IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

COST ANALYSIS OF HOTEL PROJECTS

[1]Amey Remaniche, [2]Prof.Pranjali Kulkarni

[1]Amey Remaniche, PG student, MIT ADT University, Pune, Maharashtra, India

[2]Prof. Pranjali Kulkarni, Professor, Dept. of Construction Management, MIT ADT University, Pune, Maharashtra, India

1

Abstract: In today's era, various emerging disciplines have been developed, and project management theories and cost control methods therein have become increasingly mature in this context. Many scientific methods and theories have been gradually applied in practice. However, many scholars have focused their attention on the construction side in their research, but not on the user side. As we all know, most engineering construction companies are oriented to target profits, and the final user is passive in project control. When both parties deliver, they mostly focus on expost accounting and emphasize cost targets in isolation, which leads to Overflow, therefore, project users must not only strictly supervise and review the budget and quotation form of engineering construction enterprises, but also form their own project cost control system, thereby reducing investment costs and reducing operating pressure after commissioning.

Index Terms **- Hotel projects, Cost model, Preliminary Estimate, Construction cost, Area programming**, ***Construction project, Cost control, Full life cycle***

I. INTRODUCTION

The accommodation service industry is dynamic and constantly changing in line with developments in the tourism sector in Indonesia and with the increasing number of tourist visits, providing business opportunities in tourism sectors such as a hotel to accommodate the needs of tourists (HVS Singapore, 2017). Hotels are quite complex businesses in combining reliable and intangible products provided for customers. It requires an appropriate business strategy analysis to maximise competitive advantage. Due to a variety of competitive advantages sources, the hotels can make their position, in terms of both costs and differentiation, hard to imitate by the competitors. By doing so, they can increase the potential to achieve their golas to become a key player in the market and in achieving targeted fi nancial performance (Leonidou, Leonidou, Fotiadis, & Zeriti, 2013; Molina-Azorín, Tarí, Pereira-Moliner, Lopez-Gamero,& Pertusa-Ortega, 2015). Facing competition, a new player in the hotel business requires a feasibility study to be able to plan and measure the critical factors for the future by considering the time and cost (Popovic, Stanujkic and Karabasevic, 2019). Feasibility studies in the hotel sector have been an object of research since the 1960s; according to Kim (2002). During the period 1960 to 1996, the evolution of feasibility studies in the hotels and motels industry had a significant impact on the development process of new hotel and motel projects, as well as on their future operation. In the previous hotel feasibility studies, different variables have been used to evaluate the fi nancial results of the independent hotels in comparison with the chain hotels or the viability of the lodging industry (Kapiki, Mu and Fu, 2014). The city of Bandung was s one of ten potential areas for tourism destinations (Menteri Pariwisata, 2016). Bandung, as one of the favorite tourism destinations in West Java, has more than 336 hotels ranging from no star to 5-star operating as of 2017 (Badan Pusat Statistik Kota Bandung, 2018). This study will examine X, a full-service service four-star hotel project in City of Bandung, Indonesia. This is the fi rst hotel project built by the owner and would be managed independently, without involving international or domestic hotel chain/operator. Due to a limited experience in operating hotel business, the hotel owner needs to plan the project based on the precise and accountable data. Therefore, this study describes the feasibility studies for full-service independent hotel business by using Political, Economic, Social and Technology (PEST) analysis, Porter's five forces and Resource-Based View (RBV), and capital budgeting method to provide an overview of internal and external conditions n the process of making the right decisions for independent hotel owners.

II. NEED FOR STUDY

According to the hotel sector analysis report published by Equitymaster, the demand-supply gap in India is notable and there is a need for more hotels. The shortage is mainly within the mid-market and budget hotel segments since the travelers are looking for safe and affordable accommodation. The number of international brands across all hotel segments and domestic hotel chains, too, are embarking on strong expansion and development plans across all hotel segments. (Equitymaster, 2019) Construction of hotels is primarily a private sector activity that is capital intensive and has a long gestation period. Thus, developers must ensure quality planning and execution of a hotel project along with constant vigilance for compliance and an appropriate financing structure. (HVS, 2016) Therefore, with an increase in the need for hospitality infrastructure, there is an opportunity for investors to invest in Hotel Business. But there is no defined cost model or data available for preliminary estimation of hotel projects due to its complexity and large variability. Since there is no standard format or data available based on Plinth Area rates in CPWD standard documents for preliminary estimation of hotel projects, there is a need for a cost estimating guide in an Indian scenario. This research aims to develop a cost model for hotel projects in India to facilitate investors and owners during the early decision making process regarding investment in Hotel projects.

This research is an attempt to resolve the complexity of the hotel project establishment in terms of area analysis and cost analysis of a similar range of hotels. It will also help in cost optimization and cautious decision making for investment. The cost model will also help in area programming and area allocation of different spaces in a hotel project based on the guidelines and industry norms.

III. AIM & OBJECTIVES

The aim of this research is to determine a cost model for the construction of hotel projects in India.

The objectives of this research are:

1. Understand the various classifications of hotels, typical hotel project components and categorise the construction cost of hotels in India.
2. To identify the percentage distribution of hotel spaces and its cost components using the case studies of similar projects.
3. To develop an area programing framework for hotel spaces.
4. To formulate a construction cost model for hotel projects in India.

IV. SCOPE OF STUDY

- Cost model applicability will be on similar range of hotels i.e. 3-star and 4-star rated, mid- market and upper mid-market segment of hotels projects in India.
- Land cost will be excluded from the cost data, since it will be specific to the location of site.
- Hotel feasibility, revenue model, and operation & maintenance cost of hotel projects will not be included.
- The identified cost model will not hold true for other classifications of hotels like Heritage hotels, boutiques hotels, motels, budget hotels, etc. because of the significant extent of variability.
- Case Studies will consider the actual cost incurred for the construction of hotel projects, its comparison and analysis based on the defined cost parameters.
- This cost model can be applicable to any no of hotel projects ranging from 50 to 500 keys of similar hotels.

