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**PROPOSALS OF APPROPRIATE SOLUTIONS FOR EFFICIENT
FACILITY MANAGEMENT PROCESSES IN EGYPT
AND THE MIDDLE EAST**

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ABSTRACT

Facility management is a multidisciplinary profession, drawing on theories and principles of engineering, architecture design, finance, management, and behavioral science. These disciplines have a rich history of theory, research, and practice. Facility management as a new discipline is built on this foundation to create a new set of theories and practices

The study is constructed on the comparison between the current Facility Management situation in Western countries and the Middle East countries (in our case Egypt). This research concluded through this comparative analysis, that despite the fact that the middle eastern firms slightly started improving the western region is a step ahead from the Middle Eastern part due to several differences between the two areas in applying standards, demand by the client, expertise and skills of Facility Managers.

This research studies the risks and challenges that the Middle East is facing and how to reduce them by suggesting some solutions that are promising to improve the current situation of Facility Management in Egypt, and to give a mature picture of what this industry can achieve in the future.

The main objective of this research is to examine the impact of applying some suggested strategies, involving the use of BIM through all the life cycle phases of the building, shift the orientation of the market towards outsourcing, and provide an efficient and specified education program to support the career of Facility Managers

ESTRATTO IN LINGUA ITALIANA

Il facility management è una professione multidisciplinare, basata su teorie e principi di ingegneria, progettazione dell'architettura, finanza, management e scienze comportamentali. Queste discipline hanno una ricca storia di teoria, ricerca e pratica. La gestione delle strutture come nuova disciplina, si basa su queste basi per creare un nuovo insieme di teorie e pratiche

La ricerca si basa sul confronto tra l'attuale situazione di Facility Management nei paesi occidentali e nei paesi del Medio Oriente (nel nostro caso l'Egitto). Questa ricerca ha concluso attraverso questa analisi comparativa che, nonostante il fatto che le imprese del Medio Oriente abbiano leggermente iniziato a migliorare, la regione occidentale è un passo avanti rispetto alla parte mediorientale a causa delle diverse differenze tra le due aree nell'applicazione degli standard, richiesta dal cliente, competenza e capacità dei gestori delle strutture.

I rischi e le sfide che il Medio Oriente sta affrontando e come ridurre questi ostacoli suggerendo alcune soluzioni che si prevede siano efficaci nel migliorare l'attuale situazione della Facility Management in Egitto, e di fornire un quadro maturo di ciò che questo settore può raggiungere in il futuro.

L'obiettivo principale di questa ricerca è esaminare l'impatto dell'applicazione di alcune strategie suggerite, coinvolgendo l'uso del BIM in tutte le fasi del ciclo di vita dell'edificio, spostando l'orientamento del mercato verso l'esternalizzazione e fornendo un programma educativo efficiente e specifico a sostenere la carriera dei gestori di strutture

INTRODUCTION

Facility Management is a crucial process that has a significant impact on both buildings' performance and the efficiency of their embedded systems. However, the facility management industry in Egypt has long been an area of neglect, as most of the building's stakeholders restrict their role to the operation phase of the building. This attitude disregards the precautionary maintenance processes that could be achieved through the preliminary phases of the buildings.

The main concern of this thesis is suggesting some solutions that help improving the current situation of Facility Management in Egypt and to give a mature picture of what this industry can achieve in the future. The first step of this study was to understand and analyze the current situation of Facility Management, Worldwide and in the Middle East (in particular Egypt), to point out the main differences in conception and in the practical processes, in order to understand what criteria should be applied in this area of the world, and what are the best scenarios to improve the current FM situation in there.

One of those solutions is the implementation of a new technology (BIM Building Information Modelling) that enables the integration of maintenance management considerations into the whole life cycle of the buildings. The ultimate purpose is to achieve better performing buildings regarding facility management aspects.

Another suggested solution is the shift of the core FM services to an outsource company, working in a partnership with it to manage and provide comprehensive services to all business fields starting from establishing policy, up to, run into the business itself. A part of this study is concerned with comparing between In-House services and Outsourced services and their effect on the maintenance budget of a project, considering the fact that nowadays, the worldwide trend is to make the best use of time and money to achieve optimum performance by hiring non-core services to outsource companies.

Regarding the civil engineer and Architecture education, the management of the real estate, or in general, the facility management had been faded into the background while the main

directions of civil engineering education only considering the new constructions. The education needs to reflect on the changes of market, as the market needs experts who understand the operating principles of real estate market and are in possession of fresh, up-to-date and complex knowledge of operations and utility of the real estate portfolio.

Considering the previously mentioned issue, the third and last suggestion is a teaching methodology or an educational model which could be complement with other civil engineering and architecture subjects. The main result of this is an interdisciplinary methodology. In the changing world, traditional civil engineering programs should be adjusted in order to meet market needs and opportunities.

Departing from all the previous suggested strategies, we strongly believe that after the right applications of those solutions, the Facility management market will witness a noticeable push forward in practices, with a more open mentality that can match with the current market needs, and will allow small startups to find their places in this potential market.

CHAPTER 1. CURRENT FM AND BIM PRACTISES IN ITALIAN AND EUROPEAN MARKETS

1.1. The Facility Management (Introduction of the Term for Guidance in Further Analysis)

The International Association IFMA (International Facility Management Association) defines Facility Management as "the business discipline that coordinates the physical space of work with human resources and the company's activities, integrates the principles of economic and financial management of the business, architecture, and the behavioral and engineering sciences."¹ Another definition of Facility Management is given by European legislation transposed at a national level by the UNI EN 15221: 2007, which is referred to as "integration of the internal processes of an organization in order to support and develop services that support and enhance the 'efficiency of the primary activities. "

Given these two definitions can be said that the Facility Management is nothing more than the process of design, implementation, and control through which the facilities are identified and retrieved in order to provide and maintain those service levels that meet the business needs, creating a quality work environment with as little expenditure as possible. The facility management approach is, therefore, to be an integrated approach, through the design, planning, and delivery of support services to the main activity of the company (core business), which aims to increase the organization's effectiveness and enable it to adapt quickly and easily to market changes.

It should be noted that the "facility" is any product (tangible) or service (intangible) needed to support the primary processes, organization, or anything, even a building, which was built, installed, or created to support " core business. " The discipline of Facility Management is characterized by three main aspects, namely strategic, analytical, and management - Operating:

- The strategic aspect covers all decisions relating to management policy and retrieval services, the distribution of resources to be used to support corporate objectives (preparation and budget management, cost allocation, etc.), the choice of supplier, etc.

¹ International Journal of Facility Management – November 2014

- The analytical aspect is the understanding of customer needs on services, control of the operating results and efficiency in service delivery, the identification of new techniques and technologies that support the company's business, therefore an important aspect of ensuring that the Facility Management will contribute concretely to achieving the goals of the company.
- The management / operational aspect concerns the management and coordination of all the services understood in a comprehensive manner, and not of the individual services, and includes the definition of systems and procedures and the implementation and reengineering of dispensing processes.

Recently, Facility Management, from the point of view of real estate finance, is becoming increasingly important as a guarantor of continuous, reliable, and optimal operation and usability of real estate facilities. The property becomes comparable, from a financial point of view, a long-term obligation, and high reliability. Institutional, academic, and financial aspects are converging towards the promotion of a new alliance between science, facility management, and real estate finance.

As the term "facility" indicates whether the property where the work is performed and all service activities connected to it. So when we talk about the facility we indicate the container of work, but also all the services necessary to make it possible. One can, therefore, say that the area of application of facility management discipline is one of the strategic management of properties and services, that is all those activities supporting the business of a company.

1.1.1. Facility management Services Classification

The facility management can be classified into three main areas: building services, Space services, and personal services.

- The building services include all activities aimed at maintaining the property and all of its plants and facilities. These services have as their ultimate goal to ensure continuity of operation of the building intended as a "box" in which the company conducts its business

in compliance with the regulations on the hygiene of the working environment, safety and rational use of energy.

Services also include: Ordinary and extraordinary building maintenance, Operation and maintenance of energy services (heat management, and heating and cooling);

- Space services aim to make sure that your workspace is a useful support for the company, facilitating the creation of value, the processes of communication, socialization, and the creation and circulation of knowledge. This group of services provides a high level of complexity in terms of organization.

Services also include Workplace (furniture, machinery, equipment, signage, decorations, etc.). Cleaning and sanitation (toilets, internal cleansing, cleaning and maintenance of green areas and grills, household refuse collection and disposal of hazardous waste, rodent and pest control, etc.), Cleaning and sanitation (toilets, internal cleansing, cleaning and maintenance of green areas and grills, ordinary collection and disposal of special waste, rodent and pest control, etc.).

- Personal services are very broad since it includes items such as catering, document management, reception, environmental hygiene, security, etc. Practically it is the set of activities that aim to increase productivity, well-being, and retention of those who work for the company.

Services also include Health and safety (occupational health, access control, reception or trustee caretaking, surveillance and security, fire protection, etc.). Hospitality (reception, catering/canteens, etc.).

For a more precise definition of which services of which deals with the Facility Management may be resorted to in Appendix B of the aforementioned UNI 15221.

1.1.2. Facility Management Services Delivery Methods

The Facility Management services are normally carried out following two different approaches that are chosen according to the needs of the enterprise and its size. Thus outlining two opposite ways of approaching the Facility Management:

- **In-House or insourcing (ie domestic supply):** indicates the maintenance of an asset within the company through the cooperation of an external company that guarantees the necessary know-how. It is basically an outsourcing that is carried out within the company.
- **Outsourcing, (ie the external supply):** it indicates the process by which a company, after evaluating the most appropriate defense strategies of its powers, relies on external reality, through contractual forms having specific characteristics such as duration and organizational solutions offered, the operational management of one or more functions, chains of business or elements of the business previously carried out within the system. Outsourcing is carried out according to the principle that a company engages internal resources for activities or functions that may be carried out with greater efficiency, capacity, and quality, it compresses its strategic value and sacrifices potential competitive advantage.

1.2. The Facility Management Market

The most reliable estimates attribute to outsourcing a weight between 3% and 5% of GDP of the major world players², Yet there is still no common and convincing methodology for quantifying the turnover of this market at various levels. First, it should be borne in mind that it is a set of activities defined by subtraction with respect to the core business of enterprises and organizations, it follows that you can define a core of activities that are definitely part of the potential of the Facility Management market, but these activities do not have clear boundaries, being able to be extended from time to time to a much wider range of services depending on the customer's specific needs. Another critical aspect of the estimation of the actual market size is closely connected to the nature of Facility Management, which is based on the integration of different activities among them. This approach is particularly apt in the analysis of business realities, large and small, but little lends itself to identify those activities that, as the Facility Management, are transversal to different sectors and indeed tend to encompass under a single entrepreneurial teaches a multiplicity of services.



Figure 1 Facility Management in Europe | Source: Tuomela and Puhto (2001)

² GlobalFM Market Report 2018 - IFMA

1.2.1. Facility Management in The World

The global market for Facility Management has experienced significant growth in the last decade, during which the companies have become more aware of the strategic benefits of this activity.

These benefits relate in particular to the reduction of costs and improvement of key aspects such as efficiency, quality, and sustainability of the working environment, essential elements to survive in a market where competition is growing.

Despite the negative impact of the global financial crisis on industrial growth, it is expected that the facility management market in 2020 will reach a turnover of 394 billion dollars.³

This is made possible by the increasing emphasis on the modernization of buildings, outsourcing, and investment on tools constructed to ensure that businesses remain competitive and flexible in spite of the current economic situation.

In addition, estimates indicate that in 2020 more than 70% of end-users will resort to multinational contracts, compared with a figure of 40% in 2010, because the Facility Management company calling is to an ever greater internationalization. Below we will try to better evaluate the FM markets by analyzing the most significant countries.

³ GlobalFM Market Report 2018 - IFMA

1.2.2. Facility Management in North America – USA

In the United States of America, the Facility Management phenomenon was born and developed from the end of the 70s.

Even today, the North American market remains the largest in geographical terms with a view to dominate for years to come the Global Facility Management, in terms of total expenditure and, therefore of turnover.

The owners of real estate assets are subjected to great pressure to lower their operating costs and thus concentrate on their core activities; therefore, it increases the confidence in the outsourcing of FM services to third specialized companies, giving rise to numerous market opportunities for operators of facilities management services. In fact, companies are becoming increasingly aware that by outsourcing non-core activities, not simply obtain advantages in terms of cost reduction but also the ability to free up essential resources for reuse in new activities able to generate profit.

Basically, in the North American market, the trend is more oriented towards consolidating partnerships between enterprises and operators specialized in the delivery of FM services.

Despite this positive trend, there are several cases in which companies or owners of real estate assets are not particularly inclined to change their way of doing business, making it difficult for the FM operators to expand within the market.

In the face of reluctance voiced by the potential demand, the FM North American companies are trying to promote the benefits from outsourcing services, emphasizing their ability to offer a reduction of between 15% and 20% of the costs incurred by operations and the resources employed. The FM North American market growth forecast predicts growth of 12.1% by 2020.⁴

⁴ The World bank 2018 – Global Economic Prospects

1.2.3. Facility Management in South America - Brazil

The discipline of Facility Management has made an appearance in Brazil in the mid-90s. To date, the profession enjoys a discreet solidity and presents large margins of growth and development.

Nevertheless, many local organizations are struggling to bring up the idea of a management-oriented to the result of the non-core businesses and to fully understand the importance of using innovative methods of management and optimization of processes to achieve a better quality of services at a reduced cost.

The Brazilian FM is still trying to expand its market, even to the residential sector, such as with the management of groups of apartments. This attempt to expand the demand is actually producing positive results so that the management of shared services has become a very popular item to those who have to buy the house and has a considerable weight in their final choices.⁵

1.2.4. Facility Management in Asia – China

“China hosts some of the most dynamic construction markets in the world. An increase in the development of high-end commercial facilities alongside large investments on infrastructure projects such as airports, hospitals, and educational institutions make China an attractive market for FM penetration. Increasing end-user awareness around the benefits of FM outsourcing and service integration are also expected to contribute to FM market development.”⁶

With the significant increase in construction activity, the creation of new structures, the privatization of the Real Estate market and a considerable increase in the value of the property, has been paid more and more attention in the care and appropriate management of properties, leading to the appearance on the market of several companies specializing in Property Management, many of which are derived from government departments mentioned above. Their attention is principally directed towards more traditional activities such as maintenance,

⁵ OECD : Economic Surveys, Brazil 2018

⁶ Export.gov 2017 China-Green Building

cleaning, security and care of the outer green. There are few companies that are able to bring value to its customers through a real portfolio of Facility Management activities.

The growing presence of multinationals in the Chinese territory is leading to a greater demand for facility management services, in fact, it is the American multinationals to have completed most of the major FM contracts

This process has also pushed the local property company to present itself with increasing frequency on the infant's facility management market.

The Chinese work culture encourages human resources to great mobility (people are willing to change jobs to gain an extra \$ 1 per hour), while the management level employees entitled to substantial salaries and bonuses that reflect the success of ' company and serving to ensure their loyalty in the future.

Another problem is derived from the fact that local human resources have not developed sufficient expertise to support the growth of the market; this is because the facility was not rooted locally.

These conditions make the Facility Management Chinese market one of the most attractive to potential international investors.

"China is the largest facility management market in the world" - Tony Keane, IFMA President, Sina Real Estate, in September 2010. Worth a small mention of the special administrative region of Hong Kong, because of its long history as a colony of the British Empire, continues to enjoy a high level of autonomy from the Chinese state.

Hong Kong, due to its strategic geographical position, has been able to emerge economically, becoming an extremely dynamic reality, it has been able to reinvent itself several times, making use of the most of its resources. Although Hong Kong has a very high population in some places as high as 43,000 inhabitants per square kilometer. Given its dynamic nature, it has on its territory a large number of foreign companies, and that is why the Facility Management was born in fact under the pressure of many US and European multinationals active in the area. It should be said that the market of pure Facility Management is still fairly limited at the moment,

in fact. Usually, the companies that propose the market as providers of Facility Management also offer property management services.

There is an increasing demand for facility management services in shopping centers and residential areas, a trend that, in the future, should continue to increase. In general, it will be difficult for the local market size of the Facility Management will grow, due to the physical size of the territory; for this reason, most of the FM companies are turning their interest toward China.

1.2.5. Facility Management in Australia

The Australian economy is characterized by a solid financial sector and a general abundance of resources. Despite this also Australia has suffered considerably in the recent global crisis, therefore, developing a particular propensity at reducing and controlling expenses.

This trend has logically favored the rapid growth and expansion of the sector of Facility Management, which until then had been a relatively contained phenomenon. To date, the Facility Management in Australia is one of the sectors with the greatest growth, with an annual turnover of about \$ 20 billion and 200,000 workers in various capacities within the market.⁷

In the Australian market of Facility Management plays a fundamental role in the public sector, especially for the following two reasons:

- The Australian government owns one of the largest real estate portfolios in the world, and the need to maintain the quality and operation of these buildings creates market opportunities for many businesses that not only deliver FM services but also of Real Estate and Project Management.
- The Australian government has expressed in recent years increasing attention to environmental issues, engaging particularly in reducing carbon emissions.

⁷ Reserve Bank of Australia 2018 – Statement on Monetary Policy

1.2.6. Facility Management in Europe

After an overview of the world, the next step is to understand and analyze the FM markets closer and similar to Italian markets, which will serve as a reference in further analysis.

In Europe, the facility management market spreads in the UK in the first half of the 80s, and later in the Netherlands in the second half of the 80s. In France, unlike what happened in the United

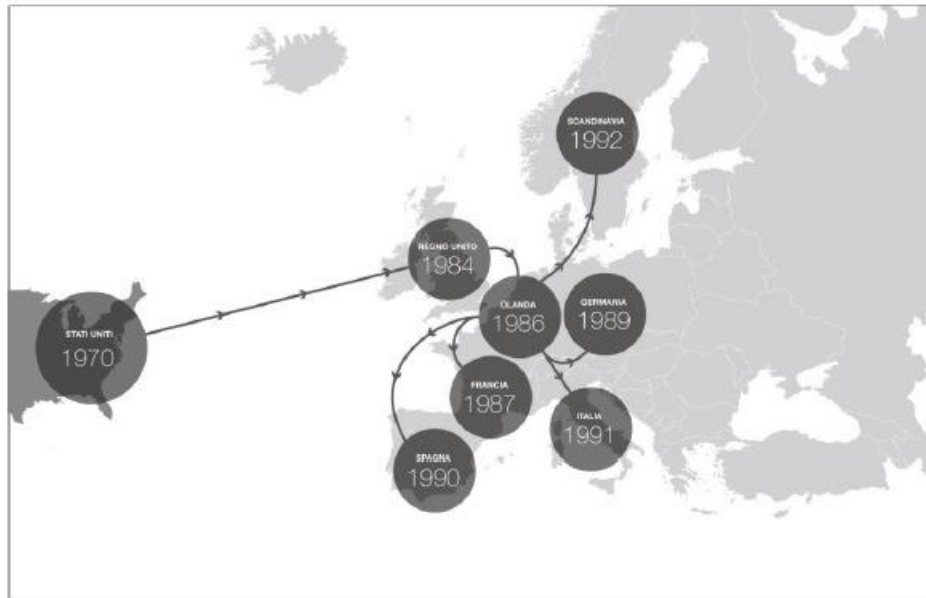


Figure 2 The spread of Facility Management
Smith et al., 2000

States, where it appears the initial close bond with the management of real estate, facility management is developed starting from the theme of the General Service management in organizations, in the late '70s and early mid-80s, later to evolve into the real estate Facility Management in the 90s. Germany sees development in the outsourcing process since the early '80s, driven by the cleaning, security, catering, and later by the Information Technology sector, in Italy the facility management market took its first steps in the late '80s and the first half of the 90s, to grow strongly over the past 20 years.⁸

Although in Europe, the FM services market is a now increasingly consolidated economic reality, to date, there are no reliable and updated analysis and overall estimates. The difficulty in

⁸ International Journal of Facility Management Vol.5,1 – November 2014

producing these data stems from the inherent complexity of this market that encompasses many different sectors to each other.

