



Maximizing Profit Potential: Assessing Commercial Viability of Lease Spaces through Dynamo and BIM Framework

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Abstract. In recent times, vertical construction in Pakistan is increasing rapidly, and the assessment of the commercial viability of buildings and malls has become vital for developers. This allows them to mold their projects in a fashion that maximizes profit potential. For this purpose, a framework using the visual programming language Dynamo and Building Information Modelling (BIM) has been developed. The Dynamo code enables real estate developers and private business owners to assess and gauge the commercial viability of lease spaces within a building, such as evaluating a shop space based on given parameters. In a computational example, an outlet located in a commercial building is ranked according to various factors identified through a market survey conducted among professionals in Pakistan's retail and hospitality industries. For the scope of this project, various factors have been identified as contributing most to the enhancement of a property's commercial viability and ease of leasing. This pioneering tool is the first of its kind and, due to its unique nature, will provide retail industry owners with insights into the project's valuation, its investment viability, and necessary design adjustments required for optimal success.

Keywords: Building Information Modelling, Leasing, Automation.

1 Introduction

Over the past decade, it has been observed that multiple high-rise buildings are being constructed in the region around Islamabad Expressway, DHA Phase 2 and Bahria Town Phase-6 to Phase-8 [1]. The said buildings are being constructed for different uses ranging from retail outlet & malls, shared working space plazas, to high end and low-end apartments [2]. The design of said structures is unique in its own manner with

elements of historic architecture like domes and arches along with a touch of modern architecture in the form of glass façade and usage of ACP cladding (Aluminum Composite Panels), yet little attention has been paid to assessing commercial viability of project prior to and during the construction phase [3]. Because of the said negligence, most of the projects that have been constructed have failed before coming into operational phase causing massive economic losses for the developers, the people who have invested in such projects, whilst at the same time damaging environment and occupation of valuable property that could have been used in a more effective manner to generate required revenue to sustain and grow and contribute positively to the city's economy

Realizing the importance of assessing the commercial viability of project during the design phase and considering the need of the hour for the architects and designer to take into consideration the aspect of commercial viability early in design phase, a BIM based dynamo framework has been developed that will serve the retail industry owners, architects, designers and engineers, and will give them an insight into the project's worth and its financial feasibility in terms of the possible return on investment [4-5]. The said dynamo framework will be capable of allocating spaces for brands & categorize the different retail spaces into 4 different levels with respect to their commercial viability.

The use of dynamo for this purpose has been adopted due to the wide range of flexibility that dynamo offers its users and the level of analysis that can be achieved to ensure that the work can be streamlined to be automated over a larger number of projects and can be customized to achieve specificity for each project. The use of dynamo and visual programming in the construction industry has been increased, for instance, it is utilized in ascertaining the life cycle costs and impacts of buildings, and to enhance the level of planning that takes place in construction. Furthermore, in retail market, the utilization of technology, is ever-increasing [6-8].

1.1 Objectives

Therefore, this research encompasses the following objectives:

- To develop a dynamo script that will allow Real Estate Developers, Architects, and Engineers to gauge the Commercial Viability of a Business Center or a Mall
- The Script will analyze the lease spaces available within the mall and will employ a rule-based approach to categorize the spaces within the mall.
- It will then estimate the worth of the said lease space based upon the Market rates and the demand of the Lease Space by Retail owners.

Before moving on to the dynamo script, a detailed market survey was carried out to determine the top factors that have significant impact on a retail space commercial viability. These include Outlet's size, Outlet's height, Outlet's front, Outlet's depth, Outlet's net usable area, Outlet's floor, mall location from the central business district, expected footfall at the mall, number of anchor stores within the mall & the presence of a grocery store. Using these factors and assigning them weightages based upon market surveys, dynamo script has been prepared that will categorize the different retail spaces into 4 different levels with respect to their commercial viability.

2 METHODOLOGY

The methodology involves identification of key parameters to determine the commercial viability of leasing spaces, conducting market survey, and preparation of dynamo framework to achieve the aforementioned objectives of this research. The methodology is illustrated by Fig. 03.