V. CONTENTS OF PROJECT COST MANAGEMENT

Project cost management runs through the entire project. From the initial establishment of the project to the end of the final completion, it is a project that combines systematic, diverse, long-lasting, and comprehensive aspects. In general, the scope of project cost management involves all aspects, including all kinds of project work. Specifically, project cost management consists of planning resources, forecasting costs, combining actual cost planning, and implementing management and control of all aspects of a specific project.

The basic goal of project cost management is to provide effective data and reference information to participate in project implementation management. According to different levels, the project cost management goals can be divided into specific goals and overall goals. The overall goal of project cost focuses on the overall operation and management of service projects, specifically to provide detailed cost information for internal and external stakeholders related to enterprise projects, making it a basis for decision-making by stakeholders, and then use economic means With advanced technology and organizational optimization methods to control costs within a predetermined range. It is worth noting that under the various influencing factors in the current different economic environments, the overall objectives of project cost management will also be changed to varying degrees in terms of performance and implementation form. Under the current situation, in an increasingly fierce market competition environment, with the different competitive strategies adopted by projects or enterprises, the overall objective of project cost management will also change. Under the situation of reducing project costs as a guiding management concept, reducing the project implementation costs as much as possible is the most original policy guideline of the entire project management; however, if it is

not just to reduce project costs, the second is to consider more comprehensive , More specifically, considering the different attributes of project management, the ultimate goal of project management is positioned on the difference between the project and the final service object, and then on the basis of considering the cost of the project, then the project cost management at this time The purpose of the project will be clearer. Specifically, project cost control includes not only cost control objectives but also cost calculation objectives.

5.2 Hotel Classification

The Hotel & Restaurant Approval & Classification Committee (HRACC) inspects and assesses the hotels based on various facilities and services offered as mentioned in their checklist published by the Ministry of Tourism for various classification/ reclassification of hotels. Hotel Projects are approved at the implementation stage and operational hotels are classified under various categories. The procedure to get approval for any specific classification is described in the guidelines published by Ministry of Tourism, HRACC Division. The classifications of hotels based on HRACC guidelines are divided into two major categories which are as follows:

- **Star Category Hotels:** These include hotels with star ratings such as 1 Star, 2 star, 3 Star, 4 Star (with or without alcohol services), 4 Star (with or without alcohol services), and 5 Star Deluxe.
- **Heritage Category Hotels:** These are heritage hotels set in properties such as small forts, palaces, havellis**,** etc. These hotels must have a minimum of 50% floor area built before 1950 with no substantial change in the original façade. These can be categorised as Heritage, Heritage Classic, and Heritage Grande.

Apart from the classifications as described by HRACC, there are other classifications of hotels based on size or no of rooms, location of hotel, clientele, duration of the guest stay, level of services provided, ownership of the hotel, market segmentation based on room tariff and facilities provided, etc. Examples: Resorts, Motels, Casino, B&B, Commercial, Suite, Time-share condominium, etc.

5.3 Hotel Feasibility

Hotels entail huge investments that are expected to generate returns over decades, and investors must pay careful attention to the planning process to avoid delays and rework. An efficiently built functional hotel may not yield a good return if built with an inappropriate positioning having a facility mix that is not in line with the current market conditions and forecasted trends. Hence, a careful assessment of the site, market trends and local bylaws must be made before determining the positioning and facilities mix of a hotel in order to ascertain the highest and best use of the real estate (HVS, 2016). This highlights the importance of a feasibility study of hotel projects. This research is based on developing a cost model which will be a part of financial feasibility of the hotel project.

The project feasibility of a hotel must be studied with all respects based on the location, available data and market trends, revenue generation streams, etc. before investing in the project. The viability of the hotel project would greatly depend on the exact location and the project costing & its profitability would vary from place to place. The financing strategy for the hotel must be well thought of. If the feasibility of the projects doesn't seem fit, it becomes difficult to convince the investor or other financiers/banks to invest in the project. Selection of Hotel operator/ brand of hotel/franchising or management contract strategies for ownership of a hotel are significant in order to establish a hotel. These impact the future revenue streams of hotel projects. Hotel O&M, revenue streams, gross operating profit are important considerations for the owner or investor in order to determine the monetary benefits.

5.4 Typical Hotel Project Components

A survey by HVS reveals that more than 60 % of all hotels with mid-market to luxury positioning have an estimated room to total area (above ground) ratio of less than 50 %. This means that more than half of the valuable floor space index (FSI) area is being utilised for building the ancillary and supporting areas of a hotel. Today, F&B outlets and meeting spaces form an integral part of hotel operations/revenue mix and serve as important selection criteria for guests. Thus, effective planning and efficient use of FSI areas is imperative and can go a long way in enhancing functionality and maximizing return on investment for a developer (HVS, 2016). The hotel development is complex in nature and great expertise is required, especially in the early stages of planning and development, which if not done properly can lead to cost over-runs and ultimately poor financial returns for the project (Achin & Sanaya, 2017). Therefore, efficient planning of hotel spaces is required which needs an understanding of the typical hotel project components. The major hotel spaces can be categorised into four groups as follows:

5.4.1 Residential Area

These include the rooms provided for the guests for lodging purposes. These are the major revenue generating areas of the hotel, contributing to 60% of the hotel revenues. Guestrooms, attached toilets, and balcony areas are a part of residential areas.

5.4.2 Public Areas- FOH (Front of House)

The FOH areas are public areas where employees deal with the customers face-to-face. These spaces include:

- Entrance & Reception
- Lobby & Lounge
- Food & Beverage: Restaurants, Dining, etc.
- Function rooms – Ball rooms, Banquet halls
- Meeting/ conference rooms
- Gymnasium & Spa
- Swimming pool, etc.

5.4.3 BOH (Back of House) Areas

Back of house areas are hidden from the guests. These are used for the back of house services for the functioning of the hotel. Separate consultants are required for the integration of these services. These include areas such as:

- Service entrance
- Kitchen – food preparation area
- Employee areas – Locker rooms
- Laundry area
- Housekeeping
- Storage areas
- Locker rooms
- Administration, offices, etc.

5.4.4 MEP Areas

Building services are one of the most necessary elements for the functioning of the hotel. Each of these must meet the requirements and specifications as per norms and standards. These include:

- Electrical
- Plumbing
- HVAC
- Fire and Life safety
- Lifts
- Building Automation system

MECHANICAL

The mechanical system inside a building could be divided into two to three categories. Generally, mechanical systems refer to HVAC, elevators, and escalators. One additional category could be mechanical support behind water supply across the infrastructure.

