and light while keeping sunshine and moisture at bay. They are usually an arrangement of parallel, horizontal blades, slats, laths, slips of glass, wood or other material designed to regulate airflow and light. In the past, louver systems were often made of wood. However, most modern louvers are now built using materials such as aluminium, metal, glass, copper, stainless steel, among others.



To Sum It Up

The above components of facade and fenestration in the construction of buildings are aimed not only at enhancing the visual appeal but also positively impacting the environment. The selection of material and the design elements are critical to ensure the sustainability of the project and create an internal environment which is not only conducive but also cost-effective. Their incorporation and usage in the real estate construction have warranted a cohesive community of major stakeholders such as architects, manufacturers, consultants, and government bodies. They are incessantly striving to make the industry capable and effective.

1.3 Major stakeholders

The concept of structural glazing and glass as a building envelope material was widely accepted in western countries since 1940-50s whereas the concept of curtain walls reached India by mid-80s and early 90s only. The first building in the nation with a curtain wall was constructed in New Delhi in the mid-80s. The curtain wall concept as a building envelope was a modern technology then reserved exclusively for high-end developments. Evolution in construction techniques and materials changed the image of the buildings altogether.

The facade and fenestration industry evolved gradually over the period of time and with an increasing focus on aesthetics, functionality, quality, durability, efficiency, building performance, sustainability, and brand value, multiple stakeholders have emerged, and the industry has grown by leaps and bounds.

Major stakeholders of the fenestration industry can be broadly classified into four categories as listed below:

Product manufacturers	Architect & Engineers	Consultants	Governing bodies
Frame material wise <ul style="list-style-type: none"> • Wood • Aluminium • uPVC Glass manufacturers Fixture and sealant manufacturers	Architects Civil Engineers Structural Engineers	Façade consultants Building energy consultants	National level authorities



1. Product Manufacturers

Being one of the major stakeholders of the façade and fenestration industry, product manufacturers include glass manufacturers, frame material manufacturers, sealant manufacturers, windows, doors, fittings and fixtures and other component manufacturers.

The frame structure of windows initially and even up to the beginning of the century was dominated with wood and then gradually transitioned to the use of aluminium. PVC and uPVC frame structures for doors and windows started coming into the picture from 2010 onwards and presently

dominates the market.

Extensive use of glass shutters was ushered into the practice as the developments started to grow vertically to accommodate more space per unit of land. This was a major change in the architectural design which was warranted for a stable structure. The use of glass reduces the load on the foundation as compared to the masonry walls. It also has an aesthetic appeal that makes the structure look spacious, wider and brighter. Thus, the requirement for manufactured material was felt strongly when the conventional products such as hardwood became scarce.

As the component requirement grew and was getting more ornate and customized, it led to the need for mass production to maintain the quality and uniformity of the product. The fixtures, fittings, sealants and several other goods were required to be innovated to pace up the execution and enhance value and aesthetics.

Manufacturers outlay a thought that material standards and standardisation are the requisites for the evolution of this industry, and India surely lacks it as of now. Hence, implementing this is vital for the growth of the industry.



2. Architects and Engineers

As per their specialization and expertise, these professionals play a vital role in deciding, designing and developing the building's facade and other aspects.

An intense study by a team of architects regarding the building requirements, performance, efficiency, climatic conditions of the location, built environment and site is done to conceptualize the building façade.

Engineers including civil and structural with sound knowledge of building construction materials, load-bearing capacity, seismic conditions, building safety, etc. ably support the construction development of the building facade.

Architects & Developers are in dire need of skilled labour for the industry. With relevant subjects and programmes introduced in institutions and training centres, the resource pool can surely be widened.



3. Consultants

With rapid advancements in the construction industry and material engineering, the need for facade consultants, building energy consultants and sustainable architects started to rise and as of now, they play a pivotal role in the development of facade and fenestration in buildings.

Increasing awareness regarding green building developments, sustainability, recyclable products, energy efficient buildings, etc. indicates that the demand for such professionals is only going to rise in the years to come.

Facade experts demand a need for stringent specifications for the facade and fenestration industry as well as IS code development and implementation for better design and execution practices.

