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INTELLIGENCE

Thought leadership: July 2023

Deciphering construction cost drivers for Indian grade A commercial space

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"We aim to assist stakeholders in setting expectations from the earliest business case stage, to ensure costs and specifications are aligned."

Executive summery

Establishing potential cost drivers

India's strong economic stability has translated into commercial sector growth across major metropolitan areas, now extending into second tier cities. A recent report by CREDAI-CRE Matrix reveals grade A office stocks have reached a staggering 700 million square feet with 25% of those assets being delivered during the last five years.

It is expected that by the end of 2030, India will have one billion square feet of grade A/A+ office spaces. Older assets are also being refurbished with upgraded interiors, bespoke façades and attractive external development to ensure the ever-changing expectations of end-users are met. Additionally, WELL standards, net zero targets and reduced embodied and operational carbon emissions in the built environment must all be taken into consideration.

Gleeds provides a service focusing on decarbonisation of construction phases by targeting embodied carbon.

As design parameters are transformed, it is important to establish potential cost drivers which will affect the construction costs of these developments.

The cost drivers and model are divided into subcategories:

Cost drivers and model subcategories			
•	Site conditions	•	External development
•	Structural design	•	Infrastructure
•	Architectural form	•	Sustainability certification
•	Interior design	•	Net zero
•	Façade systems	•	Amenities
•	Major equipment	•	Tenant improvement
•	Low-side building services	•	Market conditions
•	Vertical and horizontal transport	•	Procurement process

Via this thought leadership paper, we aim to assist stakeholders in setting expectations from the earliest business case stage, to ensure costs and specifications are aligned.

By focusing on the major items prevailing in India and looking in detail at the design and construction process, project teams can reach the highest standards of functionality and aesthetics whilst having a clear understanding of financial viability.

When incorporating the above key considerations, and maintaining an open line of communication with all stakeholders, we can successfully navigate the complexities of budgeting whilst delivering an exceptional office space that meets project objectives.

Gleeds India approaches this endeavour with diligence, originality and an eye for cost-effectiveness. By setting up cost models and adhering to target-based cost, the project team can achieve exceptional outcomes that strike a balance between financial responsibility and architectural excellence.

Introduction

India's burgeoning commercial office space sector — home to some of the world's largest private companies and the third largest start-up ecosystem in the world — is a major contributor to the country's economic success.

The establishment of a solid office infrastructure has supported the expansion of economic activity throughout the country, creating opportunities for those businesses focused on the rapidly expanding Indian commercial real estate market.

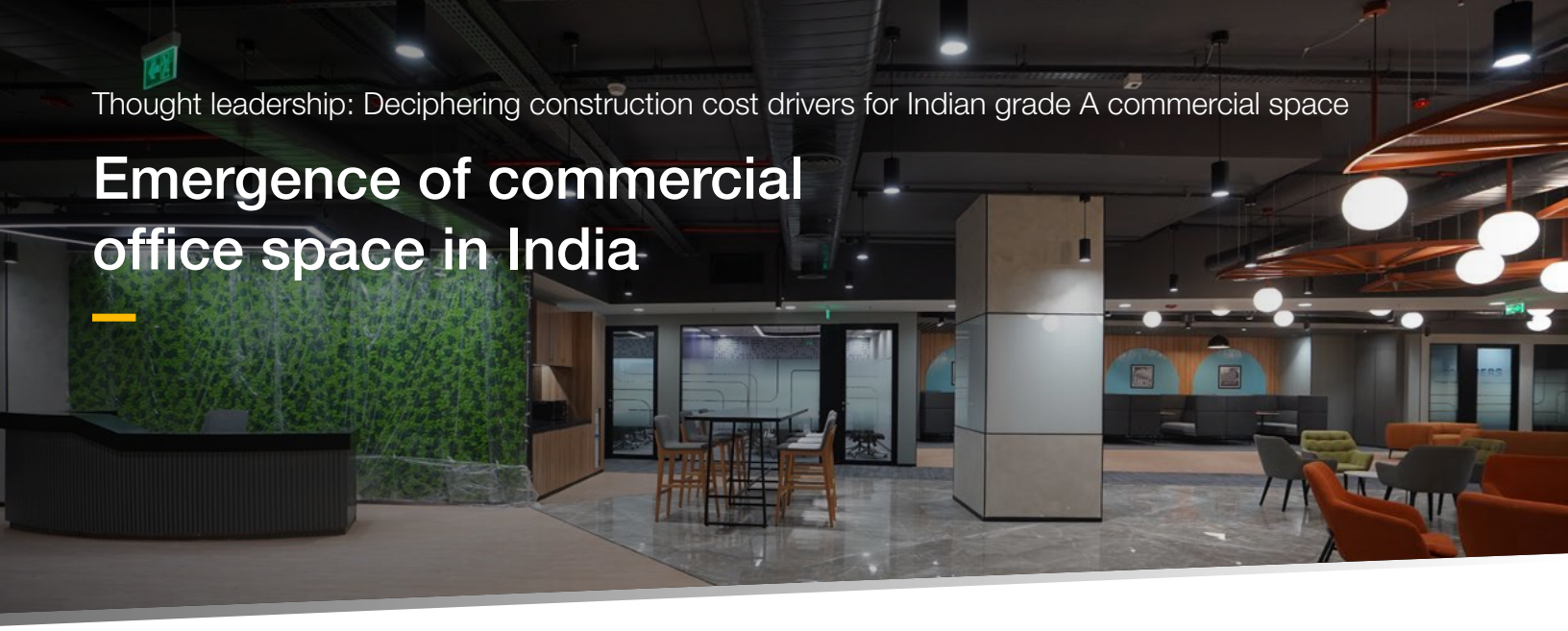
In 2022, the office market's net absorption in the top seven cities, including Mumbai, Bangalore and Hyderabad, reached a three-year high at 38.25 million

In 1Q 2023, India's six largest cities absorbed 14 million square feet of office space, an increase of 16% from the previous quarter From 2017 to 2021, foreign investments in the office sector increased from USD 3.2 billion to USD 10.3 billion.