Sven Teichmann, professor of International Real Estate Business School at the University of Regensburg, played in 2009 a survey on the FM market.⁹

The research started from the examination of the data from studies already conducted or built from scratch on a total of 41 countries, 27 of which belong to the European Union and 14 other countries added as a yardstick.

The countries were initially divided by making a geographical segmentation of the market into six groups:

- Central Europe;
- Northern Europe;
- Western Europe;
- Southern Europe;
- Eastern Europe;
- South-Eastern Europe.

After defining the regions, it focused on what parameters to use for a reliable definition of qualitative and quantitative characteristics of the various national markets and the overall European market. four key parameters have been identified:

- The correlation of spending on the services of Facility Management in relation to Gross Domestic Product (GDP)
- The type of market-related to different models of national development
- The outsourcing levels as a percentage.
- The growth rates expressed as a percentage.

⁹ Facility Management in Central and Eastern Europe - Reality Consult GmbH

The estimate of the overall size of the European market exceeds 650 billion euro, of which nearly 65% is concentrated in the five countries with more advanced economies (UK, Germany, France, Italy, and Spain).

Looking at six different geographical areas identified, it could be seen that the most significant market share is expressed from Northern obviously drawn from the UK. Followed by Central Europe, both West and South with similar market shares while Eastern and South-Eastern Europe are placed at a certain distance from the previous.

1.2.7. Facility Management in the UK

The UK was the first European country to import the principles and logic of the Facility Management from the United States. For that reason, still remains the European Market characterized by a greater dimension and continuous growth.

The FM market in the UK has reached a size of 11,5 billion pounds in the year 2017, and the forecast predicts a growth that will reach 13 billion pounds in the year 2020. It is a 9% increase as expected for the outsourcing of services and 17% for the Total Facility Management.¹⁰

This continued growth is partly due to the increasing use of outsourcing non-core activities and integrated management solutions of real estate assets. Also, in the public sector, the market is benefiting from the cuts in public spending to creep into the equity of the government with the aim of reducing the number of suppliers and thus the costs.

¹⁰ HM Treasury, UK Govt

1.2.8. Facility Management in Italy

The Facility Management took its first steps in Italy in the late '80s and mid-90s. In the last few years, it has been several attempts to define the boundaries of the Italian market.

In 2005 an analysis carried out by Consulting (the Austrian market research company) credited to the Italian market for Facility Management a turnover of 20 billion euro (considering only outsourcing). Relatively to the same year, an estimate made by CRESME put the value of the actual market in a range between 24 and 35 billion €. These early approaches us to understand how difficult and complex to reach a clear and agreed definition of the size of this market.

Among the most reliable estimates considered, there is one presented in June 2011 by the same Interco Consulting, the analyzes carried out by the German research center indicate that the Italian facility management market would grow 11% in 2008, 10.6% in 2009 and 7.9% in 2010 when a tour would be recorded business of € 23.7 billion.¹¹

To better understand the market of Facility Management in Italy, first, you have to locate the two main segments.

The market is, in fact, is divided into two large areas characterized by regulatory-procedural constraints, but also from organizational profiles and management of highly differentiated:

- **Large multinational and national companies**, major public companies now privatized, all subjects with a high level of organization and a strong supplier's ability to control and overall management of the contract.
- **Central and local public administration** (Municipalities, provinces, regions, etc.) Which must necessarily proceed to the acquisition of services with public tenders, according to the principles of supply technically and economically more favorable, or the lowest bidder.

¹¹ Di Fausto. "Il Facility Management in Italia. Il mercato pubblico e il mercato privato", eFM, Roma, 2013.

The Public Market of Facility Management in Italy

The public market of Italian FM features more sharply defined boundaries that are easier to interpret. The Italian economy is in a period of substantial recession, which leads to important consequences such as reducing public spending. In this scenario, the facility management market tends to increase.

The National Observatory numbers for the Facility Management a situation of rapid growth and expansion; In fact, it is estimated that between 2007 and 2011 the number of public announcements of this nature were both increased by 51%, while the amounts specified in the tender increased by 58%, from 24 billion in 2007 to 38 in 2011. In the same period, the market only for public works declined by 45% in terms of published notices and 34% in terms of the amounts specified in the tender, rising from 15.6 billion in 2007 to 10 in 2011.¹²

From these data shows a substantial turnaround in public demand: it goes from labor demand to demand for services (from contracts for execution only to those of design, construction, management, and integrated maintenance). Concurrently with this offering, the service model is evolving; the supply by specialist companies that deal with individual works or services, the Public / Private Partnership company in an integrated manner perform all services related to a particular space or infrastructure.

That's the key step to have a comprehensive picture of the current market of Italian Facility Management and how this has formed and established. In fact, during the crisis, the Italian economy has witnessed a real boom in facility management contracts.

The practice of outsourcing is now used heavily by the Italian public sector, particularly in light of the introduction of hard budget constraints that limit the spending power of local authorities.

¹² Di Fausto. "Il Facility Management in Italia. Il mercato pubblico e il mercato privato", eFM, Roma, 2013.

In its most advanced forms, outsourcing leads to the integrated and coordinated management of spaces, services, and infrastructure, and the management of the Facility Management, while in the simplest forms, is reflected in the traditional service contract. Certainly, the crisis is playing a key role in promoting the outsourcing and collaboration between public and private, without forgetting that these processes are based in reality on deeper roots. In the long run, the growth trend of outsourcing of public administration is driven by two major underlying forces.

This is one side of the de-verticalization process that led all economic entities, public and private, to give to the market a number of support services, and on the other of the redefinition of the boundaries between state and market, with first-place cedes space per second.

Broad types of Facility Management Services in Italy

The National Observatory of Facility Management divides the market into twelve main categories of services, namely:

- Management and maintenance of buildings and infrastructure;
- Utility services;
- Environmental and cemetery services;
- Services to mobility;
- scientific and technical consulting services;
- ICT services;
- Installation and maintenance machinery;
- Equipment and instrumentation;
- Managing cultural activities and leisure;
- Auxiliary services;
- Social health and educational assistance;
- Administrative and legal services;
- Other services.

Each published notice is given to one of these sectors on the basis of the prevailing service requested.

Among individual services, in 2007-2011, the most important in terms of amounts, was that of the construction, management, and maintenance of roads, with a turnover of 20.6 billion Euros and over 8400 public notices.¹³

Followed by maintenance and management of buildings (15.6 billion euro), the waste management services (14.8 billion euro), catering services (10.4 billion euro), the electrical system (9, 4 billion euro), cleaning (7.9 billion euro), means of transportation (7.9 billion euro) and information systems (7.7 billion euro).

Another significant share of the market as ancillary services (including hotel services, catering, cleaning, custody, and supervision), whose sales accounted for 14% of total Italian Facility Management public, with more than 13,000 public notices and turnover of 22.4 billion Euros between 2007 and 2011; although this market recorded a decrease in their turnover estimated at around 8%.¹⁴

In third place, for the volume of business, is the management of utilities (which include the generation and distribution of electricity, generation and distribution of thermal energy, mining and processing gas and petroleum, energy minerals extraction, public lighting, collection, treatment, and distribution), with 5,700 notices published for a turnover of 18.4 billion Euros. The turnover of outsourced utility services grew by 177% between 2007 and 2011.

An analysis of the actual FM services awards will immediately notice that the foregoing indications are largely confirmed. In fact, in the period between 2011 and 2017, the amounts of tenders awarded went from 11.8 billion to 25.3 billion, a 114% increase in five years, while the number of events increased from 6,589 to 14,138 recording an increase of 115%.

¹³ Di Fausto. "Il Facility Management in Italia. Il mercato pubblico e il mercato privato", eFM, Roma, 2013.

¹⁴ Di Fausto. "Il Facility Management in Italia. Il mercato pubblico e il mercato privato", eFM, Roma, 2013.

1.3. Global Facility Management Market Report 2018 (GlobalFM)

In this sector, we will show some facts about the facility management international market and practices according to the Global Facility Management Market Report for the year 2018 provided by GlobalFM

Global FM (Global Facility Management Association) is a worldwide federation of member-centric organizations committed to providing leadership in the facility management profession., with a mission to support countries that wish to form facilities management related organizations where one is not yet established, encourage greater collaboration between facilities management communities, and recognize excellence in facilities management

As a single, united entity promoting facility management, Global FM is a conduit for furthering the knowledge and understanding of facility management and sharing best practices, with both resulting in added value to the individual members of each member organization

According to the report, in 2017, the total global facilities management (FM) market* was estimated to be worth \$1.15 trillion. Of this, the outsourced FM market was valued at \$466.5 billion, with integrated facilities management (IFM) accounting for 11.5% of the segment.



Figure 3 Global facility management market
Source: Frost and Sullivan Analysis

North America and Europe are the most mature markets for FM outsourcing and IFM adoption, with many global service providers originating from these regions. Demand for service integration and the inclusion of value-add services are key factors driving growth in these established markets. While in developing markets, growth is still mainly linked to demand from multinational corporations (MNCs).

Asia-Pacific stands out in terms of growth potential in FM services, given the higher awareness and appreciation of the industry, increasing presence of global FM participants, higher demand for outsourcing, and availability of comprehensive solutions.

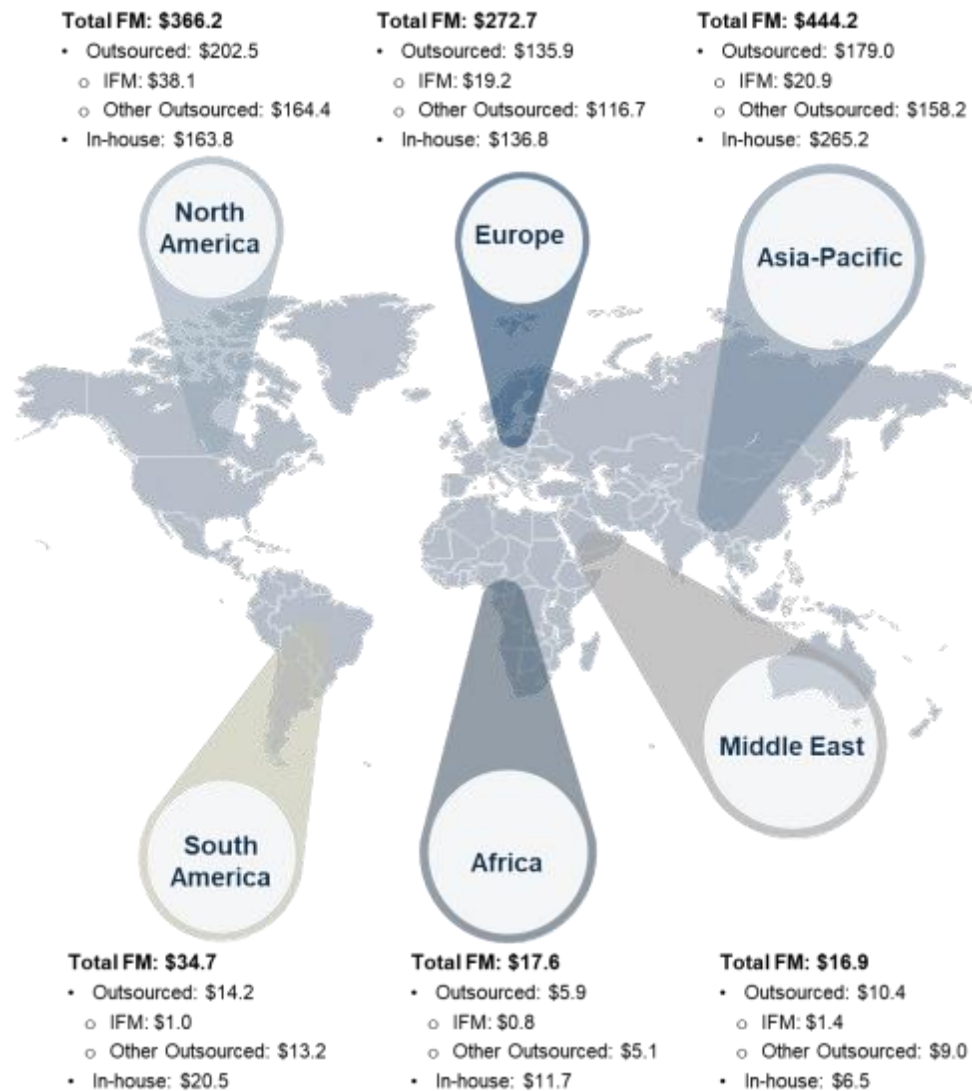


Figure 4 FM markets around the world
Source: Frost and Sullivan Analysis

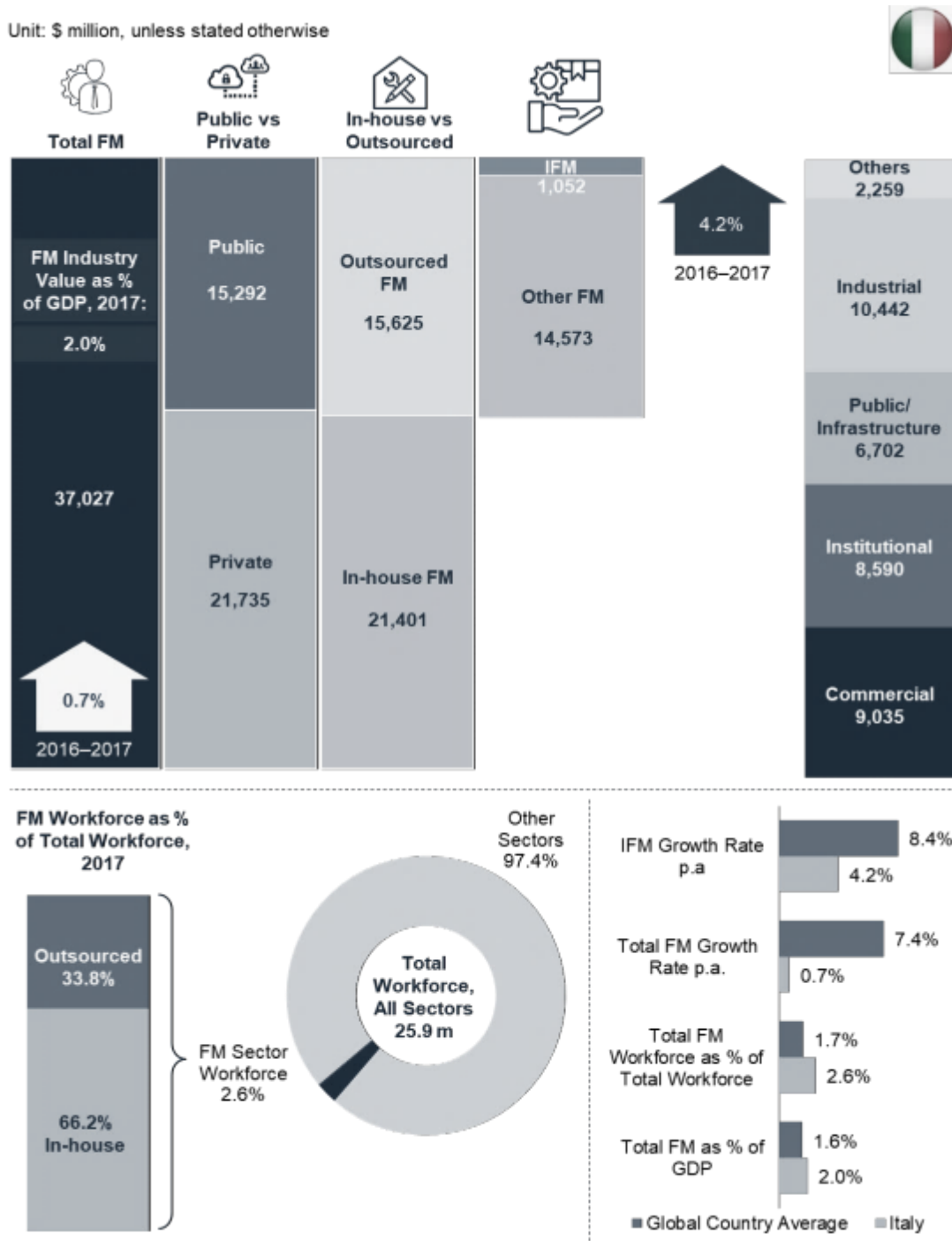


Figure 5 Facility Management Market, Italy 2017
 Source: Frost and Sullivan Analysis

The Italian FM market is among the most complex in Europe, with considerable fragmentation in the delivery of FM services. Despite Italy being one of the larger economies in Western Europe,

IFM adoption has failed to achieve a significant share of the FM outsourcing market. The under-penetration of IFM primarily reflects the conditions in Italy, especially the reluctance among many organizations to vest control of critical services to an external provider. Structural difficulties also exist. These include a tendency to source external services regionally and locally, a preference for outsourcing services individually, and labor law and trade union barriers. The total FM market growth rate has been sluggish, at only 0.7% in 2017.

The FM market consists of a small number of national and international companies, alongside a more significant amount of mid-sized suppliers of services. Meanwhile, the supply base for IFM is fragmented.

The construction sector is a vital part of the Italian economy, with its gross value added, contributing to 18.7% of GDP. The 8.9% drop in the number of construction companies from 2010 to 2016 has had a negative bearing on output, which fell by 32.3% during the same period. The impact was apparent in the 17.3% decline in turnover and a 17.2% drop in gross operating surplus in 2016 compared to 2010. Employment in the sector was affected as well, with the number of workers declining by 22.4% over the same period. Demand for more comprehensive solutions is projected to expand, boosted by awareness of the benefits of bundled packages among both private and public sector clients. A vital feature of the Italian market is its focus on cost savings, expected to remain a critical issue going forward.