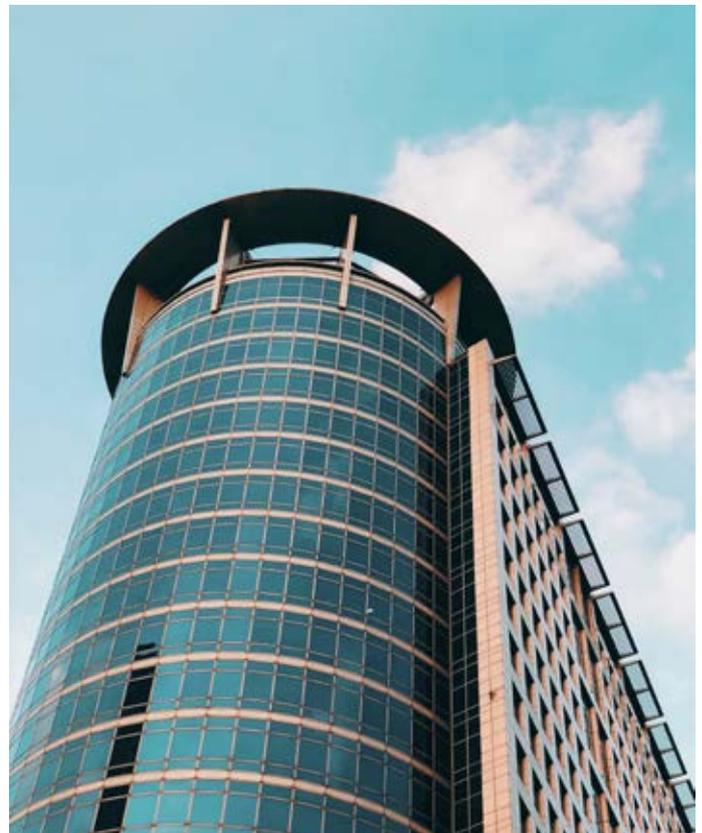


4. Governing bodies

Rapid urbanization, increased real estate developments, growing awareness of facade and fenestration and mandatory requirement of specifications creates a need for the presence of a governing body to regulate the sector.

It is now a widely accepted and proven fact that facade and fenestration is an integral part of any real estate development and if deployed judiciously, it can help conserve the environment, lower the costs and make the internal spaces healthy and safe for habitation. To enforce the same, there is a dire need that governing bodies set the standard practices and guidelines.

Governing body members demand an urgent formation of Industry body, specifications, knowledge sharing and skilled labour/ professionals to be developed for the industry to function better.



1.4 Growth drivers

The major demand for facade and fenestration industry arises from the construction and real estate industry.



Expanding Real Estate

The construction sector has already made a remarkable leap in developing large, tall and magnificent structures with advancements in material sciences and construction techniques.



Eco-friendly Buildings

Various high-rise structures and glass façade buildings have already been developed across the globe and the next likely leap is expected to be on the sustainable and eco-friendly façade developments which will focus on energy conservation and reducing the dependency on fossil fuels.



Natural Forces

As mankind faces natural calamities across the world, he will be compelled to improve the existing products and practices. Preparedness for the future and the zeal to combat the natural forces will lay open to exploring newer products, designs and the invention of superior material. These are also going to be the driving forces for the industry in the coming years.

The western world, particularly the USA has been subjected to several catastrophic hurricanes that had damaged life and property. States along the Atlantic coast have had to deal with such devastations and upon recovery, they have consciously revisited their building by-laws to enhance the enforcement and laid superior specifications to combat recurrence of such lethal geophysical events.

After the widespread damage to the residential buildings in Florida caused by the hurricane in 2004, the Fenestration Manufacturers Association (FMA) quickly reacted and formed the FMA installation committee. To improve awareness in the fenestration industry, the American Architectural Manufacturers Association (AAMA) and the Window and Door Manufacturers Association (WDMA) joined the committee to chart out standard practices to enhance the water management capabilities of the fenestration products for residential use in Florida and the coastal areas.

Chapter 2

Fenestration Industry: A look at the developed nations

The facade of a building and the openings define the functionality and unique architectural aesthetics of the building.

They are most prone to the effects of climatic changes and natural forces. These surfaces are not only meant for aesthetics' enhancements and protection but have also advanced to possess energy efficient characteristics by endeavoring to reduce the carbon footprint.

The statutory bodies of various countries are watchful of the methods and practices included

in the structural designs and choice of material to minimize the dependency of artificial lighting and ensure proper ventilation, air circulation amidst several other factors. The regulatory bodies have laid down specifications and guidelines for the same to enable compliance and adherence. Some of the practices from selected countries on fenestration practices are highlighted here.

The practices in the United Kingdom (UK) and the United Arab Emirates (UAE) are scoped in this report for certain similarities in the geographic patterns and climatic conditions with India.



