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Facility Management in Iran, a New Approach Towards Customer Service

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Abstract

Every year many constructions are going to build all around the world for different purposes due to different needs like population growth, in consequence, there will be the need for basic services such as school hospital etc. Moreover, many new services/functions make needs of new construction.

All these new constructions need providing massive amount of resources (Money/Time), usually the organizations which provide these resources are in two group, private or multinational companies, and public bodies, both want to optimize using their resources to have building's usability for longer period in proper level of function, for example, public bodies aim to prevent waste of their budget and private parts are more concern for return of capital and customer satisfaction.

On the other hand, there are many buildings which built in the previous years and now they could not provide the same level of function or their function has been changed so there are two possibilities: the first one is demolished and built a new building and the second is with a proper Facility/Maintenance management renovate the building and use it for many years with same or even better level of function.

A proper and well-organized Facility/Maintenance plan could be an answer to this need. Now, this question mark appears who should provide this plan? The building owner should employ architect, manager, and engineer to do it! The best way to this action is Outsourcing by means of giving all responsibility of a property from Built/Renovation till even simple activities like catering or cleaning to another company which is specialized in this field, which gives this chance to company to focus on their main specialization, have better control on their budget etc.

The thesis aims to show the importance of having Maintenance/Facility management plan and outsourcing this task to specialized companies, the effects of Maintenance/Facility management plan on the property as a matter of financial, serviceability, lifespan etc. Moreover, tries to point out the possibility of start-up a company in the field of facility management in a country or area which did not have any experience in having this kind of outsourcing.

The thesis begins explaining the Maintenance, Facility management and global service concept, history of outsourcing these services, different type of strategy and analysis to provide these services.

The thesis continues with proposing the case studies, an office building in Tehran (Amin Multi-Use Complex which has the plan to build by private Client for renting to International companies which probably be their headquarters. this case has been chosen due to an important reason which is The Facility/Maintenance management have never been in Iran before and just in recent years some pioneer companies did start to outsource these services but still there is not any specialized company which just focus on this matter and the owners will not believe these programs could be important for their asset value moreover, the lack of facility management and maintenance caused much irreparable loss of life and finances in Iran, so this thesis aims to help to change old school minds in Iran to convince them if they spend money on Facility/Maintenance Program it they will have better and longer function of their buildings, on the other hand, try to attract the attention of international companies to this hidden market which could reach up to million euro.

CHAPTER ONE

Definitions

1.1) Map of Thesis

The aim of thesis has been defined in the Abstract but the methods or the strategies to catch this aim did not explain. The map of thesis aims to explain the way which the thesis goes to reach the final results. The thesis will start to explain preliminary definitions in the first chapter, these definitions will be used in the next chapters. In the second chapter there will be more specialized definitions about Startup and define the valuation methods which they are going to be used for examining the Startup, moreover at the end of chapter the economic assessment of Startup has been done with using one of the methods and the other examination will be started but due to lack of information the final result will be postponed after the chapter four which is the cost estimation for the Facility/Maintenance program, and then with using the result of the chapter four the economic assessment will be finalized. Furthermore, chapter three has aim to explain the case study, chapter four is defining the Facility Management plan and there would be finalization of all chapters in chapter five.

1.2) Maintenance

In general, it will refer to repair and try to keep in work a system which could be a personal computer or a huge tower; past maintenance practices in both the private and government sectors would imply that maintenance is the actions associated with equipment repair after it is broken. The dictionary defines maintenance as follows: “*the work of keeping something in proper condition; upkeep.*” This would imply that maintenance should be actions taken to prevent a device or component from failing or to repair normal equipment degradation experienced with the operation of the device to keep it in proper working order. Unfortunately, data obtained in many studies over the past decade indicates that most private and government facilities do not expend the necessary resources to maintain equipment in proper working order. Rather, they wait for equipment failure to occur and then take whatever actions are necessary to repair or replace the equipment. ¹

In any case, the meaning of maintenance has been changed during time now it turns to into a complex process which considers as economical/engineering control of a system during its life cycle by aiming at increasing the life cycle and having better level of performance.

¹ US FEMP Organization

The figure below could be helpful to better understanding of Maintenance concept and its levels.

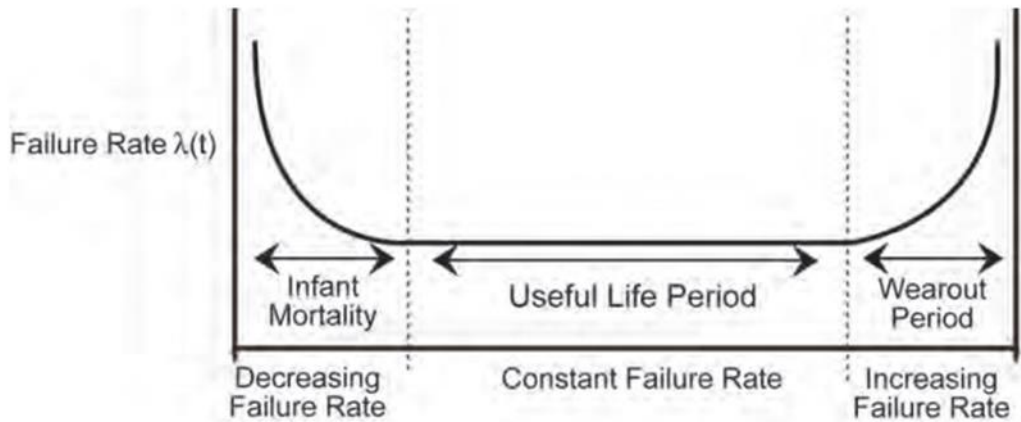


Figure 1 - component failure rate over time– Source: US FEMP Organization

It could be said by using programmed maintenance there is more possibility for a component to pass all the period which is in figure 1.

Anyway, nowadays there is programmed maintenance in most of project in design phase, is considered as an important part of the design because of it on the asset value and comfort of users, moreover many laws have been obliged the owners or builders to define also maintenance plan during their designs.

As an example, in European standard 133306, Maintenance known as below:

“Combination of all technical, administrative and managerial actions during the life cycle of an item workplace (building), work equipment, or means of transport - intended to retain it in, or restore it to, a state in which it can perform the required function.”²

Unfortunately, there is not any clear standard for Maintenance in Iranian Regulations.

As far as it could be seen the European laws paragraph is not very specified so there will be more explanation in the following, which explains different types of maintenance and contract for outsourcing this task.

² EU standard 133306

In Contract, which is called global service contracts, two different types of maintenance have been defined, Preventive and corrective maintenance which they have difference in cost structure and technical activities. It is important that two parts of agreements have been clearly explained and define which part fall into preventing and which into reactive maintenance.

1.2.1) Maintenance types

As far as mentioned above there are many laws which explained different types of maintenance, unfortunately Iran did not have a clear law about maintenance but usually when there is lack of law the US laws filling the gap so in the following it could be possible to see different types of maintenance provided by American and European laws.

Maintenance has been defined according to Federal Energy Management Program (FEMP) according to below:

1.2.1.1) Reactive Maintenance

Reactive maintenance is basically the “run it till it breaks” maintenance mode. No actions or efforts are taken to maintain the equipment as the designer originally intended to ensure design life is reached. Studies as recent as the winter of 2000 indicate this is still the predominant mode of maintenance in the United States. The referenced study breaks down the average maintenance program as follows:

- >55% Reactive
- 31% Preventive
- 12% Predictive
- 2% Other.

Note that more than 55% of maintenance resources and activities of an average facility are still reactive.

For the Reactive maintenance, it could be considering several advantages and Disadvantages as follow:

Advantages

- Low Cost
- Less Staff

Disadvantages

- Increased Cost due to unplanned downtime of equipment.
- Increased labor cost, especially if overtime is needed.
- Cost involved with repair or replacement of equipment.
- Possible Secondary equipment or process damage from equipment failure.
- Inefficient use of staff resources.

Advantages of reactive maintenance could be a double-edged sword. In case of dealing with new equipment, it could be expected minimal incidents of failure. For a pure reactive maintenance, it has not been expecting to spend money till the component break. Since we do not see any associated maintenance cost, we could view this period as saving money. The downside is reality. This time could be considered as saving money and maintenance but, there will be more cost rather than the other types of maintenance. While waiting for failure shortening the life of the equipment resulting in more frequent replacement, furthermore there will be extra cost due to failure of a related component. The other disadvantages could be an unexpected failure may cost more rather than a predictive one, also a failure may occur during holidays or the end of working days, all this reason make extra cost for this type of maintenance.

1.2.1.2) Preventive Maintenance

Preventive maintenance can be defined as follows: Actions performed on a time- or machine-run-based schedule that detected, preclude, or mitigate degradation of a component or system with the aim of sustaining or extending its useful life through controlling degradation to an acceptable level.

The US Navy was the pioneer of this method, to increase the reliability of their vessels, by simply expending the necessary resources to conduct maintenance activities intended by the equipment designer, equipment life is extended, and its reliability is increased. In addition to

reliability, there was also cost-saving, the studies indicate that there is about 12% to 18% of cost-saving.

While preventive maintenance is not the optimum maintenance program, it does have several advantages over that of a purely reactive program. By performing the preventive maintenance as the equipment designer envisioned, we will extend the life of the equipment closer to design. In following, there will be some of Advantages and Disadvantages of Preventive maintenance.

Advantages

- Cost effective in many capital-intensive processes.
- Flexibility allows the adjustment of maintenance periodically
- Increase component life cycle
- Energy saving
- Reduced equipment or process failure
- Estimated 12% to 18% cost savings over reactive maintenance program.

Disadvantages

- Catastrophic failure still likely to occur
- Labor intensive
- Includes performance of unneeded maintenance
- The Potential for incidental damage to components in conducting unneeded maintenance.

1.2.1.3) Predictive Maintenance

Predictive maintenance can be defined as follows: Measurements that detect the onset of system degradation (lower functional state), thereby allowing causal stressors to be eliminated or controlled prior to any significant deterioration in the component physical state. Results indicate current and future functional capability.

Basically, predictive maintenance differs from preventive maintenance by basing maintenance need on the actual condition of the machine rather than on some preset schedule. You will recall that preventive maintenance is time-based. Activities such as changing lubricant are based on time, like calendar time or equipment run time. For example, most people change the oil in their vehicles every 3,000 to 5,000 miles traveled. This is effectively basing the oil change needs on equipment run time. No concern is given to the actual condition and performance capability of the oil. It is changed because it is time. This methodology would be analogous to a preventive maintenance task. If, on the other hand, the operator of the car discounted the vehicle run time and had the oil analyzed at some periodicity to determine its actual condition and lubrication properties, he/she may be able to extend the oil change until the vehicle had traveled 10,000 miles. This is the fundamental difference between predictive maintenance and preventive maintenance, whereby predictive maintenance is used to define needed maintenance task based on quantified material/equipment condition.

This type of maintenance has also some advantages and disadvantages which could be summarized as follow:

Advantages

- Increased component operational life/availability.
- Allows for preemptive corrective actions.
- Decrease in equipment or process downtime.
- Decrease in costs for parts and labor.
- Better product quality.
- Improved worker and environmental safety.
- Improved worker morale.
- Energy savings.
- Estimated 8% to 12% cost savings over preventive maintenance program.

Disadvantages

- Increased investment in diagnostic equipment.
- Increased investment in staff training.
- Savings potential not readily seen by management.

In fact, independent surveys indicate the following industrial average savings resultant from initiation of a functional predictive maintenance program:

- Return on investment: 10 times
- Reduction in maintenance costs: 25% to 30%
- Elimination of breakdowns: 70% to 75%
- Reduction in downtime: 35% to 45%
- Increase in production: 20% to 25%.

1.2.1.4) Reliability Centered Maintenance

Reliability centered maintenance (RCM) process used to determine the maintenance requirements of any physical asset in its operating context.

Basically, RCM methodology deals with some key issues not dealt with by other maintenance programs. It recognizes that all equipment in a facility is not of equal importance to either the process or facility safety. It recognizes that equipment design and operation differ, and that different equipment will have a higher probability to undergo failures from different degradation mechanisms than others. It also approaches the structuring of a maintenance program recognizing that a facility does not have unlimited financial and personnel resources and that the use of both need to be prioritized and optimized. In a nutshell, RCM is a systematic approach to evaluate a facility's equipment and resources to best mate the two and result in a high degree of facility reliability and cost-effectiveness. RCM is highly reliant on predictive maintenance but also recognizes that maintenance activities on equipment that is inexpensive and unimportant to facility reliability may best be left to a reactive maintenance approach. The following maintenance program breakdowns of continually top-performing facilities would echo the RCM approach to utilize all available maintenance approaches with the predominant methodology being predictive.

Advantages

- Can be the most efficient maintenance program.
- Lower costs by eliminating unnecessary maintenance or overhauls.
- Minimize frequency of overhauls.
- Reduced probability of sudden equipment failures.
- Able to focus maintenance activities on critical components.
- Increased component reliability.
- Incorporates root cause analysis.

Disadvantages

- Can have significant startup cost, training, equipment, etc.
- Savings potential not readily seen by management

Because RCM is so heavily weighted in utilization of predictive maintenance technologies, its program advantages and disadvantages mirror those of predictive maintenance. In addition to these advantages, RCM will allow a facility to more closely match resources to needs while improving reliability and decreasing cost.

1.3) Facility Management

The International Facility Management Association (IFMA) defines facility management as “a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.” From this definition, we understand facility management to be the coordination of a facility’s operations meant to make the organization more effective at what it does.³

Put another way, think of your facility – the building itself and everything inside, both people and objects – as its own living being. Facilities management is responsible for making sure everything works harmoniously together, and the facility manager is responsible for keeping the facility alive.

The term ‘facility’ refers to any range of establishments that serve a greater purpose such as providing goods and services. In the most traditional sense, this refers to factories and offices, but the term facilities also include schools, jails, sports complexes, hospitals, hotels and retail establishments.

Each of these facilities is a complex organization of people, teams, departments, spaces, equipment, technology and more. Facilities management is the coordination of everything within the facility, so operations run smoothly. Considering the large scope, facility management can be quite a daunting task. However, facility management software simplifies

³ IFMA

an otherwise very complex process. Facility managers use facility management software to identify and schedule tasks, keep records, make facilities decisions and more.

1.3.1) The Scope of Facility Management

In a general sense, facilities management can be viewed as the management of anything within the facility operations, but we can use insight from the International Facility Management Association to narrow this down. In 2009, the IFMA identified eleven core competencies of facility management that includes the following:

- Communication
- Emergency Preparedness and Business Continuity
- Environmental Stewardship and Sustainability
- Finance and Business
- Human Factors
- Leadership and Strategy
- Operations and Maintenance
- Project Management
- Quality
- Real Estate and Property Management
- Technology

1.3.2) The Goals of Facility Management

The facilities manager has a range of duties with several organizational goals in mind. These include:

- Making sure operations run efficiently
- Ensuring the safety of workers
- Meeting building codes and government regulations
- Saving money
- Boosting productivity

- Creating an environment that is pleasing to clients and customers

Facilities managers use facility management software because it can help track and reach these goals.

Facility management is a complex coordination of everything that is happening within a facility. Luckily, facility management is made much more manageable and effective with facility management software.

1.4) Outsourcing

Outsourcing (also sometimes referred to as "contracting out") is a business practice used by companies to reduce costs or improve efficiency by shifting tasks, operations, jobs or processes to an external contracted third party for a significant period. The functions that are contracted out can be performed by the third party either onsite or offsite of the business.

1.4.1) Reasons for outsourcing

In addition to saving on overhead and labor costs, the reasons companies employ outsourcing include improved efficiency, greater productivity and the opportunity to focus on core products and functions of the business. Furthermore, more companies are looking to outsourcing providers as innovation centers.

1.5) Maintenance, Facility Management and Outsourcing Relation

Two main actors are involved in the process: on the one side the customer, with specific needs, and on the other side the service provider that owns the necessary management structure and specialized knowledge to satisfy customer needs.

The outsourcing of services has been developing a trend in the industrial world for some time now. This includes services, such as for example the management and logistics consulting, IT and 5 financial services, and industrial maintenance services provided by specialized parties, among others.

Lately, the market of maintenance services has spread also in the construction world, thanks to property owners, who have been the first to become aware of the fact that the maintenance of building structures represents a higher cost than the global cost of the buildings themselves.

The main features of the maintenance activity are the possibility to customize the service being offered and the importance given to the quality of the service, in other words the degree of customer's satisfaction.

Of course, this new approach requires the capability of understanding customer needs to create the specific service, a clear definition of tasks and responsibilities, as well as designated ways and channels to transfer and spread information. In other words, this approach requires processes and procedures that are essential to properly manage everyday activities and, above all, to effectively face potential disruptions.

1.6) Global Service

Global Service is a kind of outsourcing contract that is based on result, through which a client contracts some activities on a building structure or real estate properties out to one single contractor.

Global Service contract can include either the commitment of several activities relating to one single service (for example, the maintenance of construction buildings and installations), or the commitment of several activities relating to a variety of services (for example, the maintenance of construction buildings and installations, the maintenance of equipment and furniture, the handling of thermal plants, or of technological plants, the management of "call centers", the management of green areas, the cleaning service as well as the environmental hygiene service, among others).

Object of a Global Service contract for the real estate maintenance is therefore the commitment of maintenance services from a client to a contractor for a defined period, that are aimed at preserving the real estate at a specific required level.

1.7) Other Terms and Definitions

Facility management agreement: written or oral agreement stating the terms and conditions for provision of facility services between a client and an internal or external service provider.

facility management contractor: organization that contracts to provide facility services and is the accounting for contract performance.

Facility management service provider: organization that provides the client with a cohesive range of facility services within the terms and conditions of a Facility Management agreement.

Key performance indicator (KPI): measure that provides essential information about the performance of facility services delivery.

Service level agreement (SLA): agreement between the client or customer and the service provider on performance, measurement and conditions of services delivery (respect of the assigned priority to handle work orders).

For better understanding it could be possible find more explanation of two important terms in following:

1.7.1) Key performance indicator (KPI)

Do not mix up actions and results. Results include improved competitiveness (e.g. tons/cost), productivity (egg. tons/hours worked), and overall production efficiency (tons made/tons that could have been made, etc.). Actions include better alignment, balancing, lubrication, planning, scheduling, etc. The outcome of all these actions can be measured, and the indicators used should be as closely related to the action as possible. Action indicators should be used to drive continuous improvement and necessary change of behaviors to deliver expected results.

1.7.2) Service Level Agreement

A Service Level Agreement (or SLA) is the part of a contract which defines exactly what services a service provider will provide and the required level or standard for those services. The SLA is generally part of an outsourcing or managed services agreement, or can be used

in facilities management agreements and other agreements for the provision of services. This article is primarily aimed at customers and provides some simple tips for drafting effective SLAs.

1.7.2.1) Purpose

The purpose of this agreement is to provide a practical procedure on the expectations and communication between the Maintenance Department and customers. It is designed to define the Levels of Service that can be expected from Maintenance Department that best serve the priorities. This agreement shall define the types of services provided, define the process to request and deliver those services, and those responsible within the service request/delivery process. It will also provide a vital communication link between the various parties.

1.7.2.2) Maintenance Core Responsibilities

The primary responsibility of the Maintenance Department is to ensure that building systems are operating as designed to provide a safe and healthy environment for users.

1.7.2.3) What should be included in an SLA

A properly drafted and well thought out SLA should have the following elements:

- It will state the business objectives to be achieved in the provision of the services.
- It will describe in detail the service deliverables.
- It will define the performance standards the customer expects in the provision of the services by the service provider.
- It will provide an ongoing reporting mechanism for measuring the expected performance standards.
- It will provide a remedial mechanism and compensation regime where performance standards are not achieved, whilst incentivize the service provider to maintain a high level of performance.
- It will provide a mechanism for review and change to the service levels over the course of the contract.
- Ultimately it will give the customer the right to terminate the contract where performance standards fall consistently below an acceptable level.

1.7.2.4) The main elements of a good SLA

1. Overall objectives

The SLA should set out the overall objectives for the services to be provided. For example, if the purpose of having an external provider is to improve performance, save costs or provide access to skills and/or technologies which cannot be provided internally, then the SLA should say so. This will help the customer craft the service levels to meet these objectives and should leave the service provider in no doubt as to what is required and why.

2. Description of the Services

The SLA should include a detailed description of the services. Each individual service should be defined i.e. there should be a description of what the service is, where it is to be provided, to whom it is to be provided and when it is required. For example, if one of the services is the delivery of a specific report, the relevant provision of the SLA should describe the report, state what it should include, state its format (perhaps referring to a specific template), how it is to be delivered (e.g. by email), to whom, when and at what frequency (e.g. to the finance team daily by 10 am each weekday morning).