The Trees, Godrej One, Mumbai, Maharashtra, India —

Gleeds provided Cost Management services from initial cost planning to final account. Close to **1 million square feet**, this project has elevated the definition of grade A commercial office buildings in India.

Emergence of commercial office space in India



The concept of commercial office spaces has been prevalent in India since the early days of trade and commerce. With the expansion of cities and urbanisation, contemporary and newly emerging office spaces have grown accordingly, with high grade office space, in particular, experiencing popular demand.

As the country's population is projected to hit 1.515 billion in 2030, office space is undergoing rapid transformation with a focus on incorporating new and contemporary aspects of design, such as the recent trend of integrating wellness components into commercial complexes to attract and maintain Generation Z.

The market demand is dynamic, reflecting improvements in building technology and the changing needs of the population.

More and more commercial developers are looking to build structures with higher floor-to-ceiling ratios because of the advantages they provide in terms of natural lighting and the ability to adapt to varying heating and cooling needs. Other commercial developments include components like Minimum Efficiency Reporting Values (MERV), integrated building management systems (IBMS) and Leadership in Energy and Environmental Design (LEED) platinum certification for environmental sustainability. These characteristics now raise the bar for commercial real estate structures in India.

Office space grading

Grading is a way to categorise and evaluate different types of office spaces based on factors including location, amenities, design and overall quality. While grading systems may vary, common office space grading categories are:

Grade A+: refers to the highest quality and most prestigious category of office buildings available in prime locations within the commercial real estate market. These buildings are characterised by their superior construction, modern design and private, first-class amenities and services.

Grade A: similar to grade A+ but with a marginal difference in the rental and occupier profile. Typically located in prime or secondary central business districts, grade A offices offer modern infrastructure, state-of-the-art facilities and excellent accessibility, often featuring high-quality finishes, advanced technology, ample parking and extensive amenities.

Grade B: whilst not matching the premium standards of grade A, these office spaces offer functional layouts and a range of facilities and amenities. Although of good quality, grade B offices are usually located in secondary business districts or prime locations with slightly less favourable characteristics than grade A spaces.

Grade C: typically situated in older buildings or less than desirable locations, these offices may have outdated infrastructure and limited amenities, requiring renovation or refurbishment. Often more affordable than grade A or B offices, these spaces attract tenants with tighter budgets as well as those who value cost-effectiveness over premium features.

Description	Grade A+	Grade A	Grade B	Grade C
Tenancy	Industry-familiar names that are typically the first occupants	Prestigious tenants, usually first occupiers	At least one previous tenant's history	A lengthy history of occupancy by multiple prior occupants
Age	<15 years	<15 years	10-20 years	>20 years
Quality	Landmark architecture, renowned as prestigious buildings	High quality construction and workman ship	Standard finishes, more utilitarian spaces	In need of renovation, including basic building infrastructure
Features	Indoor atrium and greenery, exclusive ancillary retail and F&B options	Indoor atrium and greenery, ancillary retail and F&B options, Lrge windows for natural light, ceilling heignt of at least nine feet	Outdated features and spaces	Lacking in modern amenities
Services	Personalised concierge and security services	Concierge and security services	Concierge and security services	May have attendants on duty during office hours

Source: *Housing.com*

Challenges in office space construction

Commercial office space construction can present challenges including:

Site selection and preparation

Finding an appropriate location for office space that meets the requirements of the business and provides convenient access for employees and clients is essential. Preparing the site, which may involve clearing land, levelling the ground and addressing soil or environmental issues, can be complex and costly.

Building codes and regulations

Compliance with local building codes, zoning regulations and safety standards is crucial. Navigating the complex and ever-changing regulatory landscape can be time-consuming and may require expertise from architects, engineers and other professionals.

Budget and cost control

Staying within the allocated budget while meeting quality standards can be a significant challenge in commercial construction. Cost over-runs due to unexpected expenses, market price fluctuations and design changes can impact the project's profitability and completion timeline.

Infrastructure and utilities

The installation of essential infrastructure including electrical systems, heating, ventilation and air conditioning (HVAC), plumbing and internet connectivity requires careful planning and co-ordination. The seamless integration of these systems into the office environment can be challenging and may require the collaboration of multiple specialists.

Sustainability and energy efficiency

Although the importance of constructing environmentally friendly buildings is growing, the incorporation of sustainable design elements to meet the requirements of LEED/WELL ratings or net zero transition such as energy-efficient lighting, integrated façade and renewable energy sources can be difficult and may necessitate additional investment and expertise.

Technology integration

Modern office spaces often require advanced technology infrastructure including data networks, security systems, audiovisual equipment and communication platforms. Ensuring seamless integration and compatibility between technologies can be complex and may involve collaboration with IT professionals.

Brigade Tech Garden,
Bangalore, Karnataka, India

Gleeds provided Cost Management services from initial cost planning to final account.

The project is LEED Gold certified, with **4.1 million square feet**.