UAE and India are on the similar latitude of 22 to 26 degrees North and spread across the tropical and temperate zones in the northern hemisphere and are subjected to similar wind conditions affected by the large coastal areas.



The annual precipitation in the UK is like that of India and in both countries, it is more than one thousand millimeters annually.

Did you know...

As per industry estimates, the global facade market size is expected to reach USD 340 billion by 2024.



Hence, a close introspection of the practices of facade and fenestration industry and their regulatory bodies may be considered pertinent for India and can be considered as a benchmark to formulate systems, processes, and policies in India.

Both the nations, UAE and UK have a diverse market. One has the tallest structures in the world and the other with comparatively low rise has a keen eye on the specification for corrosion resistance building facades. Considering the height and weather conditions in UAE, specifications are more scoped towards thermal insulation and wind cycles. uPVC product material is more popular in

the UK than in UAE whereas aluminium thermal break systems are prominent in both the nations. High-rise buildings and skyscrapers trend are predominant in UAE which is known for astonishing architectural designs & marvels.

Based on climate change and rising costs of energy, there are statutory specifications for conserving energy that must be considered. Practices and standards for glazing and fenestration have been defined adequately and detailed specifications are laid out in both countries.

Evolution of Glazing Technology in the UK



Double glazing originated in Scotland in Victorian times while it became popular in American homes in the fourth and fifth decade of the last century. This arose from the need to replace the damaged and decaying timber windows. Nearly 20 years later, the new market for windows was established and aluminium was the preferred choice. The need to retain the inside temperature resulted in the evolution of the double-glazed windows and aluminium was replaced by uPVC which was capable of energy efficiency and design

innovations. This also led to the choice of material for the fenestrations which was made available in multiple colours.

The uPVC systems were introduced to the UK from Germany and were extremely popular for their ability to tilt and turn, albeit they were bulky. However, slimmer profiles were made particularly for the markets in the UK. The extrusion technology has enabled flexibility in design to match the sculpted designs and applied with a wide palette of colours to harmonize the design.

Did you know...

There are more than 4,000 companies in the UK which are engaged in the fabrication of doors and windows with nearly 72% of them being limited liability companies (LLPs).

British Standard Institution (BSI)



British Standard Institution is the national body of the United Kingdom which governs the technical standards for products and services. This century-old organization has been inspiring organizations across the world to improve and excel in their products and services and helping them to eradicate mediocrity and complacency.

BSI has a wealth of experience in assessment and testing of glass related products and has a system of Kitemark and CE marking services that cover a wide range of glass related products in the construction industry.

The Kitemark scheme for insulating glass units is

specified by the National House Building Council (NHBC) and the Kitemark is recognized as the best way to identify certified, quality insulating glass units for use in buildings. The UK Building regulations require glass used in critical locations within buildings to be safe and the construction products regulation require CE marking of safety glass products.

BSI also has an indigenous testing facility to provide the glazing industry with enough testing capacity. It allows manufacturers the opportunity to complete the required initial type testing in support of CE marking which BSI offers under its Notified Laboratory status.

BSI's test facility includes:



Impact testing and classification



Mechanical Strength testing



Fragmentation testing



High humidity and temperature testing

Considering the importance of security in the buildings, BSI has developed Kitemark scheme for security glazing to test and classify for resistance against manual attack.

This is the level of detailing of the specifications that are practiced for the glazing standards in buildings in the United Kingdom. Such standards and specifications can be considered and modified based on the requirements of the Indian market and prevailing building structures, to ensure the safety and efficiency of assets.



Practices in the United Arab Emirates (UAE)

The Ministry of Public Works and The Executive Council of Dubai and UAE have been on a decade-long crusade to remove the inefficiencies in the construction sector and have been committed to developing new eco-friendly buildings as per the international standards. This is directed to withstand the challenges that the environment is subjected to and efforts to make it sustainable

and safe for the citizens. The intent of these new environmentally compatible developments across the real estate asset classes is mainly to conserve energy and water, improve health conditions and lower the harmful emissions from the cooling systems. UAE is the first country in the Middle East and North Africa Region to acknowledge and adopt such practices.



↑ To Sum It Up

It is evident that UK and UAE have set standards and specifications for the facade and fenestrations in the envelope of the civil structures. While UK has bodies such as the BSI that certifies the use of the material in accordance with the purpose, in UAE the specifications are clearly defined for each type of development along with the permitted designs. In the US, there are several industry bodies such as the American Architectural Manufacturers Association (AAMA), Fenestration Manufacturers Association (FMA) and the Windows and Doors Manufacturing Association (WDMA) that work cohesively to define indigenous standards for different regions of this large country.