3. Performance Standards

Then, taking each individual service in turn, the customer should state the expected standards of performance. This will vary depending on the service. Using the “reporting” example referred to above, a possible service level could be 99.5%. However, this must be considered carefully. Often a customer will want performance standards at the highest level. Whilst understandable, in practice this might prove to be impossible, unnecessary or very expensive to achieve. On the other hand, the service provider may well argue that service levels should be set deliberately low to guarantee that the service can be provided at a competitive price. It is all a matter of judgement and the customer will need to consider each service level carefully – it is often the case that individual services will be weighted differently depending on their

business importance. Performance standards for availability of an online service are generally high as it is vital for the customer to ensure constant availability of the service. Other individual services may be less important and the service levels for these can be set at a lower level. The service provider and the customer will also need to set these performance standards in the context of anticipated workloads and the service levels may need to vary in the light of any changes to these workloads during the contract. All this can be built into the SLA so that the cost implications of a change in workload can be factored in.

4. Compensation/Service Credits

For the SLA to have any “bite”, failure to achieve the service levels needs to have a financial consequence for the service provider. This is most often achieved through the inclusion of a service credit regime. Where the service provider fails to achieve the agreed performance standards, the service provider will pay or credit the customer an agreed amount which should act as an incentive for improved performance. These service credits can be measured in many ways. For example, if the 99.5% level for reporting is not achieved, the SLA could include a service credit that a specified reduction in price is given for each 0.5% shortfall in performance in each week. Alternatively, service credits can be given where there are, say, three or more failures to meet a service level in any specified period. Again, each service level needs to be looked at individually and a sensible level of credit agreed between the service provider and the customer for failure to achieve the agreed level over a specified period. The important thing is to ensure that the service credits are reasonable and incentivize the service provider to do better, and that they kick in early enough to make a difference.

5. Critical Failure

Service credits are useful in getting the service provider to improve its performance, but what happens when service performance falls well below the expected level? If the SLA only included a service credit regime then, unless the service provided was so bad as to constitute a material breach of the contract, the customer could find itself in the position of having to pay (albeit at a reduced rate) for an unsatisfactory overall performance. The solution is to include a right for the customer to terminate the

agreement if service delivery becomes unacceptably bad. So, the SLA should include a level of critical service level failure, below which the service provider has this termination right (and the right to sue for damages). For example, if service credits kick in if a service level failure has occurred twice in a period, the SLA could state that the customer has the right to terminate the agreement for material breach if the service level has not been achieved, say, eight times in the same period. Again, as with service credits, each service level must be looked at individually and weighted according to business importance. With an on-line service, availability of that service is crucial, so you might expect the right to terminate to arise earlier than for a failure to provide routine reports on time. In addition, the SLA could group certain service levels together for calculating service credits and the right to terminate for critical failure; SLAs sometimes include aggregate point scoring systems for these purposes.

CHAPTER TWO

Startup and Valuation Methods

2.1) Startup a Facility Management Company

Probably this title could be the most Important title of the thesis, The Idea is to start a Facility Management company in the country or region which did not has any facility management experience. The point is to find a correct value of the startup with using number of valuation methods the most important point is finding a model which does consider all the relevant factors.

2.1.1) What Is a Startup

A startup company is a new business that is potentially fast growing and aims to fill a hole in the marketplace by developing and offering a new and unique product, service or process, but is still overcoming problems.

Startup companies need to receive various types of funding to rapidly develop a business from their initial business model that they can grow and build up.

2.1.2) What Are Startup Valuation Methods

Startup valuation methods are the ways in which a startup business owner can work out the value of their company. These methods are important because often startups are at a pre-revenue stage in their life-span so there aren't any hard facts or revenue figures to base the value of the business on.

Because of this guesswork, an estimation has been to be used, which is why several startup valuation method frameworks have been invented to help a startup business more accurately guess their valuation.

Business owners want the value to be as high as possible, whilst investors want the value to be low enough that they'll see a big return on their investment.

In fact, there is a simple answer: There are no precise valuations for early stage companies. In most cases professional VCs will therefore calculate several valuation models and scenarios and take a weighted average of them (depending on the estimated fit of the model to the underlying business case), as a starting point or an instrument for negotiations. A deal will

eventually happen for a certain price (market price) and companies will also refer to this price as their “market-valuation”.

2.1.3) Why are Startup Valuation Methods Important

When an early stage investor is trying to decide if they should make an investment into a startup he will guess what the likely exit size will be for that startup of a type, and in a specific industry. If a business owner has used methods to show their startup is worth a high amount that investor is likely to invest more into the company.

Using these methods or frameworks is also important because startup companies lack reliable past performance and predictable future performance that most established businesses use to estimate their value so having a way to guess a valuation is useful, even if it is all guesswork and predictions.

Ideally, a business owner should use several startup valuation methods to get the most accurate valuation possible. A business owner will want all the valuations they come to from each of the methods to be within a sensible average.

For example, a startup trying to secure 'seed' investment will offer 10 percent of the company for \$100,000. This values the company at \$1,000,000 but that doesn't necessarily mean it is worth \$1,000,000 but the startup is suggesting to the investor that there is a potential for the company to be worth that figure after growth and investment.

2.1.4) What determines a startup value

Positive Factors

- **Traction** – One of the biggest factors of proving a valuation is to show that your company has customers. If you have 100,000 customers, you have a good shot at raising \$1 million.
- **Reputation** – If a startup owner has a track record of coming up with good ideas or running successful businesses, or the product, procedure or service already has a good reputation a startup is more likely to get a higher valuation, even if there isn't traction.

- **Prototype** – Any prototype that a business may have that displays the product/service will help.
- **Revenues** – More important to business startups rather than consumer startups but revenue streams like charging users will make a company easier to value.
- **Supply and Demand** – If there are more business owners seeking money than investors willing to invest, this could affect your business valuation. This also includes a business owner's desperation to secure an investment, and an investors willingness to pay a premium.
- **Distribution Channel** – Where a startup sells its product is important, if you get a good distribution channel the value of a startup will be more likely to be higher.
- **Hotness of Industry** – If an industry is booming or popular (like mobile gaming) investors are more likely to pay a premium, meaning your startup will be worth more if it falls in the right industry.

Negative Factors

- **Poor Industry** – If a startup is in an industry that has recently shown poor performance, or may be dying off.
- **Low Margins** – Some startups will be in industries, or sell products that have low-margins, making an investment less desirable.
- **Competition** – Some industry sectors have a lot of competition, or other business that have cornered the market. A startup that might be competing in this situation is likely to put off investors.
- **Management Not Up to Scratch** – If the management team of a startup has no track record or reputation, or key positions are missing.
- **Product** – If the product doesn't work, or has no traction and doesn't seem to be popular or a good idea.

- **Desperation** – If the business owner is seeking investment because they are close to running out of cash.

2.1.5) Things to Consider When Choosing a Startup Valuation Method

Knowledge of other businesses in an industry and geographical location and what they are valued at is key to figuring out the value of a startup in the same industry and location, which is why several of the startup valuation methods include this.

A business owner should not stop with one approach. Angel investors and business owners will want to use several methods because no single method is useful all the time. Multiple methods also help a startup determine an average valuation.

Finding this average valuation is important because none of the startup valuation methods are scientifically or mathematically accurate, they are all based on predictions and guesswork.

2.1.6) Brief Introduction of the Most Famous Startup Valuation methods

2.1.6.1) Venture Capital Method

The Venture Capital Method (VC Method) is one of the methods for showing the pre-money valuation of pre-revenue startups. The concept was first described by Professor Bill Sahlman at Harvard Business School in 1987.

It uses the following formulas:

- Return on Investment (ROI) = Terminal (or Harvest) Value ÷ Post-money Valuation
- Post-money Valuation = Terminal Value ÷ Anticipated ROI

Terminal (or Harvest) value is the startup's anticipated selling price in the future, estimated by using reasonable expectation for revenues in the year of sale and estimating earnings.

If we have a tech business with a terminal value of 4,000,000 with an anticipated return of investment of 20X and they need \$100,000 to get a positive cash flow, we can do the following calculations.

- Post-money Valuation = Terminal Value ÷ Anticipated ROI = \$4 million ÷ 20X
- Post-money Valuation = \$200,000

- Pre-money Valuation = Post-money Valuation – Investment = \$200,000 - \$100,000
- Pre-money Valuation = \$100,000

2.1.6.2) Berkus Method

The Berkus Method assigns a range of values to the progress startup business owners have made in their attempts to get the startup off the ground.

	<i>If Exist</i>	<i>Add to Company Value Up to</i>
<i>Sound Idea (basic value)</i>		\$1/2 million
<i>Prototype (reducing technology risk)</i>		\$1/2 million
<i>Quality Management Team (reducing execution risk)</i>		\$1/2 million
<i>Strategic relationships (reducing market risk)</i>		\$1/2 million

Table 1 – Berkus Method Example – Source: upcounsel.com

2.1.6.3) Scorecard Valuation Method

The Scorecard Valuation Method uses the average pre-money valuation of other seed/startup businesses in the area, and then judges the startup that needs valuing against them using a scorecard to get an accurate valuation.

- The first step is to find out the average pre-money valuation of pre-revenue companies in the region and business sector of the target startup
- The next step is to find out the pre-money valuation of pre-revenue companies using the Scorecard Method to compare. The scorecard is as follows,
 - Strength of the Management Team – 0-30 percent
 - Size of the Opportunity – 0-25 percent
 - Product/Technology – 0-15 percent
 - Competitive Environment – 0-10 percent
 - Marketing/Sales Channels/Partnerships – 0-10 percent
 - Need for Additional Investment – 0-5 percent
 - Other – 0-5 percent

- The final step is to assign a factor to each of the above qualities based on the target startup and then to multiply the sum of factors by the average pre-money valuation of pre-revenue companies

2.1.6.4) Risk Factor Summation Method

The Risk Factor Summation Method compares 12 elements of the target startup to what could be expected in a fundable and possibly profitable seed/startup using the same average pre-money valuation of pre-revenue startups in the area as the Scorecard method. The 12 elements are,

- Management
- Legislation/Political risk
- Manufacturing risk
- Sales and marketing risk
- Funding/capital raising risk
- Competition risk
- Litigation risk
- International risk
- Reputation risk
- Potential lucrative exit

Each element is assessed as follows:

- +2 - very positive for growing the company and executing a wonderful exit
- +1 - positive
- 0 - neutral
- -1 - negative for growing the company and executing a wonderful exit
- -2 - very negative

The average pre-money valuation of pre-revenue companies in your region is then adjusted positively by \$250,000 for every +1 (+\$500K for a +2) and negatively by \$250,000 for every -1 (-\$500K for a -2).

2.1.6.5) Cost-to-Duplicate Method

This approach involves looking at the hard assets of a startup and working out how much it would cost to replicate the same startup business somewhere else. The idea is that an investor wouldn't invest more than it would cost to duplicate the business.

For example, if you wanted to find the cost-to-duplicate a software business, you would look at the labor cost for programmers and the amount of programming time that has been used to design the software.

2.1.6.6) Discounted Cash Flow (DCF) Method

This method involves predicting how much cash flow the company will produce, and then calculating how much that cash flow is worth against an expected rate of investment return. A higher discount rate is then applied to startups to show the high risk that the company will fail as it's just starting out.

This method relies on a market analyst's ability to make good assumptions about long term growth which for many startups becomes a guessing game after a couple of years.

2.1.6.7) Valuation by Stage

The valuation by stage method is often used by angel investors and venture capital firms to come up with a quick range of startup valuation.

This method uses the various stages of funding to decide how much risk is still present with investing in a startup. The further along a business is along the stages of funding the less the present risk. A valuation-by-stage model might look something like this:

- Estimated Company Value Stage of Development \$250,000 - \$500,000
- Has an exciting business idea or business plan \$500,000 - \$1 million?
- Has a strong management team in place to execute on the plan \$1 million – \$2 million
- Has a final product or technology prototype \$2 million – \$5 million
- Has strategic alliances or partners, or signs of a customer base \$5 million and up

Startups with just a business plan will receive a small valuation, but that will increase as they meet developmental milestones.

2.1.6.8) Comparable Method

This method is to literally look at the implied valuations of other similar startups, factoring in other ratios and multipliers for things that may not be similar between the two businesses.

For example, if Startup A is acquired for \$7,500,000, and its website had 250,000 active users, you can estimate a valuation between the price of the startup and the number of users, which is \$30/user.

Startup B might have 125,000 users which would then allow it to use the same multiple of \$30/user to reach a valuation of \$3,750,000

2.1.6.9) The Book Value Method

This method is based solely on the net worth of the company. i.e. the tangible assets of the company. This doesn't consider any form of growth or revenue, and is usually only applied when a startup is going out of business.

2.1.6.10) First Chicago Method

This method factors in the possibility of a startup really taking off, or really going badly. To do this it gives business owner three different valuations.

- Worst case scenario
- Normal case scenario
- Best case scenario⁴

2.2) Startup Goal

The Idea is to Startup a company specialized in the field of Facility Management in order to take projects from big companies like Artelia which they are not specialized in this field. Moreover, Startup could Expand its work in field of Renovating and Maintenance in such most modern/sustainable way which help the companies to arrive in same level of famous and modern Offices. The most important obstacle is lack of knowledge of Companies or Property owners about the advantages of Facility Management, they should be informed properly to be convince that the Maintenance Program or sustainable renovation could help them to have better understanding of their yearly expenses, less unexpected failure and more durable property.

⁴ Hashemi S., Venture Capital

2.3) Determine a Startup Value Factors

There are many factors which could influence the Initial and predicted value of a startup which has been mentioned above. To do a correct assessment it could be helpful to mention some advantages and difficulties of being a first company in the field of facility management.

Positive Factors

- **Traction:** It is very important for a company to know how many customers they will have in the first day that they open the company. It could be said there will be no customer in first day because first, this is a new field in the area, so the first activity could be orientation of possible customer.
- **Reputation:** another determinative factor could be reputation, it depends the person which wants to be manager of this startup has any good reputative company before or not let imagine in this case the reputation will get a Normal number.
- **Prototype:** Let's say the prototype of the Startup will get the highest possible number due to the experiences from the other countries in all around the world. Facility Management idea is spread all over and many companies has been outsourced this task to the companies like the Startup which we examine.
- **Supply and Demand:** In this case there is a strange situation, almost there is no supplier in this field, moreover there is a huge demand, but the problem is all the companies has been solved partially by putting a person in charge or any kind of more expensive and less efficient way, so it could be interpreted this way that if there be an excellent presentation probably will be faced to huge number of demanders.

Negative Factors

- **Poor Industry:** It could be said this Startup has relation with Building and construction industry which is one of the biggest industry of now and all time during these years construction industry was fluctuated in Iran, twenty years ago the price of properties has been duplicate in a short period of time but after due to oversupply market went to stagnation but now there is a stable situation, in any case both new and old buildings need a proper facility management, especially the ones which build

during the waves because they build very fast and with less care about the quality. Furthermore, it could be interesting to know the average lifespan of building in Europe is around 60 years (for buildings with concrete or steel structures) but in Iran is less than 30 years, it could be understood one of the reasons could be lack of proper facility/maintenance management.

- **Low Margins:** It should be considered that the high potential amount of customer should not cause of considering low margins in fact this Startup will not work without proper Capital and Time.
- **Competition:** Probably in the beginning there is not much competitors in the market but from the experience of Iran market if a new business shows high growth there will be many competitors in a short time.
- **Management Not Up to Scratch:** It will be so difficult if a startup begins without any experience or reputation record, especially in Iran, if no one knows you or you do not have any connection with Building/construction industry it could be so difficult to enter the market.
- **Product or Service:** if the service which would be presented to the market could not catch the building's owners attention there will be serious problem, so proper presentation of the work must be very important.

2.4) Examining the Startup with the Valuation methods

Now it could be helpful to evaluate the startup with different type of methods. To finding the basic data the information has been taken from same business in other part of the world or local similar companies for example to understand the risks or pre-money which is needed, it will be taken from a construction or architectural studio company, in fact there are many different between this startup and these kinds of companies but for example the pre-money for renting office or administration obstacle etc. is same. Furthermore, to find the other factors

like Management or international risk it could be better to use same International seed business.⁵

2.4.1) Risk Factor Summation Method

It has been mentioned above, how this method work, so it is better to go directly for valuation:

<i>Factor</i>	<i>Number</i>
<i>Management</i>	+1
<i>Legislation/Political Risk</i>	-1
<i>Manufacturing Risk</i>	+2
<i>Sales and marketing risk</i>	0
<i>Funding/Capital risk</i>	+1
<i>Competition Risk</i>	+2
<i>Litigation Risk</i>	0
<i>International Risk</i>	0
<i>Reputation Risk</i>	-1
<i>Potential Lucrative Exit</i>	-1

Table 2 – Risk Factor Summation Method Number allocation – Source: Questionnaire

Now is the time to calculate pre-money Valuation of pre-revenue, the methods instruction suggested to consider +250,000\$ for each +1 and +500,000 for each +2, and -250,000 and -500,000 respectively for -1 and -2. But these amounts are not compatible to Iran, depends on how much the startup is big and how strong it has planned to start the amount will change but if just consider the amount are IRR and again change them to Euro a reasonable price has been archive which quite correct according to previous startups (Has been asked to a local startup). New amounts are: 40,000 and -40,000 for each +1 or -1 and 80,000 and -80,000 for each +2 or -2.

⁵ Cambourg A., Valuation for Startups, 2016

2.4.1.1) Calculation:

<i>Mark</i>	<i>Amount</i>
+1	40,000
-1	-40,000
+2	80,000
0	0
+1	40,000
+2	80,000
0	0
0	0
-1	-40,000
-1	-40,000
<i>Final Amount</i>	
+3	120,000 Euro

Table 3 - Risk Factor Summation Method Value allocation – Source: Personal Activity

2.4.1.2) Numbers Allocation Reasoning:

According to this method the Startup will be profitable, but the fact is that how it could be understood that this numbers which has been allocated are right?

Actually, there is no numerical analysis to find the right numbers, or at least it did not used in this calculation, in here I did a questioner from five Startup in Iran which they work in field of Construction Management and Design. The questioner has been defined in a way that, First I explained them what is the Facility Management and what is its added value to the Built Areas then I ask them to put themselves in the shoes of a person how wants to do Startup this

company and asked to use their previous experience about running an Startup and give number to each factor.

- **Management**

According to background of management team, most of them and their families they had related study background and worked in this filed since years.

- **Legislation/Political risk**

Iran has special situation in this matter, it could be said for a registration and preliminary works it is even easier than many countries but in fact that the governmental body is huge, but working with Iranian government it could be very complicated due to the work flow permission steps you need to run, in the other hand working for private clients is still has high opportunities.

- **Manufacturing risk**

As matter of providing the service it not seems a serious problem, due to high knowledge and experience of the founders (Self Proclaimed).

- **Sales and marketing risk**

Sales and marketing risk could be the major issue, for introducing and in further stage selling the service to the potential clients there will be many difficulties because they do not feel that it could have an added value to their property or even it would be necessary to have a Facility Management Plan. It could be a huge difference if the startup has links to well-known companies and they suggest the startup to their client. In this case the owners of the startup know are searching for new connections.

- **Funding/capital raising risk**

In our case all the funding of the Startups (involved in the questioner) has been provided by the owners, without any loan or investment from Bank or person which is somehow good due to not having payback pressure on the Startup, in the other hand maybe the funded capital is not enough for expanding the business in the further stages which if we make connection to the big companies and ask them to be our partner probably it would be helpful.

- **Competition risk**

As far as this field of work is new, there are not any competitors in the market but there is the possibility of a rapid growing of Startup according to previous experienced which happened to many construction companies like Kayson, Khakrise etc. which is interesting if it be look at their growth rate.

- **Litigation risk**

In general, there would not be a big issue if the contract document and all legislation steps.

- **International risk**

After the sanctions weakened, there are many International companies start their activities in Iran, as far as its Look like in the construction field if they have any project, they prepare also the Maintenance plan, but there is not any specialized company which also prepare it for old buildings, in the other hand some of the companies in outsourcing this task to the other companies which are specialized in this field like the what Artelia* ⁶did for the both Bucharest and Elahiyeh projects, so it could be understood that, there is possibility to get offers from International companies for doing this task; in the other hand Clients are more interested to doing this task by a foreign company not a local one. So, again if we make connection to the famous companies the Clients can trust the startup much easier, furthermore the mother company itself could reach in high level of profit in the short time.

- **Reputation risk**

It could be a serious problem, because all the Startup founders are young people which they have not any reputation in the Iran market, and the only chance they got is to use their sibling's reputation (their siblings has good reputation in the field of construction), in the other hand in Iran society big companies do not trust the young people traditionally but the chance of being part of big International company is still available.