Mechanical drawings are crucial for any construction project, **including HVAC** and **MEP (mechanical, electrical, and plumbing)**. They accurately identify geometric features of the machine component and include orthographic views, also known as orthogonal projections or multiview drawings.

Mechanical drawings typically include:

A cover sheet with legends
Notes and details
Title blocks
A bill of materials
Break lines
Continuous lines, center lines, and hidden lines.
They specify the design and modifications of:
Mechanical systems
Ductwork dimensions
Damper locations
Design air delivery rates.
Thermostat locations
Diffuser locations
Supplemental cooling systems.

Electrical

The electric system is basically the power backend of your building. Each component in the electric system of your building is responsible for the distribution of power and the work being assisted by the power supply.

Electrical drawings are crucial for communication, troubleshooting, and documenting information about power systems on construction sites. They help ensure that power systems run safely, efficiently, and smoothly, and they can also identify potential risks that can be nipped in the bud before they become a problem.

Key elements of effective electrical drawings include:
Standardized symbols for electrical components Wiring representations
Layers and dimensions.
These elements help engineers understand the layout and troubleshoot issues, saving time and costs by avoiding problems, delays, and unnecessary purchases.
Electrical systems, categorized into low-voltage and high-voltage, are crucial for lighting and small appliances. **In detail, electrical plans may include:**
Connections of fixtures and components
Main cable
Wire runs
Wiring diagrams
Schedules
Main switches and fused switches
Tiebreakers
Power transformers
Winding connections
Power lines
Interconnection of electrical wires,
Equipment such as batteries, generators, air conditioning, and solar panels. Legends provide symbols, abbreviations, and descriptions, while wall lines are usually drawn lighter than fixtures.
Designing them with safety and energy efficiency in mind is essential. Proper grounding, circuit protection devices, and surge protection are essential.
To make relevant and accurate electrical drawings, consider using the interior layout as a bedrock, doing a walkthrough, planning for additional outlets, considering furniture placement, and using varied lighting.
By doing so, you can catch errors that may have been missed and place outlets and switches in the best locations. Additionally, consider the
client's preferences for lighting, such as task lighting, accent lighting, or ambient lighting, to ensure a well-lit space.

PLUMBING

The plumbing system of a building is responsible for circulating water for inhabitants' usage and removing residual wastewater outside the building premises for treatment.
A well-planned plumbing plan is crucial for any remodeling project involving significant plumbing work.
A plumbing plan illustrates the system that will bring water in and take waste back out, including
– Water supply lines
Drains
Vent pipes
Valves
Fixtures like toilets and sinks
Using official plumbing symbols and color codes, a plumbing plan helps save time and expenses, enables better thinking through the job, and minimizes extra trips to the plumbing supply store.
To create a plumbing plan, draw all fixtures to scale, mark drain lines and vents, make riser drawings, indicate pipe sizes and the exact type of every fitting, mark locations for valves, and specify the type of valve.
Inclusion of key coding, drain-waste-vent (DWV) elevation, supply drawing, and supply drawing is a must. The DWV elevation describes the system that will carry water, waste, and air out of the house, while the supply drawing indicates the estimated length of supply pipes and pipe size.
Refer to the plumbing plan when making your shopping list of materials to ensure the correct sizes and lengths are purchased.
The purpose of MEP plans
As our building requirements are getting complexier, the address to **MEP designs** are must! The office culture gives rise to buildings that facilitate business as well as a hefty workforce, just as the institutional and recreational buildings have a large footfall. The felicitation of basic services such as water, power, and ventilation now requires a mechanical approach, and MEP systems are a product of this. That is why MEP design is inevitable in today's time. MEP design initiates with MEP planning, and it is all about designers and engineers coming together to devise MEP plans.
An optimized MEP plan ensures MEP plans are crucial for building projects as they provide a comprehensive overview of the systems used to power, heat, cool, and ventilate a building.
They analyze the building's size, climate, and activities, ensuring efficient systems that don't waste energy.
A **well-detailed MEP plan leads to increased cost savings** by prioritizing energy efficiency and resource optimization.
They also act as a **guideline to maintain buildings in good condition** through proactive maintenance checks and inspections.

Quality assurance is ensured through guidelines and detailed drawings, ensuring that all components are installed correctly and that potential safety hazards are identified and mitigated.

Current trends with MEP designing and planning

The **future of MEPF design and construction is promising, with the continued adoption of building information modeling (BIM)** and the growing use of artificial intelligence (AI) in the industry.

Prefabrication, a process that involves off-site manufacturing of building components, is expected to become more common in the future. Renewable energy is becoming increasingly important in the construction industry, and designers and constructors will need to be familiar with the latest technologies to design and construct sustainable buildings.

The demand for energy-efficient, water-efficient, and environmentally friendly buildings is growing, and MEPF designers and constructors must design and construct energy-efficient, water-efficient, and environmentally friendly buildings.

The **latest trends in MEPF BIM include cloud-based BIM, augmented reality, virtual reality, 4D BIM, 5D BIM**, integrated data management, smart building technologies, and sustainability.

As technology continues to evolve, more innovative developments in MEPF design and planning services are expected.

Why Choose Tejjy for MEP Design Plans?

The route to choosing the right vendor could be challenging; it is almost equivalent to finding a needle in an ocean of sand. However, to make it simpler, there is a way out. Prioritize a vendor who prioritizes technology.

We can say this comfortably as we have more than 500 MEP projects and we outsource our projects to sub-vendors too. And when we say it, we mean it; technology is the differentiator. **At Tejjy, we follow the following**

Centralized MEP data management

We utilize a centralized digital platform for MEP plan storage, including drawings, documents, and maintenance records. Implement version control mechanisms for accurate information and stakeholder collaboration. Laser Scanning for Accurate MEP Plan Drafting

3D laser scanning captures detailed as-built conditions of structures for precise MEP plans, while point cloud integration in BIM software enhances the representation of existing conditions.