The Ministry of Public Works has laid guidelines encompassing more than 40 criteria representing 6 main groups.

Some of the important considerations and parameters are noted as follows:

- The envelop efficiency with 10 sub-parameters which covers the entire scope of facade and fenestration in the building with detailed specifications and standards for each of them.
- All glazed areas on external facades and exposed internal surfaces must be in accordance with the solar heat gain coefficient and must be necessarily double glazed.



The intent of such meticulous standards and specifications is to reduce the heat gain through the building facades resulting in energy saving and lowering of the carbon emissions. These are also expected to reduce unwanted brightness, increase the penetration and usage of natural light, reduce visual discomfort and heat gain through the facades. These practices are standard for all air-conditioned buildings used for education, leisure, commercial activities, residential and institutional.

- It also specifies that the external claddings need to be insulated to meet the standards drawn in accordance to thermal insulation for energy savings and complying with ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) standards and certified by ASTM (American Society for Testing and Materials).
- The material used should also be highly reflective and of light or bright colours as against dark colours to reduce heat gain from sunlight.
- The standards also emphasize the use of clearstory windows to maximize the use of daylight into the internal spaces and minimize the dependency on electrical lighting.



The advancements in the façade and fenestration industry have been mostly from Europe and predominantly from Germany, France, Italy, Belgium, and Greece. Some of the companies which originated in these nations are still active and have a worldwide presence. The fact that has kept Europe ahead of all market is they have been one among the earliest in standard formations (as early as 1760), as well as have periodic reviews with the specifications being revised every 10 years.

Case of India

In India, while there is an association of industry bodies such as UWDMA (uPVC Window & Door Manufacturers Association) and GSI (Glazing Society of India), they are at nascent stages and cannot be expected to turn around the ways and means in which the industry operates. There is a lot of effort and focus on learnings to be shared through several industry events. The authorities need to establish their presence and ensure that the real estate regulatory authority and the government emphasizes on the deployment of specialists for facade and fenestration along with structural and mechanical, electrical and plumbing (MEP) consultants used for commercial and residential real estate projects. This is going to be a bold step in the right direction to ensure energy-efficient and environmentally-friendly developments in the country.



Fenestration Industry in India

3.1 An Introduction

Fenestration as a predominant industry has evolved and progressed in India during the past two decades.

Previously, the concept of fenestration was confined to having wooden windows and doors in the houses. Over a period, the economic conditions of the country improved, lifestyles changed and innovative techniques in the construction industry and materials evolved, which leads to the establishment of the facade and fenestration industry.

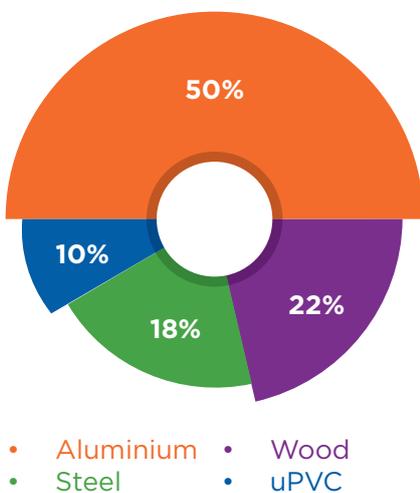
Market Size

- As per industry estimates as of December 2018, the current market size of the **Façade** industry in India is **Rs. 15,000 Cr** and witnessed an annual growth rate of 20% due to rapid urbanization and increased demand for office and other high-end glass façade buildings.
- The industry size for **Fenestration and Curtain wall** is approximately **Rs. 10,000 Cr** with 65% share held by fenestration and 35% by curtain walls.

Material Evolution

- Wooden and steel frame material was in high demand and fast-moving materials in the Indian fenestration market during the 1990s to early 2000s. From past 5-10 years, aluminium and mainly uPVC frame materials are witnessing a high demand.
- The use of uPVC materials is still in a nascent stage as evident from its low market share. As per market sources, uPVC accounts for only 10% of the facade market and is estimated to be INR 1,500 Cr.
- Aluminium is widely used in the market as it is available at lower cost and production is faster compared to uPVC. It holds 50% share and dominates the fenestration industry.

Frame Market Share
(Material Wise)



Did You Know...

uPVC is the most preferred material of the future with multiple unique qualities from the perspective of quality, durability, efficiency, performance, aesthetics, sustainability and several others.