- **Potential lucrative exit**

Probably if there is a problem and the growth program of the company do not go in the path which has been planned, there is no chance to retain the initial money which has been invested.

⁶ Artelia is an International Company in fields of construction which has some project in Iran, more details in advance

Factor	Companies Names					Final Score
	Zharfa Kavan CEO: Babak Mansouri	Omran Bana CEO: Nima Erabi	Abadgaran CEO: Mehdi Aghaye	Ilia Omran CEO: Farhad Kasiri	Nejat Sazeh CEO: Omid Nejat	
Management	0	1	1	2	1	1
Legislation/Political risk	1	-1	-1	0	-1	-1
Manufacturing risk	1	2	1	2	2	2
Sales and marketing risk	0	1	0	1	0	0
Funding/Capital raising risk	1	0	1	-1	2	1
Competition risk	2	2	2	1	2	2
Litigation risk	0	0	0	0	1	0
International risk	0	1	0	0	1	0
Reputation risk	-1	-2	1	-1	-1	-1
Potential lucrative exit	-1	-1	-1	0	-1	-1

Table 4 - Risk Factor Summation Method questionnaire – Source: Self Activity

2.4.2) First Chicago Method

The *First Chicago Method* is a situation specific business valuation approach used by venture capital and private equity investors for early stage companies. This model combines elements of market oriented and fundamental analytical methods. It is mainly used in the valuation of dynamic growth companies. Let's go through this method step by step.

Step 1: Define different future scenarios for the Company

As it mentioned in the brief explanation there should be considered three scenarios:

1. Worst-Case Scenario
2. Normal-Case Scenario
3. Best-Case Scenario

First a financial forecast must be set up (including revenues, earnings, cashflows, exit-horizon etc.) for each case. A detailed qualitative analysis of the market trends and the company are

necessary to estimate these scenarios. In general, the Normal-Case scenario is the expectation of an Analyst after the Due Diligence (DD).

Therefore, in many businesses, which are mainly driven by the scalability factor (e.g. the market is in a “winner takes it all” situation), it is reasonable to set the worst-case equivalent to the event of total loss of the invested capital. Then again there are businesses where the market determines a natural maximum cap of the financial outcome.

Still, step 1 is not easy to master and needs an extensive analytical research of the circumstances. You might even have the freedom to consider strategy-shifts in your financial forecast depending on the assumptions of each case.

Step 2: Estimate divestment price for each scenario using multiples

After setting up your financial-forecast, you need to determine the Terminal Value (TV) at the time of the exit (divestment price). At this point a market oriented valuation concept should be applied, Multiples. The idea is to estimate a valuation by comparing the investment to other transaction within the same peer group. Peer groups in the venture industry are characterized by:

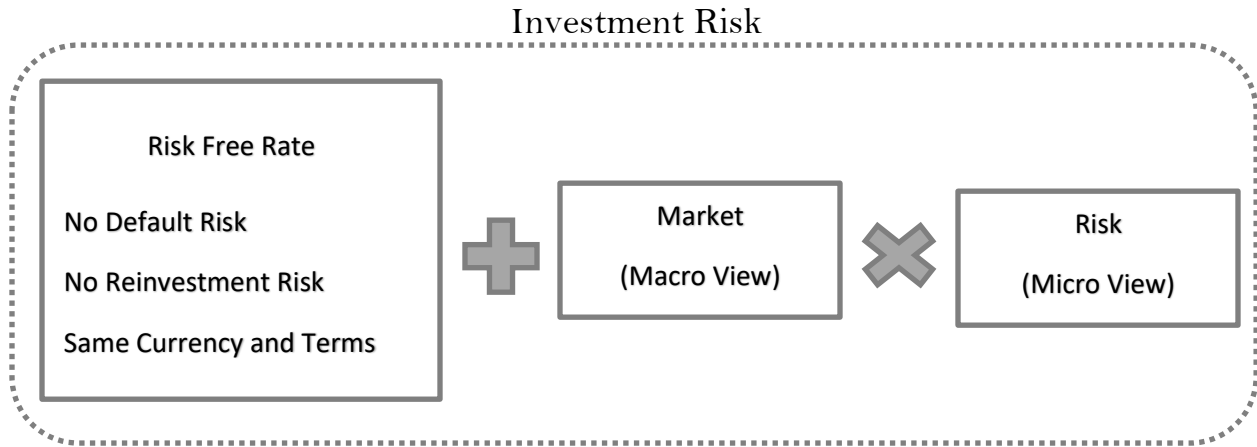
- Enterprise industry
- Enterprise stage
- Enterprise region

There are various forms of Multiples each suitable for different asset classes. Professionals in the venture industry will use Multiples based on KPIs like EBIT, Revenues etc. The critical factor in this market oriented approach is the transaction data of the peer group. Data about M&A activity in the venture industry are rare, nevertheless there are data provider on the market specializing on the venture industry.

Step 3: Determine required return and calculate valuation for each scenario

Many VCs determine the required return internally. They do not trust concepts like WACC (*Weighted Average Cost of Capital*) and CAPM (*Capital Asset Pricing Model*) due to of the incompleteness of the private equity market (you can't replicate the payoff of an investment with a portfolio of assets). However, it will give a brief introduction into WACC concept which

is adjustable to the venture market. Furthermore, it will assume the absence of debt capital in the financial forecasts, which reduces the WACC to the cost of equity (not a strong assumption approaching valuation of early stage companies).⁷



Estimating market risk for the industry, stage and region and determining a risk premium individually for each company are key factors.

The valuation for each scenario is the sum of the discounted Terminal value and the discounted cash flows until the exit-horizon.

Step 4: Estimate probabilities of scenarios and calculate weighted sum

For this last step probability must allocate to each scenario. These probabilities are naturally correlated to the definition of the scenarios and the numbers of them. Of course, it is impossible to estimate precise probabilities for every scenario. The idea is take extreme outcomes into the valuation process.

At the end calculate the weighted sum of the valuations depending on each scenario.⁸

⁷ Damodaran A., Valuation, Corporate Finance, 2009

⁸ Venionaire Capital (2015)

$$Valuation^i = \frac{TV^i}{(1+r)^h} + \sum_{t=1}^h \frac{CF_t^i}{(1+r)^t}$$

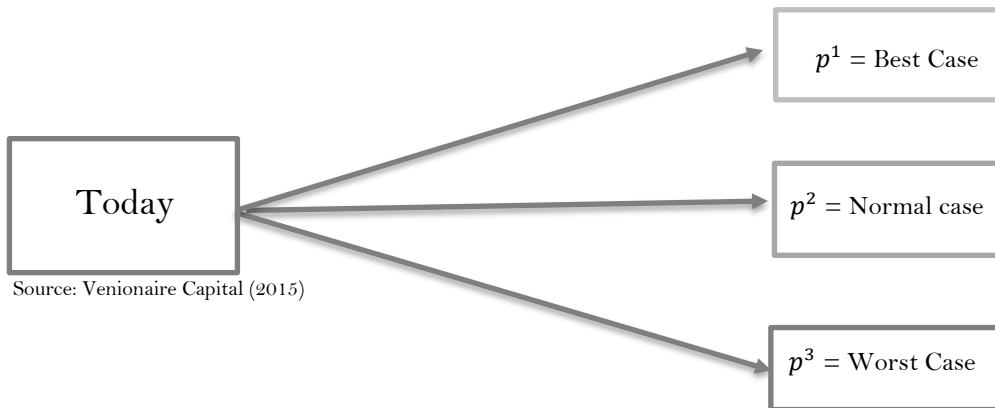
i = Index of Scenario

T = Terminal Value

t = Time to Exit

CF = Cash Flow

Source: Venionaire Capital (2015)



Source: Venionaire Capital (2015)

$$Enterprise\ Value = \sum_{i=1}^3 p^i Valuation^i$$

The *First Chicago Method* is a technique of wide scope. Step 1 gives freedom and the opportunity to consider events with low probability but huge impact on the investment payoff. On the other side this freedom brings more complexity into the valuation framework. At Step 2 the use of dataflow through the cooperation partners and professional data providers. The choice of the multiple depends on the peer group and structure of the enterprise.

At Step 3 it has been investigate the market through a short-term analysis focusing on the potential of the Business case and a long-term analysis to identify fundamental market trends.

The analysis includes all aspects of the Enterprise which will be considered based on their impact in the specific Company-peer group.

Estimating the probabilities of the scenarios is a challenging task and seems arbitrary at a first glance. Nevertheless, there are various mathematical approaches to overcome this problem, addressing the extreme possible scenarios and assuming fat-tailed and highly skewed distributions for the underlying risk-drivers of the business. Furthermore, there is an uncertainty in estimating the exit horizon because private companies are infrequently traded assets.

2.4.2.1) Applying First Chicago Method on The Case

Define Financial Forecast for Each Scenario:

1. First some financial terms should be defined for this Case like:
 - **Total market size:** Estimating the market size is a necessary task for doing business and marketing planning, and budgeting for all startups, especially those that seek third-party financing such as venture capital (VC). Even though their investment philosophies may differ, most VCs and angel investors would like to know that they are investing in a market with a large potential size.

Even if there is no need for external financing because our case study financing is all internal, understanding the market potential is essential for a range of different strategic decisions, in areas such as:

- Product development
 1. Market Analysis
 2. How to Place it
 3. How to promote it
 4. Benchmark Analysis
- Partnering and distribution
- Structure of the company and critical employee skills

- **Starting point for estimating market size:**

The starting point for estimating the market size is to understand the problem which should be solved for customers and the potential value that the product generates for them.

Depending on the technology which is going to use, it may have to be chosen which customer problem need to be solved first. There are four steps below which could be helpful to find better estimation of market size.

Step 1. Define target customer

All startups must define their target customers. The target customer equals the person or company for whom the technology solves a specific problem. To define the target customer, following should be define:

1. Determine who the target customer is.
2. Create a profile of the typical/expected target customer.

Case Study: Define the target costumer which they may Interested in our Service

Governmental or Large Companies	Small Companies or Private Enterprises
<i>Governmental Buildings</i>	<i>Towers (Office or Residential)</i>
<i>Banks Headquarters</i>	<i>Bank Branches</i>
<i>Factories</i>	<i>Workshops (Small Factories)</i>
<i>Hospitals</i>	<i>Infirmary</i>
<i>Universities</i>	<i>Schools</i>
<i>International Hotels and Fairgrounds</i>	<i>Buildings (Office or Residential)</i>
	<i>Local Hotels/Retails</i>

Table 5 – Possible Costumers – Source: Personal Activities

Step 2. Estimate the number of target customers

Estimate the total number of target customers in the market—companies who have a profile like that our target customer. Industry database could be helpful in this case but unfortunately in Iran is not exist this kind of databases.

Case Study: Number of possible costumers has been pointed out through different website, probably it is not 100% of possible costumers but it will contain a good portion of them.

Governmental or Large Companies	No. in Tehran Province	Small Companies or Private Enterprises	No. in Tehran Province
Governmental Buildings	148	<i>Towers (Offices, Commercial and Residential)</i>	58
Banks Headquarters	35	<i>Bank Branches</i>	4,110
Factories	1,030	<i>Small Factories</i>	3,015
Hospitals	183	<i>Infirmary</i>	435
Universities	104	<i>Schools</i>	13,364
		<i>Buildings (Office or large Residential)</i>	5,837
Total	1500		26,819

Table 6 – Number of Possible Costumers – Source: Tehran Municipality

Step 3. Determine the penetration rate

Refine the market size by assuming a penetration rate for the category of product. The penetration rate is a function of the nature of the product. Assume a high penetration rate if your category of product is mission-critical or mandated through regulation; assume a low penetration rate for products with a specialized purpose.

Case Study: Defining Penetration rate is an important issue to estimating the startup value, the Penetration rate in Our case study would be just estimated as below due to the low percentage of buildings which they have Facility management program:

The Penetration rate is a critical issue, if you consider penetration rate as an action of market to the new product which has been available before something similar and the startup wants to bring it with new method, the penetration rate is become much higher than this, in other hand if consider penetration rate as reaction of the market to something which has not been exist before, it may go lower than 39%, I consider the penetration rate as a number which the market in the best case accept my service according my previous experience, as far as it could be seen the worst case scenario is consider too low to cover my estimation.

$$\text{Penetration Rate} = 39\%$$

Step 4. Calculate the potential market size: Volume and value

Market volume

To find the overall market potential (that is, the potential market volume), multiply the number of target customers by the penetration rate (see steps 2 and 3 above).

$$\text{Market volume} = \text{Number of potential customers} \times \text{Penetration rate}$$

$$\text{Market Volume for Best Case Scenario} = 28,319 \times 0.39 = 11,044$$

$$\text{Market Volume for Medium Case Scenario} = 28,319 \times 0.19 = 5,380$$

$$\text{Market Volume for Worst Case Scenario} = 28,319 \times 0.001 = 28$$

Market value

To calculate the monetary value of the market, multiply the market volume by the average value (that is, price expectations).

$$\textit{Market value} = \textit{Market volume} \times \textit{Average value}$$

Case Study:

Now is just needing to calculate *Average value* and then we have the final *Market value* which is one of the key factor to calculate First Chicago Method result, but estimating the average value is difficult, the best way is to find it from the other companies in the same field, but as far as has been said before there are some companies which they do the same task but none of them do same task as our case study startup wants to do.

So, for finding real “*Average value*” we need to define a Facility/Maintenance program for each kinds of occupation, but defining a program for all the occupation is out of scope this thesis because we need to achieve just a proper estimation, so it has been decided to define one Facility/Maintenance program on my case study which is Elahiyeh Multi-Use Complex and using the final cost as an “Average value” for the same occupations and using same cost for the other occupations by adding or reducing some rational percentage.

CHAPTER THREE

Case Study Presentation

3.1) Case Studies Introduction

Elahiyeh Multi – Use Complex is a middle height tower located in the North and wealthiest part of Tehran which has been designed to have 12 floors (Around 50-meter height) from the 0.0 and -8 floors underground (around -28 meter) the minus floors mostly will be dedicate to Parking lots and building’s facilities; the Ground floor is 50% Retail space which planned to be rented to famous brands and the other 50% is Offices Lobbies. There is a Mezzanine between ground floor and first floor which will mostly be dedicated to Retail. From second floor to the last floor are all modern offices, which to be rented International companies to for their Iran or even middle - East Headquarters. Each floor has been designed to be rented to 1-3 tenants; one of the most important issues the Client requests is to provide is the flexibility versatility.

Artelia Milan has responsibility for Design, Management and general observation of the project (Execution is not included in the contract), The Architectural design has been outsourced to an External studios of Milan (OBR) and the other parts will be handled inside the companies.

3.1.1) Artelia Group Introduction

Artelia is the result of a merger between Coteba and Sogreah, finalized on 30 March 2010.

Artelia's goal is to build an international multi-specialist engineering firm able to offer its clients in the public and private sectors an original approach to engineering, project management and consultancy that meets the expectations of a fast-changing world. Artelia conducts its assignments in nine markets: building construction, water, environment, energy, maritime, urban development, transportation, industrial facilities and multi-site projects.

A notable feature of 2014 was the introduction of a new system of governance with the arrival in early January of Benoît Clocheret as the group’s CEO.

3.1.2) Artelia Italia

Artelia Italia is one of the most important companies in the Group for the range of services offered, business volume and workforce. It mainly operates in the fields of Building &

Industry, Retail Multi-Site, Energy and Environmental Sustainability, Transport and Urban Development

Created in 2001, it has earned a leading position in the fields in which it operates. In 2015, Artelia Italia consolidated its position through the acquisition of Intertecno, one of the most important Italian engineering companies in the construction sector. Because of this initiative it has become a leading Italian engineering company with an annual turnover of around € 28 million and employing over 250 people operating in Rome and Milan.

Moreover, the merger extended its services to the Building & Industry sector. In particular: project management, multidisciplinary design, construction management, cost management, planning, and reporting. In addition, it confirms the commitment to eco-sustainable design and energy efficiency as well as increasing its ability to assist its customers in their international expansion processes.

3.1.3) Milan Office Introduction

Milan Artelia Office was part of Intertecno group in past and now it has been absorbed by Artelia group, in the time of Intertecno, their first project in field of Design and Management in Iran has been obtained which was Tehran Hotel Azadi. The project has been finished successfully and Intertecno catch the credit and increased the chance of getting newer project in Iran, this office now obtained two other projects in Tehran, they are two middle height Multi – Use towers which has been chosen as a case study, in the next title it will be more explanation.

3.2) Elahiyeh Project Detailed Description

First action before defining the maintenance plan for Elahiyeh project is get know the project, some information like Location, Civil, Mechanical, Electrical and Structural Design and in general speaking to get knowledge about the building components. So, in the following it will be presentation of Elahiyeh Multi-Use Complex.

3.2.1) Location

Elahiyeh Multi-Use Complex is Located in the North part of Tehran in the neighborhood with the same name, the area is the richest part of Tehran which is mixture of residential, commercial shops and office buildings.



Figure 3-Elahiyeh Neighborhood location in Tehran, Source: Google Maps

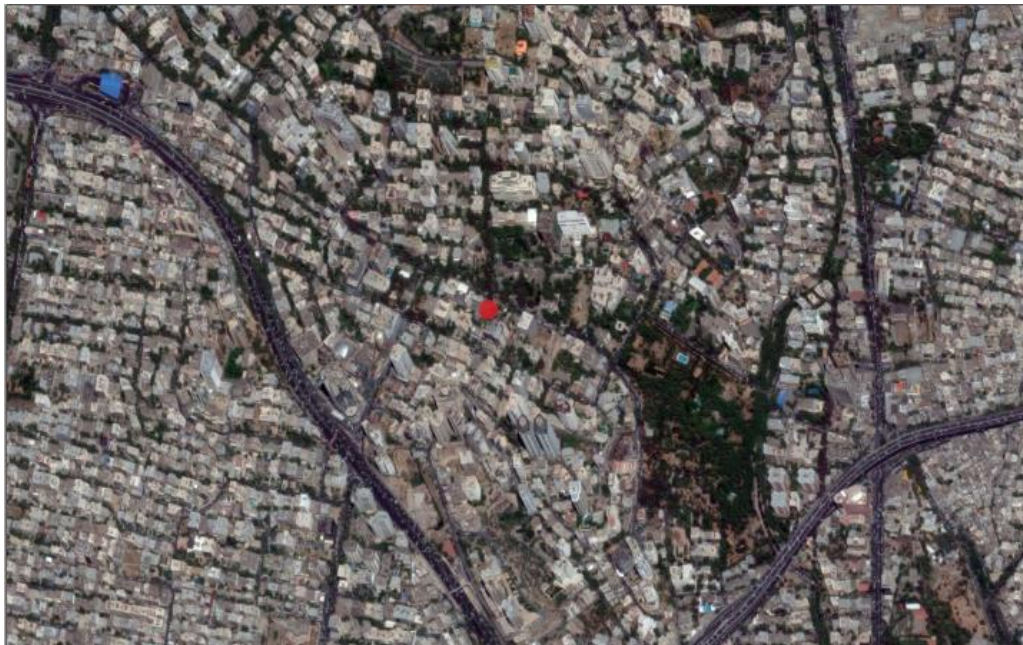


Figure 2-Site Location in Elahiyeh Neighborhood, Source: Google Maps

3.2.2) Road Connection

One of the biggest issue of this area is the narrowness of the streets (8-12M) and probably it going to be a bigger issue in the next coming years if the municipality continue to give permissions for new towers. But in any case, as it could be seen the tower has good connection to the surrounded area.