Concurrent Approach Considering Various Critical Parameters

We emphasize the importance of collaborative workflows and parametric design in MEP projects, promoting real-time adjustments and analysis based on changing requirements or conditions. BIM Dimensioning for MEP Planning

Our MEP plan outputs are routed through a thorough BIM dimension approach. The inevitable parameters like cost, time, assets, sustainability, and more must be followed to ensure optimal planning.

5.5 Hotel Cost Components

According to the cost survey done by HVS on Hotel development, the major parameters considered were Land cost, building and site improvement cost, FF&E, and Pre-opening and working capital to obtain the total cost of the project for each hotel category. A number of factors determine the budget for the construction of a hotel which varies from project to project. The breakup of the development cost of a hotel can be done into the following categories:

- Land Cost
- Construction costs
- Mechanical, electric and plumbing (MEP)
- Furniture, fixtures and equipment (FF&E)
- Soft cost
- Pre-opening cost and Working capital
- Interest during construction (IDC).

5.5.1 Land Cost

Cost of land acquisition which will be location specific. Therefore, this component is not included in the development cost of the project, and can be added separately.

5.5.2 Construction Cost

The building construction cost will include the civil works, hardscape/ external development works including landscaping work, façade work, interior finishing work, signage, etc.

5.5.3 Mechanical, electric and plumbing (MEP) Cost

These include all the works associated with building services such as electrical, plumbing, fire-fighting, HVAC, and Building automation system. It also includes the Specialized Equipment's that are specific to hotel projects such as lifts, kitchen equipment, laundry equipment, gym equipment, IT equipment, Audiovisual (AV) equipment, and security equipment, etc.

5.5.4 Furniture, Fixtures and equipment

Furniture, Fixtures and equipment (FF&E) includes all non-permanent, removable items at the hotel property, such as guestroom furnishings, kitchen equipment, and other items of decoration. It includes items such as lighting, carpet and artwork, furniture and case goods, beds, mattress, minibar, safes, etc. These items are allocated considerable amount of budget in the hotel estimate.

5.5.5 Soft Costs

The soft cost includes the items that are necessary for construction but generally are not a part of the construction contract which includes material and labour. It includes the consultant's fees, legal and approval fees, liasioning, etc. Professional and legal fees, Project management fees, consultant fees, regulatory fees, licenses, etc.

5.5.6 Pre-opening Cost and Working Capital

The pre-opening costs include expenses such as marketing, staffing, training, and administrative expenditures. Operating supplies and equipment include the small equipment that is needed for the hotel's operation, such as chinaware, linens, silverware, uniforms, engineering tools, etc. These also include items such as hairdryer, iron, hangers, towels, dishes and glassware. The working capital includes a working capital reserve to maintain adequate cash flow until the operation reaches a break-even point.

5.5.7 Interest during construction (IDC)

It is the interest that accumulates on a loan that finances the construction of a building or any development. The IDC is calculated until the project begins to generate revenue, when the company financing the project begins to service its debts.

5.6 Cost Modelling Techniques

Cost estimation models used to estimate the costs of a product or project. The results of the cost models are considered into business plans, budgets, and other financial planning and tracking process. Cost models have been found to be a useful tool, it can be used as a financial representation in the form of a spreadsheet, mathematical expression, chart, and/or diagram used to illustrate the total cost of families of systems, components, or parts within a total complex product, system, structure or facility (Egwunatum I. Samuel, 2015). The approximate costs are prepared based on unit costs of major cost components established by a survey of costs of similar cost components in completed projects. In this research, the focus is on developing a parametric model for preliminary cost estimation of hotel projects. Cost estimation is most unpredictable in construction projects during the early stages of project inception. Early cost planning and estimation response to construction projects cost volatility assure the great success of the project (Samuel & J. Snapp, 2015). The cost models can be used to determine the cost of proposed construction projects. These models can be applicable at either at the conceptual stage, feasibility stage, budget authorization stage, control stage or bidding/tendering stage. For preliminary estimation work of hotel projects, parametric estimation method, also called statistical modeling will be used for cost model framework formation by analyzing the historical data of similar projects. The comp-set strategy will be used to club projects with similar characteristics to obtain a similar range of values.

VI. RESEARCH METHODOLOGY

Total ten case studies of existing hotel projects have been collected and analysed in terms of areas and cost to develop the cost modelling and area programming framework. The process of analysing each of the case studies is mentioned in the methodology chart in Figure. 6.1.

The research methodology involved for analyzing the case study projects are as follows:

1. Selection of Case study projects as per the scope of work.
2. Area programming and analysis of selected case study projects to identify the major area components of the projects.
3. Segregation of areas based on FOH- Front of house, BOH- Back of house, MEP services, landscaping, and site services.
4. To identify the percentage distribution of areas in each project.
5. To identify and segregate the project cost details.
6. Analysis of project cost based on project areas.
7. Percentage distribution of cost categories.
8. To obtain cost per sq.m. of plinth area and cost per room
9. Area and cost summary of case study projects.
10. Determination of framework for the cost model.