However, private sector opportunities will stay focused on international companies, with little evidence of any significant trickle-down of FM to mid-sized local firms. While the public sector is likely to present several excellent opportunities, much will depend on the promotion of funding models such as PPPs.

In terms of demographics, the proportion of people aged 60 and over accounted for 27.2% of the total population in 2013. This proportion is expected to grow to 38.7% by 2050, resulting in more significant market opportunities in the healthcare sector, including aged care, over the long term.

CHAPTER 2. CURRENT FM AND BIM PRACTISES IN EGYPT AND THE MIDDLE EAST

2.1. Construction Sector of Egypt in Recent Years

“Egypt is progressing with a well-structured program to restore macroeconomic imbalances, address social inclusion priorities, and achieve high, sustainable, and well-diversified growth. The government has made clear strides toward regaining confidence in the economy through serious and comprehensive reforms while moving steadily on advancing its political agenda.”¹⁵

According to the official publication of the “Egypt Economic Development Conference,” Egypt’s economic revival is underway under committed and robust leadership. The current juncture presents a historic opportunity for the country, setting the stage for a new virtuous cycle of inclusive growth and socio-political stability. Sensible macroeconomic policies and structural reforms will create the firm foundations for higher growth, higher investment, rising FDI inflows, growing job opportunities, and higher productivity. These policies and changes will be self-reinforcing to put Egypt on a path leading ultimately to material and long-overdue improvement in social conditions and the transformation of its economic landscape. The government is fully aware of the challenges and risks that lie ahead. Its commitment to reform is complete, and its track record to date demonstrates its capacity and willingness to transform challenges to opportunities through proactive and far-reaching policies. The Egyptian government stands behind its pledge to renew the Egyptian economy and recognizes that fulfilling the strategic vision is essential not only for the people of Egypt but also for the entire region as well as for the broader international community. The government is prepared to do what it takes. And it welcomes the private sector to seize the opportunity and to engage in Egypt’s renewal.

¹⁵ StartEGY – Egypt Economic Development Conference 2015

2.1.1. Construction Sector Role in National Economic Development

The construction sector plays a significant role in Egypt's economic development, accounting for 11 percent of total employment and contributing 5 percent to GDP on average over the period 2009/2010–2013/2014.¹⁶ It caters to the increasing demand for residential and nonresidential consumers in addition to providing the necessary infrastructure. The government has structured several stimulus packages that mainly target the construction sector. This is in addition to the vast investments in the Suez Canal, as well as the one million housing units, among other construction and infrastructure projects. These projects and increased spending are expected to increase the output of the construction sector. Given the heightened construction activity initiated by the Egyptian government, it is of crucial importance to understand the effect of the increase in construction output on the Egyptian economy. Moreover, it is quite relevant to estimate its multiplier effect on the economy by calculating the forward and backward linkages with other sectors to understand how the output of these sectors will be affected accordingly. The private sector is dominating the construction activities, where its share in total investments represents 73 percent in 2013/2014. Besides, 92 percent of the construction firms are small and medium enterprises, yet accounting for 19 percent of total value added in the sector. Moreover, the sector suffers from a high degree of informality, which results in an underestimation of the official construction figures and statistics.¹⁶

2.1.2. Construction Sector Contribution to the National Egyptian GDP

The construction and building sector is an essential axis of development in both developed and developing countries due to its contribution to economic growth and job creation.

However, the role of the construction industry in Egypt is still modest with regard to its share in GDP.

¹⁶ www.mof.gov.eg : Ministry of Economic Development, Ministry of Finance, CAPMAS and Central Bank of Egypt,

The Egyptian construction industry accounted for 5 percent of GDP on average for the period 2009/2010–2013/2014 and 5 percent of GDP in 2013/2014 (Figure 6).¹⁷ This is considered a low share when compared to other sectors in the economy, namely, manufacturing (17 percent), mining (15 percent), and agriculture sectors (15 percent). Its share is also perceived as modest, in GDP, when compared to the performance of the construction sector in other lower-middle-income countries (Figure 7).

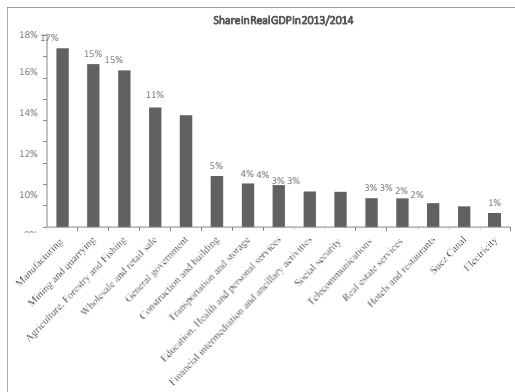


Figure 6 Economic Sectors' Relative Share in Real GDP in Egypt (2013/2014)
Based on data from the Ministry of Planning.

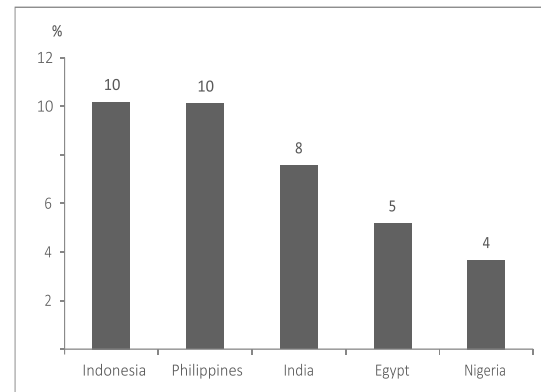


Figure 7. Construction Sector's Relative Share in GDP in a Number of Countries (2013)
Source: www.tradingeconomics.com

However, its performance differs with regard to its share in total employment. The construction sector accounts for 11 percent of full employment in 2013/2014 and 11 percent on average for the period 2009/2010–2013/2014, with a workforce of 2.7 million people (Figure 8). It is one of the major contributing sectors to employment in Egypt after the agricultural sector. Yet, compared to other countries, there is still room for further improvement in this level of employment (Figure 9). One of the reasons behind the low contribution to GDP and employment might be a result of the nature of the sector being highly characterized by informality

¹⁷ Periodical Publications of the Central Bank of Egypt Vol. 57 No. 2

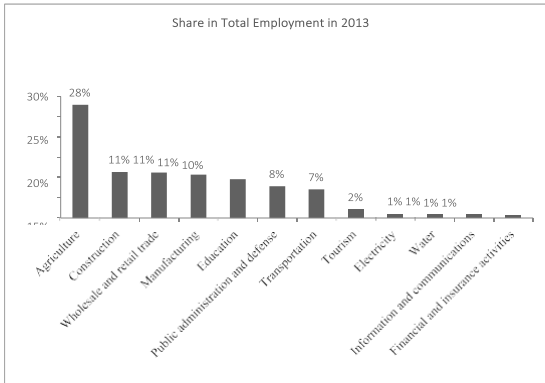


Figure 9 Economic Sectors' Relative Share in Total Employment in Egypt (2013/2014)
Based on data from the Ministry of Planning.

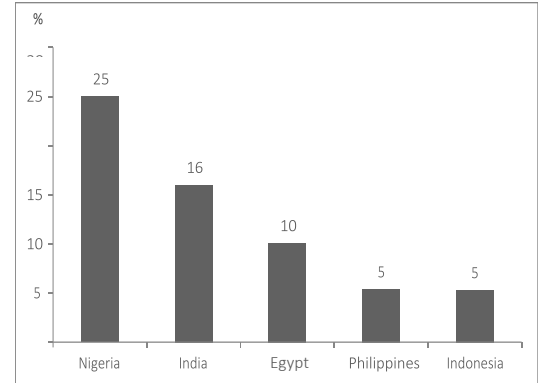


Figure 8 . Construction Sector's Relative Share in Total Employment in a Number of Countries (2013)
Source: Statistical Bulletin of Construction and Building, 2013, CAPMAS, Egypt

The sector has not witnessed severe fluctuations in its share in GDP and total employment over the period of 2009/2010 till 2013/2014. Nevertheless, the fluctuations have been witnessed in the growth rate of the sector, implemented investments, and the structure of the public and private sectors' investments. The growth rate of this sector witnessed a drop to 12 percent in 2011/2012. This drop is a reflection of the decline in implemented investments in the sector by almost 71 percent in 2011/2012 due to the country's political conditions at that time. The sector witnessed an improvement in 2012/2013, as investments rose by 92 percent, and the growth rate reported an increase to reach 16 percent in the same year.¹⁸

2.1.3. Public and Private Shares in Construction investments

On average, the private sector contributes by 71 percent to investments in the construction sector, while the public sector contributes by 29 percent in the period 2009/2010– 2013/2014. The share of the private sector declined from 83 percent in 2010/2011 to 52 percent in 2011/2012. In 2012/2013, the private sector's share increased to 73 percent in total construction investments (Figure 10). This growth in construction investments could be attributed to the optimism of the private sector and regained confidence in the economy.

¹⁸ Periodical Publications of the Central Bank of Egypt Vol. 57 No. 2

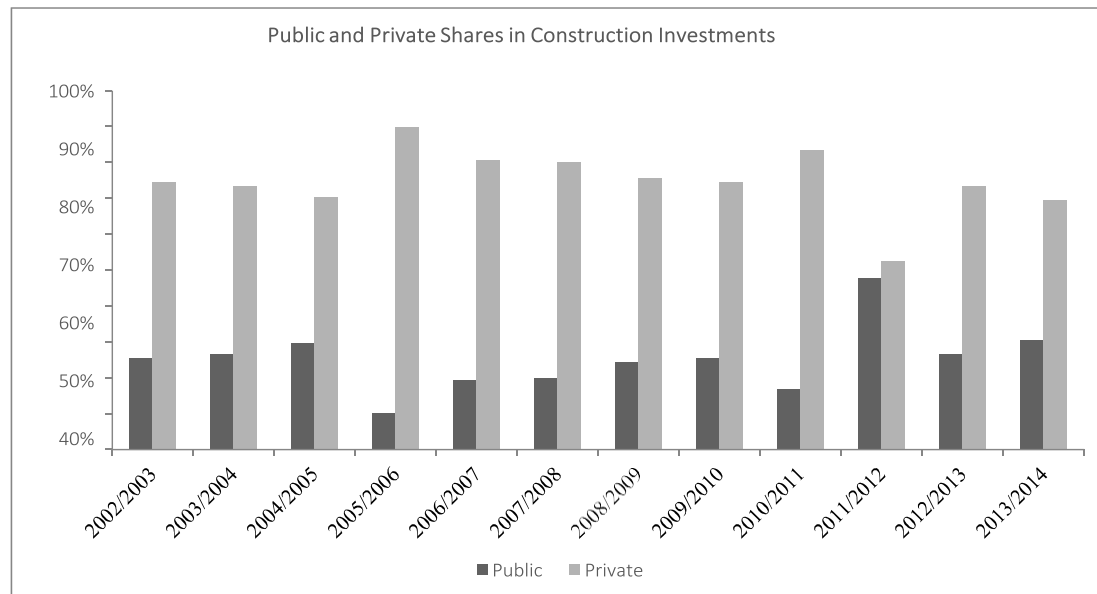


Figure 10 Public and Private shares in Construction Investment | Source: Based on data from the Ministry of Planning

Hence, private sector investments remained larger than those of the public sector over the period 2009/2010-2013/2014. Regarding geographical concentration, the private sector's activity was mainly concentrated in Cairo in 2013. However, public sector activities were primarily concentrated in other governorates (Figure 11). The reason behind the concentration of

The private sector activity in Cairo is the centralization of government ministries and institutions, organizations, and significant investors in Cairo (Rakodi 1997). Besides, the regulations governing the construction sector are not applied evenly across the governorates. For instance, preconstruction approvals time varies between provinces. Additionally, fees associated with building approvals differ from city to city. In some towns, applicants are subject to charges not required by national law (World Bank 2013). These cumbersome procedures make it harder for the private sector to align its business activities across governorates.¹⁹

¹⁹ World Bank 2013

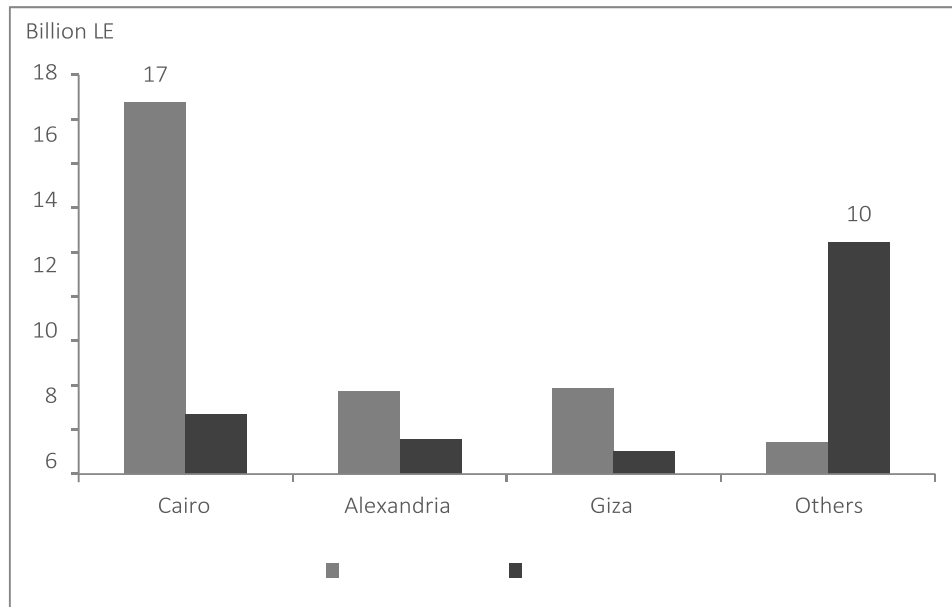


Figure 11. Production by Sector and Governorate in 2013
 Sources: CAPMAS (2013a, 2013b).

With regard to firm size, construction activity in both the private and public sectors is concentrated in large firms. Most of the work of the private sector is implemented by large firms, which account for 70 percent of total contracts and 76 percent of total value-added. This is despite the fact that 95 percent of private-sector firms are small and medium-sized. Regarding the public sector, 99 percent of the total value added is in large firms. This signals that the sector is mainly dominated by large firms, and the role of SMEs is undermined. This minor role for SMEs can be attributed to the nature of informality and subcontracting in this sector.²⁰

²⁰ Frost & Sullivan analysis

2.2. Facility Management in Egypt

2.2.1. Global FM Market Report on Egypt 2018 (by GlobalFM)

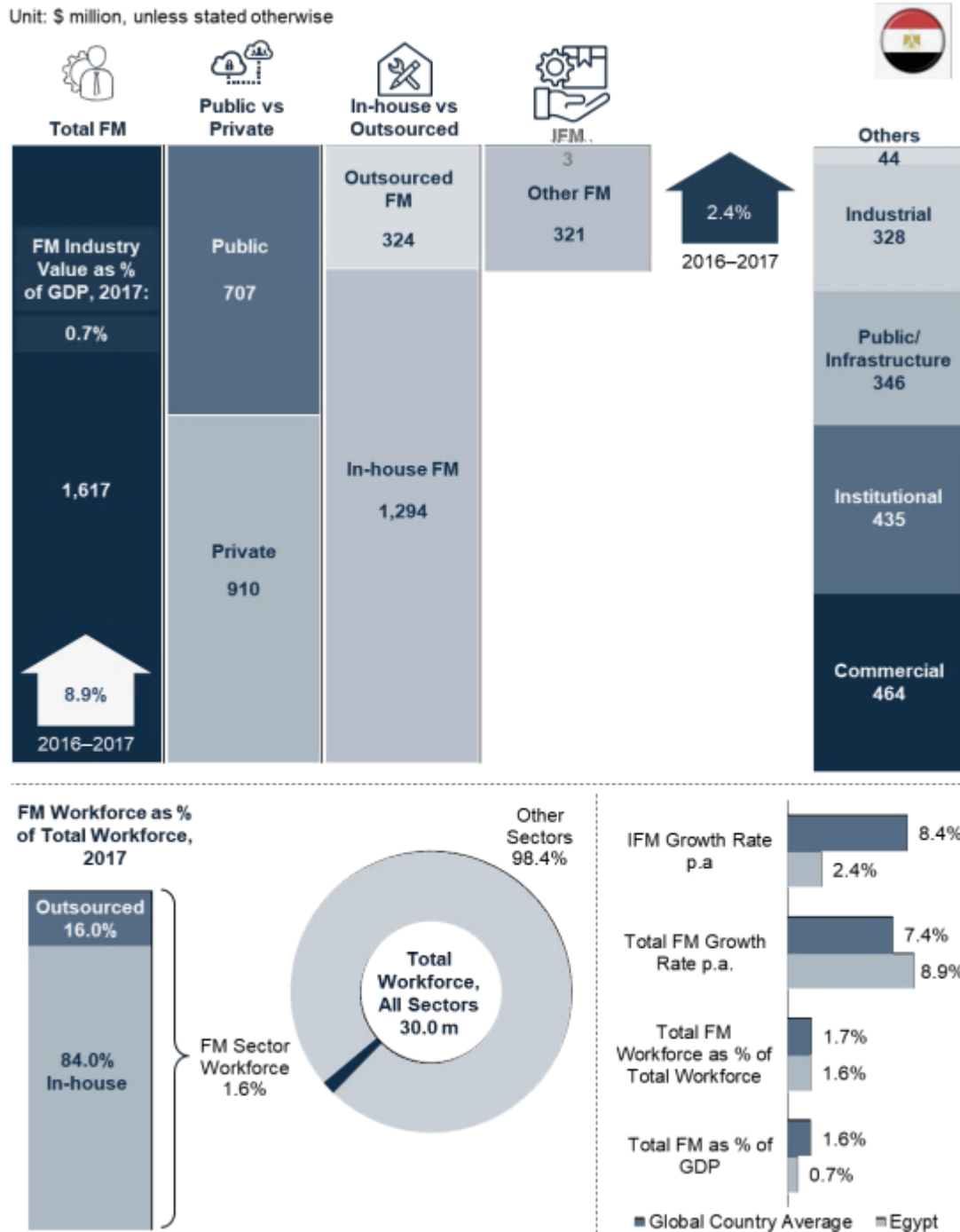


Figure 12 Global FM Market Report on Egypt 2018
Source: Frost & Sullivan analysis

Following several years of political and economic volatility, Egypt's economy appears to be gradually picking up pace. The Egypt Economic Development Conference (EEDC) in 2015 saw Egypt inking nearly 40 new investment agreements and memorandum of understanding (MoUs) with multiple countries amounting to approximately \$163 billion. The foreign direct investment (FDI) was estimated at \$6.7 billion in 2015, with the forecast trending upwards. From 4.2% in 2017, the GDP growth is expected to rise to 5.0% and 5.5% in 2018 and 2019 respectively.²¹

An increase in economic output and population are likely to stimulate private sector investments in construction and building activities, creating a massive demand for FM services in Egypt. However, expansion in the FM market could be restricted by the government's inability to ensure favorable investment conditions to developers, reducing demand from the construction sector. Other high-potential industries for FM outsourcing services include tourism, hospitality, healthcare, and infrastructure. Customers increasingly recognize the benefits of outsourcing FM services to reduce operating costs and concentrate on core business activities. The willingness to outsource FM services among customers/end users could positively impact market growth in Egypt.