Figure 4-Road Access – Source: OBR Studio



Figure 5-Pedestrian Access – Source: OBR Studio

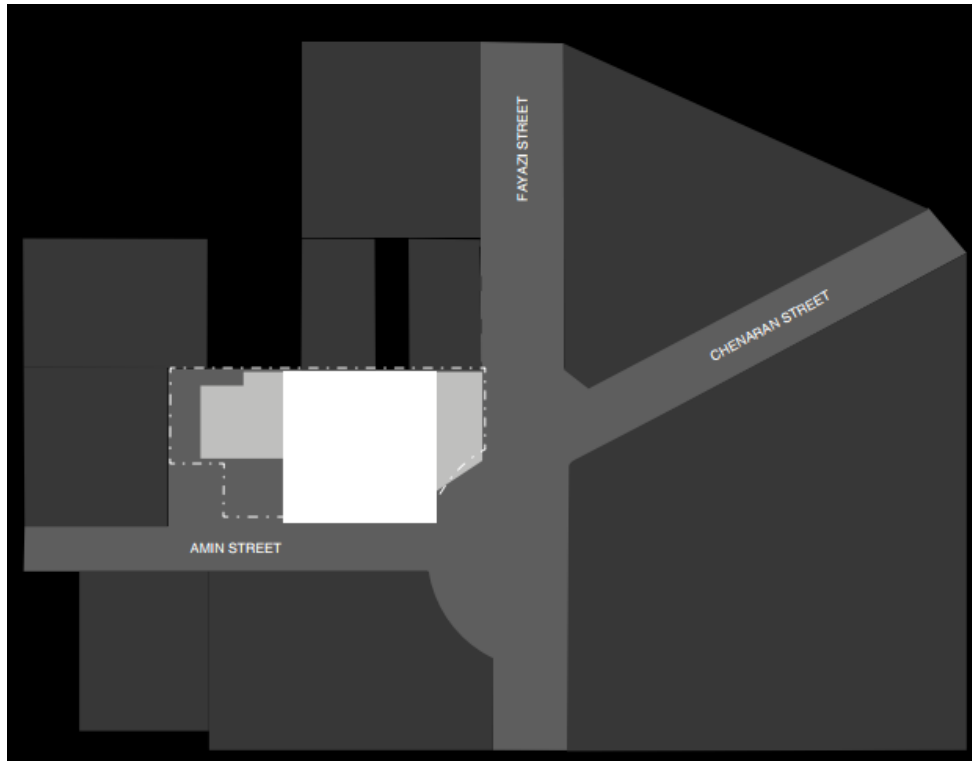


Figure 6-Site Plan – Source: OBR Studio

3.2.3) Elevations and Mass Design

Elahiyeh Multi-Use Complex has been designed to have 12 floors upper ground floor and 8 underground floors. The ground floor has the main Entrances and Commercial stores, upper the grand floor is Mezzanine which is also Commercial Stores. First Floor (Podium Floor) is dedicated Restaurant and the kitchens, from second floor up to 12th there are offices and 12th floor is rooftop with a Technical room.

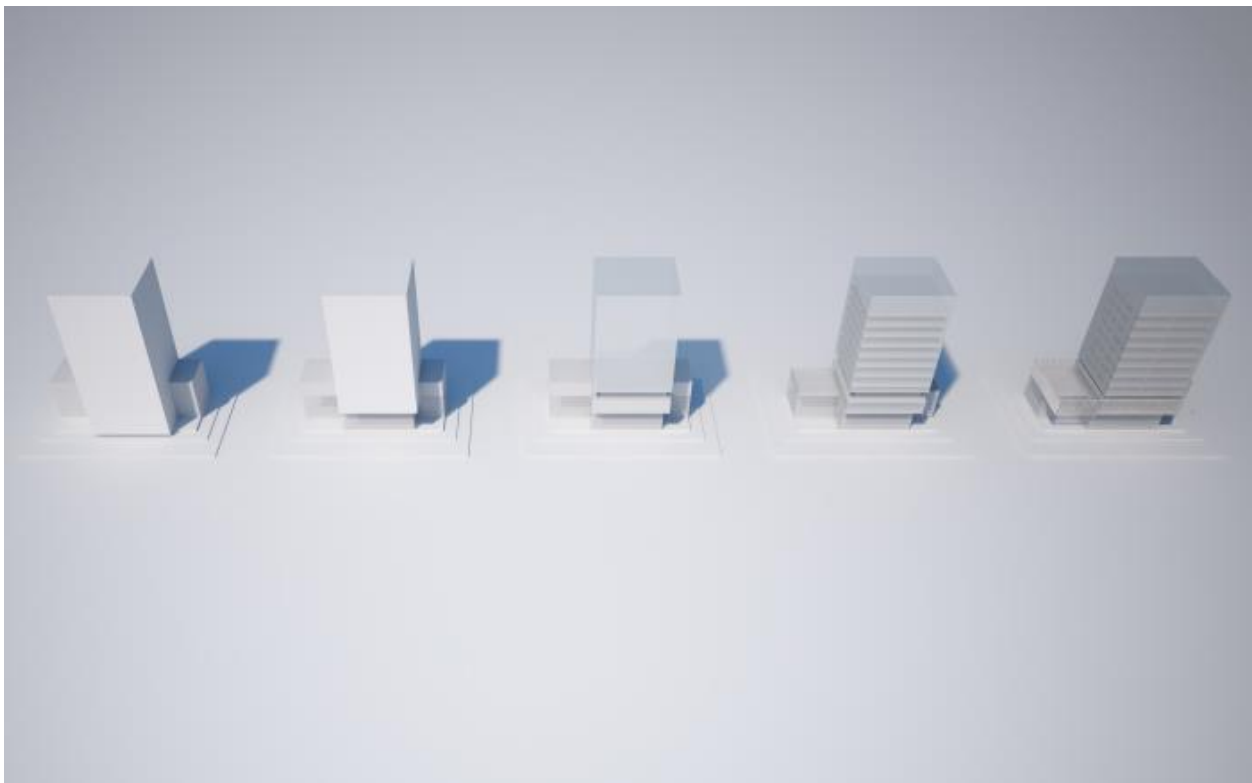


Figure 7-Mass Design – Source: OBR Studio

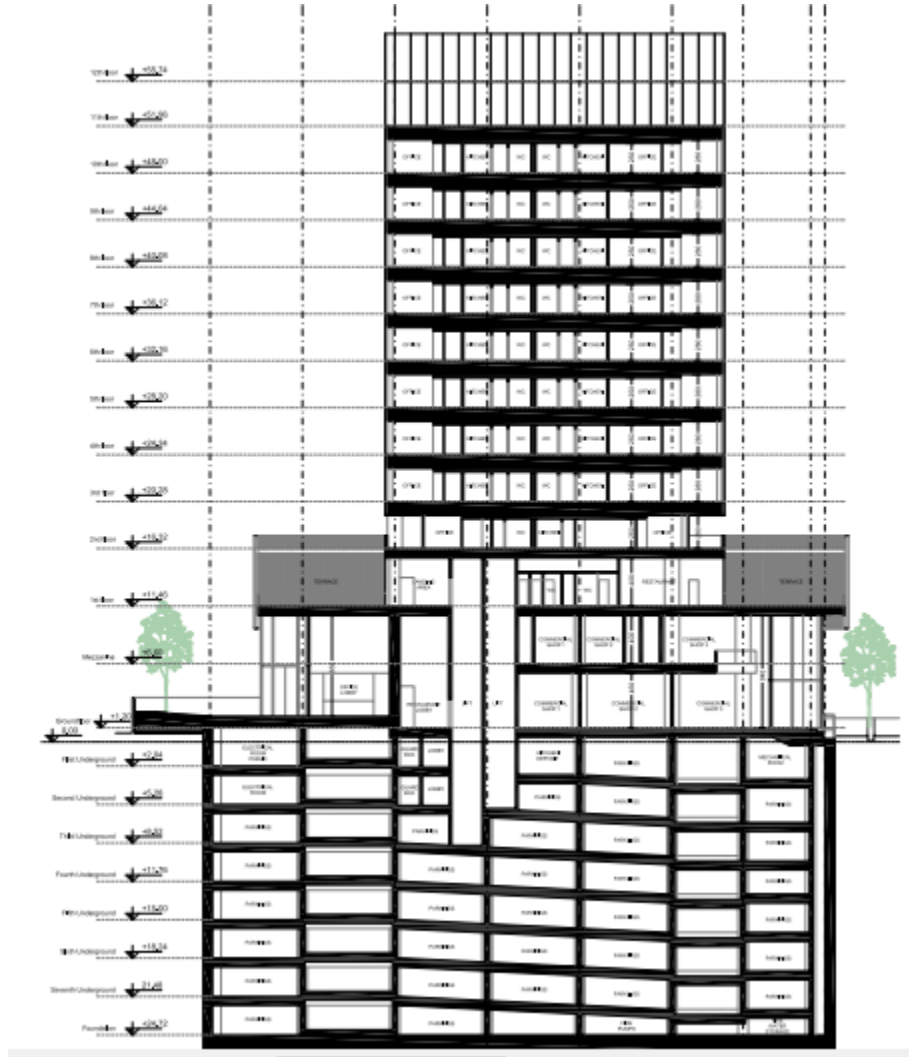


Figure 8-Elevations – Source: OBR Studio

3.2.4) View and Exterior Design

Many concepts have been provided for the Exterior of the tower by two different architects but at the end The Client decided to use simple glass façade using different shape in podium, eye-catching Entrances and some greenery inside and outside the building which was one of the architect’s suggestion. The Idea is to have different external shape for the first three floors, the structural elements should be hidden as much as possible.

To Make eye-catching difference from the podium to the tower, the Architect suggested to use bronze Blades which do not block the view and also prevent floor having direct reflection of inside activities from outside.



Figure 9 - Bird Eye View – Source: OBR Studio



Figure 10 - Podium Blades – Source: OBR Studio



Figure 12-Street View – Source: OBR Studio

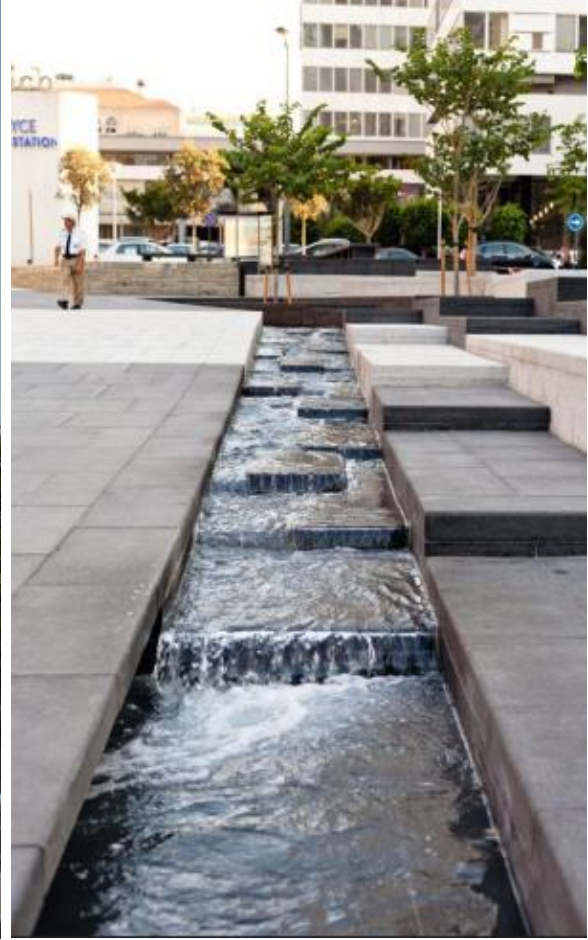


Figure 11 - Exterior Features – Source: OBR Studio

3.2.5) Interior Design and Civil Works

To follow Client's request, the interior should look modern with the mixture of glass and greenery, the entrances should have higher latitude than normal to provide the feelings Luxury place. The offices will be flexible to allow each tenant to change the design in the way they prefer, more private spaces, working posts or even modern way which is sharing posts. But an important issue here is Iranian people like to have classic style for furniture culture is going to change, the architect going forward a new concept of modern-less cost, more flexibility and functionality.

There are six different elevators to serve all the building and one elevator to serve between kitchen and restaurant, furthermore there are two escalator which there are between GF, Mezzanine and Restaurant floor. Two escaping staircases have been suggested.



Figure 13-GF Interior – Source: OBR Studio



Figure 14 – Podium Interior – Source: OBR Studio



Figure 16 - Parking Interior – Source: OBR Studio



Figure 15 - Interior Features Concept – Source: OBR Studio



In these two pictures it could be seen an Iranian old garden. The Architect has been decided to use the water features and greenery same as Persian old gardens in the Ground Floor specially and in the last two floors. These kind of features needs special maintenance which should be consider in the maintenance plan.

Figure 17 - Interior Concept – Source: Iran review.org



Figure 18 - Interior Concept – Source: labiennale.org



Architect has been decided to use greenery features in the Restaurant area to provide the feelings of calmness in contrast with the atmosphere of the offices.

Figure 19 – Restaurant Interior Greenery – Source: OBR



Figure 20 - Restaurant Interior Concept – Source: OBR office



Figure 21 - Office Interior Concept – Source: OBR Office



Figure 22 - Office Interior Concept - Source: OBR Office

As it could be seen offices have different forms from the idea of new design according to efficiency and. In the next pictures there are also private offices and small meeting rooms which will be considered in the design phase.



Figure 24 - Interior Concept Design – Source: OBR Studio



Figure 23 - Meetings Room Concept – Source: OBR Studio

Plans and Drawings of each floor is important to have better understanding of Complex in the following it could be seen the typical plan for Parking floors, Office floors and grand floor which is the most Important floor as the Client’s request because he believes that it has the first impact to all users and it should design brilliant and eye-catching, moreover there is Podium floor or Restaurant that is also very important as matter of Façade design.

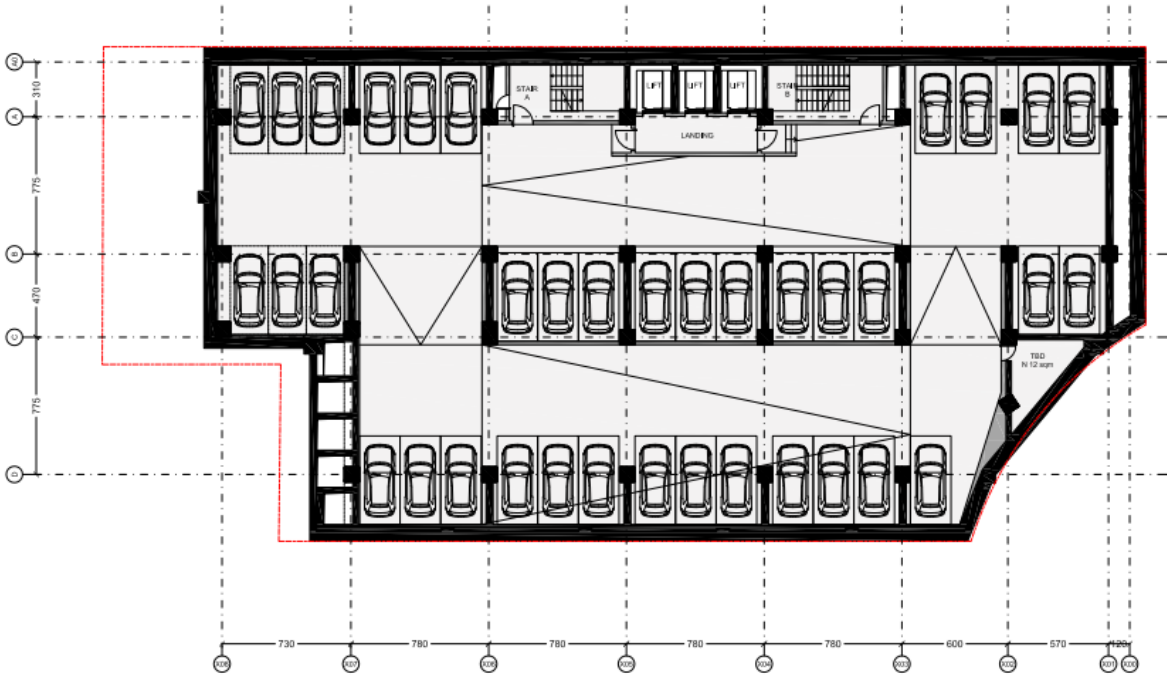


Figure 25 - Typical Parking Floor – Source: OBR Studio

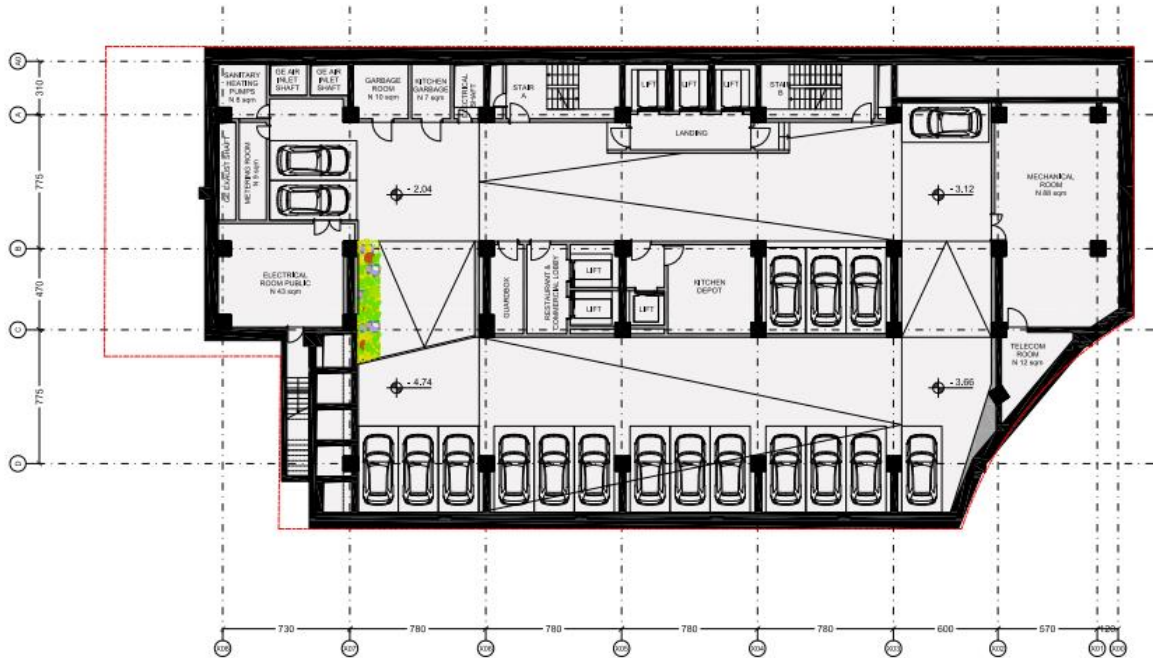


Figure 26 – First Basement – Source: OBR Studio

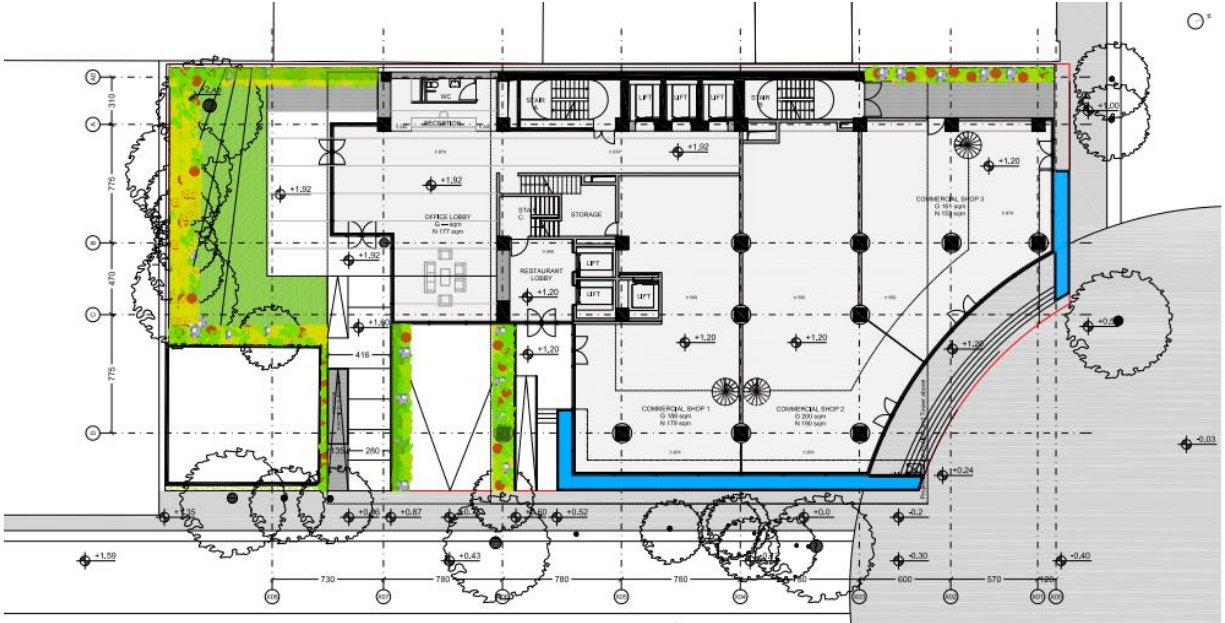


Figure 27 - GF Plan – Source: OBR Studio

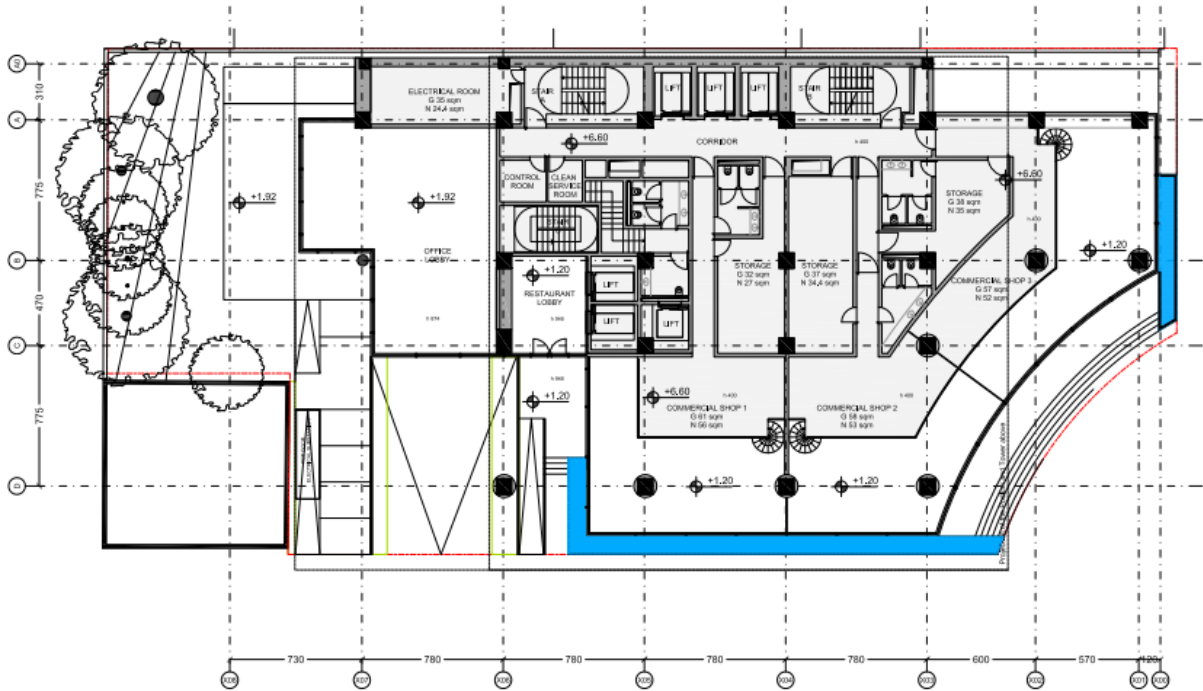


Figure 28 - Mezzanine Floor – Source: OBR Studio

The next plan is showing floor Functions which has been shown with different colors as it could be seen in the right side of the figure.



