

AN APPROACH TO MEASURE VALUE FOR COMMERCIAL CENTERS CASE STUDY OF ALMAZA CITY CENTER MALL

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Research summary:

Value engineering applications in the field of construction, including commercial center projects, are among the latest modern management techniques to solve economic problems, and it is the direction that the architect should take. Hence, the importance of developing an evaluation approach that systematically reaches the total value measurement based on finding the shortcomings to achieve the planned goals successfully for all phases of the project life. Value engineering, which is what this research study aims at¹. The research has reached a method to measure the value of the commercial centres by taking in consideration the different design criteria and divided into three parts: the performance of the building and its functional and complementary elements, the assessment of human needs and finally the analysis of the economic performance of the building and then analyzing the results using statistical analysis programs and equations to obtain the total value of the building to achieve the goals Planned for the success of all phases of the life of the project in a way that works on the success of the centre in carrying out its mission and attracting a larger number of visitors, which would improve the local communities².

Key Words: Construction economics, value engineering, commercial centers.

1. Detailed elements and stages of the proposed curriculum.

The curriculum aims to apply the inputs of value engineering in a practical way in the design projects of malls to provide the available and different alternatives to the elements in order to raise the value of these malls.

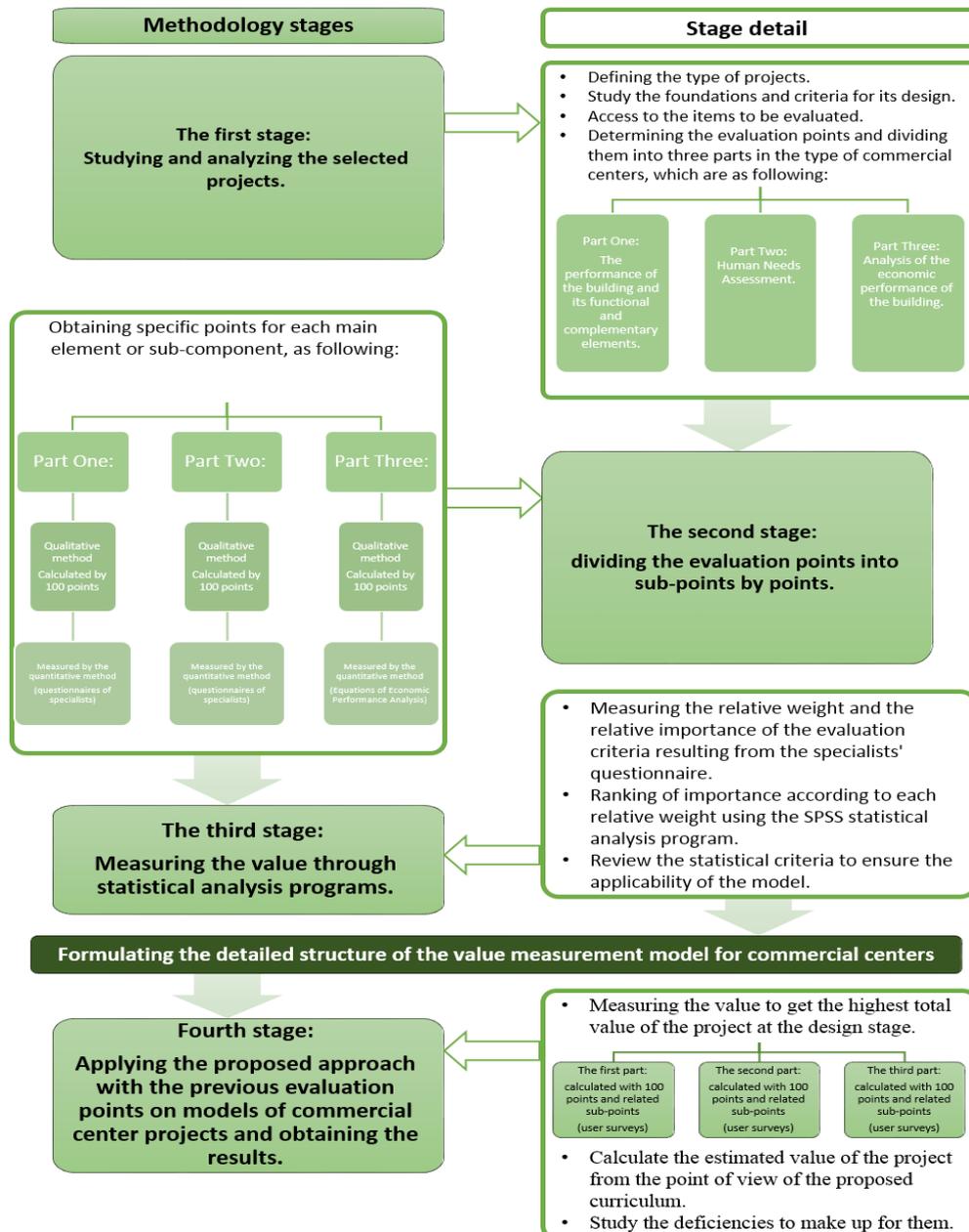


Figure1: The detailed framework of the proposed methodology - Source: the researcher