7.1 Area Analysis and Summary

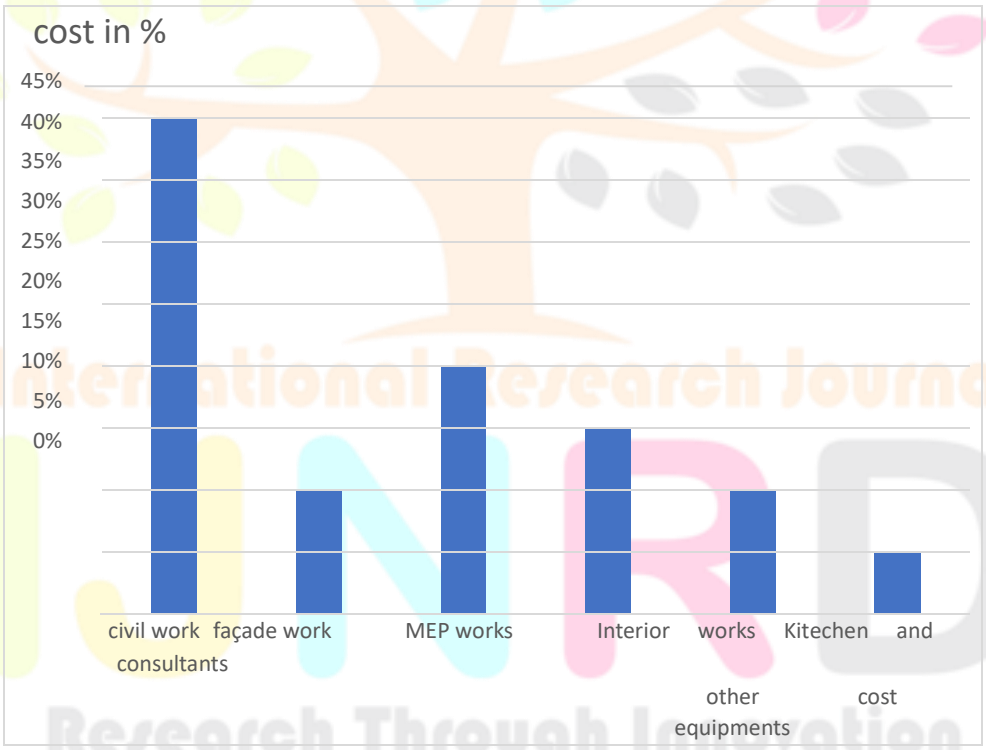
The case studies have been analyzed based on the methodology described above. Table 7.1.1 shows the percentage distribution of all the major spaces in a hotel in the case study projects. The Mean and range of each of these spaces distribution will be used in the area programming framework of hotels. According to this table, approx. 75% of the area is constituted by guest rooms and FOH public areas. Guestrooms constitute the maximum area allocation in any hotel project.

Table 7.1.1: Case Study Area Distribution Summary

S.No.	Hotel Spaces	Area Distribution
1	Guest rooms area	50.3%
2	FOH area	29.2%
3	BOH area	10.0%
4	MEP area	10.4%
	Total Area (GFA)	100.0%

The comparision of hotel space distribuition in the case studies mentioned above are as mentioned in the Figure.7.1.2. The mean values of each space distribution are obtained based on which the area programming of proposed hotel projects can be obtained.

is also included.



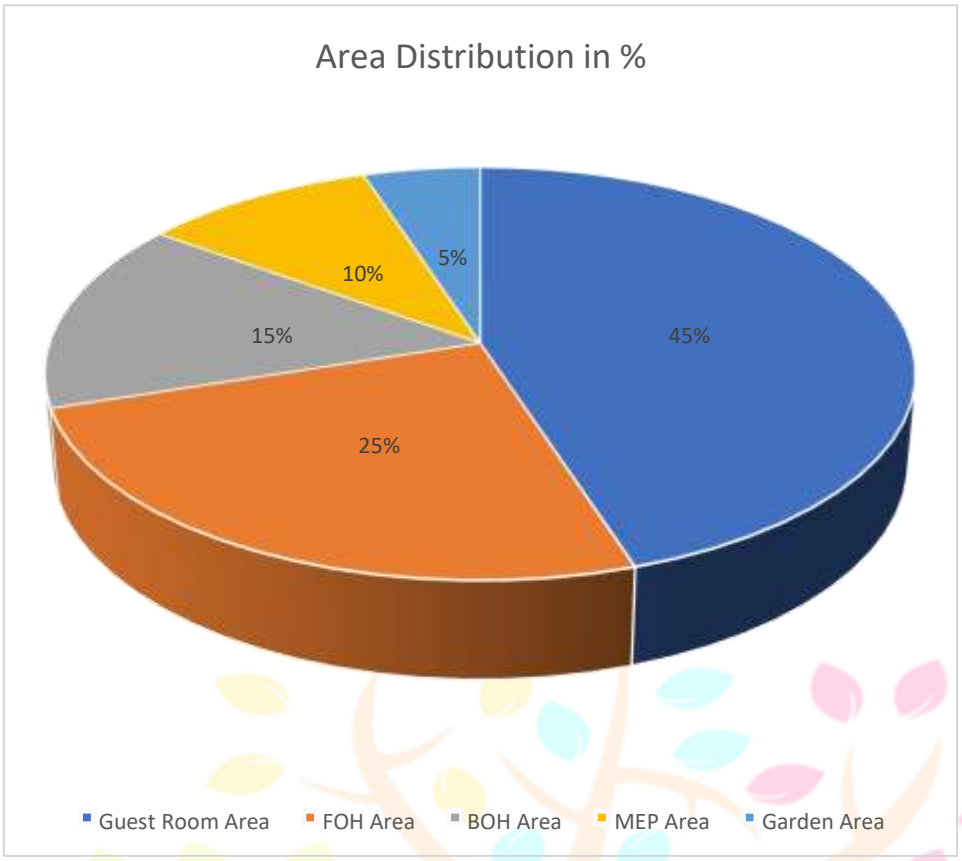


Figure 7.2.3: Percentage Distribution of Cost and Area components of Hotel Project

In Figure 7.2.4 the graph represents the cumulative data on cost per key and cost per sq.ft. of GFA based on the cost analysis of the case studies done above. By arranging the data in decreasing order of cost per key, a linear relationship can be observed between the Cost per Key and Cost per sq.ft. GFA for a specific no of keys in the case study projects.

Table 7.2.4. Range of Cost Components of Hotel Projects.

The cost categories identified are Land cost, building construction cost, soft cost, cost of furniture fixtures and equipment's and cost associated with operating supplies and equipment, pre-opening costs and working capital required to start the functioning of hotel projects. Table 7.2.4 shows the range of percentage distribution of various cost components in a mid-scale scale Hotel project.

VIII. Cost Model

For Hotel projects, Cost Model can be used for the following:

- Construction cost estimation of projects.
- To identify cost distribution among various functional components of a building.
- Financial feasibility analysis of a hotel project.
- Cost planning and optimisation of proposed hotel projects.
- To facilitate investment decisions by the investors/owners.

8.1 Cost Model Parameters

The framework for hotel case study data collection and evaluation has been established based on the data collected in terms of areas and cost of each component in the case study projects in the previous section. The cost model will be formulated as described in the Figure 8.1. For developing a cost model, there will be three types of parameters based on the values to be inserted or obtained. The parameters will be input, output and fixed parameters. The input values will be provided as per the requirement to obtain a certain output or result. The data obtained from the case studies will be used to formulate the cost model parameters.