The FM market in Egypt is a mix of both international and domestic companies. Established companies are well-positioned to harness the market potential and attract large- and medium-scale customers through their strong brand identity, competitive pricing, a wide range of services and capabilities supported by skilled technical expertise/ qualified workforce to stay competitive. Large FM service providers offer comprehensive hard and soft FM services sought out by leading developers.

However, the market shows ample room for improvement, given the lack of providers able to provide end-to-end FM services. It is common for providers to outsource certain services or use sub-contractors. Only a handful of subsidiaries of major developers such as Emaar Hospitality, Key- Mountain View, and Sodic Edara offer a complete array of services. Economic recovery and

²¹ Frost & Sullivan analysis

improved spending on infrastructure projects entering the execution phase from commitments inked with multilateral organizations such as the United Nations (UN) and World Bank and countries such as the US, UK, Russia, and China during the EEDC represent significant market opportunities for FM market service providers.

2.2.2. National Definition and Practices of Facility Management

In Egypt, FM is commonly understood as housekeeping and maintenance function in buildings. There are about 20 Facility Management Companies in Egypt; the first company was established in 1999. All FM companies are concentrated in the North (Lower Egypt), especially in Giza and Cairo, connected to the new construction communities. Figure (13) illustrates the timeline that represents the establishment and progress of facility management companies in Egypt starting from 1999 till 2004.

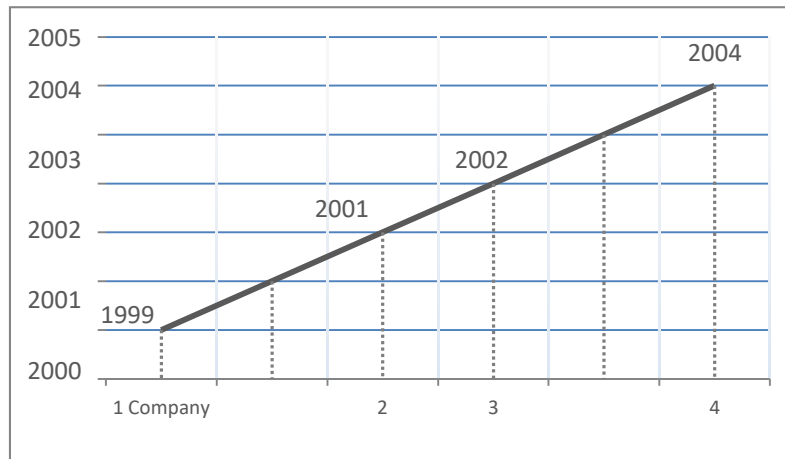


Figure 13 Timeline representing the Establishment and progress of facility management companies in Egypt

Source: Based on a survey by a professor in Ain Shams University, Cairo

2.2.3. First Integration of FM in Egypt

FM with its integrated definition appeared clearly in Egypt in 2004 when "The Nile Towers, Mega Project" needed to outsource its non-core services to an FM company through testing, commissioning, operation and maintenance phases, after that, "The Smart Village, Mega Project" found it necessary to outsource its infrastructure works to an FM company in order to be accomplished with least cost and time, and this was just the start, after achieving great success with the mentioned megaprojects, the market was totally opened to FM services²². Nowadays, not only mega projects but also average projects are outsourcing their non-core functions to FM

²² Based on a survey by a professor in Ain Shams University, Cairo

companies in order to add value to the projects through their life cycle. From 1999 to 2004, FM companies in Egypt were concerned about providing only maintenance services to the buildings. Before 1999, The Egyptian FM companies were only providing housekeeping and security services.

2.2.4. National FM Codes

In Egypt, in the beginning, there were only Maintenance companies and Housekeeping companies, after that, In-house services appeared, then a combination between maintenance and housekeeping companies occurred, this combination is then developed to become "Non-Comprehensive" FM companies, in addition to one or two "Comprehensive" FM Companies. The above may be the reason why FM is commonly applied through testing, commissioning, and O&M phases. No clear codes are found for using FM through design or pre-schematic phases. FM Comprehensive Code can be considered an integration "or a collection" between Design Codes, Fire and Safety Codes, Health, Safety & Environment (HSE) Codes, ISO Codes, Maintenance codes, Risk Management Codes, Housekeeping Codes, Catering Codes, etc. The Main Service Provider shall provide and keep on-site up to date copies of all relevant Regulations, Standards, and Codes of Practice. He shall allow the Client/Employer access to such copies at all reasonable times.

2.2.5. Current Facility Management Practices in Egypt

Almost all the FM Egyptian companies provide housekeeping and security services. On the other side, very few numbers of companies offer real estate and financial services; approximately, 100% of FM companies in Egypt provide operation and maintenance service "housekeeping," 87.5% provide administrative service "security," 87.5% provide facility planning service, 62.5% provide architecturally and engineering service, 50% provide health and safety service, 37.5%

provide space management service, 25% provide real estate service, and 25% provide financial planning service.²³

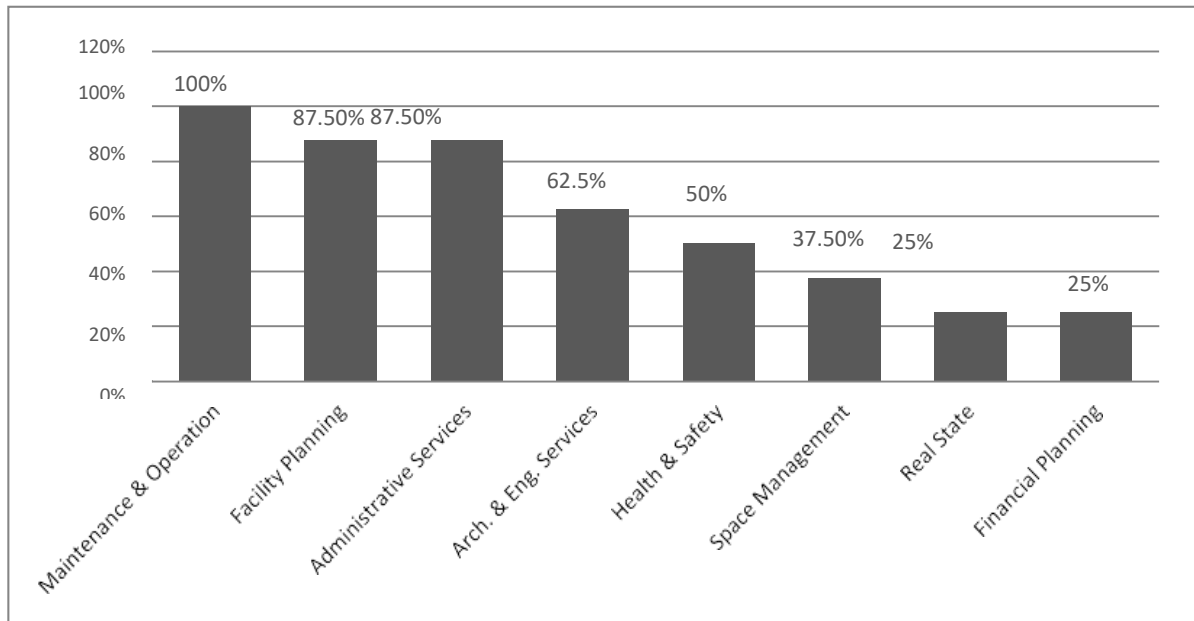


Figure 14 Percentage of Companies Providing Different FM Services
Source: Based on a survey by a professor in Ain Shams University, Cairo

²³ Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

2.2.6. The Percentage of Applying Facility Management on Projects

FM was first applied in Egypt in 2004, where the Egyptian FM companies started with providing 60% of the FM roles, which were defined by the “International Facility Management Association.” This percentage is then increased to reach 70% in 2014. It is supposed to achieve 100% in the future by providing all the eight described FM roles, which means fully applied comprehensive FM.²⁴

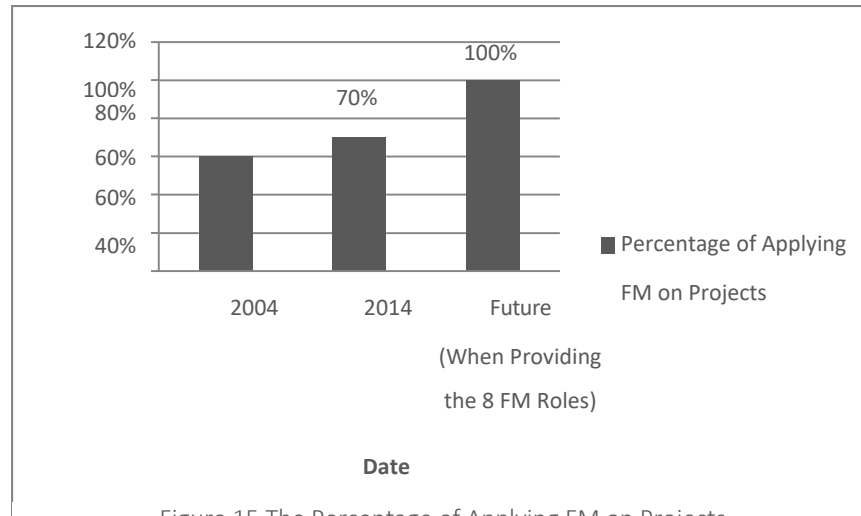


Figure 15 The Percentage of Applying FM on Projects

Source: Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

²⁴ Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

2.2.7. The Scale of Projects Applying Facility Management

The start was in 2004 when the Nile City Towers Project was the first mega project to apply comprehensive FM in Egypt. In 2014, about 50% of the mega projects, 30% of the average projects, and 2% of the small projects started applying FM. In the future, all the mega and the average projects, in addition to 70% of the little projects are expected to be implementing FM.²⁵

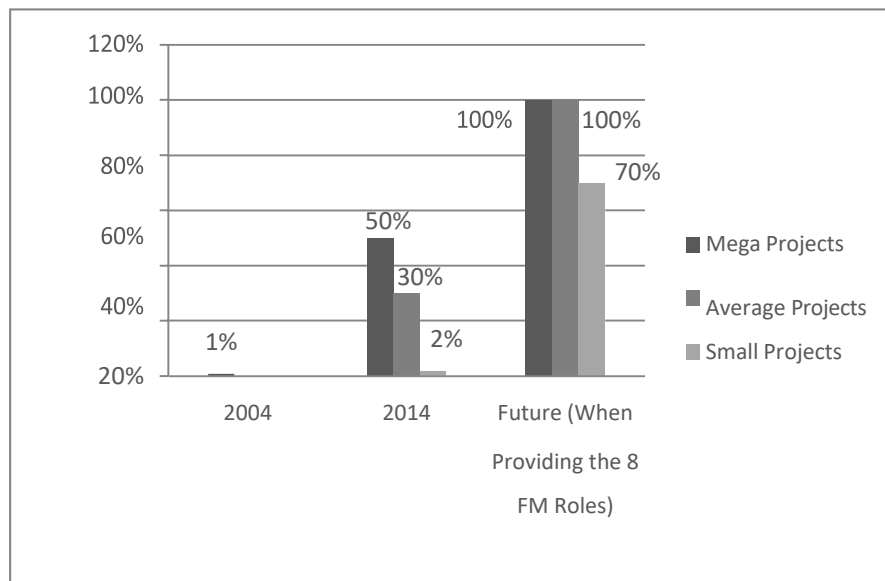


Figure 16 The percentage of different project scales that apply FM in past, present and expected future times when providing the 8 FM Roles

Source: Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

2.2.8. The Phases of Applying Facility Management on Projects

FM is commonly applied during late project phases. About 100% of the projects that consider implementing FM start using it through the Operation & Maintenance phase. About 80% of the projects apply FM during testing and commissioning, and only 30% of the projects apply FM through the construction phase. FM has never been applied through early project phases like pre-schematic or design phases.

²⁵ Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

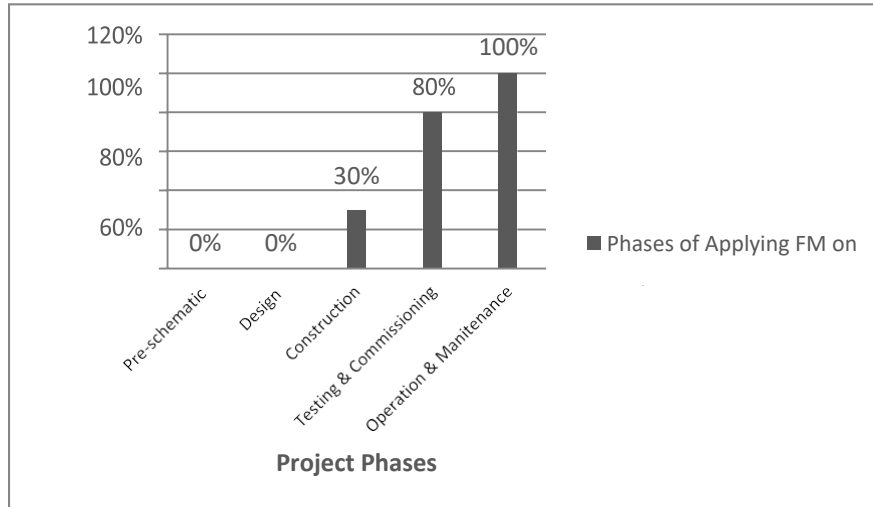


Figure 17 Phases of Applying FM on Projects in Egypt
Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

2.2.9. Current Status and Performance of FM in Egypt from the Point of View of Managers, End Users, and Service Providers

There is a discrepancy between the opinions of the target groups regarding the status of FM in Egypt. The service providers group is the most satisfied, while the end-users group is the least satisfied. 55% of the service providers who went through the questionnaire²⁶ think that FM is achieving Good rates in Egypt and that it will be achieving better rates in the future, while only

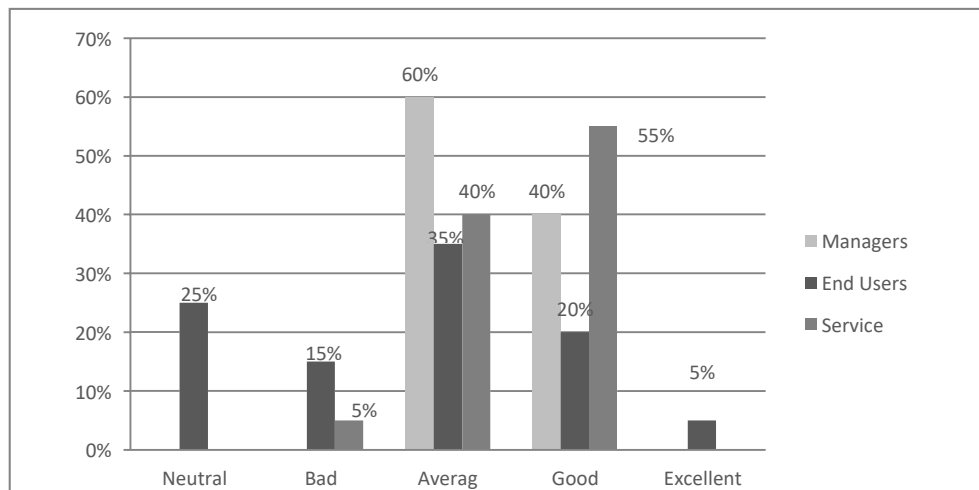


Figure 18 Performance and Status of FM in Egypt
Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

²⁶ Made by a researcher in Ain Shams University in Cairo

20% of the end-users group is satisfied with the performance of the FM in Egypt. 35% of the end-users think that FM is achieving average rates, while 25% found no difference between in-house and outsourced services. On the other side, 40% of the target managers think that FM is achieving reasonable rates; 60 % believe that FM is achieving average rates.²⁷

Good applied FM can be achieved by decreasing the percentages of the discrepancy between the three involved parties, the managers, the end-users, and the service providers. The service providers should consider the role of the managers and their requirements and points of view to improve the provided services. And both of them should consider the role of end-users in evaluating and enhancing the performance and quality of the provided services, which in return will help in achieving good applied FM in Egypt. An integrated team with a representative from each group shall be working together to establish a comprehensive management process to study and evaluate all the requirements and the optimum ways of providing the satisfying performance of FM.

²⁷ Based on a survey and an open discussion with some FM practitioners made by a researcher in Ain Shams University in Cairo

2.3. Local Case Study According to The Current FM Practices

2.3.1. Dar Al-Handasah Premises

Dar Premises creates a professional and unique workplace for 1600 professional staff; it provides the opportunity to concentrate on the core value, target, vision, and culture through outsourcing its non – core services to Smart Village as an operator and general FM company. Smart Village Company, in its turn, transferred all the services to 4 facility management companies (service providers) as per its contract agreement with Dar.²⁸

The new corporate is concerned with adding value to the organization and providing the opportunities to create a flexible and unique work environment to achieve the international quality standards; that was the main reason why the company decided to outsource all the non-core services "housekeeping, catering, maintenance, etc." to FM companies "service provider". These FM companies will take the responsibility of providing high standard non-core services and giving the corporate the chance to concentrate more on achieving the target goals and the required standards.