Figure 29 - Floor Functions – Source: Artelia Group

3.2.5.1) Civil Works Cost Estimation

This title has aim to estimate the cost for Civil work and Finishing of Elahiyeh Multi-Use Complex. The cost which could have been find in the Table 6 consist the following activities.

Inclusions:

- Waterproofing and insulations,
- Screeds,
- Roof garden,
- Metal grid floors,
- Brick walls,
- Plasterboard walls; Plasters (rough, smooth, fireproofed) and panels;
- Floors and coatings (stone and raised floors);
- Façade (blind and curtain walls);

- Entrance doors;
- Lifts
- Access: fully finished;
- Office: raised floors, preparation of the wall surface, suspended ceilings;
- Services: fully finished;
- Restaurant: kitchen floor.
- Parking: fully finished
- Equipment: fully finished;

Exclusion:

- Modifying or remodeling of external sidewalk and streets;
- Helipad
- Office: floor finishes, partitions and doors, furniture;
- Restaurant and commercial: floor and wall finishes, internal partitions and doors, ceilings,
- furniture and equipment;
- Garden accommodations.

The building has been divided into several parts, depending on the intended uses, whose areas are defined as below:

- **Access:** main entrance lobby, stairs, lifts, landing areas;
- **Office:** operative office areas;

- **Services:** toilettes, copy rooms, corridors at office floors, smoking rooms;
- **Commercial:** commercial areas at GF and Mezzanine;
- **Restaurant:** first floor dedicated to the restaurant, including the kitchen area;
- **Parking:** parking floors, excluding rooms and spaces dedicated to services, access to the building and equipment;
- **Equipment:** technical rooms.

In the next table it could be seen the cost estimation of Civil and Finishing works which has been calculated based on the assumption above,

<i>Installation</i>	<i>Area</i>	<i>Sqm</i>	<i>Above Grand Floor</i>	<i>Below Grand Floor</i>	<i>Total Estimation Cost</i>	<i>€/sqm</i>
Civil Works		20,682	€ 2,452,034.00	€ 784,763.00	€ 3,236,797.00	€ 156,50
	Access	3,287	€ 791,944	€ 316 126	€ 1.108.069,57	€ 337,06
	Office	4,939	€ 478,512	€ 130,260	€ 608.771,93	€ 123,25
	Service	1,113	€ 95,353	€ 29,363	€ 124.715,44	€ 112,01
	Commercial	759	€ 113,267	€ 20,006	€ 133.273,30	€ 175,68
	Restaurant	1,062	€ 173,779	€ 28,003	€ 201.781,93	€ 190,03
	Parking	7,644	€ 627,486	€ 201,581	€ 829.066,23	€ 108,46
	Equipment	1.878	€ 171,694	€ 59,424	€ 231.118,60	€ 123,07
Facade		20,682	€ 3,760,653.00	€ -	€ 3,760,653.00	€ 181,83
Finishes - floors, claddings & ceilings		20,682	€ 1,586,370.00	€ 308,586.00	€ 1,894,956.00	€ 91.62
	Access	3,287	€ 536,147.00	€ 75,991.00	€ 612,138.00	€ 186.21
	Office	4,939	€ 729,553.00	€ -	€ 729,553.00	€ 147.70

Service	1,113	€ 282,779.00	€ -	€ 282,779.00	€ 253.98
Commercial	759	€ -	€ -	€ -	€ -
Restaurant	1,062	€ -	€ -	€ -	€ -
Parking	7,644	€ -	€ 186,004.00	€ 186,004.00	€ 24.33
Equipment	1,878	€ 37,891.00	€ 46,591.00	€ 84,482.00	€ 44.99
	20,682	€ 7,799,057.00	€ 1,093,349.00	€ 8,892,406.00	€ 429.96

Table 7 - Civil and Finishing Cost Estimation - Source: Artelia and Personal Activities

3.2.6) Structure Design

The Structural System has been defined to be Steel SMF (Special Moment Frame), Client prefers to not have any concrete core in middle of the building in order to save space for commercial which has very high value in that area, in general the structural system has been chosen to be SMF in purpose of using less spaces for the structural elements. Usually structural elements did not have any necessary maintenance needs just periodical check to prevent oxidize progressive depreciation or detachment of fire resistance materials.

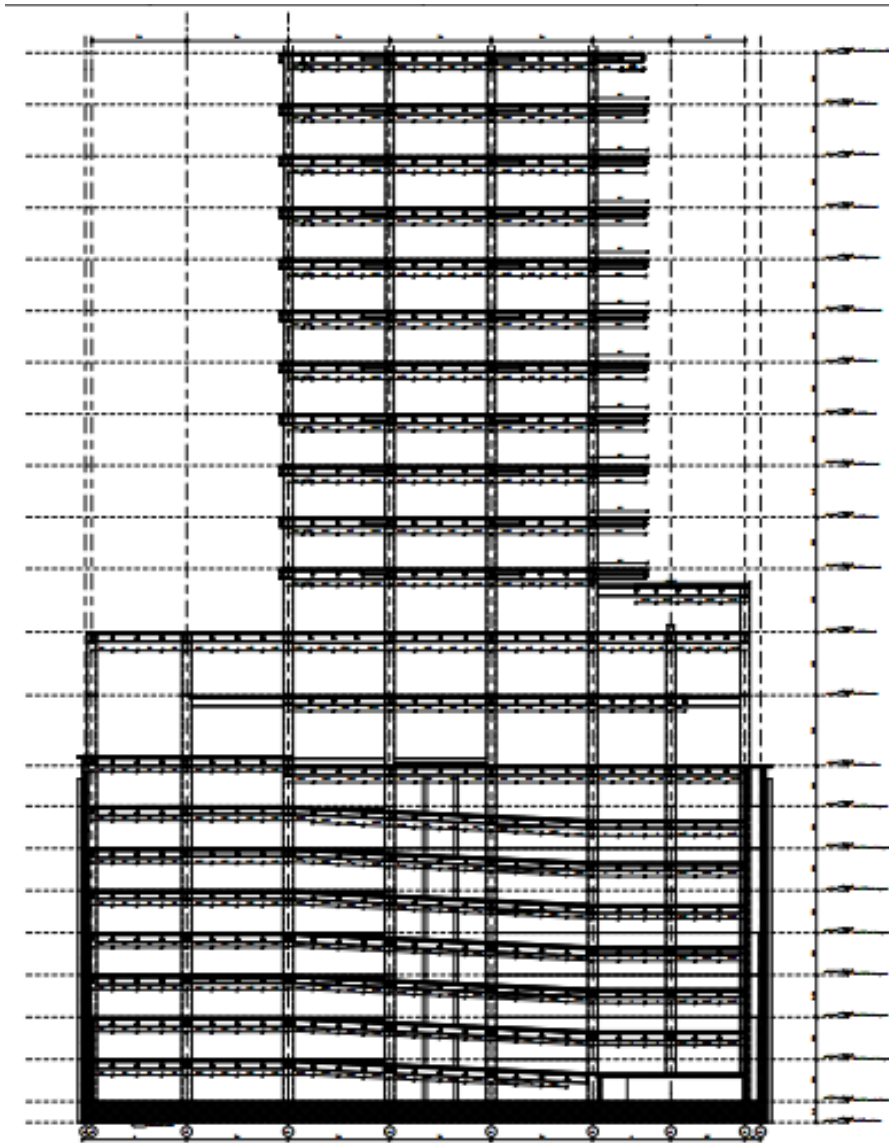


Figure 30 - A-A Section – Source: Artelia

3.2.6.1) Structure Cost Estimation

Costs for structural works has been calculated as detailed below. No distinction of intended use had been done, since there is no remarkable difference in terms of structures.

Item	Cost (€)	sqm	€/sqm
<i>Carpentry (CA on slabs incl.)</i>	€ 8,131,412.33		€ 393.00
<i>Retaining walls - Reinforced concrete (steel incl.)</i>	€ 699,968.96	20,682	€ 34.00
<i>Foundation mat (steel incl.)</i>	€ 666,030.43		€ 32.00
TOTAL	€ 9,497,371.72	20,682	€ 459.00

Table 8 - Structure Cost Estimation - Source: Artelia and Personal Activities

3.2.7) Electrical Design

The Electrical System has been designed to fulfill six objectives listed below:

- Fire safety
- Energy saving
- health and comfort of personnel
- latest technologies
- Flexibility
- Building efficiency

This design criteria covers the minimum requirements for design, Engineering, supply of equipment, materials, construction/Erection, mechanical completion and commissioning of electrical and low current systems of Elahiyeh Office.

Electrical and low current systems have been designed to have the highest reliability and minimum failure in order to achieve safe, efficient, accurate and easy operation under various operational requirements with reduced maintenance and operating cost.

Particular care has been taken for the safety of personnel during operation and maintenance, reliability of services, ease of maintenance, convenience of operation, maximum interchangeability of equipment and future expansion of demands and loads.

Main power distribution has been designed to have dedicated MV/lv transformers for all common areas and a low voltage power supply from Tehran electricity distribution company (TEDC) for each tenant of the building complex.

Main lv panel will be equipped with dedicated power metering system divided by system, duly interfaced with building management system. As far Tenants are concerned it has been foreseen only the provision for system centralization. This will allow power consumption statistics and implement energy savings philosophies. In case of rental from a single tenant the system could be fully integrated into the building's BMS by extending the BMS bus to the tenant's distribution panels.

Retail and the Offices Electrical system	<i>Electrical power Distribution (kw)</i>	<i>Electrical power Distribution HVAC (kw)</i>	<i>Electrical power lighting systems (kw)</i>	<i>Total Power (kw)</i>	<i>Number of Tenants</i>
<i>Loads Electrical Systems Tenants Retails</i>	73.28	36.64	9.16	119.08	2
<i>Loads Electrical Systems Restaurant</i>	158.80	31.76	7.94	198.50	1
<i>Loads Electrical Systems Tenants offices</i>	377.08	235.66	58,92	671.64	20

Table 9 – Electrical Technical Data Sheet – Source: Artelia Group

Common Spaces Electrical Systems	<i>Electrical power Distribution (kw)</i>	<i>Electrical power Distribution HVAC (kw)</i>	<i>Electrical power lighting systems (kw)</i>	<i>Total Power (kw)</i>	<i>Number of Tenants</i>
<i>Loads Electrical Systems Parking</i>	11.57		49,60	61.17	

<i>Loads Electrical Systems Common Spaces</i>	30.64	22.68	18.43	71.74
<i>Loads Electrical Systems Technical Areas</i>	6.20	4.72	5,90	16.83
<i>Loads Electrical Systems HVAC</i>		220,25		220.25
<i>Loads Electrical Systems Lift</i>				90.00

Table 10 - Electrical Technical Data Sheet – Source: Artelia Group

3.2.7.1) Environmental Data

- The environmental conditions will be considered to be as defined below:
 - Ambient temperatures: max: 40° C min: -10° C (outdoor)
 - Humidity: 100%
 - Altitude: >1000 above the sea level
 - Atmosphere: Normal
- Minimum Protection Degree of Systems and Equipment
 - Inside technical rooms: IP44
 - External area: IP54
 - Water treatment station and wet areas: IP54
 - Offices, reception, etc.: IP20/IP40
- Lighting illumination Levels
 - External areas: 20 Lx
 - Offices: 350 Lx (to be integrated by tenants if required specific duties)
 - Corridors: 150 Lx
 - Technical rooms: 200 Lx
- Fire detection and alarm system

The primary purpose of the system is to give an early warning of dangerous conditions to occupants enabling them to evacuate the building or area safely. A combined manual and automatic Fire Detection and Alarm System will be provided.

The connection of fire alarm/detection devices will be realized with cables laid on low current cable tray. Connection from devices to cable tray will be realized with

cables in PVC conduits. System has been designed in accordance with EN 54 standards.

- Smoke detection system

In order to improve building's safety, fire detection and alarm system will be centralized and extended to all areas of the complex.

The system will be so composed:

- Optical type smoke detectors complete of mounting base and signaling led for office areas
- Heat detectors for transforming station, diesel generator room and other technical areas
- Manual call points
- Carbon oxide gas detectors for parking areas.
- Hydrocarbon gas detectors for parking areas.
- Siemens FC2060 main fire detection control unit complete of all accessories containing
 - built-in stand-by battery, rated to maintain operation for 72 hours after mains power
 - failure in central control room.
- The FC2060 processes signals from Sinteso, collective MS7/9/24, DS11, Synova 600,
- SIGMACON, and addressed MS9i devices.

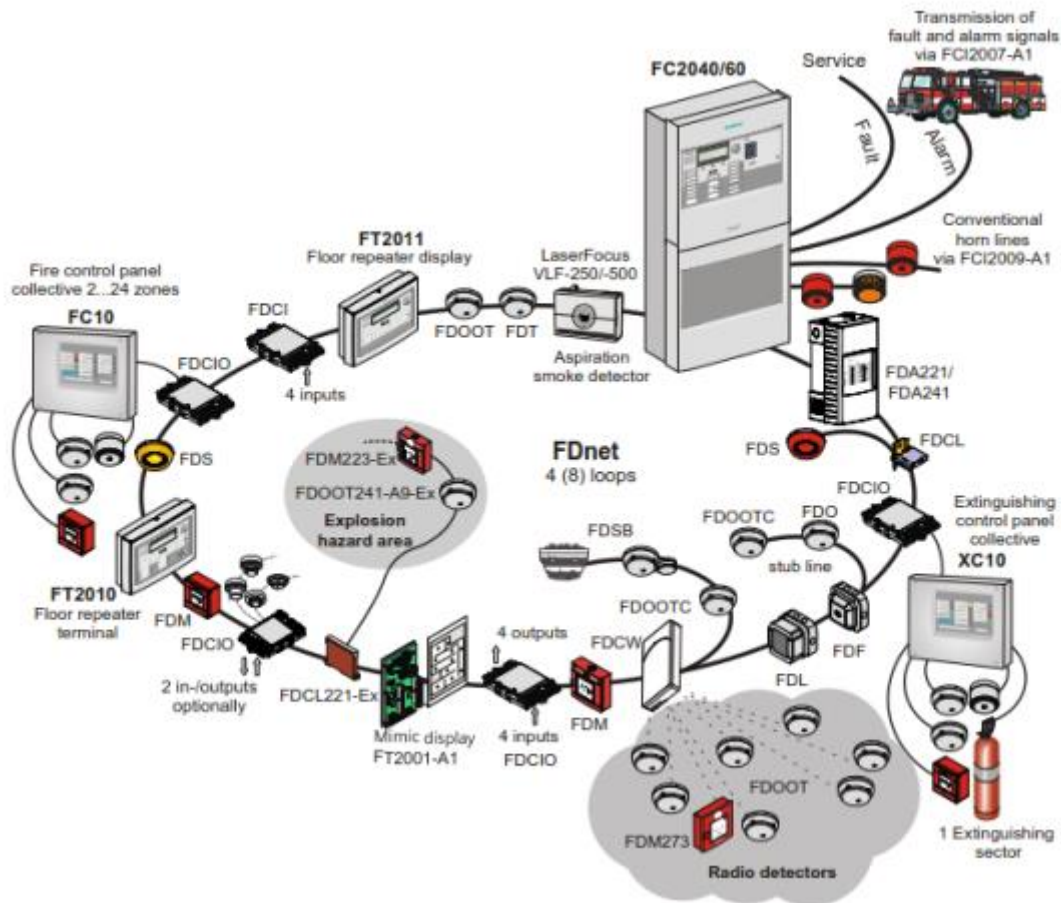


Figure 31 - Fire and Smoke Detection System Source: Artelia

There are systems which are considered as part of electrical system that they have been listed as follow. All the systems which has been mentioned before and follow are connected top each other with BMS centralized control:

- Public address system (PA/GA Voice evacuation system)
- Intrusion detection systems
- Access control systems
- CCTV system
- Structured Cabling System (SCS)
- TV antenna

- Building Automation/Management System commons areas



Figure 32 - BMS schematic Centralized – Source: Artelia

3.2.7.2) Component’s Providers List

Providing components list it is necessary to have each system final cost estimation which is the main factor to calculate the maintenance cost. In the following chart it could be seen components with different producers.

Due to the complexity of the project, relevant design shall be based upon basic characteristics pertinent to individual supplier. For this reason, the following list highlights the manufacturer of main system taken as reference during design phase.