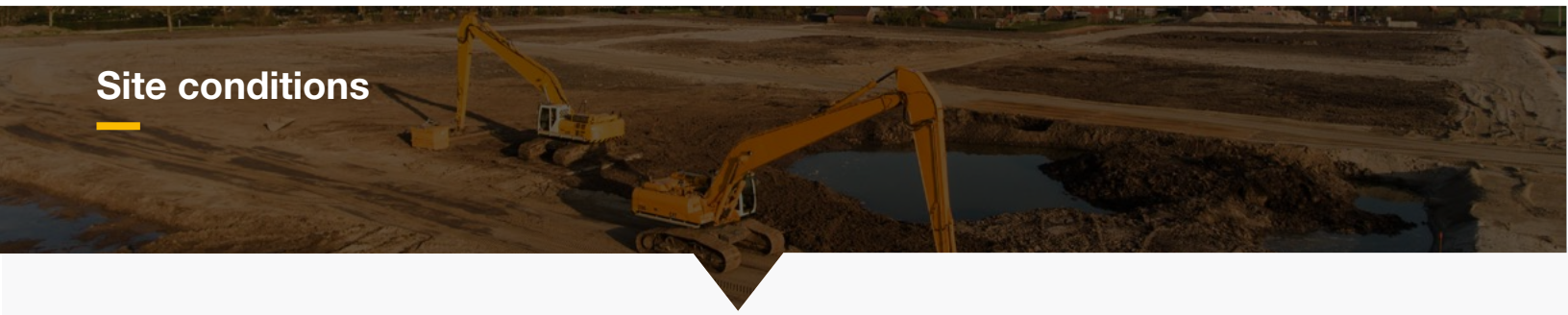
Design and cost drivers

In recent years, significant advancements have been made in the design of commercial buildings, with numerous new structural systems gaining broad acceptance. Changing requirements for the acquisition, use, quality and adaptability of buildings have prompted innovation in the design and construction of modern structures.

Location is a significant aspect in design and an important component of cost variables in urban areas. Moreover, open floor plans and designated break-out areas are in high demand among modern businesses which desire the ability to adapt to changing needs as they grow.

In commercial office space, the largest cost drivers and the services most influenced by design are civil and structure, finishes, façades (and their interface) and MEP (mechanical, electrical and plumbing). As commercial office building design evolves, dominant trends such as increased structural grids, floor-to-ceiling heights and core location influence the design response.

We examine the key cost drivers and design aspects for commercial grade A office shell and core services based on a cost model in India:



Site conditions

Soil condition

The characteristics of the soil on site can affect many aspects of the construction process, leading to potential cost implications. Extremely difficult rock requires controlled blasting, which incurs additional costs, whereas weathered rock incurs less.

Soil retention system

Different types of soil retention systems such as stabilisation techniques can have an impact on cost: shore piles and secant piles incur high cost in case of loose soil. Other cost influences include site conditions and design requirements.

Anchoring system

The stability of retention systems can be increased by using anchoring systems to reinforce and secure soil retention. Systems such as rock anchoring incur high cost whereas guniting can be a reasonable option depending on the soil strata.

Structural design

Design complexity

The architectural design of a commercial office building can impact costs. Complex designs with intricate features, unique shapes or unconventional structural elements may require additional engineering, fabrication and construction efforts. These factors can increase both the time and cost associated with the project.

Foundation and structural systems

Factors including soil conditions, building height and design requirements can increase the complexity and cost of the foundation and structural elements which provide the stability and strength required to support the entire building. The type and quality of soil on site can impact the foundation requirements, as poor soil conditions such as soft clay or loose sand may necessitate more extensive foundation systems e.g. deep piles or special ground improvement techniques.

The construction cost of raft foundations will be higher than isolated or combined footings. If grid spacing increases, structural framing also increases leading to a rise in construction costs. The construction cost of a post tensioned (PT) slab system incurs higher costs compared to a conventional slab system.

Building size, shape and height

The building size, shape and height depends upon the foundation and structural systems. Complex shapes or irregular layouts may require more intricate structural designs, increasing construction costs. As demand for taller buildings and larger floor plates rises, so do braced tubes and perimeter bracing. Its integration and interaction with the façade affects costs, as does the construction of cantilever slab projections, used in balconies and open areas in typical floors.

Floor-to-floor height — in particular, the height of the entrance lobby — is another consideration, as the greater the height, the greater the structural costs.

Site preparation

Before construction begins, the site needs to be primed by clearing, grading and preparing the land for construction. The cost of site preparation can vary depending on site conditions, soil quality and requirements such as additional excavation or compaction.

Floor systems

The design and construction of floor systems can significantly impact costs. Factors such as floor area, load-bearing requirements and desired finishes such as screed increases the cost compared to a bare slab finish.

Project scale and location

The overall scale of the building can affect costs as larger buildings generally require more materials, labour and time to construct. Moreover, market conditions, availability of construction resources and the cost of labour can vary based on the project's location.

Construction methods

Prefabricated or precast systems may require higher initial investments but can reduce labour costs and construction time. On the other hand, complex or customised structural systems may involve specialised labour and more concentrated construction processes, leading to increased costs.

Seismic considerations

In regions around India prone to earthquakes, the foundation and structural systems must be designed to withstand seismic forces. Implementing seismic-resistant measures, such as reinforced concrete cores or steel bracing, can increase construction costs depending upon location; buildings in zone 2 will incur less cost than zone 5 which has the highest seismic risk.

Future flexibility

The desired flexibility or adaptability of an office building may influence the selection of foundation and structural systems. If the building needs to accommodate future layout changes or additions, more flexible systems might be chosen, albeit at a potentially higher upfront cost.

Sustainability will continue to have an impact on structural engineers. In response to legislation and government directives, developers will need to implement alternative construction methods and consider innovative material technologies. Gleeds anticipates that the prevalence of modular systems and off-site fabrication will increase. Additionally, the use of timber frames, recycled aggregates and high-strength materials will influence cost variations.