Quality regulations

Dar Premises aims at improving the business, increasing the investments and achieving better worldwide rank for the corporate, so, it is working on implementing the International Standards of the "HSE Management System"; Where, HSE refers to "Health and Safety Executive" in England and "Health, Safety, and Environment" in America. HSE is the independent national watchdog for work-related health, safety, and illness; it's an independent regulator and acts in the public interest to reduce work-related death and serious injury across Great Britain 's workplaces.²⁹

To implement a proper HSE management plan, the organization must apply all the requirements of ISO 14001 Environment management standard and OHSAS 18001 standard for occupational health and safety management systems. These requirements can be summarized as follows:

²⁸ <https://www.dar.com/about/overview>

²⁹ <http://punyam.wordpress.com/category/hse-standard/>

- Preparing an HSE manual
- Developing adequate safety planning
- Developing an environment control system
- Working on motivating the employees
- Achieving a risk-free organization, where HSE provides a five steps risk assessment to assess and control risks in the workplace as follows:
 1. Identify the hazards
 2. Decide who might be harmed and how
 3. Evaluate the risks and decide on precaution
 4. Record your findings and implement them
 5. Review your assessment and update if necessary

Scope of Services

In the Dar building, the managers outsourced services related to their project to different companies, where 70% of the services were delegated to one of the top FM companies while the rest of the facilities were delegated to waste management, housekeeping and catering companies. The general supervisor is the smart village management that supervises all the service providers.³⁰

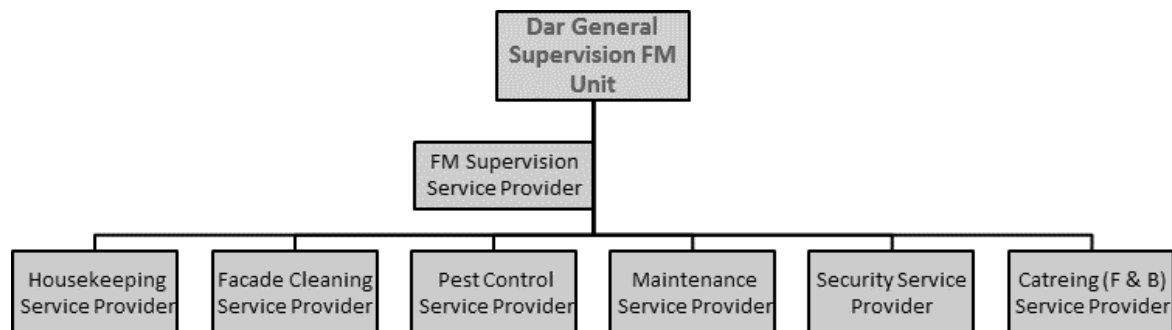


Figure 19 Dar's management Hierarchy

Source: Based on a discussion with managers of Dar Premises, held by a researcher in Ain Shams University in Cairo

³⁰ Based on a discussion with managers of Dar Premises, held by a researcher in Ain Shams University in Cairo

Dar's facility manager is managing the whole process with the help of a technical unit which consists of about ten engineers who are specialized in different fields; architects, landscape engineers, mechanical engineers and electrical engineers in addition to some workers, carpenter, plumber, cleaning supervisors, security supervisors, etc. to supervise and assess the quality and progress of the provided services and interfere when needed to take the suitable decisions. Smart village as the primary service provider offers a general supervision unit to work in parallel with Dar's FM unit to supervise all the service providers, coordinate and arrange the typical works between them or may terminate a contract with one of the providers and replace it with another upon Dar's request in order to achieve the best quality of services as per the contract agreement with Dar.

Services delivered by the FM Company

- FM Supervision Service

A general contract is signed with the FM supervision service provider to manage and supervise the service providers selected by Dar in order to fulfill the scope of all FM services to the highest level. The Contract is of a service level agreement type, which is subject to continuous evaluation through agreed key performance indicators (KPIs) and deductions against lists of failures that will be applied on the service provider payments.

- Façade Cleaning Service

The Façade Cleaning service provider is responsible for cleaning all the exterior facades, interior facades of the atrium, bridges, atrium ceiling, skylight, roof structures, photovoltaic structures, and terraces so that all the mentioned items are in condition all the time. The service provider is also responsible for providing all the necessary labor, uniforms, cleaning materials, tools, etc. to provide the required level of performance as per the contract agreement.

- Pest Control Service

The Pest Control service provider is responsible for controlling all the pests that may enter the building and interrupt the work process or the comfort of employees through applying scheduled visits away from the working hours. The service provider is also responsible for

providing all the necessary labor, uniforms, cleaning materials, tools, etc. to provide the required level of performance as per the contract agreement.

- Maintenance Service

The Maintenance service provider is responsible for operating and maintaining all the building electromechanical assets, providing the operation and maintenance services of the special systems such as elevators, UPS, CCTV, etc. besides providing an —Operation and Maintenance Manual|| for the whole building. The provider is responsible for using the Archibus technology in order to facilitate and control the operation and maintenance procedures and provide a monthly progress report to Dar 's technical unit.

- Security Service

The security service provider is responsible for ensuring 24/7 security and life safety services for the building users through guarding the building and providing an evacuation plan to be applied in case of emergency. The security team is also responsible for training the users to apply the evacuation plan in case of fire or how to deal with any kind of emergencies.

- Housekeeping Service

The Housekeeping service provider is responsible for indoor and outdoor cleaning services in the building so that the mentioned items are in perfect condition all the time. The service provider is also responsible for providing all the necessary labor, uniforms, cleaning materials, tools, etc. to provide the required level of performance as per the contract agreement.

Evaluation and feedback of the provided services

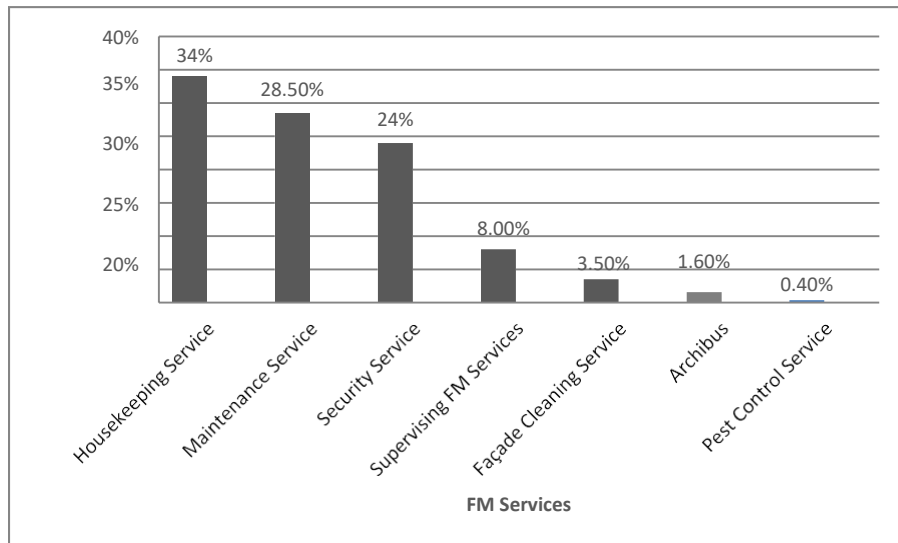


Figure 20 Value of Each FM Provided Service from the Total Monthly FM Budget
Source: Based on a survey held by a researcher in Ain Shams University in Cairo

Housekeeping service comes in the first place as it represents 34% of the total monthly FM budget. Maintenance services come in second place, and they represent 28.5% of the overall FM budget. Security service represents 24% of the full FM budget, and it comes in the 3rd place. The general supervision services represent 8%, then the Façade cleaning services with 3.5%, the Archibus service with 1.6%, and finally, the pest control service, which represents 0.4% of the total FM budget.³¹

Further to occupying the highest weights in the FM contract budget, housekeeping, maintenance, and security services are supposed to be adding the greatest values to the building by achieving the agreed performance levels and satisfaction as per the agreed.

There are five main aspects to evaluate the performance of FM provided services in Dar; vision, efficiency, flexibility, quality, and scope of services. The aim of the mentioned aspects is achieved by applying some agreed KPIs that were determined in a general contract which was signed with an FM supervision service provider to manage and supervise the service providers selected by

³¹ Based on a survey held by a researcher in Ain Shams University in Cairo

Dar in order to fulfill the scope and performance of all FM services to the highest level and achieve maximum satisfaction to the users.

All the problems that faced Dar project were either due to the unavailability of complete data and sufficient studies or due to the division and limited scope and vision of project phases. Each team is working separately without a global look or a comprehensive tool that can integrate all the parties to prevent any further problems. This led to the accumulation of the issues in testing and commissioning and operation and maintenance phases. Solving problems became difficult in terms of cost, effort, and time. Figure (20) illustrates the risk initiation phases, where 30% of risks started during the design phase, while 70% of risks started during the testing and commissioning phase.

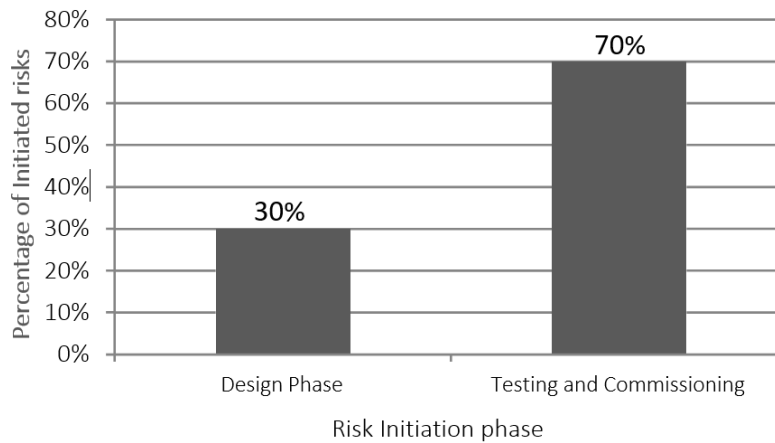


Figure 21 Percentages of risks that happened but evolved and were discovered during late project phases

Source: Based on a survey held by a researcher in Ain Shams University in Cairo

CHAPTER 3. ANALYSIS OF THE CURRENT FM & BUILDING MAINTENANCE NEEDS AND CHALLENGES IN EGYPT THROUGH CASE STUDIES

3.1. Facility Management Misconceptions in Egypt

3.1.1. FM Ideal Interpretation

FM is an integrated process that should be involved in project's design phase and should have a continuous input through the building's life cycle even after demolition and recycling phases, but it all depends on the owner's and the project manager's deal with the FM company, they are responsible for deciding when to apply through which phase it should be applied. Internationally, FM is always applied from day one; it has a sufficient input through the design phase, it gives precautions and highlights all the risks that may face the building in construction and operation phases, it is responsible for preventative maintenance and for adding value to the project through its life cycle, and it gives recommendations for making the best use of the building after demolition. Before establishing the FM associations, FM was considered to be maintenance works in buildings.

3.1.2. Maintenance Codes Development in the Egyptian Market vs. the World

Maintenance works were defined as many international maintenance codes, which were then developed to cover some housekeeping requirements, catering requirements, air quality requirements, etc. till it became the "Code of Practice - FM Briefing."

Housekeeping represents the highest value between all the provided services in the FM contract budget, and this may be one of the reasons why FM services are misunderstood as housekeeping services in a building.

Maintenance and Security services represent the second two highest values after the housekeeping services, and this may be one of the reasons why the Egyptian market considers a company providing the three mentioned services to be an FM Company according to their value and weight in the FM contract budget.

3.1.3. Egyptian Interpretation of FM practices

In Egypt, due to the lack of awareness, believing in over-quality and that anyone involved in the project can achieve any task related to that project, there is a misunderstanding that applying FM in early stages "design phase" would add unnecessary costs to the project's budget, so, in-house services are used instead of outsourcing services, and FM is only involved through testing, commissioning and operation and maintenance phases. In case of appearing of design phase problems or its consequences through late project phases (construction, operation, and maintenance), the FM company will be responsible for solving these problems but costlier in terms of both time and money.

Egyptian FM companies were only providing maintenance services from 1999 to 2004, before 1999, FM companies were only providing housekeeping and security services. Figure (22) is a timeline that represents the progress of the FM provided services in Egypt.

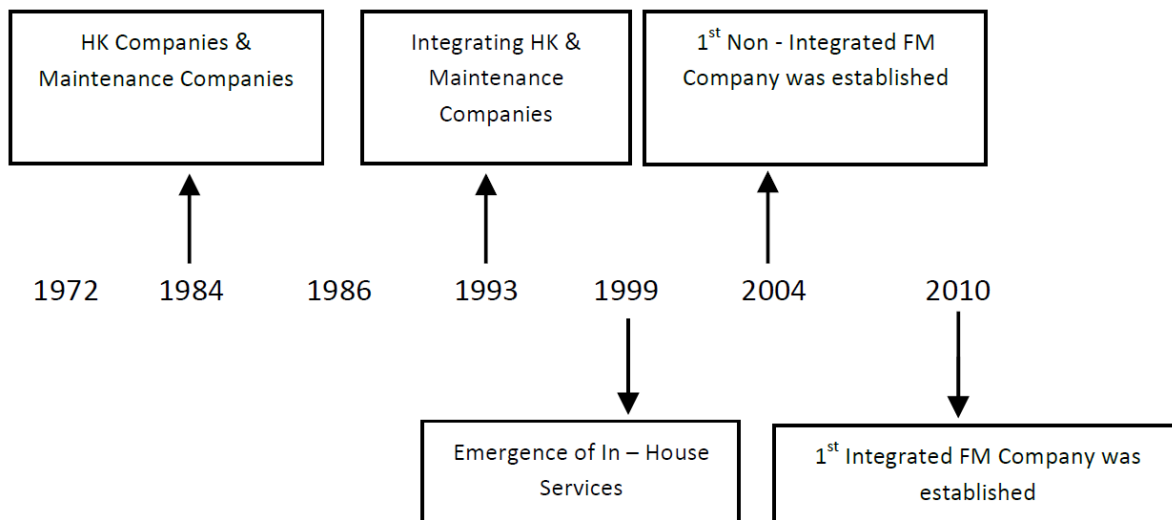


Figure 22 Timeline representing the progress of the FM provided services in Egypt
Source: Based on research previously mentioned

3.1.4. Percentage of Applied FM Services in Egypt Compared to Those Mentioned by IFMA

Table (1) is a checklist of applied FM services in Egypt compared to those mentioned by IFMA. Egyptian FM companies provide the same maintenance services like those provided and indicated by the international FM companies and associations. Facility planning services come in the second place where Egyptian FM companies offer 50% of the facility planning services as defined and described by the international FM companies. The rest of the percentages are illustrated in figure (23).

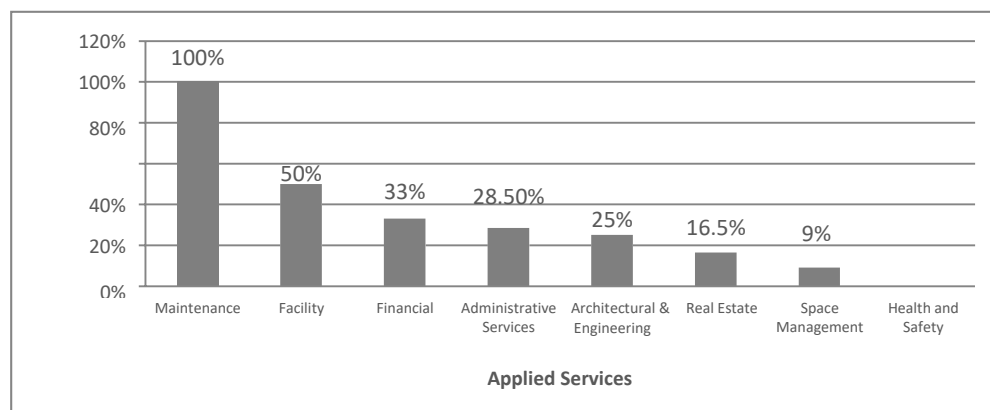


Figure 23 Percentage of applied services in Egypt
Source: Based on the survey previously mentioned

The Eight Headings of FM Responsibilities Internationally	The Forty One Responsibilities of FM Internationally (100%)	Check List for the FM Responsibilities in Egypt	Percentage of Applied FM Services in Egypt Compared to Those Mentioned by IFMA
Maintenance Operations	Furniture maintenance	✓	100 %
	Finishes maintenance	✓	
	Preventive maintenance	✓	
	Breakdown maintenance	✓	
	Exterior maintenance	✓	
	Custodial/housekeeping	✓	
	Landscape Maintenance	✓	
Administrative Services	Corporate artwork	✓	28.5 %
	Mail services	X	
	Shipping/receiving	X	
	Records retention	X	
	Security	✓	
	Telecommunications	X	
	Copy services	X	
Space Management	Space inventory Space policies	X	9 %
	Space allocation	X	
	Forecasting needs	X	
	Furniture purchase	X	
	Furniture specifications	X	
	Furniture inventory	✓	
	Interior plans	X	
	Furniture moves	X	
	Major redesign	X	
	Trash/solid waste	X	
	Hazardous materials	X	
Architectural and Engineering Services	Code compliance	X	25 %
	Construction management	X	
	Building systems	✓	
	Architectural design	X	
Real Estate	Building leases	✓	16.5 %
	Site selection	X	
	Acquisition/disposal	X	
	Building purchases	X	
	Property appraisals	X	
	Subleasing	X	
Facility Planning	Operational plans	✓	50 %
	Emergency plans	✓	
	Strategic plans	X	
	Energy planning	X	
Financial Planning	Operational budgets	✓	33 %
	Capital budgets	X	
	Major financing	X	
Health and Safety	Ergonomics	X	0 %
	Energy management	X	
	Indoor air quality	X	
	Recycling program	X	
	Emissions	X	

Table 1 Percentage of Applied FM Services in Egypt Compared to Those Mentioned by IFMA

3.2. Building Maintenance During the Life Cycle of a Project

3.2.1. The Building Maintenance Industry in Egypt

Maintenance of buildings is a crucial process that has a significant impact on both the building's performance and the efficiency of their embedded systems. However, the building maintenance industry in Egypt has long been an area of neglect, as most of the building's stakeholders restrict its role to the operation phase of the building. This attitude disregards the careful maintenance processes that could be achieved through the preliminary stages of the buildings. The main concern of this part of the research is suggesting specific guidelines that enable the integration of maintenance considerations into the whole life cycle of the buildings. The ultimate purpose is to achieve better performing buildings regarding maintenance aspects.

3.2.2. Barriers facing the effective Maintenance Process in Egypt

Several factors induce building owners to maintain their buildings to the required standards; these factors include the increase in number and variety of buildings, the increase in complexities and advance in technology, and the growing concern on the health, safety, and environmental issues. Nevertheless, building the maintenance industry in Egypt has long been an area of neglect, as most of the building's stakeholders restrict its role to the operation phase of the building.

Besides Different barriers face the implementation of an effective maintenance process such as the scarcity of some spare parts in the local market, lack of qualified labor, inappropriate finishing relative to the nature of building type and the local site conditions, constrained budget for the maintenance of buildings, vandalism and the inaccessibility of building spaces to apply the required maintenance work.

3.2.3. Building lifecycle phases

The life cycle of buildings comprises six significant stages. Planning is the first phase, where the process of producing a strategic plan occurs. It also represents the starting point of the building delivery process. The role of this phase is performing market-need analysis. The Programming or Briefing phase begins as soon as the strategic planning ends. The program is considered vital when all details about the project, including needs, aims, resources as well as the context of the project, are documented. The third phase is the design phase, where the design team develops two and three-dimensional images that respond to the priorities established throughout the planning and functional programming processes.

Afterward, in the construction phase, the construction documents are produced for the chosen design solution. Throughout this stage, all relevant information is merged with the practical instructions and requirements needed to build the facility. The Occupancy and Operation phase comes after the construction phase and is considered the longest of all phases as it might last for 30-50 years based upon the type of the building. During this phase, an adjustment of the building and its systems is made to fulfill the user's requirements. The last stage in the design process is the Adaptive reuse of the building, which is, as the planning phase, based on market and need- analysis.

The design phase, amongst all stages of the delivery of the building, has an immense impact on the maintenance of the building afterward. Vital decisions could be made at the preliminary design phases of the building delivery, which could make the application of different maintenance processes on both buildings systems and components easier. The value added is higher performance and lower operating costs of the buildings.