3.2 Evolution

The economic liberalization in the last decade of the 20th century opened trade avenues in the Indian markets. Many international players were quick to respond to this opportunity and were seen to choose India as their new-found market for products and services. The largest impact was seen when multiple technology players had chosen to leverage the talent pool to outsource their back-end operations and software development work to the professionals here. This led to the evolution of the new growth pattern in the economy which was driven by the services sector. The Information Technology and Information Technology - enabled services (IT-ITeS) sector started flourishing which resulted in the rise of household incomes causing a marked change in expenditure patterns. Subsequently, direct and indirect employment opportunities started growing.



Demand for real estate assets across the segments increased with rising employment opportunities in metro cities. The urban landscape of major cities rapidly metamorphosed to include new developments similar to those in the developed economies. The new age commercial spaces in the IT parks and business parks having glass facades dominated the real estate landscape which drove the fenestration demand in India.



The growth of residential real estate industry has expedited since 2005 but faced hard hit during 2008 because of global economic crisis and in most recent years the introduction and implementation of economic reforms, structural changes such as RERA, GST shattered the industry, albeit the long-term future surely looks bright. The Indian real estate industry market size in India by 2030 is expected to reach USD 1 trillion from USD 120 billion in 2017.



Rising income and availability of aspirational products changed the lifestyle of the people and was reflected in the change in shopping behaviour. Malls in the neighbourhoods emerged to be the perfect destination for leisure and entertainment. The visit to the local stores was quickly replaced by the hypermarkets in the malls. The retail segment started growing in parallel with the recognition for brand and quality as well as economic development of the nation. Malls were established in large number in metro cities of India with curtain walls of glass or covered with ACP (aluminium composite panels) sheets.

To Sum It Up

The major components fuelling the growth of the industry are real estate and construction industry, higher usage of eco-friendly construction materials, changing building construction practices and a rise in office space demand as well as the growth of retail real estate development.

uPVC to become the most preferred material and is assured to take the center-stage in the near future. It is mainly because of the trending green building practices that inhibit products with qualities of energy efficiency, eco-friendliness, and recyclability.

3.3 Governing Bodies

The National Building Code lays the guidelines for construction and the civic authorities ensure the involvement of structural and mechanical, electrical and plumbing consultants to certify the strength and soundness of the development. They are mandated by all today and form an integral part of the real estate system. Facade and fenestration industry in India is still at a nascent stage of development with limited knowledge providers, guidelines, and governing bodies. There is a dire need of amending proper regulations and specifications to get the industry standardized.

As of now, there are two key bodies/authorities working and serving towards the purpose of making the facade industry standardized and regulated.



Glazing Society of India (GSI)

An inclusive and independent body working towards the glass and glazing products for product certification and standardization. It is a Non-Profit Organization (NPO) which is registered under the Society Registration Act, 1860.

Aim:

To develop and administer independent rating and labeling systems in areas such as energy, safety etc. for glazing of all types.

Mission:

To be an independent building envelop rating, standardization and certification institution which will service the industry by providing authentic, accurate and unbiased testing performance results on Glazing and other elements of Building Envelop so as to further the development of safe, sustainable, energy-efficient building envelopes design, products, and services.

Key member categories:

- Glass manufacturing companies
- Glass processors and experts
- Glass fabrication companies
- Installers and testing laboratory
- Builders, developers, and contractors
- Educational institutions and research bodies
- Policy formulating bodies

Objectives:

- To promote standardization and certification of glazing products by organizing Certification Programs.
- To support governmental legislation and codes by creating a framework for their implementation through certification activities.
- To further the understanding of the Glass and Glazing technology.
- To spread awareness of Glass and Glazing Technology.
- To co-operate and assist other societies, institutions, and organizations which are working in standardization, certification, research, and development.
- To implement the Energy Performance Certification (EPC) program to facilitate the implementation of the Energy Conservation Building Code (ECBC).



uPVC Window and Door Manufacturing Association (UWDMA)

It is an organization formed to promote as well as propagate the benefits of uPVC doors and windows. A Non-Profit Organization and Non-Government Organization registered under the societies act of 1996, the organization has also developed guidelines called UWDMA Guideline for Fabrication of uPVC Windows and Doors.

Aim:

The association is constituting itself into a new form of organization with commitments such as technical support, testing facilities, guidelines for Central Public Works Department (CPWD), collaboration with Ministry of Skill Development and Entrepreneurship (MSDE), technology and participation in exhibitions for knowledge sharing and collaboration.

Major Initiatives:

- UWDMA and GSI have signed a Memorandum of Understanding (MoU) in June 2018 for capacity building for “Window and uPVC profile in India.”