Transformers

<i>Manufacturer</i>	<i>Country</i>
<i>IRAN TRANSFO</i>	IRAN
<i>ABB TRAF0</i>	ITALY
<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>SIEMENS</i>	ITALIAN BRANCH

UPS

SCHNEIDER ELECTRIC | FRANCE

CHLORIDE SILECTRON | FRANCE

SIEL | ITALY

SIEMENS | ITALY

Switchgears

IRAN TABLO | IRAN

PARS SWITCH BOARD | IRAN

SKEMA S.P.A. | ITALY

SCHNEIDER ELECTRIC | FRANCE

SIEMENS | ITALY

Cable trays & accessories

AJINEH | IRAN

FEMI CZ | ITALY

SATI | ITALY

OBO BETTERMAN | AUSTRIA

LEGRAND | FRANCE

Wire & cables

ALBORZ CABLE | IRAN

ABHAR WIRE AND CABLE | IRAN

DUCAB | UAE

PRYSMIAN CABLE | ITALY

Junction box

<i>LEGRAND</i>	FRANCE
<i>GEWISS</i>	ITALY
<i>VIMAR</i>	ITALY
<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>ARABIAN FALCON ABU DHABI</i>	UAE

Electric motors

<i>SIEMENS</i>	ITALY
<i>ABB</i>	FRANCE
<i>MARELLI</i>	ITALY

Bus duct

<i>GITAL</i>	IRAN
<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>POGLIANO</i>	ITALY
<i>SIEMENS</i>	ITALY
<i>GERSAN ELEKTRIC</i>	TURKEY
<i>ARABIAN FALCON ABU DHABI</i>	UAE

Socket outlet and switch

<i>LEGRAND</i>	FRANCE
<i>VIMAR</i>	ITALY
<i>ABB</i>	GERMANY
<i>WOERTZ</i>	SWITZERLAND

Offices automation

<i>WIELAND ELECTRIC</i>	GERMANY
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<i>WOERTZ</i>	SWITZERLAND
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<i>ENSTO</i>	FINLAND
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<i>SIEMENS</i>	ITALY
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EVAC/Paging system

<i>BOSCH</i>	☑ BOSCH GERMANY
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<i>PHILIPS</i>	NETHERLAND
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<i>DYNACORD</i>	GERMANY
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<i>SIEMENS</i>	ITALY
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<i>RCF</i>	ITALY
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Access control system and intrusion detection

<i>ASSA ABLOY</i>	SWEDEN
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<i>HONEYWELL SECURITY M.E.</i>	UAE
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<i>SCHNEIDER ELECTRIC</i>	FRANCE
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<i>SIEMENS</i>	ITALY
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Fire alarm system

<i>GENT UNITED KINGDOM</i>	KINGDOM
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<i>HONEYWELL NOTIFIER ITALY</i>	ITALY
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<i>DEF FRANCE</i>	FRANCE
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<i>SIEMENS ITALY</i>	ITALY
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CCTV

<i>LIVAR PARS SYSTEM</i>	IRAN
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<i>SAMSUNG</i>	KOREA
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<i>PANASONIC</i>	JAPAN
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<i>SONY</i>	JAPAN
<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>SIEMENS</i>	ITALY

B.M.S and distributed control system

<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>SIEMENS</i>	ITALY
<i>JOHNSON CONTROLS</i>	UNITED KINGDOM
<i>SAUTER</i>	SWITZERLAND

TV antenna

<i>SPAUN</i>	GERMANY/IRAN
<i>HIRSCHMANN</i>	GERMANY
<i>FRACARRO</i>	ITALY
<i>PANASONIC</i>	JAPAN

Structured cabling systems

<i>AVAYA UNITED</i>	UNITED KINGDOM
<i>HUAWEI</i>	CHINA
<i>PANDUIT</i>	ITALY BRANCH
<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>VIMAR</i>	ITALY

PABX Systems

<i>SIEMENS</i>	ITALY
<i>ERICSSON</i>	SWEDEN
<i>ALCATEL</i>	FRANCE

PANASONIC	JAPAN
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Lan active equipment

MOXA	TAIWAN
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CISCO SYSTEM	USA
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HUAWEI	CHINA
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ENGENIUS	USA
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Parking management equipment

FAAC AUTOMATION	ITALY
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MIDDLE EAST ITS	UAE
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AKE SYSTEM	CHINA
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Table 11 – Component Providers – Source: Personal Activity

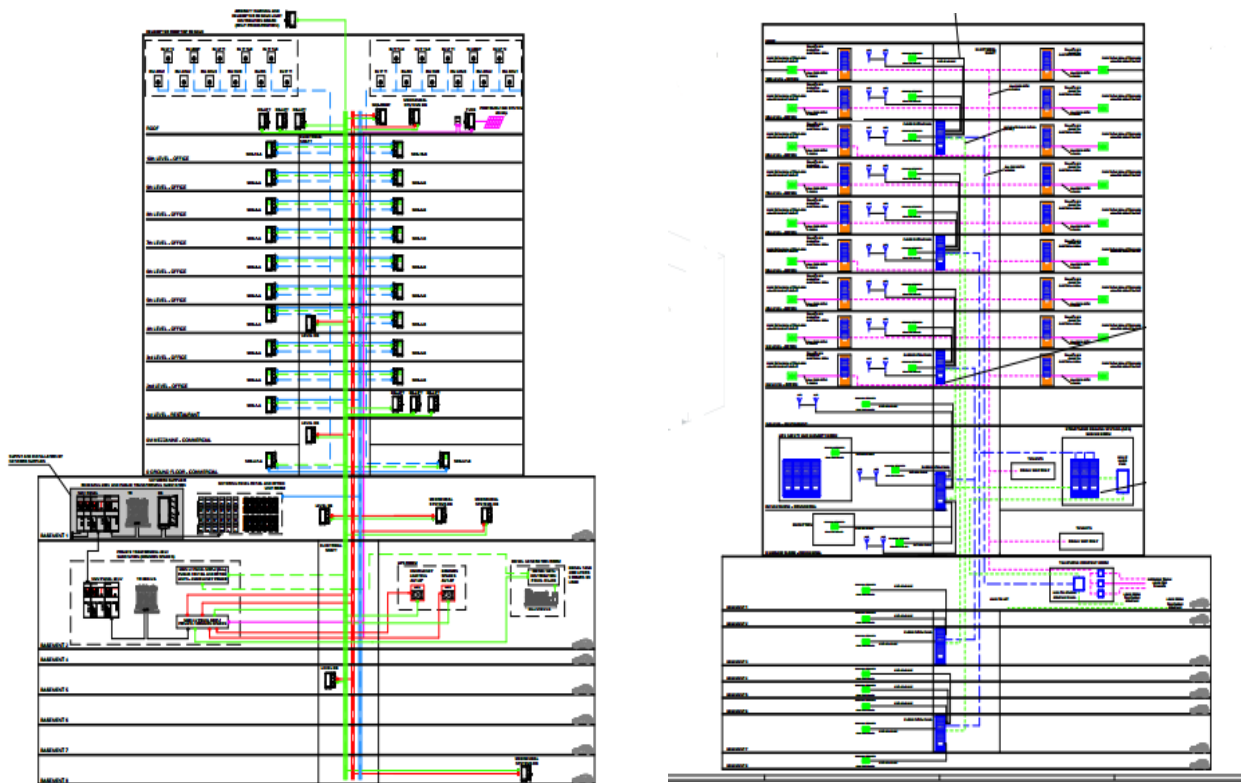


Figure 33 - Electricity and Server Plans – Source: Artelia

3.2.7.3) Electricity Cost Estimation

This title has aim to estimate the cost for electrical system of Elahiyeh Multi-Use Complex.

The following cost has been calculated based on the average prices of each type of product which has been mentioned in the Table number eight plus the working hours multiplied by square meters of each activity.

The building has been divided into several parts, depending on the intended uses, whose areas are defined as below:

- **Access:** main entrance lobby, stairs, lifts, landing areas;
- **Office:** operative office areas;
- **Services:** toilettes, copy rooms, corridors at office floors, smoking rooms;
- **Commercial:** commercial areas at GF and Mezzanine;
- **Restaurant:** first floor dedicated to the restaurant, including the kitchen area;
- **Parking:** parking floors, excluding rooms and spaces dedicated to services, access to the building and equipment;
- **Equipment:** technical rooms.

In the table number 9 it could be seen the areas of each function, moreover in the table number 10 all equipment costs have been listed which has been showed with each square meter cost and Total cost.

Destination Area	m^2
Access	3,287
Office	4,939

Service	1,113
Commercial	759
Restaurant	1,062
Parking	7,644
Equipment	1,878
Total	20,682

Table 12 – Areas by Functions – Artelia and Personal Activity

Installation	Area	sqm	Above Ground Floor	Below Ground Floor	Total Estimation Cost	€/sqm	Exclusion
Lighting System LED		20,682	€ 613,649.15	€ 219.260,00	€ 832.909,15	€ 40.27	Architectural luminaries in commercial and restaurant area
	Access	3,287	€ 213,7682.30		€ 2137682.30	€ 65	
	Office	4,939	€ 321,053.85		€ 321053.85	€ 65	
	Service	1,113	€ 33,402.00		€ 33402.00	€ 30	
	Commercial	759	€ 18,965.25		€ 18965.25	€ 25	
	Restaurant	1,062	€ 26,545.75		€ 26545.75	€ 25	
	Parking	7,644		€ 191091.50	€ 191091.50	€ 25	
	Equipment	1,878		€ 28168.50	€ 28168.50	€ 15	
Facade and external Lighting - Lighting system LED		870	€ 82,450.00		€ 82450.00	€ 94.77	Led lighting tower high part from the first floor to the floor 11. External Area lighting to be defined as per Architectural Design.
	Facade	520	€ 70,200.00		€ 70200.00	€ 135	
	External	350	€ 12,250.00		€ 12250.00	€ 35	

**Security Lighting
System LED**

	20,682	€ 138,069.85	€ 28,564.65	€ 166,634.53	€ 8.06
Access	3,287	€ 49,311.30		€ 49,311.30	€ 15
Office	4,939	€ 74,089.35		€ 74,089.35	€ 15
Service	1,113	€ 5,567.00		€ 5,567.00	€ 5
Commercial	759	€ 3,793.05		€ 3,793.05	€ 5
Restaurant	1,062	€ 5,309.15		€ 5,309.15	€ 5
Parking	7,644		€ 22,930.98	€ 22,930.98	€ 3
Equipment	1,878		€ 5,633.70	€ 5,633.70	€3

Distribution Power

	20,682	€ 377,799.55	66,386.80	444,186.35	21,48	Lighting Strike
Access	3,287	€ 82,185.50		€ 82,185.50	€ 25	
Office	4,939	€ 222,268.05		€ 222,268.05	€ 45	
Service	1,113	€ 27,835.00		€ 27,835.00	€ 25	
Commercial	759	€ 18,965.25		€ 18,965.25	€ 25	
Restaurant	1,062	€ 26,545.75		€ 26,545.75	€ 25	
Parking	7,644		€ 38,218.30	€ 38,218.30	€ 5	
Equipment	1,878		€ 28,168.50	€ 28,168.50	€ 15	

**Mechanical System
Distribution Power**

	20,682	€ 390,619.25	€180,381.40	€ 571,000.65	€ 27.61	pumps / valves / motors / VRF unit / sensor / inverters, ecc.
Access	3,287	€ 115,059.70		€ 115,059.70	€ 35	
Office	4,939	€ 172,875.15		€ 172,875.15	€ 35	
Service	1,113	€ 38,969.00		€ 38,969.00	€ 35	control panel for each tenant
Commercial	759	€ 26,551.35		€ 26,551.35	€ 35	
Restaurant	1,062	€ 37,164.05		€ 37,164.05	€ 35	Room thermostat for tenant
Parking	7,644		€ 114,654.90	€ 114,654.90	€ 15	
Equipment	1,878		€ 65,726.50	€ 65,726.50	€ 35	VRF regulation system

						Bus connections for VRF system
Substations, Diesel Generator, UP, ecc.	1,878		€ 292,952.40	€ 292,952.40	€ 156	Network supplier receiving and public transforming substation
Equipment	1,878		€ 292,952.40	€ 292,952.40	€ 156	
Parking automation system	7,644		€ 57,327.45	€ 57,327.45	€ 7.5	
Parking			€ 57,327.45	€ 57,327.45	€ 7.5	
TV Antenna System	8,227	€ 24,680.13		€ 24,680.13	€ 3	tv color / decoder ecc.
Access	3,287	€ 9,862.26		€ 9,862.26	€ 3	
Office	4,939	€ 14,817.87		€ 14,817.87	€ 3	
Intrusion/Security System	20,682	€ 40,177.98	€ 34,277.62	€ 74,455.60	€ 3.60	Intrusion detection Systems inside Tenants
Access	3,287	€ 11,834.71		€ 11,834.71	€ 3.60	
Office	4,939	€ 17,781.44		€ 17,781.44	€ 3.60	
Service	1,113	€ 4,008.24		€ 4,008.24	€ 3.60	
Commercial	759	€ 2,731.00		€ 2,731.00	€ 3.60	
Restaurant	1,062	€ 3,822.59		€ 3,822.59	€ 3.60	
Parking	7,644		€ 27,517.18	€ 27,517.18	€ 3.60	
Equipment	1,878		€ 6,760.44	€ 6,760.44	€ 3.60	
Fire Alarm System	20,682	€ 189,729.35	€ 161,866.52	€ 351,595.87	€ 17	
Access	3,287	€ 58,886.14		€ 58,886.14	€ 17	
Office	4,939	€ 83,967.93		€ 83,967.93	€ 17	
Service	1,113	€ 18,927.80		€ 18,927.80	€ 17	
Commercial	759	€ 12,896.37		€ 12,896.37	€ 17	
Restaurant	1,062	€ 18,051.11		€ 18,051.11	€ 17	
Parking	7,644		€ 129,942.22	€ 129,942.22	€ 17	

	Equipment	1,878		€ 31,924.30	€ 31,924.30	€ 17	
Public address system		20,682	€ 44.642,20	€ 38.086,24	€ 82.728,44	€ 4,00	
(PA/GA Voice evacuation system)							
	Access	3,287	€ 13.149,68		€ 13.149,68	€ 4,00	
	Office	4,939	€ 19.757,16		€ 19.757,16	€ 4,00	
	Service	1,113	€ 4.453,60		€ 4.453,60	€ 4,00	
	Commercial	759	€ 3.034,44		€ 3.034,44	€ 4,00	
	Restaurant	1,062	€ 4.247,32		€ 4.247,32	€ 4,00	
	Parking	7,644		€ 30.574,64	€ 30.574,64	€ 4,00	
	Equipment	1,878		€ 7.511,60	€ 7.511,60	€ 4,00	
Access Control System		20,682	€ 33.481,65	€ 28.564,68	€ 62.046,33	€ 3,00	Turnstiles
	Access	3,287	€ 9.862,26		€ 9.862,26	€ 3,00	
	Office	4,939	€ 14.817,87		€ 14.817,87	€ 3,00	
	Service	1,113	€ 3.340,20		€ 3.340,20	€ 3,00	
	Commercial	759	€ 2.275,83		€ 2.275,83	€ 3,00	
	Restaurant	1,062	€ 3.185,49		€ 3.185,49	€ 3,00	
	Parking	7,644		€ 22.930,98	€ 22.930,98	€ 3,00	
	Equipment	1,878		€ 5.633,70	€ 5.633,70	€ 3,00	
CCTV System		18,804	€ 55.802,75	€ 38.218,30	€ 94.021,05	€ 5,00	CCTV systems inside Tenants
	Access	3,287	€ 16.437,10		€ 16.437,10	€ 5,00	
	Office	4,939	€ 24.696,45		€ 24.696,45	€ 5,00	
	Service	1,113	€ 5.567,00		€ 5.567,00	€ 5,00	
	Commercial	759	€ 3.793,05		€ 3.793,05	€ 5,00	
	Restaurant	1,062	€ 5.309,15		€ 5.309,15	€ 5,00	
	Parking	7,644		€ 38.218,30	€ 38.218,30	€ 5,00	

Structured Cabling System (SCS)

	20,682	€ 281.916,71	€ 76.172,48	€ 358.089,19	€ 17,31	Servers
Access	3,287	€ 26.299,36		€ 26.299,36	8,00	Switches
Office	4,939	€ 232.146,63		€ 232.146,63	47,00	
Service	1,113	€ 8.907,20		€ 8.907,20	8,00	
Commercial	759	€ 6.068,88		€ 6.068,88	8,00	For restaurant / commercial only cable try
Restaurant	1,062	€ 8.494,64		€ 8.494,64	8,00	Telephone exchange
Parking	7,644		€ 61.149,28	€ 61.149,28	8,00	
Equipment	1,878		€ 15.023,20	€ 15.023,20	8,00	Phones
						Active equipment

Table 13 – Electrical System Cost Estimation – Source: Artelia and Personal Activities

BMS System

	20,682	€ 200.889,90	€ 171.388,08	€ 372.277,98	€ 18,00	For tenant areas the climate control systems
Access	3,287	€ 59.173,56		€ 59.173,56	€ 18,00	will be stand-alone type
Office	4,939	€ 88.907,22		€ 88.907,22	€ 18,00	
Service	1,113	€ 20.041,20		€ 20.041,20	€ 18,00	MS for Tenants (If required by tenant's their system could be integrated into BMS through necessary gateway devices)
Commercial	759	€ 13.654,98		€ 13.654,98	€ 18,00	
Restaurant	1,062	€ 19.112,94		€ 19.112,94	€ 18,00	
Parking	7,644		€ 137.585,88	€ 137.585,88	€ 18,00	
Equipment	1.878		€ 33.802,20	€ 33.802,20	€ 18,00	

Total | **20,682** | **2,473,908.47** | **1,393,446.65** | **3,867,355.12** | **€ 187**

3.2.8) Mechanical Design

This technical report has been purposed the technology and components which they have been going to use in Elahiyeh Multi-Use Complex.

Design goal is to achieve the six main objectives listed below were considered as guidelines for the development of the design solutions.

The main objectives are:

- Internal comfort
- Energy saving
- Latest technologies
- Flexibility
- Building efficiency

This design criteria covers the minimum requirements for design, Engineering, supply of equipment, materials, construction/Erection, and commissioning of mechanical systems of Elahiyeh Office in 42 Amin Street Tehran.

Mechanical systems are designed to have the highest reliability and minimum failure in order to achieve safe, efficient, accurate and easy operation under various operational requirements with reduced maintenance and operating cost.

Particular care has been taken for reliability of services, ease of maintenance, convenience of operation, interchange ability of equipment and future expansion of demands and loads, namely the modular size and capacity of the HVAC equipment allows the increase of units to face future needs of cooling and/or heating. Technical room Spare space on the area where the units are positioned has been considered.

The different part of Mechanical system has been defined as follow:

- Air Conditioning System
- The HVAC system
- The Ventilation of the kitchen

- Stairwells pressurization
- Car parks ventilation
- Domestic Hot and Cold-Water System
- Central plant and boosting pumps
- Drinking water treatment
- Hot water production with solar collectors and make-up heat pumps
- Domestic hot and cold-water distribution
- Sanitary ware
- Toilets flushing with reclaimed water
- Waste Water System
- Sanitary and waste water drainage
- Waste water drainage from parking floors
- Water treatment plant for water reclaiming
- Fire Suppression Systems
- Fire water supply to the building
- Automatic sprinkler system
- Standpipe system
- Portable fire extinguishers

3.2.8.1) Component Providers List

In the following it could be seen the Components providers list which could help to define better Facility Management plan.

<i>Company Name</i>	<i>Country of Origin</i>
<i>VRF Systems</i>	
<i>DAIKIN</i>	JAPAN
<i>FUJITSU</i>	JAPAN
<i>Ventilation Systems</i>	
<i>FLÄKT WOODS</i>	UK
<i>SODECA</i>	SPAIN
<i>Filtering Systems</i>	
<i>COFIM</i>	ITALY
<i>CAMFIL</i>	SWEDEN
<i>Air distribution Fixtures</i>	
<i>TROX</i>	GERMANY
<i>SHAKO</i>	GERMANY
<i>KRANTZ</i>	GERMANY
<i>Parking ventilation Systems</i>	
<i>FLÄKT WOODS</i>	UK
<i>SODECA</i>	SPAIN
<i>Pressurizing Systems</i>	
<i>GRUNDFOS</i>	DENMARK
<i>KSB</i>	GERMANY
<i>VILO</i>	GERMANY

<i>Water treatment Systems</i>	
<i>BEST WATER TECHNOLOGY</i>	AUSTRIA
<i>CULLIGAN</i>	BELGIUM
<i>Waste water treatment Systems</i>	
<i>ENVIROCHEMIE</i>	GERMANY
<i>Fire suppression Pumps Sets</i>	
<i>GRUNDFOS</i>	DENMARK
<i>Fire Suppression Fixtures</i>	
<i>TYCO</i>	IRELAND
<i>B.M.S and distributed control system</i>	
<i>SCHNEIDER ELECTRIC</i>	FRANCE
<i>SIEMENS</i>	ITALY
<i>JOHNSON CONTROLS</i>	UNITED KINGDOM
<i>SAUTER</i>	SWITZERLAND

Table 14 - Mechanical Components Provider List - Source: Personal Activity

32.8.2) Mechanical System Cost Estimation

This title has been aims to estimate the cost for Mechanical System of Elahiyeh project.

The building has been divided into several parts, depending on the intended uses, whose areas are defined as below:

- **Access:** main entrance lobby, stairs, lifts, landing areas;
- **Office:** operative office areas;
- **Services:** toilettes, copy rooms, corridors at office floors, smoking rooms;
- **Commercial:** commercial areas at GF and Mezzanine;

- **Restaurant:** first floor dedicated to the restaurant, including the kitchen area;
- **Parking:** parking floors, excluding rooms and spaces dedicated to services, access to the building and equipment;
- **Equipment:** technical rooms.