3.3. Case Studies

Four public buildings in Egypt were chosen for the case studies. The selection of the case studies was based upon several factors, including:³²

- Public Buildings with relative significance.
- Large scale type of buildings.
- Different years of operation.
- Varied types of buildings use.
- The existence/inexistence of a maintenance management department.
- Varied types of ownership (public/private).
- Varied locations (Cairo, Old Cairo, and Alexandria).

The buildings under analysis were selected from among diversified patterns of public buildings in Egypt: a museum, a hotel, a library, and a commercial /recreational center. This selection aims at objectively tackling the most critical problems or obstructions which face the process of public building maintenance as effectively and efficiently required.

This selection of the four patterns of buildings resulted in the researcher's ability to make precise inferences about the nature of such problems and obstructions in general, as a primary step towards achieving the main objective of the research, namely, "suggesting specific guidelines that enable the integration of maintenance considerations into the whole lifecycle of the buildings.", which has a significant effect on relieving the impact of the obstructions which face the process of building maintenance.

³² Journal Of Construction Volume 8 Issue 1

3.3.1. The Coptic Museum in Cairo

The Coptic Museum exists in a place called "civilizations center" in Cairo. The maintenance processes in this historical place depend on making contracts with specialized companies, only if any harm occurs in one of the different systems of the building. This is because there are no particular plans for the maintenance of the building or even for making daily cleaning processes, precautionary maintenance, renewal plans, or plans for replacing the current system since the building lacks an administration that is responsible for the maintenance of the building.

The building has been subjected to a process of a complete renewal of the systems of display and lighting. This process aimed at improving the performance of the building as a whole, along with providing a welcoming and motivating atmosphere for visitors. The process of improvement faced a number of problems and obstructions, which strongly affected the performance of the required maintenance processes. These obstructions are represented in the following points

After its renewal and opening, the museum depended on natural ventilation, which resulted in the continuous occurrence of a collision between the open windows and the display glass cases, leading to the damage of some of them. It also resulted in the accumulation of large piles of dust inside and outside the glass cases. This shows that the planning of the process of renewing the museum was inadequate and that the consequences of depending on natural ventilation in such a dusty atmosphere were not studied, especially with some display glass cases being placed beside open windows, resulting in their being subject to a collision. The figures show the glass cases which were used in the museum after the renewal processes and the glass windows from inside the museum.



Figure 24 Coptic Museum in Cairo 1



Figure 25 Coptic Museum in Cairo 2

A large number of the lighting units were damaged after reopening of the museum. This damage occurred to nearly one-third of the lighting units of the museum, which refers to the existence of a problem with the decision-making process regarding the systems used in the building and their efficiency. The board of the building sought the assistance of a foreign company specialized in providing and setting glass cases.

However, the technique used by this company in setting the glass cases, together with the policy of the company, do not allow anyone except the workers of the company to open the glass cases, and upon an advance request. This led to imposing new restrictions upon performing maintenance processes, whether the daily cleaning of glass cases from inside or the precautionary maintenance of lighting units or even replacing damaged ones.

As an attempt from the administration of the museum to overcome the previous problems a central air-conditioning system was set up in the museum as a whole to prevent the collision of windows with the glass cases and to lessen the

amount of dust inside them and, in turn, the rates of periodical maintenance and cleaning. However, this solution led to the increase of the general budget of the renewal project, while, at the same time, leaving the problem of opening the cases for adequately performing the maintenance processes unsolved.

3.3.2. The Semiramis Intercontinental hotel

The Semiramis Intercontinental hotel overlooks River Nile in Cairo. The advantage of studying and analyzing this building is that it has already spent half of its age since it had been opened about twenty-five years ago. This makes it a rich case for studying as it has encountered varied maintenance-related problems throughout its lifetime.

The building had been subjected to entire air-conditioning system replacement, in addition to undergoing renewal processes for all systems, as well as for the internal and external facades. These processes were followed up by a specialized maintenance administration which is stationed inside the building. The most critical problems which faced this building can be summed up as follows: The project met the problem of lack of some spare parts of high-quality materials; it also encountered the problem of lack of locally trained workers who are capable of dealing with modern techniques. Such issues clearly emerged when it was time for making precautionary maintenance for the air-conditioning system of the building. The decision to replace the whole air conditioning system was taken after studying the costs which were provided for treating and renewing the old system. The choice of installing a new air conditioning system, which was made by the maintenance administration, led to lessening the burdens of maintaining the old system, which needed frequent maintenance cycles.

The building suffers from the incompatibility between the materials used for finishing and the dusty, polluted weather surrounding it as a result of its presence in an essential place in the middle of Cairo. This leads to many burdens on the performance of maintenance and cleaning processes, especially for entrances and glass facades for the purpose of keeping the good and attractive appearance of the building. Some machines and accessories inside the building were subjected to damage or vandalism from users, especially in public halls and lavatories. There is

great difficulty in performing maintenance processes and other relevant works (especially precautionary maintenance and fixing processes) in some of the hotel halls in which guests are present.

3.3.3. Shopping Mall and Recreational Building

The City Stars project situated in Heliopolis, Cairo, includes an integrated management system, not only for the maintenance of the building but also for facility management as a whole. Figure (25) illustrates the structure of the maintenance management departments in the building. This shows the integration between the maintenance administration and other administrations since the maintenance administration depends on using computer techniques besides manual techniques in making maintenance schedules and issuing working order.

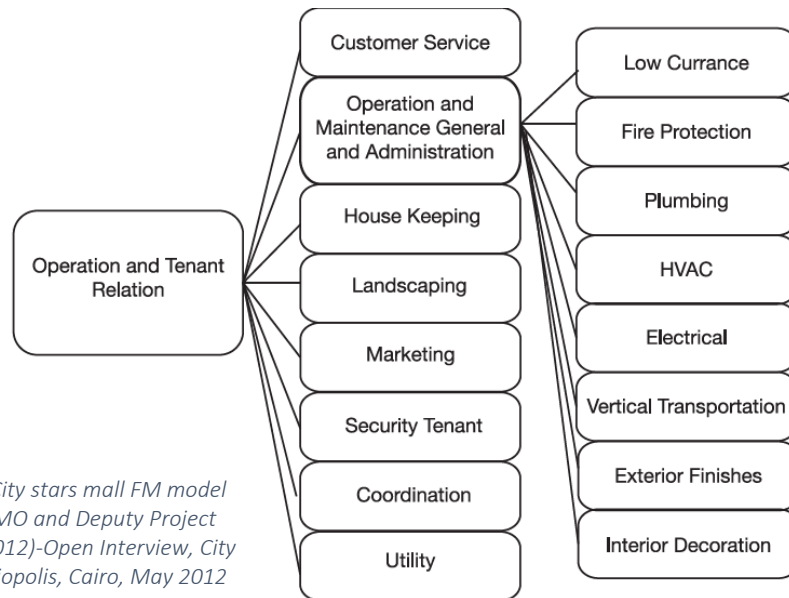


Figure 26 City stars mall FM model
 Source: PMO and Deputy Project Manager(2012)-Open Interview, City Stars – Heliopolis, Cairo, May 2012

The administration of the building started its job after the building was implemented and shortly before starting its work. The obstacles which encountered the maintenance of the project’s halls comprised the following:

Despite using high-quality paintings in internal corridors and public halls, the selection of such kinds of paintings disregarded some hostile manners by some users who lean with their shoes on

the walls, causing damage to these paintings and making their cleaning difficult, as well as leading to the need for repainting these walls more frequently than expected. Decision-makers disregarded a very important factor related to the choice of devices and accessories, which are used in lavatories, namely subjection to vandalism. The system of selection of these devices depended on its efficiency and quality, regardless of safety measures against vandalism. This led to the subjection of most devices and accessories inside public lavatory halls to theft shortly after opening the project, which caused the administration to replace the devices with less efficient and safer ones (which cannot be removed).

The building was greatly affected by the lack of some locally modern techniques, as well as some materials with standard quality. This was clearly shown in implementing an external façade of the mall, which was planned to be made in the form of waterfalls. The administrators were forced during the implementation of the project to make use of limited local techniques to carry out the design by using pipes in hidden parts of the façade.

This resulted in great problems represented in the leakage of water inside the mall because of the lack of techniques and bad implementation. Consequently, the maintenance administration resorted to the periodical injection of leakage parts.

On the other hand, the effect of local water and the percentage of salt in it were not studied, resulting in the obvious accumulation of salt on the façade. This, in turn, resulted in using filters to purify water from salts, leading to the appearance of such relatively big filters on the external façade of the building, this problem represents a clear example of what can be caused by not integrating the maintenance considerations during the first phases of design, because solving the problem after its occurrence led to adding more unexpected burdens to performing maintenance processes for the building.

This project encountered another type of problem, which represents an obstacle for building maintenance, which is the inability to reach some systems, especially inside the shops that do not have an outer façade facing the street. This problem led to the occurrence of limited fires inside the mall, as well as the need for evacuating these shops during the maintenance process of the different control systems inside them.

3.3.4. Library Building

The Bibliotheca Alexandrina library building is considered a revival of the old Alexandrian library and is situated in Alexandria, Egypt. The building has a complete administration which covers all its fields. Figure 26 shows the structure of the management department. The administration started to perform its work after the implementation of the building and before its beginning with the help of a foreign specialized management company. Then it sought the assistance of locally professional people after the foreign company had trained the local managers.

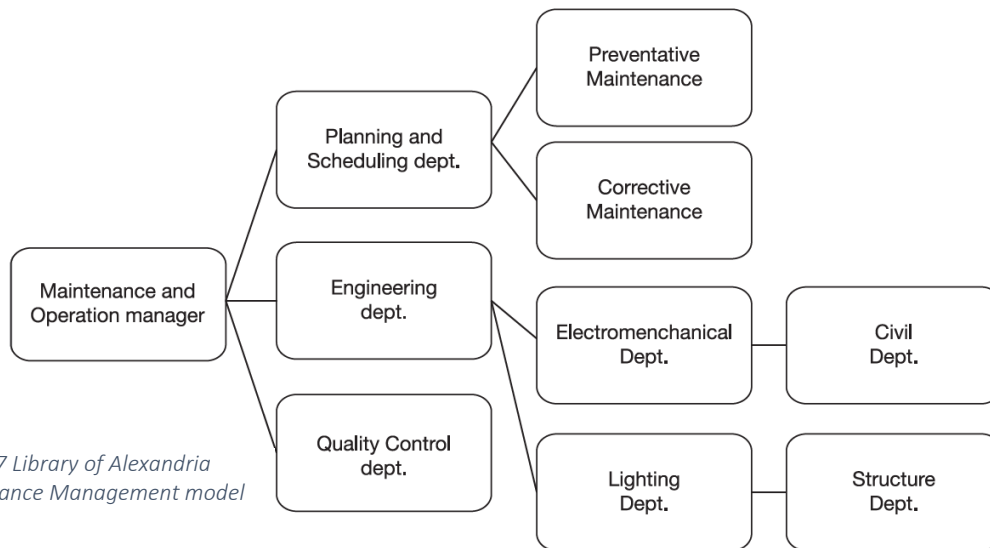


Figure 27 Library of Alexandria Maintenance Management model

The maintenance administration of the project depends on an improved administration system, which is carried out by a specialized computer program that produces both precautionary and corrective maintenance schedules, in addition to managing human resources, materials, costs, and issuing work orders. It also performs an effective role in following up on the performance of employees and evaluating them at the end of each maintenance cycle (3 to 12 months).

Most of the problems and obstacles which confronted the implementation of maintenance processes for the building are represented in the following points

A local specialized company was used to manufacture the internal partitions in the hall of the library with non-standard measures (as a kind of uniqueness for this building which has symbolic importance). However, this resulted in a problem related to performing maintenance measures for these partitions and replacing damaged ones, since the manufacturing company cannot provide a small number of these partitions which were specially formed for the library building, which entails changing all the partitions at once after their hypothetical age. This problem refers to the lack of effect of maintenance considerations on the phases of building design, as well as to the existence of a mistake in selecting materials and in the used systems since the availability and costs of such materials and systems later in local markets were not studied.

The other challenge which encountered the maintenance of this building was the shape of the building itself since the façade of the building is extremely sloped and made of glass.



*Figure 28 The inclined roof which forms a challenge for maintenance processes
Head of Preventive Maintenance Management Department(2010)-Open
Interview, Bibliotequa Alexandrina – Alexandria, July 2010*

This shape is incompatible with the climatic nature of Alexandria (the rainy, dusty weather), making the cleaning of the façade very difficult, especially with the lack of modern techniques and depending on the manual craft.

Moreover, the extremely sloping nature of the building makes it impossible to use cranes and imposes on workers the need to walk over the sloping top of the library to perform maintenance.

Using some materials which are not suitable for the climatic nature and the weather changes makes them subject to damage quickly, causing the distortion of the appearance of the building in the eyes of the guests.

3.3.5. Findings of Case Studies

The top barriers that occurred in most of the case study buildings were in order as follows:

- Inaccurate choice of materials
- Vandalism
- Lack of integration between different management disciplines
- Late involvement of maintenance managers

Meanwhile, the barriers that have the most severe impacts on achieving efficient maintenance of buildings were found to be:

- Lack of maintenance management/management plan
- Lack of integration between different management disciplines
- late involvement of maintenance managers.

CHAPTER 4. STRATEGIES FOR IMPROVEMENT OF THE CURRENT FM SITUATION IN EGYPT

4.1. Introduction

According to the Global FM Market Report 2018, here is a discrepancy between the opinions of the target groups regarding the status of FM in Egypt. The service providers group is the most satisfied, while the end-users group is the least satisfied. 55% of the service providers who went through the questionnaire think that FM is achieving Good rates in Egypt and that it will be achieving better rates in the future, while only 20% of the end-users group is satisfied with the performance of the FM in Egypt. 35% of the end-users think that FM is achieving average rates, while 25% found no difference between in-house and outsourced services. On the other side, 40% of the target managers think that FM is achieving reasonable rates; 60 % believe that FM is achieving average rates.

Looking at those results, It's obvious that the current FM situation in Egypt is in need of improvement to achieve better results and a higher level of satisfaction, especially for the end-users who find the performance of the FM services in Egypt insufficient and unsatisfactory.

In this chapter, we will discuss some suggested solutions which can improve the delivery of FM services to the end-users in Egypt, thus to level-up the FM Market in Egypt to be competing with its rivals in the world or at least to be on the right track of improvement and sustainability.

4.2. FM Services Outsourcing

4.2.1. Outsourcing Services Concept

The FM Company is the company that enters into a contractual agreement with an organization (the project) to take the responsibility of achieving all the non-core services and give this organization the ability to concentrate and perform well on its core services. This process is called —*Outsourcing*—. An organization outsources its non-core services to an FM Company in order to achieve greater budget flexibility and control, reduce short-cut and regulatory costs to focus money and resources to its core services, save time and effort and consequently, decrease risks.

4.2.2. Current Situation in Egypt

In Egypt, due to the lack of awareness and believing in over-quality, there is a misunderstanding that outsourcing non-core services of a project would add unnecessary costs to the project's budget, so, *in-house services are used instead of outsourcing services* especially through operation and maintenance phases. Depending on In-House services and neglecting the positive effective role of outsourcing may cause an increase in the maintenance budget and the life cycle cost in addition to a decrease in the quality of the non-core services.

According to a study made at Ain Shams University in Cairo, simple survey and an open discussion were performed among a group of FM practitioners and managers to compare between in-house and outsourced services and to determine the risks of both types of services and their effect on the value of the building and its facilities.

The table(2) compares between In-House and Outsourced Services in Egypt in terms of the reason of choosing each service, the criteria of choice, the scope of services provided by each service and the value added by both types of services in order to determine the risks that may face a project as a result of choosing each type of services.

Although the outsourced services initial cost exceeds the in-house services initial cost by 40 to 50 %, the managers prefer the outsourced services in order to decrease risks through lowering the life cycle cost of the building in addition to saving time and helping in enhancing the company's core services, while the owner and the users prefer the in-house services as they trust their company's workers and find it easier to deal with them.³³

³³ Based on a survey and an open discussion with some FM practitioners in Egypt

Table 2 Source: Based on the Survey and the Open discussion with Some FM Practitioners

	In-House Services	Outsourced Services
Reason of Choice	<p>Lower costs</p> <p>The loyalty of workers to their company and their care to improve the quality</p> <p>Enhancement of quality of workers through time</p> <p>Higher percentages of users' satisfaction</p>	<p>Better quality as the service provider is always specialized through his scope</p> <p>Reduced risks as facing risks and solving any problems are always the responsibility of the provider</p> <p>It's the present and future worldwide trend</p> <p>Lower life cycle cost</p> <p>Less headache as the owner is never responsible for workers' insurance, salaries, transportation, etc.</p> <p>Saving time, effort, and manpower.</p>
Scope of Services	<p>Maintenance</p> <p>Housekeeping</p> <p>Driving</p> <p>Security</p>	<p>Maintenance</p> <p>Housekeeping</p> <p>Catering</p> <p>Driving</p> <p>Security</p> <p>Façade Cleaning</p> <p>Pest Control</p>
Criteria of Choice	<p>Quality of provided services</p> <p>Cost of service compared to the quality and the effect on the overall budget</p>	<p>Reputation compared to other providers</p> <p>Quality of provided service</p> <p>Cost of service compared to the quality and the effect on the overall budget</p>
Added Value	- No added value	- There is added value as a result of concentrating all the time, efforts and manpower to the core services to achieve better quality and better market place

Figure (29) is a comparison between in-house and outsourced services in terms of Added Value, Initial Costs, Life Cycle Costs, Quality, and Time. Although the initial costs of outsourced services are 40% to 50 % higher than that of in-house, outsourcing achieves 60% added value to a project more than that added by in-house. Outsourcing also provides a 35% lower life cycle cost compared to in-house in addition to providing better quality, saving more time and effort, and consequently decreases risks.