The evaluation points were formed by giving equal points to each component of the value engineering, which are:

Part 1: the performance of the building and its functional and complementary elements (100 points).

Part 2: Human Needs Assessment (100points).

Part 3: Analysis of the economic performance (100points).

This brings the total to 300points.

Based on the results of a sample size for specialists (which amounted to about 50samples) in the first and second parts, the results of the questionnaire were analyzed by unloading and tabulating all the questionnaires for the sample, then the data was entered into the computer using the SPSS program, which is one of the most widely used programs for analyzing statistical information in sociology. Today, it is widely used by researchers in the fields of marketing, finance, government, and education. It is also used to analyze questionnaires, manage information, and document information.¹

The statistical operations were carried out in three stages:

The first stage: the descriptive stage, which includes (measuring the arithmetic mean - measuring the standard deviation).

The second stage: the inferential or deductive stage, and it includes the use of the ordering method for the questions in order to arrange the elements according to their importance by the research sample, as well as the statistical analysis to examine the correlational relationships with the aim of deducing the relationship between the variables and their direction and the strength of the relationship between them

The third stage: the stage of statistical analysis of the questionnaire data, which included the analysis of items, in which the length of the statistical category of the item was calculated and the mean and deviation σ and the possible error in the mean of the samples were calculated using the two equations:

Statistical class length (in) = [(maximum value - minimum value)/1+3.2 le (n)]

Where n represents the number of samples to be analyzed in the questionnaire and from the statistical analysis it was possible to find the frequency distribution of the samples and calculate the mean for them and their standard deviations (σ), which was used to find the possible error in the sample in the error calculation law, where: Error = $(t/\sqrt{n}) * \sigma$

Where t is a statistical indicator that depends on the confidence limit and takes the following values: 1.3for a confidence level = %90, 2for a confidence level - %95and 3for a confidence level = %99. A value of t = 2corresponding to a confidence level of %95and the calculated value of the error has been taken It expresses the accuracy of the questionnaires.

n = number of samples (sum of frequency) and σ = standard deviation.

As for the third part, it was calculated using the building's economic performance equations.

Applied field study of the chosen model: Almaza City Center Mall - Almaza – Cairo:



**Figure 2 :City Center Almaza Mall - Source:
www.citycentrealmaza.com/ar 2022**

Designed by: Callison RTKL, a global architecture, design and technology consultancy.

Execution: Consolidated Contractors Company (CCC) and Hassan Allam Construction Company.

Opening date: 2019

Area: 103.455thousand square meters.

Project components:

The “City Center Almaza” center includes more than 260 stores, and about %10 of its space has been allocated for entertainment, in addition to containing the first “Vox Cinemas” in East Cairo (16 screens), and visitors to the mall can enjoy visiting the “Magic planet” indoor games hall. Planet, Gravity Code, an indoor trampoline park, as well as City Center Almaza’s wide choices of food and beverages distributed within the center’s outdoor and indoor spaces and in the uniquely designed food court.¹

The centre also includes a “Carrefour Hypermarket”, which for the first time in Egypt offers a unique experience for visitors by providing the latest amenities and exclusive services including free Wi-Fi, valet parking, a waiting hall and more than 4,000 parking spaces.

Environmental Rating: The mall has been awarded the LEED “Leadership in Energy-Conserving and Environmentally Friendly Design” certification from the Gold category in the Building Design and Construction category.