Mechanical works have been divided per different systems:

- HVAC and Fresh Air Ventilation
- Ventilation system
- Plumbing (cold and hot water supply)

<i>Installation</i>	<i>Area</i>	<i>sqm</i>	<i>Above Ground Floor</i>	<i>Below Ground Floor</i>	<i>Total Estimation Cost</i>	<i>€/sqm</i>	<i>Exclusion</i>
HVAC/Fresh Air Ventilation		20,682	€ 2.735.000,00	€ -	€ 2.735.000,00	€ 132,24	System controllers and higher-level devices for automation systems apart from VRF
	Access	3,287	€ 750.000,00		€ 750.000,00	€ 228,14	
	Office	4,939	€ 1.300.000,00		€ 1.300.000,00	€ 263,20	(only in-field devices are supplied by mech.)
	Service	1,113	€ 165.000,00		€ 165.000,00	€ 148,19	
	Commercial	759	€ 200.000,00		€ 200.000,00	€ 263,64	Contractor plus the complete system for VRF)
	Restaurant	1,062	€ 320.000,00		€ 320.000,00	€ 301,37	
	Parking	7,644			€ -	€ -	masonry assistance
	Equipment	1.878			€ -	€ -	electrical power and control cabling
Ventilation		20,682	€ 361.100,00	€ 438.900,00	€ 800.000,00	€ 38,68	kitchen equipment,

Access	3,287	€ 221.100,00	€ 108.900,00	€ 330.000,00	€ 100,38	
Office	4,939	€ 20.000,00		€ -	€ -	kitchen hoods,
Service	1,113	€ 120.000,00		€ 20.000,00	€ 17,96	
Commercial	759			€ -	€ -	electrical power and control cabling
Restaurant	1,062			€ 120.000,00	€ 113,01	
Parking	7,644		€ 250.000,00	€ 250.000,00	€ 32,71	masonry assistance
Equipment	1.878		€ 80.000,00	€ 80.000,00	€ 42,60	System controllers and higher-level devices for automation systems

Plumbing Cold and Hot water supply

	20,682	€ 505.000,00	€ -	€ 505.000,00	€ 24,42	electrical power and control cabling
Access	3,287			€ -		masonry assistance
Office	4,939			€ -		
Service	1,113	€ 420.000,00		€ 420.000,00		System controllers and higher-level devices for
Commercial	759	€ 30.000,00		€ 30.000,00		automation systems
Restaurant	1,062	€ 55.000,00		€ 55.000,00		
Parking	7,644			€ -		
Equipment	1.878			€ -		

Plumbing - Waste

	20,682	€ -	€ 220.000,00	€ 220.000,00	€ 10,64	- sanitary fixtures with faucets
Access	3,287			€ -	€ -	
Office	4,939			€ -	€ -	- masonry assistance
Service	1,113		€ 60.000,00	€ 60.000,00	€ 53,89	
Commercial	759		€ 15.000,00	€ 15.000,00	€ 19,77	electrical power and control cabling

	Restaurant	1,062		€ 15.000,00	€ 15.000,00	€ 14,13	System controllers and higher-level devices for automation systems
	Parking	7,644		€ 105.000,00	€ 105.000,00	€ 13,74	
	Equipment	1.878		€ 25.000,00	€ 25.000,00	€ 13,31	
Water Reclaim for Toilets flushing		20,682	€ 215.000,00	€ -	€ 215.000,00	€ 10,40	storm water drainage system,
	Access	3,287			€ -	€ -	masonry assistance
	Office	4,939			€ -	€ -	
	Service	1,113	€ 160.000,00		€ 160.000,00	€ 143,70	electrical power and control cabling
	Commercial	759	€ 30.000,00		€ 30.000,00	€ 39,55	
	Restaurant	1,062	€ 25.000,00		€ 25.000,00	€ 23,54	System controllers and higher-level devices for automation systems
	Parking	7,644			€ -	€ -	
	Equipment	1.878			€ -	€ -	
Fire Fighting		20,682	€ 525.000,00	€ -	€ 525.000,00	€ 25,38	masonry assistance
	Access	3,287	€ 85.000,00		€ 85.000,00	€ 25,86	electrical power and control cabling
	Office	4,939	€ 130.000,00		€ 130.000,00	€ 26,32	
	Service	1,113	€ 30.000,00		€ 30.000,00	€ 26,94	System controllers and higher-level devices for automation systems
	Commercial	759	€ 20.000,00		€ 20.000,00	€ 26,36	
	Restaurant	1,062	€ 30.000,00		€ 30.000,00	€ 28,25	automation systems
	Parking	7,644	€ 230.000,00		€ 230.000,00	€ 30,09	
	Equipment	1.878			€ -	€ -	
		20.682	€ 4.341.100,00	€ 658.900,00	€ 5.000.000,00	241,75	

Table 15 = Mechanical System Cost Estimation – Artelia and Personal Activities

3.3) Summery Cost Estimation Table

Based on all the Cost estimations in each different section Table 15 has been summarized Cost for Elahiyeh Multi-Use Complex.

<i>Activities</i>	<i>Cost (€)</i>	<i>sqm</i>	<i>€/sqm</i>
<i>Structural</i>	€ 9,497,371.72	20,682	€ 459.00
<i>Civil and Finishes</i>	€ 8,892,406.00		€ 430.00
<i>Electrical</i>	€ 3,867,355.12		€ 187.00
<i>Mechanical</i>	€ 5,000,000.00		€ 242.00
<i>TOTAL</i>	€ 27,257,132.84	20,682	€ 1,318.00

Table 16 - Summary Cost Estimation Table - Artelia Personal Activities

CHAPTER FOUR

Elahiyeh Multi-Use Complex Facility

Management Plan

4) Elahiyeh Multi-Use Complex Facility Management Plan

Defining Facility Management Plan is a vital issue for the Startup as matter of two topic, first it will give a proper economical estimation about how much the facility management of building does it cost for the Startup and in the other hand how much should Startup charge the owner in case of having a convenient profit. Of course, it is just one example and maybe in the other cases the needs may change but the most important matter here is the procedure if the process of facility management plan and the cost estimation define correctly it can expand to the other cases too.

The second matter could be a correct estimation of human resources, for example if Startup get a project like Elahiyeh it is possible to understand how many persons they need in all different sectors to run the building according to the Facility Management contract.

4.1) Facility Management Plan

Before going into practical and economical calculation it would be better to understand what does our requirement form a Facility/Maintenance program, so first it would be better to consider standard as the basis of our program. The Standard which have been chosen is the UNI 8290.

Now to define Facility Management plan for Elahiyeh Multi-Use Complex have been decided to divide the building into different sectors, and define an economical and practical program separately for each sector.

The Sectors which are going to explain in the following have been defined as below.

- Façade and External Finishing
- Internal Finishing
- Structure

- Mechanical and Electrical (M&E)
- Security

4.1.1) Façade and External Finishing

First Step it could be understand the requirement of UNI 8290 from Façade and External Finishing, the technical requirements that should be satisfied by the components are defining as below:

- Static resistance
- Mechanical resistance
- Reliability
- Un-hygroscopic
- Tolerance control
- Aptitude for
- intervention
- Waterproofing
- Maintainability
- Replaceability
- Cleanability
- Fire resistance
- Reaction to fire
- Resistance against

- chemical attacks
- Intrusion resistance
- Solar radiation resistance
- Impacts resistance
- Geometrical regularity

The strategy to satisfy all the above-mentioned requirement is to have first a periodical check a periodical protection and treatment.

Four different aspect of The Facility /Maintenance Management will be defined in five different categories, Visual Inspection, Cleaning, Protection Treatment, and Partial replacement.

Visual Inspection

If the failure is found at an early stage it could be repaired with lowest cost; furthermore, to find any kind of failure needs person as an inspector, so it defined to do the inspection every two or three years.



Figure 34 - Facade Inspection - Source: MEnD.com

Now if it would be considered every three years the visual inspection done by two-person, one special inspector and one assistance and they inspect 20sqm per hour by working 8 hour a day it will take to observe all the façade in 130 days. If we consider 15 euro per hour for assistance and 20 euro for expert it will cost totally:

Assistant: $15 \times 9 \times 130 = 17,550$

Expert: $20 \times 9 \times 130 = 23,400$

Total: $17,550 + 23,400 = 40,950$ euro

Total Annual Cost: $40,950/3 = 13,650$ euro

Cleaning

Cost estimation depends on methods it uses to clean the facades so for now the method is manually (Suspended person from the rooftop), so the cost calculation is based one salary of the cleaner and the equipment and material they use. Furthermore, it is the most expensive part for the maintenance of the glass facades, so if the cleaning did not be do well the facades will has poor appearance.



Figure 35 - Facade Cleaning - Source: Hseintegro.com

So, if five cleaners do the façade cleaning every six month the annually cost would have calculated as below:

$20,682 \text{ m}^2 / 10 \text{ m}^2 \text{ per hour (each worker)} = 413.64 / 8 \text{ hour} + 52 \text{ hours lunch break} = 466 \text{ hour}$
* 30 euro = 13,970

Total Annual Cost: $13,970 * 2 * 5 = 139,603$ euro per year

Protection Treatment

Protection and treatment could be as an example from preventing a little crack to expand or changing a façade structure's joint all these parts should consider as a fixed cost. So, the price for protection and treatment should be calculated with considering material which use to do this treatment and that the salary of the person how doing this job.



Figure 36 - Facade Protection and Treatment - Source: hseintegro.com

Partial Replacement

Failure in some cases needs a replacement, in our case some glass panel or a façade component needs to be replaced. Moreover, each glass panel after finishing its life cycle needs to be changed, due the high weight of panels also cost it needs a pre-planned program and determining fixed cost.



Figure 37 - Façade Replacement - Source: Constructionweekonline.com

so as experimental experience it found something near 10 percent of the cost of the Façade should spend for the protection and treatment + Partial replacement every five year which have calculated as below:

$$€ 3,760,653.00/10 = 376,065.3/5 = 75,213 \text{ euro per year}$$

Total Annual Cost: $376,065.3/5 = 75,213$ euro

Total refurbishment

So, at the end it could be find approximately fixed cost and plan to doing the maintenance.

The Total annual cost would be the summation of all different actions:

$$\text{Visual Inspection (13,650) + Cleaning (139,603) + Partial replacement and protection (75,213)} \\ = \mathbf{228,468 \text{ euro}}$$

- Durability
- Cleanability
- Fire resistance
- Reaction to fire
- Resistance against
- biological attacks
- Repair ability
- Replaceability
- Impacts resistance
- Geometrical regularity

The Next Step is to define different actions like what have been done for the External Finishing.

Visual Inspection

Visual Inspection in the Internal Finishing would be different from the External one in sense of possibility of using the user's announcement for any kind failure. This information could receive to Startup by using different ways such as Mobile App or Telephone number, but this kind of maintenance would be considered as after failure maintenance which is not satisfactory for a modern method of maintenance which the Startup aims to provide, so the periodical Inspection would be done also for more technical components. The combination of these two methods would be helpful in case of decreasing the Inspector working hours and in result the final cost.



Figure 39 - Internal Finishing Inspector - Source: Los Angeles Inspectors

The Internal Finishing Inspection should be done annually by using two inspectors one Building Engineer and one assistant they should check each level upper grand floor in three days and each floor underground in two days and one week to preparing the annual report.

So, the Inspection period would be: $12 \text{ (Upper floors)} * 3 \text{ (Days)} + 8 \text{ (Underground floors)} * 2 \text{ (days)} + 7 \text{ (days)} = 59 \text{ days almost } 2 \text{ months.}$

One-month salary for Engineer: 2500

One-month Salary for Assistant: 1500

Total Visual Inspection Cost: $2500*2 + 1500*2 = 8000$ euro per year

Cleaning

The Cleaning for Internal Area should have been done every day and it would be really an important matter for the Users no one likes to work in dirty area in the other hand in the absence of proper cleaning there would be possibility of spreading infection between users which could waste many working hours and expenses.



Figure 40 - Cleaning Office buildings - Source: Dirtmasterpa.com

The Planning for cleaning would be define as follow:

Upper Grand floor: each upper floor needs two workers to clean the area except the restaurant floor where the cleaning will be done by the restaurant staff. Each worker will work 2 hour every night except the weekends which could be consider each month 20 working days, each worker will receive 10 euro per hour. Moreover, the cleaning of the parking floors and big shopping areas could be done by mechanize devices which may cost at the beginning but will reduce the labor cost.

But before the calculation it should be considered each year has usually one month as holidays which should be minus from the total cost.

Upper Grand Floors: $10 \text{ (floors)} * 2 \text{ (hour)} * 2 \text{ (Workers)} * 10\text{euro/hour} = 400 \text{ €/day} = 400 \text{ €} * 20 \text{ d} = 8000 \text{ €/ month} = \mathbf{88,000 \text{ €/Year}}$

Lower Grand Floors: Mechanized: $20\text{min} * 8 = 2.7\text{h} * 15\text{€}$ (Machin operator) = 40 day = 800 Month = **8,800 €/year** + (one worker to clean the connections and other areas which is not possible to be clean with Machine) $1\text{w} * 1\text{h} * 8\text{floor} * 10\text{€/h} = 80 \text{ €/day} = 1600 \text{ €/month} =$
17,600 Year

Total Lower Grand Floor: 26,400 €

Total Cleaning Cost: $88,000 + 26,400 = 114,400 \text{ €/year}$

Protection/Treatment and Partial Replacement

Protection and treatment or replacement of a component in time before the failure happens probably is the most important part of the preventing maintenance strategy, The Treatment or Replacement first should be done for the components which they need to change according to annual report of visual inspectors, furthermore it should be done for the elements which are at the end of the end of their life cycle according to their data sheets. The cost for Internal treatment and replacement should be considered 10% of the total initial cost each five year which is based on experimental examination. Which will have calculated as below:

According to Table7: $5,131,753 \text{ €}$ (total Internal Finishing)/10 = $513,175 \text{ €/5 Year}$

= **102,635 €/Year**

Total Refurbishment

Now it would be possible to find out the fixed cost of Internal finishing maintenance for each year that would be calculated as below:

Total Fixed Annual Cost: $8,000.00 + 114,400.00 + 102,635.00 =$ **225,035.00 € / Year**

				Internal Finishing maintenance plan																					
Building component:		Area [m²]:	20,682																						
Year																									
MAINTENANCE STRATEGY	INTERVENTION		COST PER YEAR(€)	1	2	3	4	5	6	7	8	9	10												
		Name		Visual Inspection	8,000.00																				
	Cost €/m ²	0.39																							
	Name	Cleaning	114,400.00																						
	Cost €/m ²	5.53		220	220	220	220	220	220	220	220	220	220												
	Name	Treatments/Replacement	102,635.00																						
	Cost €/m ²	4.96																							
	Name	Total refurbishment	225,035.00																						
	Cost €/m ²	10.88																							

Figure 41 - Internal Finishing Maintenance Plan - Source: Self Activity

4.1.3) Structure

Usually the structure does not have any special sectors like cleaning or annual replacement, structure just need periodical inspection with long period timing to just prevent any progressive failures like progressive rust or detachment of fire resistance layer in the steel structures which is our case. Furthermore, as the UNI 8290 has been chosen as standard, so the requirements have to be considered that are listed as below:

- Static resistance
- Mechanical resistance
- Fire resistance
- Reaction to fire
- Thermal resistance
- Acoustic resistance
- Condensation control
- Thermal inertia

- Reliability
- Maintainability
- Durability
- Aptitude to:
 - Integration
 - Intervention
- Repair ability
- Replaceability
- Resistance against
 - biological attacks
- Tolerance control

The periodical inspection will be defined every ten year that should be done by one structural engineer and one assistant. If it be considered entire inspection period lasts one month the cost for Structural inspection would be considered:

Engineer Salary: 2500 €/month

Assistant Salary: 1500 €/month

Total Inspection Cost: 4000 € for each inspection period. (every 10 years)

The structural maintenance cost would not be just the inspection cost also some percentage of failure should be considered. According to experimental achievement 2% from total structural cost would be reasonable which could be calculated according to table 8 as below:

Total Structural maintenance: $9,497,371 * 0.02 = 189,947.42 \text{ €} / 10 = 18,995 \text{ €} / \text{year}$

Total Annual Cost: 18,995 € + 400 € = **19,395 € per year**

				Structure maintenance plan																			
Building component:		Area [m²]:	20,682																				
Year																							
MAINTENANCE STRATEGY	INTERVENTION		COST PER YEAR(€)	1	2	3	4	5	6	7	8	9	10										
	Name	Visual Inspection	400.00																				
	Cost €/m ²	0.02																					
	Name	Treatments/Replacement	18,995.00																				
	Cost €/m ²	0.92																					
	Name	Total refurbishment	19,395.00																				
	Cost €/m ²	0.94																					

Figure 42 - Structure Maintenance Plan – Source; Personal Activity

4.1.4) Electrical and Mechanical Systems

Electrical and Mechanical system are very Important in an office building in sense of no one like to lose power while doing an important project or when they are in an important meeting neither for mechanical system, losing water or air conditioning system of the offices or Parking floors ventilation system could be annoying also may cause loss of money so the Maintenance plan for these two parts have some different objects.

Stand by Engineers

To make sure that the building Mechanical and Electrical system are running without an interruption two engineers one mechanical and one electrical would be define as a stand by engineer within the building to answer to any failure immediately. So, the annual cost to having to stand by engineers would be:

Monthly Salary of a stand by Engineer: 2500 €

Total Cost of Stand by Engineers: 2500 € * 2 * 12 = **60,000 €/Year**

Visual Inspection:

Even if two stands by engineers have been defining to monitor all the Electrical and Mechanical systems every day, but there should be defined a periodical inspection in order to

4.1.5) Security

Security is an important issue in this building because the building will host luxury brands and International companies which is required a highly secure place, so first step is to create an effective security system with using trained personnel and CCTVs, motion sensors and etc. the Electrical has been designed in the previous parts, now it should be find out how many forces it will need in case to provide a secure area.



Figure 44 - Building Security - Source: pinterest.com

Parking Floors

In the parking entrance there would be need one person in the cabin to give the numbers to the arriving cars and one in the exit to take the number and parking cost but there is possibility to make it mechanized and eliminate the need for these two persons, but one person may need to guide cars inside and outside the parking and in case of problem like system failure etc., solve it as fast as possible.

Each two floors need one person for the security, In Iran these kind of multi-use complexes are starting to work from 8 AM to 10 PM it means in each post there would need of two person which each one work one working shift.

Number of Crew: $5 * 2$ working shift: 10

Monthly Salary: 1500 euro

Total Security for Parking floors cost:

$$10 * 1500 \text{ €} = 15,000 \text{ €}, 15,000 \text{ €} * 12 = \mathbf{180,000 \text{ €/year}}$$

Shops and Offices:

For the shops and office floors, would be need one security and one reception in the office entrance lobby, one persons for each shop, two persons for controlling the CCTVs. For the shops there will need two working shifts because in Iran shops are open from 10 AM to 10 PM, but for the offices there is no need reception after 6, there just need 24-hour security which could be done by 3 working shifts and after 6 there would be need just one person in the Control room.

Number of Crew: 14 working shifts

Monthly Salary for each Working Shifts:

$$14 * 1500 \text{ €/month} = 21,000 \text{ €/month} * 12 = \mathbf{252,000 \text{ €/year}}$$

Total yearly Security Cost:

$$180,000 \text{ €/year} + 252,000 \text{ €/year} = \mathbf{432,000 \text{ €/year}}$$

4.2) Facility Management Cost

In the previous Clause the Facility Management plan for Elahiyeh Multi-Use Complex have been defined, Moreover the cost estimation also calculated for each part, for sure it is not a accurate calculation and probably there are many short comings in the calculation but it was sufficient to have an idea about yearly cost and also the method which has been defined could be useful for anyone how wants to calculate the Facility management cost.

Now the total amount would be calculated which is an important factor for the startup in order to complete the First Chicago method and finalize the Startup valuation.

<i>Activity</i>	<i>Cost (€/year)</i>
<i>Façade and External Finishing</i>	116,803.00
<i>Internal Finishing</i>	225,035.00

	<i>Structure</i>	19,395.00
	<i>M and E systems</i>	238,847.00
	<i>Security</i>	432,000.00
Total		1,032,080.00

Table 17 - Total Annual Facility Management Cost – Source: Personal Activity

4.3) Costumer Care

Another missing part in Iran’s market is costumer care, unfortunately due to unfair sanctions during last forty years, there was not many competitors in the market, so people buy everything available by more expensive than what is worth, always lack of competitors will affect on costumer care, but now days the sanctions are weakened, and the competitors are increasing in the market, people are searching for a products/services which have more costumer care.

In this case the Startup could follow this idea that first improve its own costumer care in order to have better penetration in the market in the other hand it could suggest it to the maintenance projects, for example if there is shopping mall which is not have enough costumers like before, after the renovation could provide a list of costumer care activities which could attract more people, like: providing small kindergarten that families could leave their child there in order to have more time to go around, shopping and spend time with their partners, or having an office which could solve any complaints of costumer about functionality of the building, miss management or problems with shops/restaurant owners, providing a membership card, which if they spend money inside the complex receive some points and for example they could get silver, gold and platinum membership and receive some extra service like, advantage discount shopping before official sales season, special parking service, like free car wash, free parking, discount on restaurant or cinemas or any other entertainment within complex etc. it could be possible to write a chapter about costumer services which a facility management startup could provide it anyway in further stages of startup this matter will be more detailed.