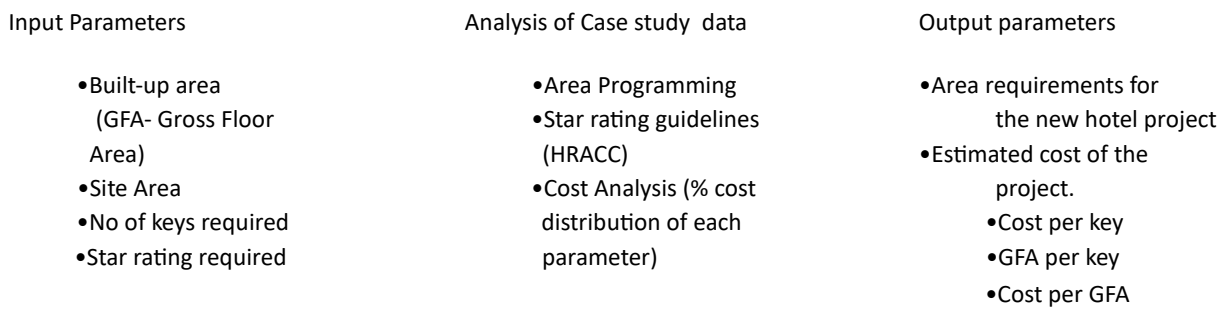


Figure 8.1: Framework for cost model formation

The cost model parameters are as follows:

8.1.1 Input Parameters

These parameters will be manually filled up in the cost model. The following are the input values required in the cost model:

- Plot area, type of hotel and required star rating.
- Byelaws: FAR, Ground coverage and building height based on the location of the hotel and plot area.
- Values for number of keys and average room sizes will be obtained from the built-up area and gross floor area calculation.
- No of keys and area per room can be adjusted between minimum and maximum values to obtain no of rooms required and design optimization.
- Values required from the given set of range, otherwise calculations will pick up the mean values which fixed data obtained from case studies. This applies for both areas and cost calculations.

8.1.2 Output Parameters

These are the values received in return after the input values are provided. These parameters are the output data obtained in the cost model. Input parameters for cost model and output will result in terms of GFA required to build a hotel with certain number of rooms and associated facilities and amenities. Output parameters can be:

- Area requirements and distribution in the proposed hotel project.
- Capacity calculation results.
- Cost distribution of the project.
- Total Cost of the project
- Cost per Key, Cost per GFA, etc.

8.1.3 Fixed Parameters

These contain the fixed values obtained from the working sheets of cost and area analysis of hotel case study projects. These are to be modified only if the values are required to be modified from the given range of values. Fixed parameters can be: Percentage distribution of each cost component.

- Percentage distribution of hotel spaces.
- Percentage distribution of types of hotel rooms & suites.
- Values and units of cost dependent variables.

Since the requirements of hotel byelaws vary as per the location of the project, it is necessary to follow the byelaws to obtain the values of floor area ratio, ground coverage, building height and parking requirements. Further calculation for the project cost and area are to be done as per the permissible areas and building height.

Note: To understand the cost model calculations with input and output values, it is explained by taking an example of a proposed hotel project with 2500 sq.m. plot area located in Gurgaon to be developed for a 3 star rating.

8.2 Calculations for No of Keys (rooms)

Values for number of keys and average room sizes will be obtained from the built-up area and gross floor area calculation. The no of keys and area per room can be adjusted between minimum and maximum values to obtain the total no of rooms required with average guestroom size for design optimization. The Minimum values for the proposed star rated project must be checked from HRACC guidelines.

8.3 Project Cost Framework

The total cost of the project can be obtained from the calculations given below in Table.8.3.1. Project Cost breakup as per percentage division of each cost component obtained in the previous chapter is used here for calculation and are mentioned in the Table 8.3.2. Alternate cost working of the project cost is obtained in Table 8.3.3 based on the range of values obtained from the cost dependent variables in each of the case studies.

Table 8.3.1: Project Cost Summary

S. No.	Cost Details	Value	Unit
1	Total Project Cost	**58,01,31,877.61**	INR
		58.01	Cr
		Project Cost	
2	Cost per GFA	86,546.26	INR/sq.m.
		8,043.33	INR/sq.ft.
3	Cost per Key	55,10,001.00	INR/Key
		55 Lakhs	INR/Key
4	GFA per Key	65.88	sq.m./key
		708.89	sq.ft./key

Table 8.3.2: Project Cost Breakup

S.No.	Project Cost Breakup Cost Breakup	% cost %	Min value %	Max value %	Value Considered %	Total Cost INR	Total Cost In Cr
1	Building Construction Cost	74.82%			74.82%	43,40,70,247.67	43.41
1a	Civil Work	31.46%	29.1%	33.9%	31.46%	18,24,97,274.79	18.25
1b	Façade work	2.61%	3.2%	4.9%	2.61%	1,51,54,603.66	1.52
1c	Services - MEP work	21.35%	20.6%	18.0%	21.35%	12,38,84,590.81	12.39
1d	Interior Works	14.82%	16.4%	12.2%	14.82%	8,59,95,526.34	8.60
1e	Specialized Equipment's	7.79%	9.9%	8.7%	7.79%	4,51,85,110.36	4.52
2	FF&E	7.31%	7.6%	6.8%	7.31%	4,24,06,826.62	4.24
3	OS&E	4.36%	3.2%	4.7%	4.36%	2,52,77,335.40	2.53
4	Consultants - Soft Cost	10.30%	9.9%	10.7%	10.30%	5,97,30,609.63	5.97
5	IDC	6.86%			6.86%	3,97,81,620.69	3.98
6	Pre-opening cost	2.86%			2.86%	1,66,02,199.77	1.66
	Total Cost of Project	**100.00%**	100.0%	100.0%	100.00%	**58,01,31,877.61**	**58.01**

By considering the calculations based on individual cost components as shown in Table 8.3.3, the cost of each cost component can be obtained by cost dependent variables and its value from a defined range of values for cost optimisation. These values have been obtained from the case study analysis data. In this alternate costing method, the total cost of the project turns out to be 55.5 crores, whereas the cost calculation based on parametric estimate of the cost per key is calculated to be 58 crores. Therefore, the cost of a project can be optimized as per the requirement.