Architectural form and interior design

The materials and elements used to finish interior and exterior surfaces (walls, floors, ceilings and other visible areas) influence cost in the following ways:

Material selection

The cost of materials for finishes can vary greatly. High-end finishes include marble, granite, textured paints and exotic woods and tend to be more expensive compared to more common options like emulsion paints, ceramic tiles and laminate flooring.

Design complexity, quality and durability

Finishes range in quality and durability. Although higher-quality finishes often come at a higher cost, they can provide greater longevity, requiring less maintenance over time whereas cheaper finishes may result in more frequent replacements or repairs, increasing costs in the long run.

Importing materials for finishes in a main lobby typically incurs high cost when compared with sourcing local materials such as marble, granite, wood and veneer. The ceiling finishes in a lobby could be wooden rafters cladded with veneer, specialised metal ceilings or acoustic ceilings which also raise costs when compared to gypsum ceilings with paints.

Generally, the finishes of materials used in toilets are good quality, although cost can be affected by the type of sanitary fittings selected.

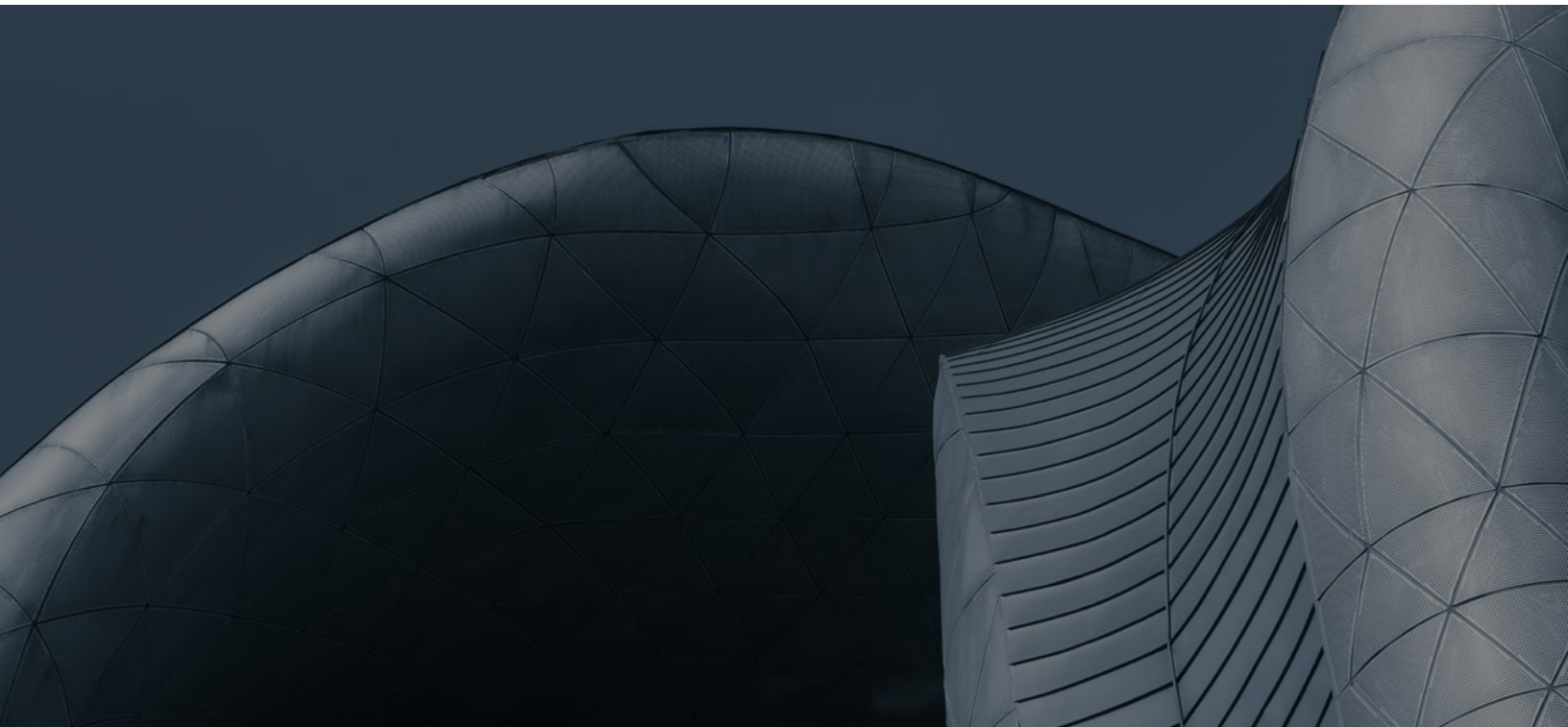
Specialised sustainable finishes

Certain specialised finishes, such as acoustic panels, soundproofing materials or high-tech finishes, often serve specific purposes like enhancing acoustics, improving energy efficiency or incorporating advanced technologies. However, many of these contain imported materials, making them more expensive than standard options.

Labour and installation

The complexity of installing certain finishes, like elaborate tile patterns or high-end wall coverings, may require skilled labour or specialised contractors. These labour costs can contribute significantly to the overall project cost, especially if the installation process is time-consuming or requires additional expertise.

While high-quality finishes can improve the aesthetics and value of a commercial office building, it is essential to strike a balance between the desired level of quality and the available budget. A well-planned and executed design can assist in achieving the optimal cost-to-finish ratio.



Façade systems

Façade systems can have a significant impact on the cost of constructing a commercial office building when considering:

Material selection

Façade materials: glass, aluminium, stone, composite panels, etc. can vary widely in price. High-end materials like curtain wall systems with high performance custom glass panels will be more expensive than simpler options such as precast concrete panels or stone claddings. The cost of materials will depend on factors which could include aesthetics, performance requirements and project budget.