Location: The mall is located among a group of the most important development sites in Cairo, in the north-eastern quadrant of the area connecting Cairo-Suez Road and El-Nasr Road in Heliopolis, as it is easily accessible because it is in a major area of special importance. City Center Almaza Mall will launch a new concept of shopping in Egypt to be the best shopping center for the residents of Heliopolis.

a) **The social significance of the center:**

City Center Almaza is a trendy retail and entertainment destination in East Cairo with stores representing the most prominent international and local fashion and lifestyle brands.

b) **Diversity in the architectural formation:**

- **overall design**
- **Function compatibility of configuration:**
 - ❖ The visibility of the building from the outside.
 - ❖ Clarity of the multiple entrances to the center.
 - ❖ Clarity and ease of movement within the center.
- **Clarity of design elements:**
 - ❖ Paths: clear, continuous and of sufficient width.
 - ❖ Borders: the interior spaces are defined and clear.
 - ❖ Distinguishing Marks: Interactive spaces between the blocks and the Food court area.
 - ❖ Assembly Points: There are resting places along the corridors and assembly points on each floor.
 - ❖ Zones: The clarity of the different areas, especially the hypermarkets and children's areas, in addition to the transparency of the display in the various stores.

c) **Social and design effectiveness:**

- **Social efficacy.**
 - ❖ The most important interactive space within the building is the Food Court Area, which gives a sense of comfort and spaciousness, in addition to the secondary spaces as shown in Figure .3



Figure 3: Food court area in Almaza City Center Mall - source of the researcher 2022

- ❖ Attractive activities: the center provides spaces to support many diverse activities such as local activities and exhibitions of various occasions such as New Year celebrations and various holidays as shown in Figure .4



Figure 4: Various activities such as the New Year's celebration in City Center Almaza Mall - source : the researcher 2022

- **Diversity of uses:**
 - ❖ The center contains a variety of shops for clothes and other goods in addition to children's play areas, cafes, restaurants, cinema halls, as well as a Carrefour store.
- **Design effectiveness.**
 - ❖ Expansion of the interior spaces.
 - ❖ The feeling of spaciousness within the building through the internal courtyards, as in Figure .5

- ❖ The interior environment depends on industrial ventilation, and the interior facades of the stores give a sense of movement through the use of transparent glass for the different storefronts.



Figure 5: The inner courtyards of Almaza City Center Mall - source : the researcher 2022

d) Location and relationship with the surrounding:

- ❖ It is easy to reach the mall where Cairo-Suez Road and Nasr Road in Heliopolis, and it was distinguished by new services, including valet parking service in the car park, which accommodates more than 4,000 parking spaces as shown in Figure 6¹.



Figure 6: Parking in City Center Almaza Mall – Source: google maps 2022

e) **Sustainability:**

- ❖ The City Center Almaza project has been awarded the “Leadership in Energy-Conserving and Environmentally Friendly Design” (LEED) Gold Category Certificate in Building Design and Construction.

By applying the latest technical solutions that enhance design solutions, contributing to a more productive and sustainable environment. Sustainability solutions and strategies, designs, energy savings, water efficiency, and a reduction in the carbon footprint within the center’s building contributed to obtaining this certificate as a high-quality environmental center, where advanced systems were installed that save %14.6of electricity, and the building, development and design processes of the center relied on local materials.

By placing these advanced designs on providing natural lighting for the building, taking into account that it does not cause unnecessary heat to enter the building, we rely on the strategy of placing windows in the upper part of the wall while keeping the upper ceiling lights to a minimum. This strategy contributes to providing good levels of natural ambient light while controlling the amount of sunlight allowed without affecting the applicable ecosystems².

Since the opening of the mall until now, energy conservation levels have reached %15 through the use of renewable energy means such as solar panels, in addition to rationalizing water consumption by %47as shown in Figure .7



Figure 7 Providing natural lighting for the building in City Center Mall Almaza - Source www.citycentrealmaza.com/ar 2022

The stage of conducting the surver:

Which was designed to solicit the opinions of those who frequent the selected commercial centers, including visitors, administrators and others, to get to know their aspirations regarding the evaluation axes of the proposed methodology. The study community included part or part of the original community units concerned with the research, and the sample includes the characteristics of the required group (representing it), and it dispenses with the

study of all those who frequent the selected commercial centers, which contributes to saving efforts and material costs and obtaining information from the sample community and obtaining Full and complete responses.

The research sample was determined to be a simple random sample, which is the sample in which the probability of selecting all items is equal, known, and can be calculated, and represents from 10-5% of the total volume of people who frequent the selected commercial centres.

The stage of statistical analysis of the survey questionnaire data:

At this stage, all the questionnaires for the sample are unloaded and tabulated, and then the data was entered into the computer using the SPSS program to reach the total evaluation points for each project.

2. Applying the measurement approach to the selected project:

The size of the questionnaire was measured on a number of 1350 users, representing 5% of the mall users.¹

Evaluation of the first part: the performance of the building and its functional and complementary elements.