As discussed, prior to the preparation of the dynamo framework, factors that affect the leasing potential of a retail store were to be determined. For this very purpose, a detailed market survey was carried out using selective sampling approach. From the selective sampling approach, responses of 30 individuals were shortlisted who directly oversee the expansion of various outlets as well as heads of Retail and Leasing Departments in Malls responsible for renting out the available spaces inside the mall. These included expansion heads of famous clothing stores including Khadi, Sapphire, Bonanza Satrangi & Ethnic, expansion heads of grocery stores including Hypermarket & Imtiaz Stores, expansion heads of food outlets including KFC Islamabad and OPTP as well as leasing managers of Islamabad based developers including Imarat Group & Zameen [9]. The participants of the survey were asked to identify the top factors that contribute most to the enhancement of a store's commercial viability and the ease with which the store can be leased out in a retail outlet mall. Also, the participants were asked to assign weightages to the factors they pointed out, out of a total score of 100. Also, apart from carrying out a detailed and interactive questionnaire survey with the target audience, interviews were also carried out with the leasing managers of the developers' companies to understand the designing and leasing process and the need of integration between them for improved commercial viability of project.

Once the factors were identified and respective weightages were determined by taking into consideration the inputs of participants and applying the three-point formulae for best weightage, a dynamo framework was prepared.

The development of framework involves extraction of all the necessary inputs from the floor plans that are linked to Revit model and then couples them together with the user generated inputs to determine a ranking scheme which is then used to assess the commercial viability of the project.



Fig. 1. Exporting of factors to excel using Dynamo

As the parts from the dynamo script are shown in Fig. 1 and Fig. 2, it can be observed that various packages have been deployed to ensure that each outlet's ranking is done as per the factors identified through the robust market survey.

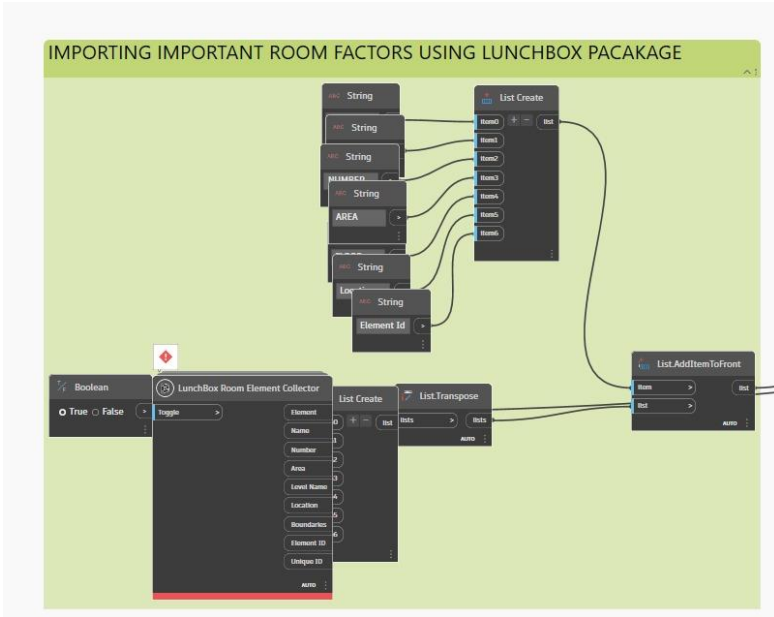


Fig. 2. *Dynamo Visual Programming*

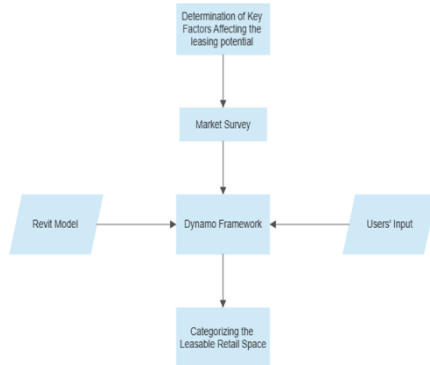


Fig. 3. *Methodology of Developing Dynamo Framework*

The importance of said factors is elaborated through the following points.

2.1 Factors

- **Outlet Size:** Refers to the area of the leasable retail space; has a strong bearing on the leasing potential since stores like Khaadi require huge spaces.
- **Outlet Height:** As the height of store increases, the leasing potential also increases since many brands prefer double height stores for decoration purposes, ambiance purposes as well as storage purpose.
- **Outlet Front:** Refers to the length of the wall having front entrance to the store; has a strong bearing on the leasing potential since stores like grand entrance.
- **Outlet Depth:** Refers to the length of store from front side to back side.
- **Outlet Net Usable Area:** 60 to 70% of total area of store; area required for storage etc. is removed from the total area to determine net usable area.
- **Outlet Floor Number:** Leasable retail space on ground floor have higher commercial value, the said value drops as the floor number rises but after 6 to 7 floors, the commercial value rises again.