Complexity of design

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Performance requirements

Façade systems provide thermal insulation, acoustic performance, weatherproofing and energy efficiency. Higher-performance requirements, such as enhanced thermal or acoustic properties, may necessitate the use of specialised materials or additional coating layers like triple-glazed. Additionally, vertical or horizontal fins, used for shading or as per design requirement, incur higher costs.

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Structural considerations

The façade must be structurally sound and able to withstand wind loads, seismic forces and other external factors. Depending on the building location and design, reinforcement like steel supports or extra framing may be necessary to meet structural requirements, thereby increasing costs. Extended canopies at the entrance and pergolas on a terrace will also require additional structural considerations.

Integration with building systems

Façades need to integrate with other building systems such as HVAC, lighting and electrical. Complex integration requirements like automated shading systems, sensors and other smart technologies all add to the overall cost of the façade system.

Installation and maintenance

The installation process for façade systems can be labour-intensive, requiring specialised skills, particularly if complex or customised systems require more time and expertise, increasing labour costs. Additionally, ongoing maintenance considerations, including the type of building maintenance unit (BMU) used as accessibility for cleaning and repairs, should be factored into the expenditure.

Building regulations and codes

Local building regulations and codes can impose specific requirements on façade systems, such as fire resistance, safety glazing or energy performance standards. Compliance with these regulations may necessitate automatic actuators for façade openings, impacting high cost.

Other variables affecting the cost of the envelope include wall:floor ratio and aspect ratio, which also influence internal heat loads and the specification of the façade itself.

Façade systems play a crucial role in the aesthetics, functionality and energy efficiency of a building. Cost considerations must be balanced with design intent and performance requirements for a commercial office building project to be successful.

Major equipment and low-side building services

Façade systems can have a significant impact on the cost of constructing a commercial office building when considering:

System selection

The design choices made for MEP systems can significantly impact on construction costs. Different options such as HVAC systems, lighting systems and plumbing fixtures vary in terms of initial investment, operational efficiency and maintenance requirements. Choosing more energy-efficient systems may involve higher upfront costs but can result in long-term energy savings.

Equipment and material costs

MEP design specifies the type and quality of equipment and materials required for installation. The cost of these components can vary based on their efficiency, durability and brand. High-quality equipment and materials might have higher upfront costs but can provide better performance and reduce maintenance and replacement expenses over time. High-end equipment such as transformers, diesel generators (DG), chillers and treatment plants (if provided with backup or standby) will increase the cost.

Sanctions, approvals, and co-ordination

Sanctions and approvals related to MEP services can have a huge impact on the cost of a commercial office building. The process of obtaining permits and scheduling inspections can involve fees, although costs depend upon the project scope, size and location.

Electrical installation

Factors impacting cost:

- Provisions of substation/receiving stations
- Power transmission bus ducts in place of cables
- Load provisions/considerations per square feet of carpet area
- Common earthing system or additional tenant-specific requirements
- Systems with 100% DG backup
- N–N configuration
- Fire survival armoured cables
- UPS systems with 100% back up and N–N configuration
- Containment arrangements for ELV
- Scrubber for DG sets
- Central pollution control board (CPCB4) DG sets
- Lightening protection system (LPS) methods

Plumbing and firefighting installation

Factors impacting cost:

- Type of pipes: GI, CI, UPVC
- Type of STP: MBBR, MBR
- Type of fittings: grooved
- Type of pumps and pipe fittings (valves, sprinklers, etc.): normal or ULFM certified
- Façade protection system: sprinklers or water curtains
- Fire suppression systems and aspirating systems
- Welded joints or Victaulic joint
- Motor standards as per IE3, IE4 and IE5
- Fire curtain
- Addressable FA, PA and TBS.

Energy efficiency and sustainability

MEP design that emphasises energy efficiency and sustainability can have a positive impact on both operational costs and the environment. Incorporating energy-efficient technologies such as LED lighting, smart controls and renewable energy systems can lead to reduced energy consumption in the long run. However, these eco-friendly solutions may involve higher initial investments.

External utility connections

Power and water supply and other utility connections can affect the total cost, particularly if they must be drawn from distant locations. Less distance equals less expense.

Overall, MEP design decisions have a direct influence on construction costs and the ongoing operational expenses of a commercial office building. Careful consideration of system selection, equipment and material costs, sizing, complexity, labour requirements and long-term maintenance can help optimise costs while meeting the building's functional and sustainability goals.

Major equipment and low-side building services

BMS and IBMS

Integration with building management systems (BMS)

Modern commercial office buildings often have complex building management systems that integrate various subsystems including electrical, HVAC and security. Ensuring proper co-ordination and compatibility between the electrical design and the BMS can influence costs related to actuators, control cables, control panels, communication networks and software integration.

Lighting fixtures

Lighting fixtures encompasses the selection and placement of light fixtures, switches and controls for common areas, façade lighting, landscape lighting and general lighting. Energy-efficient lighting solutions (DALI systems) such as LED fixtures and occupancy sensors can impact the cost.

Vertical and horizontal transport systems

The vertical transport system, which includes elevators and escalators, can have a significant impact on the cost of constructing a commercial office building. Key aspects to consider are:

Equipment and installation

Elevators and escalators are expensive to purchase and install. The number and size of elevators required for a building depends on factors which include building height, number of floors, expected occupancy and traffic patterns. The more elevators needed, the higher the cost of equipment and installation.

Architectural internal finishes

As elevators are an integral part of a building's design, their placement and integration within the architectural layout can affect construction costs. The quality of internal finishes and the incorporation of custom design elements, such as glass walls, special finishes or decorative features, can add to the cost of the project.

Size and capacity

Larger elevators with higher weight capacities are generally more expensive to install and maintain. The required size and capacity will depend on the expected number of occupants, the building's purpose and specific accessibility requirements.