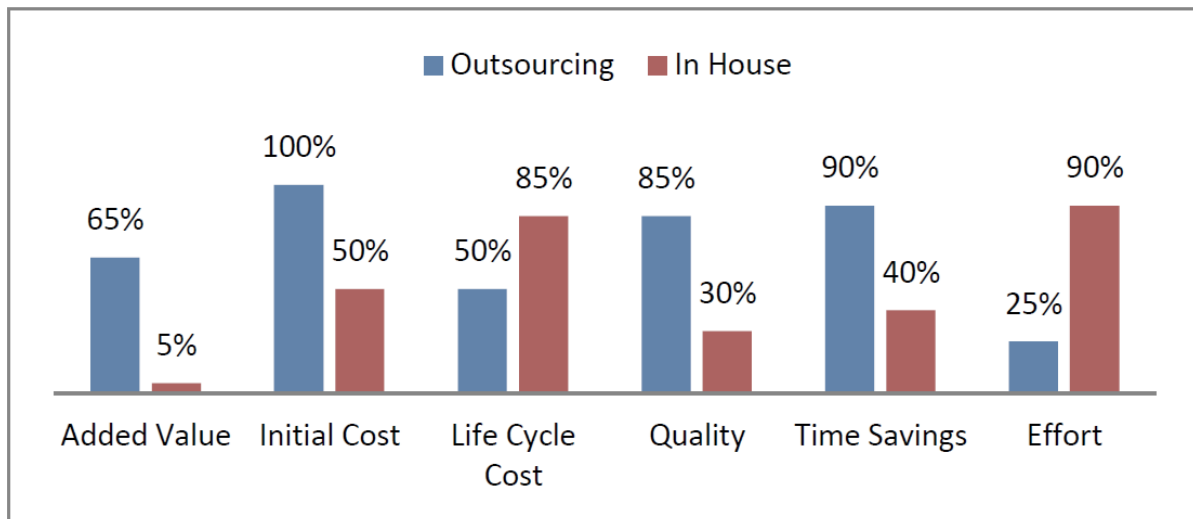


Figure 29 Comparison between In-House and Outsourced Services
Source: Based on a survey and an open discussion with some FM practitioners in Egypt

No specific standards can be determined to compare outsourcing service providers, and that's a clear reason why most companies still prefer in-house services. Also, there is a lack in understanding the meaning of life cycle costs, so the owner is always searching for lower initial costs "Contract budget". Despite the headache and responsibility of in-house services, the training of workers, their salaries and insurance, the owner still finds risks in outsourcing so he prefers in-house service to have strict control on the attitude of workers and their quality of work

4.2.3. Example of Outsourcing in Egypt

Etisalat building in New Cairo City, 5th district, shown in figure (29) is considered a landmark, it is famous for its huge white ball at the top of the building with its unique design, after six months of operating the building, the bright white color of the ball began to fade due to the accumulation of dust on the ball, Using in-house services, the owners tried to clean the ball, but

they found it very difficult, so they decided to outsource the cleaning of the white ball to an FM company, and this added many costs to the operation and maintenance budget.



*Figure 30 The White Ball at the top of Etisalat Building, New Cairo
Source: Google Search*

During the design phase, the architect refused to check the design of the white ball with a facility manager in order to recommend the best design and materials for the ball, the architect was very keen on the design, and he thought that involving FM through project's early stages would only add unnecessary costs to the project's budget; while the fact is that involving FM through early stages would have saved huge costs through operation and maintenance phase and consequently, decreased the life cycle cost and added value to the building.

4.2.4. Advantages of Outsourcing

- Outsourcing offers a wide range of benefits to organizations such as cost reduction, better access to superior quality, flexibility in responding to market change, opportunity to focus on core competencies, and facilitate the development of product diversification.

- Outsourcing the non-core activities will give more time to concentrate on the core business processes and the design & construction phases.
- Outsourcing can give access to professional, expert, and high-quality services, thus reduce risks and waste of time and resources.
- With outsourcing, the organization can experience increased efficiency and productivity in non-core business processes.
- Outsourcing can help to streamline business operations.
- Offshore outsourcing can help to save on time, effort, manpower, operating costs, and training costs amongst others.

On the other hand, there are some risks associated with Outsourcing., because outsourcing is a rather recent tool of managers, especially in Egypt, the complete costs are not yet known, which poses a risk in itself.

There is an initial tendency to overstate benefits and that the suppliers are likely to perform better at the beginning of a contract to make good first impressions (Schwyn). This thinking suggests that outsourcing failures are not due to an inherent problem with outsourcing but rather the lack of guiding methodology for managers

4.2.5. Best Practices for FM Outsourcing

Customers expect FM service providers to be able to document the quality of their output based on SLAs and key performance indicators (KPIs) and to have the ability to benchmark these with other similar customers. To accomplish this, FM organizations must empower front-line employees and provide them with more responsibility.

- Develop long-term vested partnership relationships to capture the best performance and cost savings:
- Use incentive models to reward the supplier for delivering added value year after year
- Identify suppliers that are the right fit for the organization:
- Experts who can clearly identify any risks and develop risk mitigation plans.

- An organization with the right cultural fit and a complementary company vision and practices
- Carefully validate unnecessary service requirements that drive increased costs: • Over reporting
- Metrics that are not used as KPIs but are given equal weight
- Leverage suppliers that are a good fit for delivering service at all enterprise sites with favored pricing
- Establish KPIs early in the contracting phase to ensure a clear governance model
Customers definitely consider demonstrated ability to provide the range of services requested: wide self-delivery capabilities in the service offering is therefore essential.

4.2.6. Conclusion

The study on the comparison between outsourcing and in-house facilities management concludes that outsourcing in facilities management defined as contracting out to obtain the services or products from an outside provider instead of having them provided by in-house resources. In the attempt of outsourcing, it is important to ensure that the company's mission and long-term goals and objectives are achieved while the advantages of outsourcing seem to give value for money to the company by having more time to concentrate on core business and having access to professional, expert and high-quality services.

4.3. Building Information Modelling (BIM)

4.3.1. Introduction to BIM

BIM is a Middleware; an adapter represents the development and use of computer-generated n-dimensional (n-D) models to simulate the planning, design, construction, and operation of a facility. It helps architects, engineers, and construction. Since the term "Building Information Modeling" (BIM) was initially presented in the Design, engineering, and Construction AEC industry in the most recent decade, it has changed numerous parts of the design, development, and operation of a building. The problem was the risks and challenges that the Middle East is facing and how to reduce these obstacles by comparing the implementation of BIM in the Middle East to the western region, which managed to solve those risks.

The western region is a step ahead from the Middle Eastern region due to several differences between the two regions in applying the standards, demand by the client, expertise in the training of BIM technology, social differences between the two regions in accepting the change to BIM. There are also similarities in several points, such as reducing the cost and the time for the projects which implemented BIM, also the challenges due to the high cost of BIM technology. Overall the findings represent the Middle East industry that is optimistic and aware but inexperienced in BIM.

Despite the fact that the Egyptian firms slightly started to use BIM application to overcome the previous issue, they faced many risks that prevent applying this process widely, as the western countries who deal with the BIM challenges and find a solution for them.

4.3.2. Assessment of BIM in Egypt and The Middle East

The construction industry in the Middle East is talking about BIM; some have already started the deployment of BIM, while others are still questioning the need for BIM. Whether BIM is useful or not, but it came to the Middle East, and it has invaded the industry. However, the implementation of BIM in the Middle East is partial and limited, due to many barriers, such as:

- **Misunderstanding of BIM: People are still comparing BIM to CAD**

Till now, individuals in the industry are demanding contrasting BIM with computer-aided design, and it is not the correct approach to take a gander at BIM, Contrasting BIM with the computer-aided design is not sensible. BIM is not a drafting or demonstrating apparatus acquainted with supplanting computer-aided design; BIM is a collaborative procedure of creating and overseeing building information through the life cycle of a venture, a three-dimensional virtual model is utilized as a 3D database where graphical and non-graphical information is put away and connected to the components inside the BIM model.

- **Resistance to change**

Resistance to change is the very classic obstacle to improve; it is a known fact that people resist change and hate to leave their comfort zone. With the absence of a good understanding of the BIM process, it will always be so difficult to convince people to adopt BIM and leave the conventional methods they preferred.

- **Lack of BIM specialists in the region**

As BIM is new to the region, qualified BIM specialists are rare. Accordingly, firms tend to hire and train people on using BIM tools without educating them on the BIM process. ⁶ Most of BIM specialists in the Middle East region are self-trained and refer to the literature to enhance their skills and understanding of BIM.

- **Absence of certified BIM educational and consultancy institutes**

BIM training and education are limited to use BIM software and tools as there are no certified institutions to train people on the BIM process and proper implementation of BIM. Available

training focuses on the technology part alone. When it comes to using a BIM software expert will be found, and whenever they are asked to define BIM, they will always focus on the technology part.

- **Being conservative towards information sharing**

BIM is a collaborative process and requires a significant share of data and information through the project life cycle between internal and external parties involved in the project; however, companies in this region tend to be conservative and not so open to sharing information.

- **None standardized BIM practice across the world**

BIM is in continuous improvement and development, and till now, there is no standardized BIM practice across the world. Although there is a general agreement on BIM as a concept, but when it comes to putting BIM into practice, the process begins to change. This is an expected scenario due to the difference in internal and external business environments from one country to another, also from one firm to another.

- **The need for industry culture change**

In fact, culture is a global BIM deployment obstacle “According to a survey taken at the Royal Institute of Chartered surveyors conference, 53% of respondents say their biggest BIM deployment obstacle was culture change” *BIMForum SmartBrief*.⁶ Obviously, this is the biggest obstacle for a full BIM implementation in the region too.

4.3.3. Example of the BIM process in the Middle East

According to the “2010 Middle East Building Information Modelling Market Survey” that was undertaken by buildingSMART, most respondents indicated operations in multiple locations. There was a noticeable concentration of respondents operating in the UAE (77%), Saudi Arabia, (41%) and Qatar, (35%), with Oman, Bahrain, Kuwait, being 22%, 19%, and 18% respectively, as shown in figure 31. Jordan had the lowest representation, accounting for only 7% of respondents. This distribution is largely proportionate to the areas of high construction activity

(ie. with increased activity in the UAE, Saudi and Qatar) and can therefore be considered a reasonable reflection of the market.³⁴

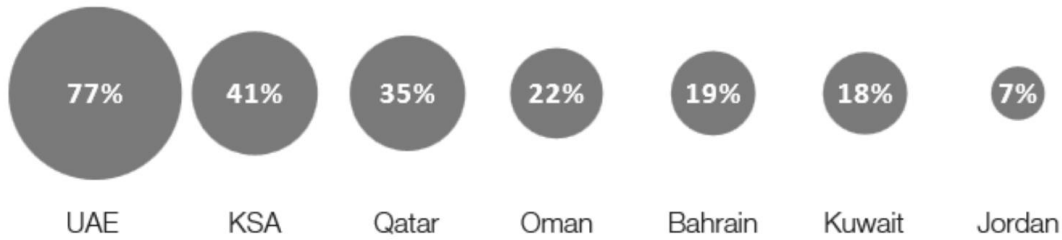


Figure 31 Respondent areas of operation, Building smart, 2011
Market Survey undertaken by buildingSMART

4.3.4. Comparison between BIM application in Egypt & Middle East and The Western World

Table 3 comparison of the differences and similarities between the Middle Eastern region and the western region

Points	BIM in the Middle east	BIM in western countries
BIM adoption	BIM in Egypt is at the ‘early adoption’ stage	Due to the mandatory policies to BIM use in the projects, BIM in the western countries in the advanced stage.
Codes and standards	There are no standards, but widespread adoption of BIM will only be achieved if a powerful industry voice, led by government and supports BIM	Establishing a Government/ Industry delivery team to develop their own BIM adoption strategies in order to meet the Government’s BIM mandate.
Challenges	The lack of availability of skilled staff and training may hinder the adoption of BIM. The cost of BIM adoption. Lack of demand by the client.	Not readily used by Quantity Surveying firms. Cost of implementing BIM features within the existing practice.

³⁴ Market Survey undertaken by buildingSMART

benefits	There are several benefits: save cost, reduce the time of the schedule and better quality.	There are several benefits: save cost, reduce the time of the schedule and better quality.
Training	Industry professionals do not know where to go to get information on BIM training.	Educational institutions encouraged BIM to be at the forefront. Availability of trainings with expertise.
Case studies	There are several projects which implemented BIM such as Midfield Terminal Building of the Abu Dhabi Airport	Northern Kentucky University, Bank of Kentucky Center. The Ohio State University, James Cancer Hospital, and Solove Research Institute. The Reva and David Logan Center for the Arts.

The western region is a step ahead from the Middle Eastern region due to several differences between the two regions in:

- Applying the standards.
- Demand by the client.
- Expertise in the training of BIM technology.
- Social differences between these regions in accepting the change to BIM.

There are also similarities in several points such as:

- Reducing the cost and the time for the projects which implemented BIM.
- Challenges due to the high cost of BIM technology.

Overall the findings represent the Middle East industry that is optimistic and aware, but inexperienced in BIM.

4.3.5. Benefits of Integrating BIM in Facility Management

- **High efficiency of Facility management**

This is finished by giving data that can be shared effectively and productively by the contractors engaged in the AECO.

- **The Behavior of a Simpler Imitation using BIM**

For ventures to update and renovate, BIM investigates, painstakingly outlines, and accordingly actualizes reproduction, all the more effectively and efficiently.

- **Building Information modeling BIM**

Streamlined support the key test in building up a support system is entering the item and resource data required for preventive upkeep. The Information about building hardware put away in BIM models can dispense with months of pushing to precisely populate upkeep frameworks.

- **BIM/FM Productive Use of Energy**

Facility managers can dissect and think about the different option vitality utilizing BIM innovation, to diminish ecological effect and working expenses.

- **BIM Efficient Modifications**

BIM models present one way or the simple strides to speak to the 3D attributes of a building. Data about existing conditions to decrease the expense and unpredictability of building redesign.

- **Building Equipment Management**

Keep up a fitting stock of building gear with reference to building hardware data from BIM models, so as to maintain a strategic distance from a period expending undertaking and costly in building up an organized project of support.

- **Better Space Management**

Facility managers can fabricate stock space and utilize existing building property in an effective way with reference to BIM models. This will lessen superfluous expenses.

- **Building Lifecycle Management**

For a model made by the designer and upgraded after some time by the development stage, it will have the ability to be a model "Fabricated" or 'As Built', which can likewise be conveyed to the proprietor. The model will have the capacity to contain every one of the particulars, working manuals, and upkeep (O and M), and data affirmation, which is helpful for future support. This empowers the disposal of issues that can be experienced now if the O and M manual has been lost or put away in a remote area.

Moreover, as one of the results, BIM has canceled out any drawbacks that were connected with FM not being used starting from the beginning; this adjustment was improved by the integration as the data is available to the facility manager from the start, therefore, preventing any data loss. Taking everything into account, the selection of BIM in a building will bolster the FM with more beneficial and remarkable.

FM can be ordered in numerous things, from money related and resource administration through to operations and maintenance offices, and even to the measures of 'quick track' administration and arranging.

By utilizing BIM programming, the FM techniques can without much of a stretch be produced in a concentrated system database. In system databases, the information or data that is not required will be uprooted, and the 3D geometric information building will be associated with FM capacity and convenience in supporting the operations of a building. Reconciliation of FM with BIM empowers the information associations from the outline, development, and redesign for the utilization of operation and lifetime administration of structures, resources, and offices.

4.4. Teaching Facility Management

The third solution suggested for improving the Facility management situation in Egypt is by considering the education that a future facility manager receives, an education that allows him to deal with the current needs and to have a vision for the future.

Regarding the whole engineering education in Egypt, the management of Real Estate, or in general, the facility management had been faded into the background while the main directions of civil engineering education are all about establishing new buildings

. The education needs to reflect on the changes in market paradigms, as the market needs experts who understand the operating principles of the real estate market and are in possession of fresh, up-to-date, and complex knowledge of operations and utility of the real estate portfolio.

4.4.1. Facility Management Education Worldwide

According to a study made at Budapest University of Technology and Economics, there are only 26 training programs (bachelor and master's degrees) that are accredited courses provided by the IFMA (International Facility Management Association) and the RICS (Royal Institute of Chartered Surveyors)³⁵. It is remarkable that only in Europe, there are 350 registered courses for architectural training, while the number of civil engineering training is much more worldwide.³⁶

These 26 programs were analyzed by the published materials of the educating institutions (leaflets, home pages, and offers). Half of the examined pieces of training give bachelor degrees; the other half provides a master's degree for its students. Among the examined programs, there are 14 at North American universities, eight at European universities (in the UK, in the Netherlands and in Austria), while four can be chosen in Asia. Among the educational institutions in the sample, there are two that provide distance learning programs, but basically, all examined

³⁵ Hajnal, I. and Rostás, Z., (2013). Architect Education in the light of the real estate crisis. Miklós Hajdu, Mirosław J. Skibniewski (ed.). *Creative Construction Conference 2013*. Budapest, 2013.07.06-2013.07.09. Budapest: Diamond Congress Kft, pp. 288-299, **41**. ISBN: 978-963-269-366-8.

³⁶ D. K. Gattie and N. N. Kellam and J. R. Schramski and J. Walter (2011). Engineering Education as a Complex System, *European Journal of Engineering Education*

educational programs follow the traditional methods of teaching. There were found intensive practical courses and site practices in three cases, while half of the programs integrate some kind of work practical training. The program of Singapore University is to be emphasized as it exploits the local facilities of the state city and, at the same time, prepares the students for the facility management of these (amusement park and airport). The quantity, contents, and requirements of the examined courses show significant dispersion. The time of bachelor training is 2 to 6 years, an average of 3.2 years while the master training lasts for 1 to 4 years, an average of 1.8 years.³⁷ The credit system is usually variant between universities and countries; therefore, it is not suitable for comparison; however, it is a reference data that the average credit requirements of bachelor trainings make 123 credits, while the average credit requirements of MSc trainings make 92 credits. It is observed that – not surprisingly – the main profile of the mother institute (technical, management, economic) influences the curriculum of certain training. We can picture the composition of the programs by the number and contents of the modules taught. Within the examined sample, the number of taught modules (corrected with the number of minimum expected facultative subjects) is average 20. It is remarkable also that the standard deviation of the number of modules is high: there are training programs with seven and also 46 modules. Monitoring the contents of the modules as well, certain institutions break the knowledge into more pieces; however, it can be stated that the necessary package of knowledge to obtain a degree might be significantly different by institutions. In light of the fact that the examined programs are all accredited by international organizations, we can draw the conclusion that there are no standards of knowledge in the field of Facility Management.

However, it can be generally stated that the training programs do not emphasize enough, the interdisciplinary nature of facility management. There are less management-oriented subjects, and there are fewer background studies; education programs are typically dominated by technical and technological knowledge.

³⁷ Hajnal, I. and Rostás, Z., (2013). Architect Education in the light of the real estate crisis. Miklós Hajdu, Mirosław J. Skibniewski (ed.). *Creative Construction Conference 2013*. Budapest- Budapest: Diamond Congress Kft, pp. 288-299

4.4.2. Facility Manager competencies required

The IFMA continuously tests the market and draws the profile of the facility management experts. According to this profile, it regularly publishes the list of competencies that can be expected at different responsibility levels from the facility managers. In the article [14] of 2011, Awng et al. urge the introduction and accountability of these competencies into higher education. The IFMA remarks 28 expected competences altogether at 11 areas³⁸. These competence areas are as follows:

1. **Communication:** Communication plans and processes for both internal and external stakeholders
2. **Emergency Preparedness and Business Continuity**—Emergency and risk management plans and procedures
3. **Environmental Stewardship and Sustainability**—Sustainable management of built and natural environments
4. **Finance & Business**—Strategic plans, budgets, financial analyses, procurement
5. **Human Factors**—Healthful and save the environment, security, FM employee development
6. **Leadership and Strategy**—Strategic planning, organize, staff and lead organization
7. **Operations and Maintenance**—Building operations and maintenance, occupant services
8. **Project Management**—Oversight and management of all projects and related contracts
9. **Quality**—Best practices, process improvements, audits and measurements
10. **Real Estate and Property Management**—Real estate planning, acquisition, and disposition.
11. **Technology**—Facility management technology, workplace management systems.