2.2 Users' input

Apart from the said factors, the dynamo framework asks for user input on following key factors:

- **Mall Location from CBD:** As the distance increases, commercial value of leasable retail space decreases.
- **Expected Footfall:** Refers to the average expected number of people that would visit the mall in a single day.
- **Number of Anchor Stores:** Anchor Stores are defined as the stores occupying a considerable area in comparison to the Mall's size and having a massive brand value.
- **Number of Grocery stores:** has a strong bearing on the leasing potential most of the footfall is caused to presence of grocery stores.

2.3 Criteria

After all the above-mentioned factors have been determined in the dynamo framework, respective weightages are multiplied with factors and aggregate score is determined by adding all the values. Based on the final score, categories are decided for each leasable retail space in the mall. If the final score is more than 80%, the leasable retail space will be assigned Tier 01. Leasable retail space with a score of more than 70% but less than 79% will be assigned Tier 02, while leasable retail space with a score of more than 55% but less than 70% will be assigned Tier 03. For a score of less than 55%, Tier 04 will be assigned to the leasable retail space.

Once all the categories have been identified and marked on the Revit Model, the owner/ client will be able to accurately determine the commercial value of the project. Also, the said Revit Model will act as a proposed leasing plan, whilst at the same time giving brands the chance to evaluate their category and select the best possible location for their store within the available mall area.

3 COMPUTATIONAL EXAMPLE

For the said dynamo framework, Revit Architectural Model was utilized for an ongoing construction project on Islamabad Expressway by the name of Mall of Imarat (MOI). The Mall offers premier dining and entertainment options and haute-couture fashion and retail choices, along with the majestic Four Points by Sheraton Hotel, a world-class hotel brand.

Through the execution of dynamo framework, a proposed leasing plan has been prepared.

Following are the steps taken to apply the developed framework:

- **Step 01:** Room Tagging of Leasable Spaces in Revit Model as shown in Fig. 04.
- **Step 02:** Running the Dynamo Script and Input the User Values to Compile Results
- **Step 03- Extraction of Results:** The dynamo script exports the results for all tagged spaces as follow into an excel file where the Tier Rating is the final desired outcome as shown in table 1.