Speed and performance

The speed and performance of elevators can vary depending on the building's needs and design specifications. High-speed elevators that can efficiently transport occupants between floors will generally cost more than slower, standard-speed elevators. Advanced features such as destination control systems or predictive maintenance capabilities can also increase costs.

Wait time and energy efficiency

Reduced wait time will incur higher costs in elevators. Energy-efficient elevators, including regenerative drives or LED lighting, can reduce operational costs over the long term but may have higher upfront costs. Incorporating sustainable and energy-saving features into the elevator design can contribute to a higher initial investment.

Future expansion and modernisation

It is essential to consider the future needs of a building when selecting and installing a vertical transport system. The building may require additional elevators or modernisation of existing systems as tenant requirements evolve. Planning for future expansion and modernisation can impact upfront costs.

External development

External development can have a significant influence on the cost of constructing a commercial office building in the following ways:

Infrastructure

The development or improvement of infrastructure around an office building site can typically include road widening, new utility lines (water, electricity, sewage) and transportation systems. These costs are usually borne by the developer or local government and can significantly impact the construction budget.

Site preparation

Depending on the site condition and requirements of external development, additional site preparation can include excavation, grading or cut and fill. Environmental concerns, geological challenges or complex topography that requires specialist engineering or mitigation measures can increase these site preparation costs.

Accessibility and parking

External development often includes provisions for accessibility, parking spaces and landscaping. Depending on local regulations, the construction of ramps, elevators, parking lots and green spaces may also be necessary.

Puzzle or stack parking also impacts upon costs as accommodating these additional features can require specialised design and materials.

Impact on construction timeline

The construction timeline of an office building can be impacted by road closures, utility installations or even nearby construction projects. Delays caused by external development activities can extend project durations, risking potential claims and additional expenses.

Collaboration with local authorities, early engagement with relevant stakeholders and due diligence during the project planning phase can help manage the potential cost impacts of external development.

Sustainability certification

Different types of sustainability certification can have varying influences on the construction cost of a commercial office building. It is important to note that the specific costs associated with achieving each certification system can depend on factors such as project location, design aspirations and the desired level of certification (e.g. silver, gold, platinum).

Some examples of well-known sustainability certification systems and how they may impact costs are shown below:

WELL

The WELL Building Standard focuses on the health and wellbeing of building occupants, addressing factors like air quality, lighting, water quality, comfort and mental health. Pursuing WELL certification may involve costs related to specialised systems, equipment and materials that prioritise occupant health and comfort; the cost impact of which can be in the 0.5% to 1% range of the overall project cost, depending on the base level included within the project design.

US Green Building Council (USGBC)/Indian Green Building Council (IGBC)

The USGBC and IGBC are the organisations responsible for the LEED certification rating — one of the most widely recognised sustainability certification systems for commercial office buildings.

LEED ratings focus on aspects of sustainability including energy efficiency, water conservation, materials selection, indoor environmental quality and site development. Pursuing LEED certification can involve additional expenses for design, documentation and compliance with specific criteria. The certification also promotes sustainable construction practices including waste reduction, recycling and efficient use of resources. As implementing these practices can mean additional co-ordination, training and resources, increased costs may be incurred.

Whilst silver level certification fees do not vary significantly, the price for gold and platinum level certification is around 1.5% to 2.5% of total project cost, depending on base design requirements.

Net zero

To achieve net zero energy usage commercial office buildings typically incorporate renewable energy generation systems such as solar panels, wind turbines or geothermal energy sources. The cost of installing these systems can vary depending on factors including energy demand, available space on site, potential to put required technology on site and statutory restrictions, amongst others.

Building envelope

A well-designed and highly efficient building envelope (including walls, windows, roof and insulation) is crucial for reducing energy consumption. Enhancements to the building envelope to meet net zero requirements may result in increased construction costs.

Façade-integrated photovoltaics (FIPV), also known as building-integrated photovoltaics (BIPV), involves integrating solar panels directly into the building's façade elements including windows, cladding and shading systems. The material cost, design and engineering and installation (which requires specialised skills) can impact upon the cost.

Algae façade systems involve integrating living algae organisms into the building's façade elements, such as panels or modules, to provide shading, temperature regulation and potentially generate biomass or bioenergy.

The cost impact will depend upon factors such as size and complexity of the installation, the specific algae species used, local climate conditions and the availability of specialised materials and expertise in algae façade technology.

Roof-mounted photovoltaic (PV) systems are solar panels installed on the roof of a commercial office building to generate renewable electricity. The solar panels and mounting equipment, design and engineering, integration of the system into additional electrical infrastructure and obtaining the necessary permits can have a huge impact on cost.

Due to lack of space in prime business districts of India, it is difficult to achieve net zero although steps which can be taken include a mix of energy reduction, an increase of renewable power on site and grid-level investment in renewable sources.

Amenities

The inclusion of amenities such as cafeterias, fitness facilities, wellness facilities, crèches, retail stores, food courts, kitchen equipment, rooftop activation and additional landscape features are a major cost component and will impact upon budget.

The specific cost impact of a cafeteria and kitchen will depend on whether the planning, design and installation of the facilities is exclusively in-house or outsourced to a third-party consultant.

Rooftop activation, also known as rooftop amenities or rooftop features, refers to the utilisation of this space for purposes such as gardens, outdoor lounges, recreational areas, event spaces or additional toilets.

Balancing the desired features with the available budget is crucial to ensure project feasibility and successful implementation of rooftop activation in a commercial office building.

Market conditions

In addition to procurement strategy, market conditions play a significant role as a cost driver. Factors such as supply and demand dynamics, labour availability, material costs and overall economic and climatic conditions play an important role in influencing cost.