Table 8.3.3: Cost Breakup: Alternate Cost Working for each component

	Cost Breakup: Alternate Cost working for each component						
S. No.	**Cost Heads**	**Cost Dependent Variable**		**Cost (INR)**	**Range of values (INR)**		**Total Cost (INR)**
		Type	**Value**	**Per Variable type**	Minimum	Maximum	
1	**Building Construction Cost**	Unit: sq.m./ Nos / %					
1a	**Civil Cost**	Per GFA area	6250	27,318.22	19,337.95	40,618.67	17,07,38,873.86
	Structural Work	Per GFA area	6250	21,920.67	16,770.77	30,503.84	13,70,04,185.02
	External Development work	Per external area	1750	5,046.79	4,329.10	7,316.13	88,31,890.13
1b	**Façade Work**	Per Façade area	3698	6,117.41	3,595.74	9,921.36	2,26,23,534.77
1c	**Services - MEP work**	Per GFA area	6250	16,638.75	13,683.24	21,564.60	10,39,92,199.43
	Electrical	Per GFA area	6250	6,738.52	5,188.12	10,032.13	4,21,15,732.72
	Plumbing	Per GFA area	6250	2,334.31	2,334.31	2,334.31	1,45,89,448.14
	Fire Fighting	Per GFA area	6250	1,704.27	1,233.84	2,057.09	1,06,51,704.94
	HVAC	Per GFA area	6250	4,269.14	3,055.66	4,745.48	2,66,82,113.80
1d	**Interior Works**	Per GFA area	6250	12,716.19	10,855.06	14,577.31	7,94,76,157.86
	Guest Room Interior	Per Guestroom area	2948.04	14,479.84	12,975.16	15,081.72	4,26,87,125.57
	FOH- Public area Interior	Per Public area	1747.08	16,225.66	10,603.25	22,366.19	2,83,47,564.56
	BOH Interior	Per BOH area	920.80		6,701.54	15,791.36	93,09,526.57
	Signages	Per GFA area	6250	241.31	196.23	263.85	15,08,180.94
1e	**Specialized Equipment's**	Per Key	105	4,46,428.60	3,89,805.82	6,16,224.88	4,70,03,160.87
	Lifts	Per Lift	3	24,07,066.26	16,57,496.75	31,56,635.76	76,02,988.83
	Kitchen	Per Key	105	1,44,557.97	2,01,495.41	1,01,854.89	1,52,20,085.42
	Laundry	Per Key	105	6,502.96	5,437.91	7,944.56	6,84,678.02
	Gym	Per Key	105	16,700.38	10,073.59	33,267.35	17,58,333.77
	IT Equipment	Per Key	105	1,32,507.75	1,17,852.85	1,43,498.93	1,39,51,353.13
	AV Equipment	Per Key	105	30,244.16	20,336.04	43,454.98	31,84,318.85
	Security Equipment	Per Key	105	51,263.77	23,162.14	1,07,467.01	53,97,411.85
2	**FF&E**	Per GFA area	6250	6,908.36	5,071.65	8,137.20	4,31,77,240.01
3	**OS&E**	Per Key	105	2,32,454.30	1,27,542.04	3,37,366.56	2,44,74,432.83
4	**Consultant's - Soft Cost**	On project development cost	11%	58,01,31,877.61			6,34,65,176.85

8.4 Project Area Framework

The area requirements of various spaces of the hotel project can be obtained from the Table 8.4.1. The capacity calculations for various spaces such as guest rooms, Banquet hall, meeting rooms, dining, restaurant, manning, no of lifts, etc. are required to be done separately.

Table 8.4.1: Project Area Details: Summary

S.No	Guest Room Details Type of room	Description	Distribution of rooms	Room count (Nos)	Room areas Range (sqm)	Area per room (sqm)	Total Area (sqm)
	STANDARD ROOMS	**95.0%**	90 to 95%	100			
1	Type 01 Standard Rooms	Standard King	56.5%	57	23 - 28	26	1469.33
2	Type 02 Standard Double	Twin Room	26.0%	26	24 - 28	26	676.15
3	Type 02 Standard Accessible	Disabled room	1.5%	2	28 - 34	28	42.01
4	Type 03 Deluxe Rooms	Premium rooms	16.0%	16	30 - 35	32	512.12
	Total		100.0%				
	SUITES	**5.0%**	5 to 10%	5			
5	Type 05 Junior Suite	Standard	70%	4	42-55	42	154.77
6	Type 05 Master Suite	Executive	30%	2	56-75	56	88.44
			Total rooms	**105**	**Average Room Size**	**28.0**	**2942.83**
	Note: Only the type of rooms required to be filled.				The average room size has to match the initial calculation done in Table 8.2.1for no of rooms in the beginning.		
	Total Area	**2942.83**	Sq.m.				
	No of Rooms	**105**	Nos				

	Project Area Details - Area Summary Area Breakup	% Mean area	Range	Selected value	Area Required (sq.m.)	Area Required (sq.ft.)
	GFA (without parking)	100.00%			**6250**	67250.00
1	Guest Rooms Area	47.17%	36% - 55%	47.17%	2948.04	31720.89
2	Public – FoH Areas	27.95%	20% - 35%	27.95%	1747.08	18798.61
3	BoH Area	14.73%	11% - 20%	14.73%	920.80	9907.84
4	MEP Area	10.15%	6.5% - 12%	10.15%	634.08	6822.66

The calculation for total no of guestrooms can be obtained from Table 8.4.2 where different types of rooms with required areas can be calculated. A standard hotel contains different types of rooms and suits as required. Similarly, calculations for restaurant, dining, banquet and meeting halls, etc. can also be calculated. The distribution of hotel rooms and area calculations can be obtained as follows:

Table 8.4.2: Guest Rooms Area Calculations

Public Areas - FOH Area Details		
Space description	**% distribution**	**Area (sq.m.)**
Entry Lobby/ Reception	6.8%	118.62

BOH Area Details		
Space description	**% distribution**	**Area (sq.m.)**
Admin and Support	16.9%	155.21