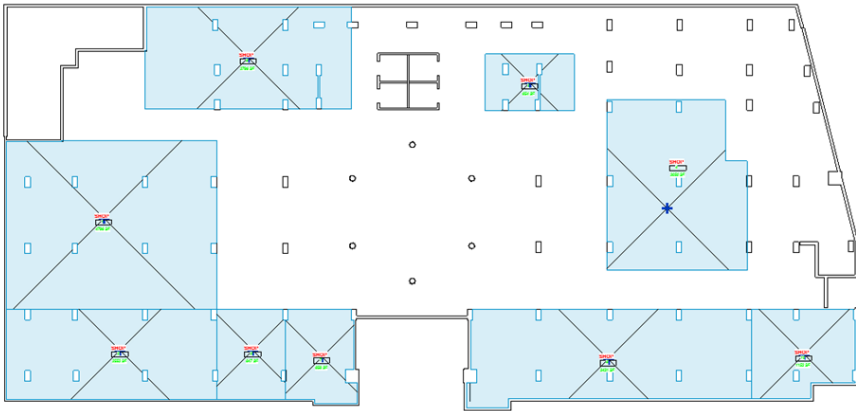


Fig. 4. Room Tagging in Revit

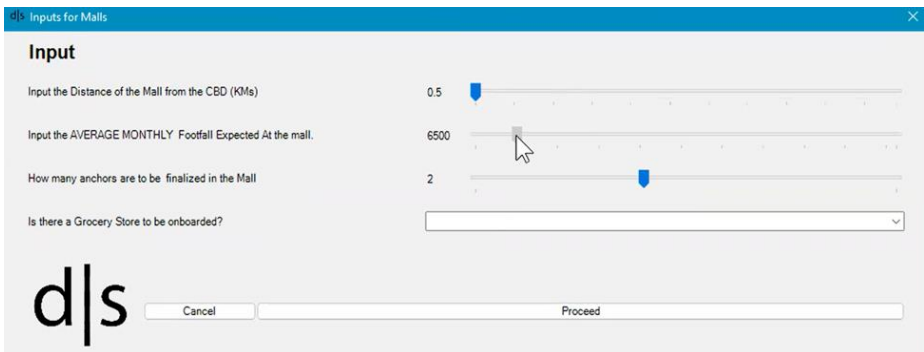


Fig. 5. Required User Input

Fig. 05 is part of the dynamo framework that requests the user to identify factors particular to their retail space. The factors include the distance of the mall to the Central Business district, the average monthly footfall that is expected at the retail center, the number of anchors stores planned and whether a grocery store has been planned at the retail center. These factors are then used to assess the commercial viability of the outlet.

Table 1. Outcome of framework for one shop

Tier 2 Rating
Element; Room
NAME; SHOP
NUMBER; 1
AREA; 4795.833 sft.
FLOOR; Level 1
Location; Point (X = 1357.878, Y = 627.771, Z = 0.000)
Element Id; 367808
Width; 77.858 ft
Depth; 62.506 ft
Height; 19 ft
Distance of the Mall from the CBD (KMs); 0.5
Average Monthly Footfall Expected At the mall; 6500.
Anchors to be finalized in the mall; 2
Grocery Stores; Yes
Area Score; 5
Floor Score; 17
Width Score; 11
Depth Score; 5.5
Height Score; 11
Net Usable Area; 3596.875 sft
Net Usable area ranking; 6
Footfall Ranking; 4
Mall Ranking; 9
Anchor stores Ranking; 3.5
Grocery Rank; 5
Total Score; 77
Tier Rating; Tier 2

4 Results And Discussions

The dynamo framework successfully categorized all of the mall leasable spaces into four tiers based on their commercial viability. The example for one shop is depicted by

Table 01. Secondly, as per the market survey Fig. 06 illustrates the identified factors that contribute most to the enhancement of a store's commercial viability and the ease with which the store can be leased out in a retail outlet mall. Also, their respective weightages have been mentioned which have been determined by taking into consideration the inputs of participants and applying the three-point formulae for best weightages.

The biggest practical advantage of this study is that it enables project developers to ensure that their property is up to the standard of major retail companies and thus it will be a positive indicator for the overall commercial viability of the project. Additionally, this tool will allow the retail owners to effortlessly assess each property to determine the best ones for expansion of their brand.

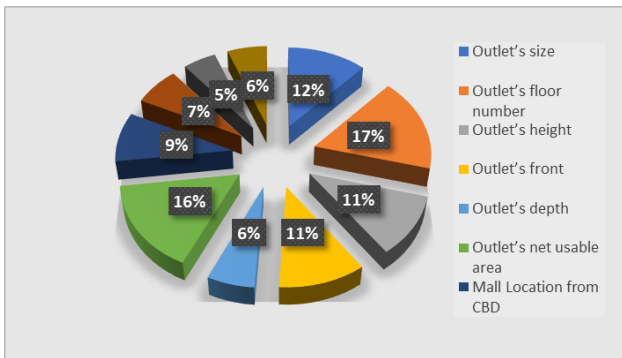


Fig. 6. Factors Contributing to Commercial Viability of a Space along with Weightage

5 CONCLUSION AND FUTURE RECOMMENDATIONS

In conclusion, the development of a framework utilizing Dynamo and BIM has addressed the critical need for assessing the commercial viability of vertical construction projects in Pakistan. By enabling real estate developers and business owners to evaluate lease spaces within buildings, this tool offers valuable insights into maximizing profit potential and optimizing project designs. Through the integration of factors identified in market surveys, it provides a comprehensive understanding of a property's commercial viability and ease of leasing. This pioneering approach represents a significant advancement in the industry, offering actionable insights to retail industry owners and facilitating informed decision-making for successful project outcomes.

Typically, the design of Buildings and Shopping Spaces in Pakistan is done as per the architect's vision with little or no regards for Commercial aspect of a building. This automation tool will allow the architects to gauge their designs and develop the most profitable buildings and commercial spaces. Furthermore, there are a huge number of buildings being constructed in Islamabad and Rawalpindi region alone. The developed

framework could allow the developers to gauge the commercial success of the building and then remodel it as per their requirements.

In future, the Dynamo code can be modified further to highlight the spaces based on their categorization into tiers within the Revit File and generate the outcome as Floor Plans

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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