Item	Points assigned	Number of samples	Average percentage	Average item rating rate	Calculated points	Notes
Project importance	12.12	1350	%95.13	0.95	11.53	The mall is considered one of the most important development sites in the northeastern quadrant of Cairo. Error 1.31%
Distance or proximity to transportation	9.09	1350	%97.46	0.97	8.86	It is easily accessible as Cairo-Suez Road and Nasr Road in Heliopolis. Error 1.25%
Area	7.57	1350	%91.41	0.91	6.92	Enough with an area of 103.455 thousand square meters. Error 1.19%
Building orientation	3.03	1350	%70.95	0.70	2.15	Proper orientation of the building. Error 1.42%
Green areas	3.03	1350	%34.98	0.34	1.06	Not enough. Error 1.82%
Facade finishing	13.63	1350	%82.09	0.82	11.19	Excellent finish. Error 1.92%
Parking spaces	13.63	1350	%97.50	0.97	13.29	More than 4000 parking spaces. Error 1.63%
The number of entrances to the building	1.51	1350	%74.83	0.74	1.31	enough Error 1.53%
	63.63				56.31	%88.49

Table 1: Part One - First: Building performance for the Almaza City Center Mall project

Item	Points assigned	Number of samples	Average percentage	Average item rating rate	Calculated points	Notes
Dimensions of the main space for the basic elements of the project.	10.90	1350	%84.22	0.84	9.18	Enough spaces for various activities. Error 1.36%
Interior finishing of the project for the basic elements of the project.	10.90	1350	%84.03	0.84	9.16	Excellent interior finishing. Error 1.68%
Orientation of spaces for the essential elements of the project.	3.63	1350	%60.33	0.60	2.19	Appropriate orientation depending on the type of different activities. Error 1.91%
Dimensions of the main space of the service elements of the project.	1.21	1350	%66.94	0.66	0.81	Spaces of sufficient dimensions. Error 1.21%
Internal finishing of the service elements of the project.	2.42	1350	%95.86	0.95	2.32	Excellent finishing. Error 1.56%
Orientation of spaces for the service elements of the project.	7.27	1350	%91.33	0.91	6.64	Proper orientation. Error 1.39%
	36.36				30.3	%83.33

Table :2 Part One - Two: The functional elements of the building for the Almaza City Center Mall project

Item	Points assigned	Number of samples	Average percentage	Average item rating rate	Calculated points	Notes
windows	0.37	1350	%83.78	0.83	0.31	Not clear, where the greatest reliance on industrial ventilation. Error 1.63%
lighting units	2.27	1350	%95.59	0.95	2.17	Suitable for the type of activity. Error 1.92%
Sanitary Fittings	2.65	1350	%84.9	0.84	2.25	Error 2.19%
Stairs and elevators	3.78	1350	%69.04	0.69	2.61	Somewhat insufficient and located next to the entrances only. Error 2.52%
	9.09				7.34	%80.74

Table3:Part One - Three: Complementary elements in the building for the Almaza City Center Mall project

Evaluation part two: Human needs.

Item	Points assigned	Number of samples	Average percentage	Average item rating rate	Calculated points	Notes
Safety and security	39.3	1350	%80.20	0.80	31.52	Error 2.98%
Leisure needs	8.73	1350	82.58	0.82	7.21	Error 1.79%
Containment	17.46	1350	%98.28	0.89	15.59	Error 1.24%
	65.50				54.32	%82.93

Table 2: Part Two - First: The Natural Needs of Almaza City Center Mall

Item	Points assigned	Number of samples	Average percentage	Average item rating rate	Calculated points	Notes
Production increase	2.02	1350	%62.37	0.62	1.26	Error 2.26%
Privacy	2.02	1350	%83.16	0.83	1.68	Error 1.95%
Cultural (customs and traditions)	10.14	1350	%86.68	0.86	8.79	Error 1.62%
Psychological (feeling of beauty)	20.29	1350	%94.52	0.94	19.18	Error 2.62%
	34.50				30.91	%89.59

Table5: Part Two - Second: Functional needs of the Almaza City Center Mall project

Analysis of the economic performance of the building:

Initial cost of the project in EGP	4 billion Egyptian pounds
The final cost of the project in EGP	9.35 billion Egyptian pounds

item	Points assigned	Calculated points	Notes
Unnecessary costs from poor design	50.00	16.87	Calculated from the equation 50x EPC
Unnecessary costs over the life of the project	50.00	16.87	
	100	33.74	%33.74

Table6 : Part three - Analysis of the economic performance of the building.