Washrooms	3.1%	54.44	Front Office	2.7%	25.04
Guest Lift and Lobby	5.5%	95.34	Kitchen Areas	22.1%	203.50
Guest Corridor	23.9%	417.86	Laundry & Linen Areas	5.8%	53.19
Staircase	14.6%	254.70	Staff Cafeteria	3.2%	29.47
All day dining and bar lounge	12.3%	214.49	General Store	5.3%	49.21
Speciality Restaurant	6.8%	119.37	Lockers Area	7.7%	71.07
Spa	2.2%	38.89	Liquor & Banquet Store	2.6%	24.40
Gym	2.6%	45.27	Garbage handling	2.1%	18.92
Pre-function area	4.8%	83.24	Room Service	4.3%	39.54
Banquet Hall + meeting room	17.5%	305.74	Service Lift and Lobby	8.3%	76.84
Executive lounge	Extra		Corridor/ Circulation	16.5%	151.93
Swimming pool+ deck	Extra		Receiving dock	2.5%	22.85
TOTAL FOH AREA	**100.0%**	**1747.08**	**TOTAL BOH AREA**	**100.0%**	**920.80**

The summary of area calculation of each space associated with FOH, BOH and MEP areas can be obtained from the Table 8.4.3.

Table 8.4.3: Area Distribution of FOH, BOH and MEP areas.

MEP Area Details		
Space description	**% distribution**	**Area (sq.m.)**
Plumbing Plant room and water tanks	38.5%	244.36
Maintenance Rooms	4.9%	31.30
STP and WTP	18.2%	115.31
HVAC Plant room, Fan room	17.2%	109.06
LT Panel and Electrical room	14.7%	92.99
UPS Room	2.1%	13.34
CCTV and IT Room	1.9%	12.01
Service rooms	2.5%	15.66
DG and Sub-station area	Extra	
TOTAL MEP AREA	100.0%	634.08

The main difference between 3 star and 4 star hotels is that 3 star hotels typically don't have suites whereas 4 star hotels have both rooms and suites as per HRACC guidelines. 4 star hotels will have more room options than 3 star hotels since they also offer suites. 4 star hotels offer more luxury than 3 star hotels and offer high-quality service and comfort. They also provide fine dining, bars, swimming pool, lounge, spa, gym, fitness center, concierge services, extensive business facilities, multiple restaurants and valet parking. Another difference is in the Manning requirements of hotels. Manning is the total staff in a hotel including General Manager. Manning in 3-star hotels is 0.5 to 0.8 people per key and in 4-star it will be 1 to 1.2 per key. This has impact on BOH and staff area planning of hotel projects, which in turn will increase the cost per key of hotels.

Various parameters associated with formulating cost model were divided into input and output parameters. These parameters would give the required data specific to a proposed hotel project with detailed calculations of each capacity, associated cost and areas. The individual calculations for obtaining cost and areas can be optimized as required by alternating the values of each component by manually inserting the data.

IX. Discussion and Conclusion

In this research work, the cost model is generated for 3 star and 4 star rated hotel projects which can be useful for preliminary estimation of the project. This model is formulated to be used for reference to have an idea about hotel spaces distribution and cost distribution of various cost components. According to a survey report published by HVS, providing the overall development cost estimate for a positioning highlights the need for an investor to be cognizant of the many variables that may influence it. Development costs can also be evaluated based on various facilities provided, built-up area, interest during construction for project loans, etc. As per the observed results regarding construction cost of surveyed hotel projects, the development costs must not be evaluated on a per square foot basis only, but rather analyzed alongside the facilities mix of the hotel (HVS, 2016). Hotel development is complex in nature and solid expertise is needed, especially in the early stages of planning and development, the lack of which can result in cost over-runs and ultimately poor financial returns for the project. Several project post-mortem discussions highlight that complex and long projects, such as hotel development, require a sound understanding of the end product. It is, therefore, time that developers take notice of the benefits of cohesive project planning and designing to limit the number of unfeasible projects that have already been floating in the market (Achin & Sanaya, 2017).

The investor can make an optimal decision by applying the proposed framework as per available data, which will facilitate the decisionmaking process focused on the selection of an appropriate hotel construction project to invest in and reduce the risk of making a bad decision. The issue of the selection of any hotel construction project to invest in is paramount since the decisions regarding the investment will lead to the return of the invested financial resources, as well as to a future business operation success. Since each project is unique, exact value of total cost of a project cannot be obtained pertaining to various factors and the project's specific requirements. However, these calculations can assist people for preliminary estimation of hotels and can be a checkpoint while developing the projectspecific requirements.

References

[1] Achin, K., & Sanaya, J. (2017). *Hotels in India – Trends and Opportunities.* New Delhi: HVS.

[2] Chadha, V. (2016). Insights into the Potential and Growth of the Indian Hospitality Industry and India level challenges. *CEOWORLD magazine*.

[3] Consultancy.in. (2017, October 30). *Indian hotel industry sees economic fundamentals improve*. Retrieved from Consultancy.in: https://www.consultancy.in/news/238/indian-hotel-industry-sees-economic-fundamentals-improve

[4] Darshini, K. (2019). *Indian Hotel Industry – Review & Prospects.* CARE Ratings, Professional Risk Opinion.

[5] Egwunatum I. Samuel, O. J. (2015). Cost Model for Unit Rate Pricing of Concrete in Construction Projects. *International Journal of Construction Engineering and Management*, 149-158.

[6] Equitymaster. (2019). *Indian Hotels Industry Report, Hotels Sector Research & Analysis in India.* Mumbai: Equitymaster.

[7] Gaurav, K. (2014). Challenges faced by the Hotel Industry: a review of Indian Scenario. *IOSR Journal of Business and Management (IOSR-JBM), Volume 16,*(Issue 9.Ver. I), 69-73.

[8] Gupta, Y. (2011). *Feasibility Study of Hotel Projects from Developer's perspective.* New Delhi: BEM Thesis.

[9] HVS. (2016). *With 2016 Hotel Development Cost Survey, HVS tackles project viability in India.* New Delhi: Newsroom.

[10] Khanna, A., & Tyagi, G. (2019). *2019 Indian Hospitality TRENDS & OPPORTUNITIES.* Delhi: Hotelivate.