- Inauguration of UWDMA skill development centres and establishment of UWDMA training centres.

Objectives:

- The association is committed to create awareness and educate the end user, planners, specifiers, technocrats, builders, architect, etc. by highlighting the comprehensive value proposition of uPVC Windows and Doors including energy conservation, eco-friendliness, and recyclability.
- The association will create benchmark and standardization of technical specification of uPVC Windows and Doors product, manufacturing, and installation to have quality product and services to the user.
- The association will represent and pursue with relevant government bodies in creating quality standards for the industry.
- The association will represent on behalf of the manufacturers to the concerned government bodies and institutions to focus on industry needs and requirements. It will bring forward on behalf of the industry the social, environment and business advantages to the government and pursue the formation of regulations.
- To collect and disseminate statistical and technical information in respect of uPVC Window and Doors trade and industry to its members

↑ To Sum It Up

These governing bodies in the industry have been set up with the aim to regulate and organize the industry. The feedback from the multiple stakeholders and the need of the industry to be better organized makes a case for larger national bodies to emerge and enhance the industry further.

3.4 Growth Drivers

Post the economic liberalization, the country has been witnessing rapid growth across sectors including the real estate and construction. As international companies prefer to set up their presence in India, the demand for high-end office space has been on the rise. Some of the major growth drivers are stated as follows:



Economic Development:

India witnessed growth in per capita income by 8.6% in FY 2018 and GDP is estimated to have increased in 2017-18 by 6.6% as well as expected to grow at 7.3% in 2018-19. These parameters showcasing the economic developments have been catalytic in creating an environment for the emergence of new ways of shopping, entertainment, hospitals, educational institutions, modern urban dwellings. These developments have enabled the growth of the façade and fenestration industry. Such opportunities are expected to drive the demand for the façade and fenestration industry.

Smart Cities:

The pipeline for urban development as announced by the government through its various initiatives are likely to have long term effect. The nation plans to develop 100 smart cities and rejuvenation of 500 more cities for which Rs. 98,000 Cr budget is approved from the Indian cabinet. Its blueprints include urban development to comprise major commercial and institutional structures along with significant residential development across the cities.

Increase in Investment in Construction Sector:

The global investors have been interested in the construction sector in India as evident from the increasing trends of foreign direct investments (FDI). During FY 2017-18 the total FDI in the construction development (Townships, housing, built-up infrastructure) was Rs. 3,473 Cr which recorded nearly a five-fold increase from the previous fiscal year's FDI accounting to Rs. 703 Cr. While most of the investment is for infrastructure and development projects they all require significant proportions of real estate in different asset classes.

Renovation:

Several old and dilapidated structures in the city centres are also being replaced or renovated to capitalize on the rising opportunities and their prime location. Such structures are not only being given a facelift but also being upgraded with the latest structural and construction elements and adhere to the green building norms which are more energy efficient.

Extended Development Opportunities in Tier 2 & 3 Cities:

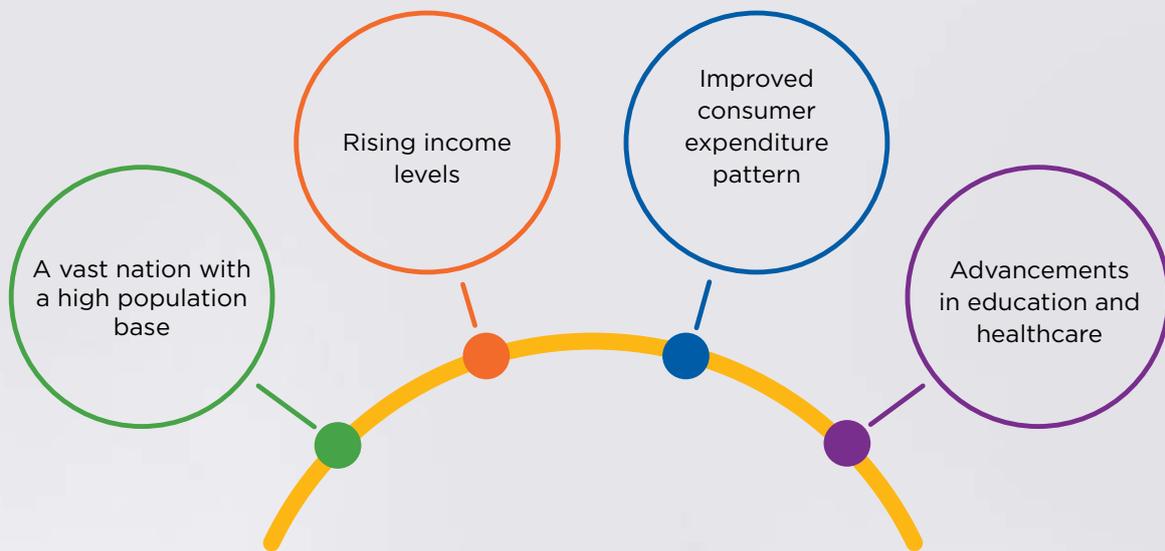
As the economy grows and the development opportunities within the urban agglomerations of the tier 1 cities reduce the natural advancement is going to be into the tier 2&3 cities. With >90% of Indian population residing in non-tier I cities, 40% of the total real estate spaces in tier II and III cities and retail real estate investments of USD 6.2 Billion in tier II and tier III cities between 2006-2017, expansion and extension of activities is witnessed which is soon bound to be followed by the rest sooner or later.