If the project is ambitious with a less well-known client group, or a history of project delays, the contractor will assume additional risk to protect themselves. In addition, vendors may be less interested in working in the warmer seasonal conditions or may wish to alter their standard working practices to suit. This would pose the possibility of additional preliminaries, such as extra labour which brings with it the usage of more consumables and site resources.

Procurement process

The right procurement strategy plays a significant role in influencing the cost model for shell and core commercial office buildings in terms of a project's cost and schedule.

The different types of procurement process include:

- Design build
- Traditional design bid build
- Construction management
- Lump sum
- Guaranteed maximum price.

Stakeholders can optimise costs and ensure successful project delivery by considering:

- Construction methodology
- Supplier and contractor selection
- Material procurement
- Risk management
- Timeframe and scheduling
- Project management practices.

Thought leadership: Deciphering construction cost drivers for Indian grade A commercial space

Benchmarking of grade A office buildings

To ensure a comprehensive comparison, the benchmarking data for grade A office building is taken from four similar sized projects.

The cost components in the cost model below can be compared with the benchmarking data to assess the project's cost structure based on cost drivers and site-specific requirements.

Referring to the cost model, it is evident there are wide ranges in the cost per sq ft for each cost head.

Each individual project comes with its unique requirements, therefore it is critical to examine a number of projects and their costs when undertaking benchmarking exercises.

Projects		**Project 1**	**Project 2**	**Project 3**	**Project 4**
Built up area in sq ft		1.1 Mn sft	1 Mn sft	1.2 Mn sft	1.5 Mn sft
Number of upper floors		13	18	20	21
Building height		75m	75m	70m	85m
Frame		Concrete	Concrete	Concrete	Concrete
Location		Mumbai	Bangalore	Mumbai	Pune
S.no	**Cost heads**	**INR/sq ft**	**INR/sq ft**	**INR/sq ft**	**INR/sq ft**
1	Excavation and shoring works	131	153	150	320
2	Structural works	1,492	1,362	1,547	1,518
3	Architectural form and interior design works	523	320	438	430
4	Façade systems	544	430	785	407
5	Electrical installations including lightening arrester	168	208	216	204
6	Heating, ventilation and air conditioning (HVAC) installations	215	185	243	204
7	Plumbing installation including rain water harvesting	86	84	104	95
8	Firefighting installations	89	83	94	82
9	Extra low voltage systems (fire alarm, public address, building management system, security)	88	38	65	96
10	Vertical transport	137	95	207	103
11	Desel generator (DG) and high speed diesel works	71	115	107	65
12	Sewage treatment plants (STP) and water treatment plants (WTP)	5	13	4	9
13	Organic waste converter	3	3	1	2
14	Solar/photovoltaic	25	13	11	6
15	Gas bank	5	3	2	4
16	Mechanical parking	152	423	427	325
17	External development works	188	119	142	118
Total		**3,922**	**3,647**	**4,543**	**3,988**

Thought leadership: Deciphering construction cost drivers for Indian grade A commercial space

Cost model: commercial (grade A) office building

The building cost model is used to analyse project costs at an early stage and is based on historical cost trends and cost drivers.

Its objective is to provide an exhaustive breakdown of anticipated costs associated with constructing the fundamental elements of a project such as structure, exterior envelope, core services and finishes.

As the cost model assists with project budgeting and assessing the financial viability of prospective developments, it is crucial to consider regional construction costs, building regulations, design complexity and market conditions.

It is noted that costs for a campus-based development of commercial buildings for end-users would vary based on approach, design specification and requirements, as well as all add-ons included in the base build works.

The cost model is based on the expected range for a developer-led, multi-package, item-rate contract for a commercial, grade A, warm shell building/multi-tenant occupation. If the procurement strategy is altered, the cost model will have differential costs.

A general contractor with ownership of all work packages would have additional cost impact of 8% to 12% on the balance packages. In case of nomination (where risk of vendor performance is shared with the client), the additional cost impact would be 7% to 10% on the nominated package.

Basis of cost model:

- The office cost model is based on a prime location in a metropolitan city in India
- The building comprises three basements, a ground floor level and 10 typical floors. It has a built-up area of two million square feet
- Frame: RCC structure with PT slabs
- Building height is less than 70 metres
- Procurement strategies: trade package procurement and direct client procurement of high-end equipment

Project contractor: grade A for shell and core works, remaining grade B

Cost model is based on cost data available for March 2023

The cost range is determined primarily by the site constraints, allowable areas and its interaction with the required structural solution, followed by overall specification levels and height.

Assumptions are based on the following considerations:

Civil and structure

- The cost of excavation is based on a combination of soft rock and hard rock strata. For piling or shore piling/ diaphragm walls, additional costs vary from INR 80 to INR 120/sq ft
- Civil and structural costs are based on concrete consumption ratio of 0.048m3/sq ft and reinforcement steel of 5.5kg/sq ft. PT reinforcement is considered as per 0.4kg/sq ft
- For basement parking, driveway and ramps, VDF flooring has been considered (average 100mm thickness)
- External development is based on a combination of paver blocks, granite stone and landscaping elements with water bodies and vegetation.

Finishes

- Interior costs are based on INR 400/sq ft for Italian marble flooring in common areas such as entrance lobby and typical floor lift lobbies
- Granolithic flooring for all MEP and service areas.
- Common toilets are based on INR 65/sq ft for vitrified tiles.

Façade

- The façade is composed of 90% double-glazed, semi-unitised system and curtain wall for common areas, 5% stone surface and 5% louvres, doors and paintwork.

Thought leadership: Deciphering construction cost drivers for Indian grade A commercial space

Cost model: commercial (grade A) office building

Services:

Electrical

- Transformer cost is 250W/sq ft with 80% diversity
- Generator rating is based on 70% overall connected load.