Chapter five

Startup Valuation results

5) Startup Valuation Result

Now with the new information has been provided from two previous chapters it would be possible to reach an accurate result. As it has been mentioned in the chapter two First Chicago method has define three different situations for each Startup, which are: Best, Medium and Worst-case scenario, So, now I am going to calculate again the three scenario this time by using the assumption of the target market of Startup has just focused on Tehran office buildings.

5.1) Profit Calculations

There are many ways to calculate the profit of a company but in here it is not my interest to put focuses on complicated calculations, so according to Iran regulation each company or factory should gain 20% of the final production price as the company profit.

So, the company profit from a project like Elahiyeh it would be:

$$1,032,080.00 \text{ €} * 0.2 = 206,416 \text{ €/year}$$

According to Table number 6 there are 241 medium or large size office building in the Tehran if we assume that in the **Best-case** company could make contract to 69% of these building the yearly profit would be:

Best-case:

$$241 * 0.39 \text{ (Penetration rate)} = 94 \text{ Buildings}$$

$$\text{Yearly profit: } 94 * 206,416 = 19,403,104 \text{ €/year}$$

Medium-Case:

$$241 * 0.19 = 46$$

$$\text{Yearly Profit: } 46 * 206,416 = 9,493,136$$

Worst-Case:

In the worst case the assumption is totally bankruptcy without getting project which the total amount that the founders will be lose would be the total payment to the employee for one year the second assumption is at the beginning the number of employees are equal to doing one project same as Elahiyeh, which will be calculated as below:

432,000 € (Security team) + 60,000 € (M and E Engineer) + 400 € (Structural Engineer) + 13,650 € (Façade Inspector Cost) + 8000 € (Internal Finishing Inspector cost) + 24,000 € (office Rent) + 10,000 (office equipment) + 18,000 (Annual secretary Salary) = 566,050 €

So, the result would be loss of 550,000 €

It should be considered this situation could be named worst-worst situation, it would be possible to cut some of expenses after first three-month, second option is to make changes and get related works to facility management but not the exact work which has been planned.

5.2) Startup Business Plan

Always there is long way from a good idea to a good business it need to be think about maximizing chance of success, there is no way to understand a startup business will be successful 100% but it would be possible to have a forecast.

One of the important factors which could be helpful to have a successful business is a proper business plan. A business plan will help turn an idea into a business. It needs to think through all the parts of business to plan how everything will work. In its simplest form, a business plan is a guide—a roadmap for a business that outlines goals and details how it could be planned to achieve those goals.

Now the next question which comes to mind is how a good business plan looks like and what should be consist. The answer is a best business plans aren't long and complex; they explain only the most important information – what startup wants to achieve, how it will get there, and the things has been needed to do along the way.

The method has been chosen to provide a business plan for my Startup, has been suggested by Prince's Trust Enterprise. The Business Plan divided into sections to help the development of the business idea. The information in The Guide could be helpful for Startup developer to complete the sections. Some of the sections of The Business Plan have tables to record the financial parts of the business.

5.2.1) Sections Introduction

- SECTION ONE
The quick pitch: executive summary and elevator pitch
- SECTION TWO
All about you
- SECTION THREE
What are you going to sell?
- SECTION FOUR
Who are your customers?
- SECTION FIVE
Do you know what it's like out there?
- SECTION SIX
How will you contact your customers?
- SECTION SEVEN
Who are your competitors and how do you compare?
- SECTION EIGHT
Operational Plan
- SECTION NINE
How much will it cost?
How much money will you make?
- SECTION TEN
What if it doesn't work?

5.2.1.1) Section One: The quick pitch: executive summary and elevator pitch

Business Summary

The Startup Idea is a service base company which aims to provide Facility Management and Maintenance for different types of buildings. The company is an Italian register company which is going to start business in Iran due to preference of Iranian owners and huge lack of these kind of services in the country, The Company has been registered in Italy because European Companies are more trustable for the people. “Building Runners” is an early stage name which has been chosen for the Startup due to, similarity of the name to a famous trilogy and in the other hand it could reflect what is the company’s work about. The main aims of the company are to help buildings to have longer period of use in a same pre-determined level of function: To Help owners to have a better estimation about long term running a building cost and in general provide a proper and nice area to work and live. The financial forecast is to reach the break-even in the first year, and have positive turnover in the following. The initial cost of the startup has been decided to provide by the owners, but we are going to search for any related company in Europe to get financial aid which could affect the name or shares of the Startup.

Elevator Pitch

In the Building Runners, we aim to provide highest level of comfort and functionality for the building users, our slogan is “**with Building Runners, you will just focus on your business**”. We are trying to answer to any need of your workplace, building, company, factory while you are focused on your own business we provide from food a cleaning to most complicated problems like IT, Mechanical, Electrical etc.

Just tell us what do you need, you have technical problem with the computer, we will be there in half an hour, or you want a sushi for lunch you just need to make order in our application. Imagine everyday 24/7 when you come to your place is in the best condition for work, highest security and cleanness without a single failure. Work with Professional Makes you Professional.

5.2.1.2) Section Two: All About Us

Owners Background

My Bachelor Degree in Civil Engineering and my Master Engineering in Construction Management was the first motivation to work in this field, moreover I have participated in many seminars and training courses in the related fields.

The main purpose for us to run this business, first is understanding a huge lack of proper services in Iran which made many buildings useless or with very low-level functionality, in the other hand my course of study in University also my own experience in rebuilt and renovation build up this Idea of having my own company which would be a great help to construction industry of the country and my own financial interest, because I believes this if this Startup goes to right direction could be reach in higher level which is over the practical estimation.

My previous almost four years of work experience and training are mostly about management of construction site or design process of construction or rebuilt, furthermore I was involved in several construction or rehabilitation project which I can mention “Iran Mall project” which is the largest Shopping Center in the world.

5.2.1.3) Section Three: What Kinds of Services Will Provide

The Services which will be provide by Startup would be all in category of Construction Management, such as providing Maintenance Management for the short term and long term of the buildings, Executive maintenance, Rebuilt and Rehabilitation, Design and Execution of a Maintenance program, Facility Management and any kind of Action which is necessary for running any buildings.

5.2.1.4) Section Four: Who the Costumers Are

The costumers could be both private and companies, from the owners of five floors building to a Ministry building which belongs to government, maybe there seems to be a huge difference from what an private owner wants to what governmental body or institution wants but there is same point for all the costumers, they need better management or better running

their buildings, they need a professional group to help them to control and improve their maintenance cost and planning and provide them a better quality of working and living in their property.

5.2.1.5) Section Five: Market Research

There are many businesses which seems to be successful in the paper but the results in a field in vice versa, to have better understanding about what is going to happen outside it is necessary to do First desk research and then field research. About Desk research a proper work has been done in the chapter four, but there was not any field research, so to have better understanding the situation outside I designed two very simple questioners, first questioner has been asked from five biggest shopping mall owners in Tehran, and the other has been asked from their tenants. The questioners have been completed in Jan/Feb 2018.

First Questioner: Owners Questioner

Question 1: Are you Interested to pay another Company which provides you the following services for your shopping center:

- Design and Execution of Maintenance Plan for 10 years.
- Any Service to Running the building such as: Security, Cleaning, Financial Management, solve any problem related to authorities and Tenants in legal situations.
- All advertisement and other activities which is necessary to keep the shopping mall far from bankruptcy.

Question 2: If the answer of question one is yes, how do you like to pay:

1. A yearly constant amount, with no chance of increase or decrease.
2. Pay 10% of what company spend to do the above-mentioned activities. (In Iran there are many contracts like this, for example it will be defined that the contractor company spend money to do an activity for example building a house and then when it finished the land owner will pay 10% more than what the contractor has been spend to complete the project as a contractor profit).
3. Company will spend money for the above-mentioned activities under the owner's supervision and owner will pay a constant amount as a company profit.

Second Questioner: Tenant Questioner

Question 1: Are you interested to pay yearly amount to cover all expenses which maybe is 30% more than what you now you pay as “Charge” of the building monthly and instead you will get these extra service:

- Any maintenance needed for your store
- Solve or getting help with any legal problem you will face (authorities, Owners).
- Cover all monthly expenses like: Electricity, Gas, Water, Cleaning and Security)

Questioner Results:

Questioner 1:

<i>Shopping Centers</i>	<i>First Question</i>	<i>Second Question</i>
<i>Kouros Mall</i>	No	-
<i>Golestan Mall</i>	Yes	Number 2
<i>Madaen Shopping Center</i>	Yes	Number 2
<i>Seven Center</i>	No	-
<i>Tandis Center</i>	Yes	Number 1

Table 18 - Owner's Questioner Table

As it could be seen there is not much willing for specially brand new shopping centers, exactly two new ones which are consider the main centers one in east of the city the other one in west, probably they do not have feeling about it may could not be like this as always, anyway the other three that they answered yes are more interested in an old way of payment which is very popular in Iran first they need to make sure that the company spend money and provide proper services then they going to pay, which means if we provide a high level of work they may trust us and for the next years it could be possible to use the new payment methods, furthermore, if the startup reach to a great success for example in the Tandis center it could be a good advertisement for the project which may help to expand the work.

Question Number 2:

In the questioner number two we asked from 100 tenants almost 20 stores in each shopping center, the results are like following: 36% said Yes to our question, 64% said No. by considering that we did not explain the advantages of this new method it could be reasonable results, after I talked to them some of them has been said first you provide the services if we consider them useful we will pay you.

Conclusion:

Unfortunately, in Iran there is cultural problem which people do not trust to pay in advance for an activity, they prefer first the contractor finish the job and then they will get paid, which in their opinion it has two advantages, first, it will warranty the quality otherwise there will not be any payment, second reason is it had happened before the company has been disappeared after receiving many payments from the owners before the job done. This cultural problem may affect on investment to initiate a company, by means of more initial capital is needed to start a work but at the end the turnover is still positive.

5.2.1.6) Section Six: Marketing Strategy

Marketing strategy is one of the most important parts in the Business plan, choosing the right strategy could entirely change the results, there are many different strategies to do marketing, as an example, word of mouth, direct marketing, Advertisement, Social Media, Trade shows and Exhibition, Website, etc.

The strategy has been chosen for the our Startup is divided into two different parts, in the first step Direct marketing and Website is a best choice because our clients are few compare to the other businesses which they may have thousands of customers, furthermore due to our business is new it need to do a proper presentation to convince the clients, of course the advertisement, social media or trade shows will not work for our case for many reason as an example, our potential clients have no idea about our work and they do not feel a gap or need before we present it, in the other hand if they know something about this new method they will not go to social media or advertisement to find the company they will prefer to ask from someone that had the same experience for example another shopping mall which had the same experience, from now one after some well-done job from our Startup next stage of marketing strategy will start which is word of mouth, this strategy is very important especially in the

building industry of Iran, I would say 90% of the any construction work will be given to the Contractors which they did successful job for the relative, friends or someone the clients trust.

Marketing Strategy Total Cost:

- Website: According to one of the most famous Website designer company (<https://venet.ir/>) in Iran designing a professional website will cost around 1000 euro.
- Direct Marketing: if we consider this job will be done by three different teams and each team two person, it would be monthly salary of six person. A Regular salary to doing this job would be 800 euro for each person. If the period, consider 3 month the cost would be: $6*3*800 = 14,400$ euro
- Word of mouth: One of the advantages of word of mouth is that there is no need to spend money and it will be done automatically.

So, the final cost is something around less than 16,000 euro for the first three-month period.

5.2.1.7) Section Seven: Competitors Analysis

As far as has been said before, the Startup idea has been shaped based on the obsession of this method in Iran, in the hand it will be so optimistic if we say there are no alternatives methods or competitors but none of them do not provide the same package as what we provide, for example the mechanical, Electrical, Cleaning and ... each one of them will provide by different companies and they just repair in case of emergency.

So, it could be considered there is no competitors in the market, this is a great opportunity for the Startup, there is proverb which says if you want to have a successful business you should be the first or the best, in this case we try to be also the best and not just the first.

5.2.1.8) Section Eight: Operation and Logistic

Operational Staff

To providing our service for the costumer we need to have an operational plan, for the beginning the company will start with five permanent engineers: Manager, two maintenance planner and Construction engineers, Mechanical engineer and Electrical engineer, this five

are going to do the supervision in the field and on the design process, also a secretary needed for the meetings arrangements.

For the rest of staff which is needed the policy of Startup is going to outsource the work, for example the security, M and E operators or any other staff needed it will outsourced by individual contract.

Payment Costs

The payments are going to be paid monthly for the permanent staffs, the amounts in the following table is consider just as survival payment and by possible increasing in the projects the monthly salary of staff will be increase.

<i>Position</i>	<i>Monthly Salary (€/Month)</i>
<i>Manager</i>	800
<i>Maintenance Planners</i>	800*2
<i>Electrical Engineer</i>	800
<i>Mechanical Engineer</i>	800
<i>Secretary</i>	400
<i>Total</i>	4,400

Table 19 - Monthly Salary

Suppliers

Having professional and trustworthy suppliers is another objective, there are several features which each supplier needs to have in order to work with us, for example:

- **Punctuality:** is an Important task, because base of our work is on the fast response to any kind of service which our client needs.
- **Trustworthy:** We need our suppliers be trustworthy in order to put our work in priority always.
- **Professionality:** The professionalism is important because we need to provide higher level of service to our customers in order to have upper hand from the other solutions.

Equipment

One of the factors that can influence on cash flow is the equipment, in the next table it could be possible to find a list of equipment needed for the beginning:

<i>Equipment</i>	<i>Number</i>	<i>Cost (€)</i>
<i>Office</i>	1	1000 €/per month
<i>Office Internal Design</i>	-	8000 €
<i>Desktop</i>	6	1000 €
<i>Laptop</i>	5	1000 €
<i>ICT Connections</i>	-	500 €
<i>Stationary</i>	-	300 €
<i>Copy, Scanner and Plater device</i>	-	5000 €
<i>Total</i>		15,800 € + 1000 €/per month

Table 20 - Office Equipments

Insurance and Legal Requirement

There are several Legal requirements from both countries to register the company which many cost around 2000 euro, furthermore, to follow Insurance policy in Iran the company needs to pay for each permanent worker 70 euro per month.

Which has the Total Cost of: $70 * 12 * 6 = 5,040 + 2000$ for the registration requirements.

5.2.1.9) Section Nine: Costs and Pricing Strategy

Making a unit price for this kind of service which will be provide for the buildings is not easy as define price for a products which is possible to calculate the production price, and then add the profit margin but it could be similar to pricing a design service, for example steel structural designing of a building which calculated by weight of the steel or a Architectural design which will calculate with the area of the project, furthermore, both traditional ways are not always same sometimes due to difficulties it has the price will change

In the other hand providing the exact price for service we provide in this stage is quite mean less in this section providing the strategy of pricing the service would be more important than calculation of the final price.

First Strategy

The first Strategy will follow an old but smart way of service cost calculation which is still compatible to the new way of cost calculation, in this method first the Labor and Material cost will be calculated and then the price should be doubled to reach the customer price before taxes.

Second Strategy

For the other major service, which is running the building in all cases the calculation should be more accurate for example if the building is old and there is a high possibility of failure the yearly price should be higher, after calculation of total possible cost of the building, 21 percent of the cost should be added to the final cost in order to reach the Customer cost.

Financial Forecast

A sales forecast shows how many sales you are aiming to achieve in your first year and how much money that would mean you receive. It's hard to know what a realistic number of sales might be so it's better to plan for the worst case. But as it could be found in the previous chapter a financial forecast with considering Best, Normal and Worst-case scenario has been done, but in any case, let's do another forecast according to the Prince's Trust.

If we consider the company will take four contracts during a year and we use the first method of cost calculation the company turn over would be like below:

Labor and Material Costs for One Year: $5 \times 800 \text{€} \times 12$ (Engineers Salary) + $1 \times 400 \text{€} \times 12$ (Secretary Salary) + $12 \times 1000 \text{€}$ + 2000€ (Stationary, plat and copy and other Consumables) = $48,000 + 4,800 + 12,000 + 2000 = 66,800 \text{ €/year}$

Each Project: $66,800 / 4 = 16,700 \text{ €/project}$

Customer Price: $16,700 \times 2 = 33,400 \text{ €/project}$

Total Turnover: $33,400 \times 4 = 133,600 \text{ €/year}$

Profit = $66,800 \text{ €/year}$

Profit after Taxes: $66,800 \times 88\% = 58,784 \text{ €/year}$ (The Tax is Calculated in Iranian Law) *

Profit after Insurance Expenses: $58,784 - 5,040 = 53,744 \text{ €}$

Gross Profit: $53,744 \text{ €}$

Startup Cost: 15,800 € (equipment) + 2000 € (legal registration) + 10,000 (refundable Office rent Deposit)

= 27,800 €

The above calculation was not accurate for sure due to many reasons like:

1. The complicated tax laws in both countries,
2. To make owners to be interested in our work we need to decrease our price,
3. Other expenses which is not considered or create due to an accident.

But even in a bad scenario which could increase the tax around 50% if we consider Italian law is still have positive profit, furthermore in the worst case of not successful to have even one project the Total loss will be acceptable compare to other Startups.

Note: The Total labor cost should be existing in the company bank account in the beginning in which we could pay to employers in the worst-case scenario.

5.2.1.10) Section Ten: Backup Plan

Sometimes, despite careful planning, the unexpected will happen and a business will fail. There are many reasons why a business might fail; a lack of cash, a new competitor or changes in your personal life. Nobody plans to fail but it is important to plan for the 'what if' scenario. What if doesn't work out as you imagined?

Sometimes all that could be required is changes to your existing business that reduce your costs or boost your income. Other times, it may be that, despite your best efforts, you have to close the business and tackle Plan B. And it's far better to have a Plan B in your back pocket ready, if and when the unexpected happens.

Plan B

My Strategy to reduce cost of the company could be, first do not spend money to employee the Mechanical and electrical engineers and if we took enough project then we can add them to our team, second, it is possible to decrease the monthly salary of employees at least 30%, because the amount

which has been mentioned in the previous chapter is more than what is normal in Iran. Third, it could be possible to start in cheaper office with the second handed equipment, and also buy some second handed equipment like Scanner, Plater or copy machine. By applying this strategy, it could be possible to do more resistance in the market.

Conclusion

As a Conclusion it could be said that to examining a Startup probably many other economical valuations should be done to reach the proper of accuracy, but this thesis had aim to absorb the International company's attraction to this hidden market that could have unbelievable profit to their interest; one of the Italian government members once named Iran as a Land of opportunities for the International companies in the other hand, could be so great also for my country in case of having higher quality of life and work with maximum possible optimization. In my point of view this thesis has been already reached the aim by take look at the Valuation analysis results.

The other obstacle which is probably would be the most concern of anyone how wants to Startup a company like this is the willing of the society, companies and government to use these kind of services, The answer would be yes the Iranian companies are all interested in the optimization of office areas and energy also the economic plans are need to be well prepared, according to newest Iranian president Hassan Rohani letter, all the government parts are obliged to reduce the working areas because the huge part of the government budget are spending to provide the buildings for ministries, he emphasis that the all government bodies should use the open space offices to reduce the working area, furthermore they do whatever is necessary to optimize the all sector. So, it would be concluded that the Facility Management would be in Iran's future and the first Company which enter the market by prepared program would be the winner.

معاون رئیس جمهور
و
رئیس سازمان



ریاست جمهوری

سازمان اداری و استخدامی کشور

شماره: ۱۴۵۹۰۷۸
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اقتصاد تعاونی تولید - اشتغال

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وزیر محترم راه و شهرسازی

با سلام و احترام؛

با عنایت به تأکید ریاست محترم جمهور مبنی بر صرفه جویی منطقی در هزینه های دولت، خواهشمند است دستور فرمایید در تخصیص اعتبار برای ساخت و خرید ساختمان های اداری دستگاه های اجرایی کشور، استانداردهای موجود در تصویب نامه شماره ۲۰۶/۷۵۳۹ مورخ ۱۳۹۰/۴/۱ شورای عالی اداری به منظور بهره برداری مطلوب از فضاهای اداری و کاهش هزینه های ناشی از تامین و نگهداری ساختمان های دولتی، مدنظر قرار گرفته و در بازسازی ساختمان ها، بر ایجاد فضای باز اداری (Open Office) تأکید گردد.

جمشید انصاری

Figure 45 - Iran President letter – Source: Sobhaneonline.com

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