Energy-Efficient Façade Designs:

India, owing to its tropical position on the globe is among the highest recipients of solar radiations. This has been posing a challenge and an opportunity for the construction sector in the country. While unnecessary heating is a challenge in many regions there are areas which are energy deficient. There is a need to maximize on the benefits of this renewable power and mitigate the ill-effects in the form of abundant heat gained at places where it is not required. Hence, proper designs and material of fenestrations can aid us in combating such challenges.

The above trends in the country today and their continuity can be predicted with a high level of certainty, with factors such as



To Sum It Up

The new age developments will be necessitated to improvise and innovate, be energy efficient, bear strength and durability and be capable of withstanding the forces of nature. Thus, there is going to be a constant need to improve and innovate in the façade and fenestration. This sector is likely to emerge as an important partner which will catalyze the change and lay a foundation for sustainable development.

3.5 Issues & Challenges

Despite the growing popularity of facade and fenestration and their rising acceptance globally, the markets in India are still divided and averse to the introduction of such products. There are several impediments for the sector when they endeavor to scale up. While the industry is striving to popularise and publicize the benefits, the buyers are yet to stake a claim for their implementation. Some of the issues and challenges are discussed below.



Material

Though uPVC is established as the most preferred material globally owing to its multi-faceted properties such as security, easy care, long life, dustproof, thermal insulation, and low maintenance, it is observed that in semi-urban areas aluminium or timber is preferred owing to the differential costs. Even in many government projects in rural areas, there is widespread use of mild steel. The local markets are still inundated with low priced traditional materials which pose stiff competition to standard products.



Awareness

Lack of awareness among the consumers and a myopic approach towards short-term cost savings have forced the environmental issues to the back burner. Today, builders and engineers are looking at optimizing costs for better returns. They are reluctant to incur any additional expenditure on

façade and fenestration which would minimize the operational cost and thereby result in savings in energy expenses and help reduce the adverse impact on the environment.



Absence of industry standards and regulatory bodies

In a market which is devoid of standards and regulations, the industry naturally remains fragmented in nature. This lays to stake the quality and efficiency of the products and deters the growth or introduction of new practices. The civic bodies are yet to recognize the importance of facade consultants in the same lines as those of architects, structural engineers, and MEP consultants. Their participation, if mandated in the process of assessing the structural stability and granting of the approvals will help to organize the industry. This will help to reduce the dependency on unclassified products and designs thereby helping in organizing the sector.



Lack of Skilled Resources/Talent Pool

With the industry being unorganized and fragmented, the young talent pool loses their interest in developing a career in the façade and fenestration industry. The scope and practices must be amended and organized efficiently by a governing body, along with the introduction of mandatory courses in institutions to develop the talent pool that can lead the industry in an appropriate manner.

To Sum It Up

The issues in acceptance or implementation of the new products and practices will require participation from a wide spectrum of stakeholders. While some of the issues will be automatically resolved as the industry matures, for others some form of enforcement may be required. Above all, it has been the conscious calling from the stakeholders to evaluate the efficiencies and long-term benefits against the immediate benefits. It is anticipated that the sooner the sector gets its own set of regulations and codes of practice the process of evolution is expected to be initiated. The massive scope of development the country is ready to take up soon will be benefitted if the façade and fenestration sector is able to outgrow by conquering the challenges.

Chapter 4

Recommendations

Facade and fenestration industry in India is at a nascent stage today. There is a dire need to organize and regulate this sector. Major recommendations to the industry from experts post analyzing the industry are stated as follows:

Practices, specifications standard code to be framed

The facade and fenestration industry did not exist as a defined industry around 2 decades ago. Gradually, with the evolution of construction practices and adoption of modern material technologies, glass as a façade material became popular. Today, the façade and fenestration industry demand the need for proper specifications and standard code of practices for making the industry organized and efficient in terms of material manufacturing to site execution practices.