Economic performance factor = $1 - \frac{(\text{final cost} - \text{initial cost})}{\text{initial cost}}$

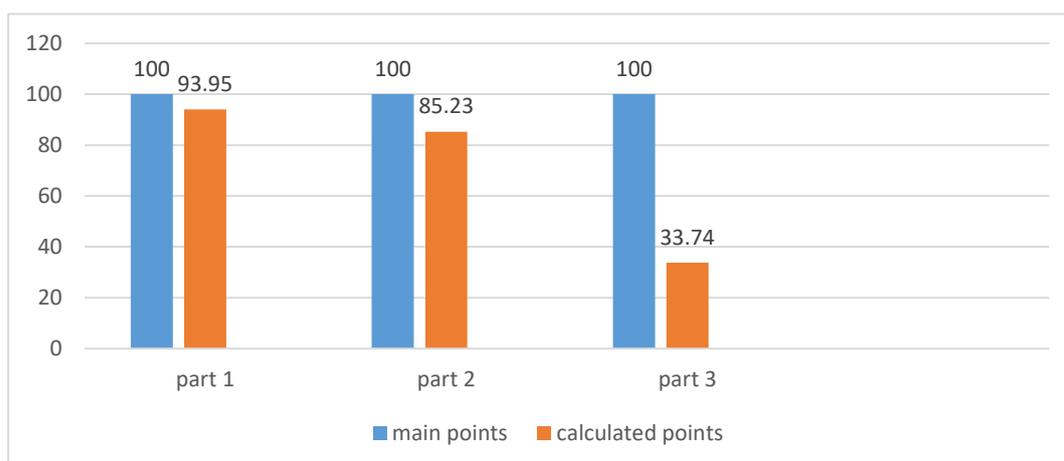
- $\frac{[(9.35\text{billion} - 4\text{billion})]}{4\text{billion}} = 0.337$

The economic performance of the building was analyzed by following the equation proposed by the researcher and it was not included in the questionnaire. This was done by reviewing the initial and final project costs.

Summary of evaluation results for the Almaza City Center Mall project:

Item	Final value of points	Calculated points	Notes
Part One - First: Building performance	63.63	56.31	
Part One - Two: The functional elements of the building	36.36	30.3	
Part One - Three: Complementary elements in the building	9.09	7.34	
First part: the performance of the building and its functional and complementary elements.	100	93.95	
Part Two - First: The Natural Needs	65.50	54.32	
Part Two - Second: Functional needs	34.50	30.91	
Part two: Human needs.	100	85.23	
Economic performance (cost)	100	33.74	
Part three - Analysis of the economic performance of the building	100	33.74	
	300	212.92	%70.97

Table 3: Summary of evaluation results for the Almaza City Center Mall project.



The City Center Almaza Mall project in Cairo scored 212.92 points, which is equivalent to %70.97, which is between a good evaluation range (254-210) points.

Analysis of the increase in the final cost prices over the initial cost:

- The price control of materials was not taken in consideration and the potential price increase during the project implementation period was not taken into account.
- The slowdown in the implementation of some works, as a result of the lack of regular payments, which led to an increase in the prices of raw materials and the prices of labor.

From the foregoing, it is clear after the evaluation of the building that the implementation of this building did not follow the value engineering methodology at any stage of the project, and if the value engineering methodology had been followed from the beginning, it would have been possible to distribute the spaces better to meet the aspirations of the users for it and at the same time a single alternative to the project would be identified. It achieves the highest possible value in terms of performance, human needs and appropriate economic performance that reduces excess costs and does not achieve any satisfactory return in performance or human needs, and at the same time adheres to implementation deadlines without delay.

The estimated value of this building if it was implemented at the estimated initial cost of it:
Value = (Performance + Human Needs) / Initial Cost = (85.23+93.95)/4 billion = 0.0449 x 10⁻⁶

The value of this building is estimated at final cost = (performance + human needs) / final cost 0.0191 = x 6-10

Calculated values ratios = 0.0191 x 6-10 / 0.0449 x 6-10 = 0.425

That is, the inaccuracy in the implementation of the project led to a decrease in value by %57.5

Results:

- The results of the applied study concluded the importance of applying the curriculum to different models of the projects under study to measure the extent of their value, which would achieve the objectives of the study.
- There was a need to pay attention to the third part of the evaluation process, which is the analysis of the economic performance of the project, which will have the greatest impact in raising the value of the selected projects.

Recommendations:

In view of the previous results, the study recommends the following:

- Applying the proposed measurement approach to the buildings of commercial centers in order to achieve the goals of value engineering at the design stage.

- Deepening the study of the economic performance of the quality of commercial buildings.
- Monitor the performance of commercial centers in order to increase occupancy and attract visitors.
- Apply the principles of value engineering to all projects.

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