Plumbing

- Sewage treatment plant is based on SBR type determined by potential population based on National Building Code
- Organic waste convertor is based on local norm
- Water treatment plant is determined by potential population based on National Building Code

Firefighting

- Firefighting systems along with drencher, first fix fire hydrant in tenant areas and complete fire hydrant system in common areas. Fire curtains in parking areas.

HVAC

- Standard air-cooled chillers cost is based on 350 sq ft/t in air-conditioned areas.

Mechanical carpark

- Mechanical stack parking as per parking requirements
- 8/10 ACH jet fan and exhaust systems
- Cost is dependent on type of parking system used e.g. puzzle/automatic/hydraulic.

Vertical transport

- Passenger elevators are based on traffic study with destination control system, standard 2m/s2 rate of acceleration. All elevators are of machine-room-less category
- Service elevators are based on 1 to 1.75m/s2 with group control technology.

Miscellaneous

- CCTV, IBMS system, IT system, parking management systems and security equipment based on standard common area requirements of grade A office space
- Solar PV panel system for 5% of the connected load for rooftop.

Built up area in sq ft	Parking in sq ft	Commercial in sq ft
2,000,000	600,000	1,400,000

Location	Bangalore	Project details			Range for Grade A Office Buildings - INR / SFT	
S.no	Description	Amount	INR/sq ft	% of Cost	Low	High
1	Excavation and shoring works	39,70,72,893	199	5.6%	150	300
2	Structural works	2,803,995,587	1,402	39.4%	1,250	1,500
3	Architectural works	343,963,325	172	4.8%	150	200
4	Interior design and finishes	647,655,090	324	9.1%	250	350
5	Façade and building maintenance unit	859,243730	430	12.1%	350	600
6	Electrical installation	504,626,851	252	7.1%	200	350
7	Public health engineering works	107,546,641	54	1.5%	50	100
8	Sewage treatment plant	12,787,500	6	0.2%	5	20
9	Heating, ventilation, and air conditioning (HVAC)	432,034,241	216	6.1%	200	275
10	Firefighting	19,91,91,725	100	2.8%	80	110
11	Building management system (BMS)	38,216,761	19	0.5%	15	20
12	Electro-mechanical works	24,037,122	12	0.3%	5	15
13	Security	44,706,908	22	0.6%	15	25
14	Parking management	20,000,000	10	0.3%	5	10
15	Close circuit television system (CCTV)	40,000,000	20	0.6%	15	25
16	Mechanical car parking	158,720,000	79	2.2%	60	150
17	Elevators/vertical transport	153,400,000	77	2.2%	70	120
18	Lighting fixtures and decorative lighting	54,598,925	27	0.8%	20	40
19	External Development	211,167,528	106	3.0%	100	200
20	Solar photovoltaic (PV) panel system-540KW (540KW @ INR 65,000)	35,100,000	18	0.5	15	20
21	Organic waste management (20,00,000 **sq.ft @ INR 2**)	4,000,000	2	0.1%	2	5
22	Gas bank allowance (20,00,000 **sq.ft @ INR 2.6**)	5,187,408	3	0.1%	3	5
23	Water treatment plant (470KLD @ **INR 12,000**)	5,640,000	3	0.1%	2	5
24	Signage	14,627,321	7	0.2%	7	15
Total		**7,11,75,19,555**	**3,559**	**100%**	**3,019**	**4,460**

Excluded			
Owner's direct cost and preliminaries	Contingencies and escalations	Green building certification	Goods and service tax (GST) and labour costs
GST & Labour cess	Any works outside site boundary	Sub station Works	All costs to bring Power and other utilities to Site
Abnormal Site conditions affecting foundations / basement walls	Project Phasing	Net Zero Transformation Costs	Main Contractor Approach / Coordination / Attendance Costs
Curved Glass sections / Smart Glass systems	Digital Transformation Costs	Campus Development	

Conclusion

The significant growth of commercial office buildings in India has been driven by various factors such as economic development, urbanisation and the expansion of industry. India's rapid economic progress has created demand for office spaces, particularly in major cities like Mumbai, Delhi, Bangalore and Chennai.

Multi-national corporations, as well as domestic companies, are increasingly establishing their operations in India. Initiatives such as "Make in India" and "Digital India", the rise of the start-up ecosystem and technological advancements have encouraged both domestic and international companies to expand their presence in the country, resulting in increased call for office spaces.

The commercial grade A office cost model can be used by businesses and organisations to understand and manage their construction cost expenses. The cost model expedites the identification of potential cost drivers and the implementation of strategies to optimise resource allocation. In addition, the model facilitates precise financial planning and budgeting by providing a transparent overview of anticipated costs over time.

The model promotes accountability within an organisation by enabling stakeholders to understand the financial consequences of their decisions. It is important to note, however, that the cost model is not static and should be reviewed and updated frequently to account for changing market conditions, inflation rates and other relevant factors. Flexibility and adaptability are essential for ensuring that the model's outputs are accurate and relevant.

Understanding the factors that significantly impact construction costs in commercial office buildings is crucial for all stakeholders involved. These cost drivers provide valuable insights into the influence of land prices, design, construction materials, labour, building regulations, technology, market conditions and sustainability requirements. This understanding enables improved assessment of project feasibility and identifies areas of cost savings without compromising quality.

Ultimately, comprehending the cost drivers in commercial office buildings empowers stakeholders to navigate the complexities of the Indian office space market and execute successful projects with greater cost efficiency.

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Thank you to Ashish Pimpalkhare, Bhagyshree Parikh, Jayashree S. and Manojkumar P for their contributions to the report.