Development of governing bodies and reforms

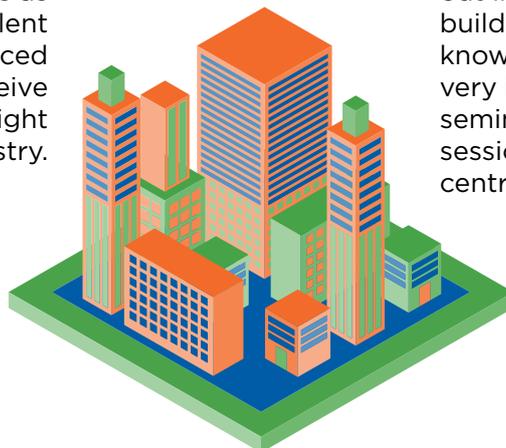
For an industry to abide by standard practices and quality material production, a governing body or regulatory authority defining manufacturing, execution, and safety is mandatory. Organizations such as UWDMA and GSI are surely putting in efforts to develop and make the industry organized. With all the awareness and knowledge being infused into the industry, it is expected that the façade and fenestration sector in India will evolve soon. However, there is a dire need of a national-level authority/regulator to drive the market.

Develop skilled labour and talent pool

One of the major drawbacks in the development of façade and fenestration industry is lack of knowledge regarding the production, execution and ideal practices as well as skilled labour/talent pool to supervise. Over the years, multiple companies manufacturing curtain walls have initiated in-house training for their workers and professionals to enhance their knowledge regarding the industry. Facade engineering as a subject needs to be included in relevant institutes as a mandatory subject to develop talent pool and also should be introduced in youth welfare centres to receive large skilled labour set for a bright successful future of the industry.

Stakeholder knowledge enhancement

The biggest challenge to the facade and fenestration industry in India is the lack of knowledge to the involved stakeholders. Apart from production, execution, safety practices involved appropriate project planning also plays an important role. Material specifications suitable to the building facade and time consumed for production, as well as execution, needs to be well organized, erstwhile the whole project development will lose out in its timeline as well as efficient building performance in future. Hence, knowledge to respective stakeholders is very important which can be availed by seminars, exhibitions and meets, training sessions by organizations and welfare centres of the façade industry.



thank
you

Acknowledgements

Deepak Chugh
Director
LGF Sysmac

P. Jothi Ramalingam
Director
Winwall Technology

Samidha Lad
Vice President - Design
Urbania Realty LLP

Satish Kumar
Country Head
Deceuninck

Our Authors

Virendra Joshi
Vice President, Research
virendra.joshi@anarock.com

Ashim Bhanja Chowdhury
Senior Manager, Research
ashim.chowdhury@anarock.com

Shruti R Merwade
Assistant Manager, Research
shruti.merwade@anarock.com

Our Editor

Priyanka Kapoor
AVP, Research
priyanka.kapoor@anarock.com



ANAROCK Property Consultants Pvt Ltd.

“ANAROCK is India’s leading independent real estate services company that houses a comprehensive range of complementary businesses. Our key strategic business units are Residential Broking & Advisory, Retail, Investment Banking, Hospitality, Land Services, Warehousing, Industrial & Logistics, Investment Management and Strategic Consulting.

ANAROCK serves the needs of investors, developers, occupiers, financiers, land owners and the public sector.

With a dynamic team of 1500+ real estate specialists, we have deep understanding of clients’ requirements and a strong commitment towards business values. ANAROCK is headquartered in Mumbai with presence in all major markets in the country and dedicated services in Dubai. ANAROCK has formed strategic business alliance with global partners - HVS | ANAROCK to bring global best practices in Hospitality Consulting Services. We also have a global footprint with over 80,000 preferred channel partners and affiliates in US and UK market.

Every facet of ANAROCK reflects the core promise and vision to its clients and partners – Values over Value.”

Visit: www.anarock.com

For Research Services, Please Contact

Prashant Kumar Thakur
Head of Research
prashant.thakur@anarock.com

ANAROCK Property Consultants Pvt. Ltd

1002, 10th Floor, B Wing
ONE BKC, Plot No. C-66, G Block
Bandra Kurla Complex
Bandra East, Mumbai 400 051
www.anarock.com

MahaRERA Registration No. A51900000108 available at <http://maharera.mahaonline.gov.in>