³⁸ IFMA Complete List of Competencies; <http://www.ifmacredentials.org/cfm/IFMACompetencyList.pdf>; (accessed 27.08.2014)

4.4.3. Facility Management Education in Egypt

As we know, Facility Management arrived in Egypt with a relative delay compared to other countries around the world and the response of the Egyptian university system to the growing demand for figures specialized in the management of real estate assets was even slower, even though Egypt has always been a good tradition in the training of technicians of building among the Middle Eastern countries.

Thinking of the several universities that provide courses of excellence in subjects such as Architecture, Construction Engineering, and related, unfortunately, only a few universities have been able to grasp the change taking place in the construction sector and therefore understand the new needs revealed by the market. This has translated into the substantial inability to produce managerial figures capable of holding the role of Facility Manager, often entrusted to incomplete figures such as Architects, Engineers of various kinds, etc.

As mostly expected, the only university that has been able to react more promptly and more completely is Ain Shams University which, has been able to offer for its students some FM related subjects and considerations in the architectural Master's degree courses.

Ain Shams University, as the third Egyptian university, was founded in July 1950 under the name of "Ibrahim Pasha University." It participated with the two earlier universities, "Cairo University" (Fua'd the 1st) and "Alexandria University" (Farouk the 1st) in fulfilling the message of universities and meeting the increasing demand of youth for higher education.

Taking a look at the architectural engineering undergraduate course provided by Ain Shams University, we can barely find any Facility Management considerations or even basic principles.

Here's the list of subjects covered during the four years undergraduate course of architectural engineering:³⁹

- Visual Design
- Architectural Drawing & Representation Techniques

³⁹ Ref: <http://eng.asu.edu.eg/english/article.php?action=show&id=60#.Vs7BK9H433k>

- Architectural Design
- Theory of Architecture
- History of Architecture
- Building Construction
- Environmental Design & Control
- Computer applications
- Building construction & Principles of working drawings
- Acoustic & Artificial Lighting
- Spatial Composition & Aesthetics in Architecture
- Architectural Renderings
- Interior Design
- Architectural Criticism & Project Evaluation
- Specifications & Quantity
- Environmental Design & Energy Conservation
- Housing in Developing Countries
- Humanities in Architecture
- Contemporary Vernacular
- Advanced Technical Installations
- Feasibility Studies & Project Management
- Professional Practice & Legislation
- Urban & Architectural Heritage
- Project Studies & Technical Report

It's very noticeable the lack of education in the field of Facility Management in this course of architectural engineering. Knowing that this course provided by Ain Shams University is one of the best and most famous architectural programs in the whole country, it becomes very obvious the neglect of the field of FM and maintenance management.

Generally speaking about the Architecture & Engineering education programs in Egypt, what is missing is the ability to react univocally and uniformly to the demands that the market requires

from the Egyptian education system. In the last ten years, we have not been able to offer a consolidated and widespread training model throughout the whole country, creating, in fact, differences in the training of professionals in the sector and, sometimes, ignoring what is required by companies.

I believe that when we find ourselves in a situation of difficulty and inability to act as we should, we need to look at those who, in the past, have been able to face the same problems and have managed to draw positive consequences from them.

4.4.4. Facility Management Education in the UK (As an Example to Follow)

The UK university system is organized on two educational levels: Undergraduate and Postgraduate. The undergraduate provides 3-year training courses, different than the Egyptian five-year degree, which allow access to postgraduate education, which however lasts only one year, an aspect that favors students in presenting themselves on the global job market with one year ahead of its competitors, i.e., students from other countries.

Already starting from undergraduate training, in the United Kingdom, there is an innumerable variety of training courses dedicated to the construction sector which transcend the classical subjects of Architecture and Building Engineering and which focus on more transversal and complete aspects of the construction sector and its related management.

Below are just some of the undergraduate study courses offered in a widespread manner by the main universities in the United Kingdom:

- Construction Management
- Building Engineering
- Building Surveying
- Property and Planning
- Real Estate Management
- Property Development and Management
- Construction and Project Management

As can easily be seen, these are not classical study courses (Architectural Design and Building Engineering) which, it is clear, are however offered by the UK university system; on the other hand, these are paths that are capable of training really competent figures in the first three years not only on the basic aspects of the construction market but also on the more detailed ones and with a particular propensity for management, a fundamental aspect for the training of professional candidates.

But the great strength of the university system of the United Kingdom lies in the postgraduate, lean and at the same time highly specialized and therefore qualifying education. And it is precisely at this level that the furrow between the training of the Egyptian Facility Managers compared to those of overseas is marked. In fact, there are no postgraduate courses that are offered solely and specifically on the issues of Facility Management.

Below we present a brief summary of the courses offered by the main UK universities on the topic:

- University of Greenwich - M.Sc. Facilities Management
- University College of London - M.Sc. Facility and Environment Management
- University of Westminster - M.Sc. Facilities and Property Management
- Liverpool John Moores University - M.Sc. Applied Facilities Management
- University of Brighton - M.Sc. Facilities Management
- Sheffield Hallam University - M.Sc. Facilities Management
- Leeds Beckett University - M.Sc. Facilities Management
- University of Wales Trinity Saint David - M.Sc. Facilities Management
- Edinburgh Napier University - M.Sc. Facilities Management

These are just some of the Master's training courses offered by UK universities. The first aspect that is surprising for those coming from the Egyptian university system is the uniformity of the training programs. Since the name, which is practically identical for all universities, it is clear that

the issues addressed are the same and that the degree of study is equivalent to the different training proposals.

This obviously guarantees uniformity of training throughout the national territory, thus allowing the market to grow and develop in a widespread manner thanks to the presence of professionals of similar value throughout the United Kingdom.

To give an idea of the level of preparation that professionals in the United Kingdom can reach thanks to these training courses, I offer a brief summary of the subjects and topics addressed in an ideal university course. Among those analyzed the most complete, I found to be the one offered by Westminster University composed at an undergraduate level by the BSc. Property and Planning, and at a postgraduate level by the M.Sc. Facilities and Property Management.

BSc. Property and Planning - University of Westminster

The 3-year course provides important tools for the assimilation of the concepts of evaluation, development, planning, regeneration, and management of the real estate market. This mix of knowledge guarantees the cultural background necessary to consciously approach the world of Facility Management.

The subjects studied during the course are listed below:

Year 1:

- Global Cities: Introduction to Urban Sociology
- Introduction to Building Technology
- Introduction to Legal Studies
- Introduction to Property Investment and Valuation
- Introduction to Urban Policy and Planning Law
- Property Economics
- Public and Private Finance in Property

Year 2:

- Environmental Law and Policy
- Housing Law
- London 's City Regeneration
- Managing Property Businesses
- Planning Practice
- Urban Regeneration and Development
- Valuation Practice

Year 3:

- Community Engagement in Urban Policy Making and Implementation
- Development and Investment Appraisal
- International Planning and Property Practice
- Personal Development for Work
- Property Management (Residential and Commercial)
- Sustainability and Planning

M.Sc. Facilities and Property Management - University of Westminster

The course lasts one year and aims to train specialized figures in the field of Facility and Property Management. The professionals who come from this course of study are able to consciously manage the orders entrusted to them by virtue of the technical, economic, and managerial background provided by the course. The subjects dealt with are the following:

- Fabric and Services Management
- Facilities Management: Strategy and Practice
- Finance and Asset Management
- Landlord and Tenant
- Law for Property Professionals
- Space Strategies and Legislation

What we have decided to present is just one of the possible training courses that can be undertaken in the United Kingdom for training as a Facility Manager. Obviously, each university has its own peculiarities and specializations that differentiate it from the others, without however undermining the training uniformity we have already mentioned, which constitutes the true strength of a developed and widespread market such as that of Facility Management in the United Kingdom.

4.4.5. Proposals for the improvement of the Academic Training System

On the basis of what has been said so far, it seems appropriate to draw indications on possible improvements to be made to the Egyptian university system.

- **Standardization of the training proposal**

Following the example of what happens overseas, it is considered essential to include from the Bachelor's degree course subjects that can offer students a wide range of training ideas on the various issues concerning the construction sector. The most common courses, such as Architecture and Building Engineering, should be accompanied by courses that fully address all aspects of the real estate sector that can no longer be considered disconnected from the world of architectural and engineering design. Issues such as those relating to Real Estate, Property Management, and Asset Management, Project Management, and, last but not least, Facility Management cannot be simple ideas provided during a course of study but must constitute real foundations that all operators in the sector must know.

After completing the five-year studies, it should then be possible to specialize, in a Master's degree program, in the sector of one's preference. It is unthinkable that there are currently no Master's Degrees relating to the world of Facility Management; also, in this case, it is believed that universities and the Ministry of Education have a duty to respond to the growing market demand by establishing specific specializations for the theme of Facility Management.

Obviously, for all the training courses above it is believed that it is up to the Ministry of Education to dictate the guidelines to be followed in the delivery of these teachings and, subsequently, to the universities the task of shaping their training offer on the peculiarities and specializations that distinguish it.

- **Reduction of Education times**

The UK specialization system, with an annual duration, is believed to have advantages as well as disadvantages.

In the first instance, it must be said that the possibility of completing the studies a year in advance on the main "competitors " of the other countries certainly represents a big advantage for British students, who can thus approach the job market faster.

On the other hand, it must be underlined that this model could hardly be adopted in Egypt since the risk of reducing the quality level of training would be too high. A possible middle way that could help the market by supplying professionals of a certain level could be to offer 1st level Masters highly specialized in the discipline of Facility Management. Obviously, this point is closely related to the first, for two reasons.

In the first place, it is impossible to offer a highly specialized Masters in Facility Management if there is no basic training on this issue since the five-year bachelor's degree.

Secondly, in order for their effects on the market to be seen in terms of professional production, these Masters must not be sporadic initiatives of individual universities but that they should be part of a wider shared training project on a national scale.

In this way, it would be possible to train highly specialized professionals in Facility Management with only four academic years. Obviously, the formation of a 1-year Master's degree cannot be compared to that of a 2-year Master's Degree, but it is believed that it could still provide the tools to consciously play the role of Facility Manager in certain companies.

- **Collaboration with the job market**

The brief experience we have acquired in the world of Facility Management has strengthened a belief in us: practice teaches much more than theory.

We believe that it would be highly advisable to increase the number of training credits, and therefore hours, currently dedicated to curricular internships in Egyptian universities and especially in the main technical faculties such as the one we are dealing with. Especially in the Master's degree it would be advisable to be able to carry out an internship in a company lasting at least 480 hours (equal to 3 working months), in order to truly be able to enter the world of work and to understand what path to take in one's career future.

To do this, it would be sufficient to compress the teachings of the four semesters that make up the two academic years in the first three semesters and leave the last one available to students for the internship and possibly the thesis associated with it.

Therefore we believe that the Master of Science in Facility Management courses should be designed and structured in order to offer consistent work experience to their students so as to deliver them to the job market already aware of what awaits them and therefore more attractive to the companies themselves.

In conclusion, we believe that the training of Facility Management professionals inevitably passes from 3 innovations to be introduced in the Egyptian university system:

- Introduction of Facility Management courses in all the Faculties of Architecture, Building Engineering, and similar to ensure that all professionals in the sector, even if they did not personally deal with the topic, know sufficiently the principles and logic of the subject.
- Introduction of 1st level Masters in the world of Facility Management, if possible offered in English, to be competitive on the international job market and to guarantee sufficiently specialized training for the Facility Management sector
- Introduction of Master's Degrees in Facility Management, if possible, offered in English to train high-level professionals for the Facility Management sector, able to immediately cover important positions and responsibilities on the labor market.

4.4.6. Suggested FM Educational Program

By market expectations summarized in the above points and the previous educational programs of certain universities, I prepared my own master level training program reacting to the new real estate needs to be applied and realized within the Egyptian educational system. Within this program, there are five main domains where there are several subjects to be covered. The education starts with everyday problems and case studies and provides further solutions to these practical questions through special subjects. Therefore, each module is discussed in overlap thorough the whole of the course.

- **Domain A: Basic Knowledge**

The courses that are part of the Basic Area are designed for those who need to acquire basic knowledge on the discipline of Facility Management because they have recently assumed responsibility for the management of corporate facilities, or for those who need to systematize within a framework. Coherent and in-depth experiences gathered in the workplace in the first years of activity.

The methodological approach used is both intuitive and scientific regarding the presentation of economic theories (notions of business organization, management, cost management, market structure, relations between operators and Facility Managers). In addition to the analysis of practical experiences also through the presence of case studies.

The participants are stimulated to relate the theory with the experience gained or, in order to understand the strategic importance of efficient facility management, for the achievement of the economic and business result and to make the necessary tools to carry out this activity correctly and effectively.

Basic Knowledge courses :

- Basics of Facility Management

- **Domain B: Services Management**

The courses included in this area are addressed both to the Facility Managers, who make up the demand side and to the operators who make up the supply side, in response to the need to study the market dimensions.

The management of the services implies the deepening of different themes: the influence of the environmental characteristics on the performances of the employees, the importance of the communicative approach to colleagues and collaborators for the achievement of the company objectives, the relevance of the optimization of the costs in the management of the facilities, the methods for measuring efficiency in order to achieve continuous improvement.

Course in the Service Management Domain:

- Performance and Customer Satisfaction
- Benchmarking, budget and FM cost analysis
- Advanced Facility Management
- Tender process and start-up

- **Domain C: Leadership and Management**

The courses in the Leadership & Management area were designed to provide facility managers with tools to support the development of communication skills, decision-making, and problem-solving skills. Those who manage services are called to measure themselves with constant changes and to operate in stressful conditions. The courses are characterized by active teaching, aimed at maximizing the involvement of all participants. The theoretical treatment is interspersed with exercises that facilitate learning and help in identifying answers to problems encountered during work.

Courses in the Leadership and Management Domain:

- Communication and Facility Management
- Conflict management in Facility Management

- Solving Facility Problem
- Facility Team Working
- Time Management

- **Domain D: Organization and Business Support**

The courses that are part of this area have been designed to provide the participant with the means to deal with economic and financial decisions regarding the facilities with awareness: from the choices relating to the lease or purchase of the company headquarters, to the methods and the times to be used in the realization of projects, from the planning phase to those of realization and verification of the results.

In order to fully play the role of Facility Manager, it is essential to have economic knowledge that ranges from drafting and checking the budget to understanding the functioning of the real estate market up to the methods and tools for managing complex projects.

Courses in the Organization and Business Support Domain:

- Facility and Project Management
- Building and plant management
- Plant Maintenance Design
- Real Estate Management
- Finance

Domain E: Sustainability & Technology

The training course is aimed at those who wish to acquire, deepen and expand their skills and knowledge on new technologies, innovative building construction techniques, current regulations, and existing certifications at the international level in the field of environmental sustainability.

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Sustainability & Technology courses :

- Introduction to Sustainability & Technology
- Basics of Facility Management
- Sustainable Facility Specialist

4.4.7. Legalization and Licensing rules

The Facility Manager Specialist recognition is valid for three years and is renewable as long as it demonstrates the continuous updating on sector issues. In this case, unlike what happens for Architects, Engineers, or other professional orders, it would not be necessary to pass an exam to practice the profession since there will be no signature compared to the former.

In this way, the position of these candidates would be regulated. Above all, the abuse of the title of Facility Manager, which we are witnessing daily on the labor market, would be curbed.

Furthermore, joining the Registry of Facility Managers would entitle, following the payment of a registration fee, to attend annual updating courses on the issues, tools, and methods of Facility Management with the obligation to obtain a certain number of credits to maintain the title of Facility Manager.

This practice would act as protection both for the Facility Manager who would see his professionalism publicly recognized and for companies that could turn to professionals of safe caliber and reliability.

4.4.8. Potential Issues to the Proposed Program

Obviously, we are aware of the difficulties that would be encountered in applying this proposal. The first place would be for the 'opposition of those who for years have acted as Facility Managers without having adequate training. We respond to this possible hitch with what was stated a few pages ago, that is, "practice teaches much more than theory. "

Starting from this assumption, we believe that anyone who has performed roles similar to that of Facility Manager for at least ten years, even if coming from different training courses, acquires the right to enroll in the Facility Manager register.

In other cases, or for those who have carried out the profession for less than ten years or for those coming from similar academic worlds (architecture or construction engineering), an examination could be devised to verify the knowledge of the logics that govern Facility Management through an oral interview which includes a theoretical part and a practical part.

Finally, enrollment in the registry would be automatic for those who obtained the 1st level Master's degree in Facility Management or the Master's degree in Facility Management.

We believe that the previously proposed methodology represents the only method to guarantee professionalism in a sector, which all too often sees simple technicians or graduates in the most varied subjects dealing with Facility Management.

Our belief is that today it is necessary to turn the page, keeping in mind the precious work done by those who first practiced Facility Management in Egypt, but with the awareness that to compete with the other countries with which we are confronted, it is necessary to raise the professionalism threshold in the sector.

4.4.9. Benefits of The Suggested Educational Program

Through this education program, FM will become more popular in organizations, thus increasing the need for certified facility managers. This, in turn, will generate the required population interested in pursuing complete and full-time FM careers. It is important to note that the transition of these phases demands time and research invested in by major Egyptian universities. Therefore, the main answer to the research question is to support the FM market by providing current FM professionals in Egypt with courses focused on soft services in a managerial direction in line with FM theory. Also, courses should cover the FM fundamentals, such as EN 15221. This knowledge will be brought into practice by those professionals and therefore increase the awareness of FM in the Egyptian market and society.

Facility managers graduating from our suggested program will be able to face the current issues of the Egyptian Facility Management Market, of which the main cause is the lack of the expertise and the know-how as mentioned in previous chapters

CONCLUSION

The Facility Management market in Egypt is established and well-positioned to harness the market potential and attract large and medium scale customers through their strong brand identity, competitive pricing, a wide range of services and capabilities supported by skilled technical expertise/ qualified workforce to stay competitive. However, the market shows ample room for improvement, given the lack of providers able to provide end-to-end FM services.

The study realized that the Egyptian FM market is still evolving and is currently in room for new implementations and justifications, especially in the field of building maintenance.

The study also showed that the best delivery approach of Facility Management services is through outsourcing, instead of the in-House method, which represents the majority of the market activities in Egypt.

The Facility Management in the Egyptian education system had been faded into the background while the main directions of civil engineering education are all about establishing new creations, which showed a good opportunity for emerging a new line of education for preparation of a new generation of Facility managers which are able to face the current issues of the Egyptian Facility Management Market, of which the main cause is the lack of the expertise and the know-how.

On the other hand, the study suggested the use of BIM throughout the whole lifecycle phases of the building, starting from the design phase till the operation and management, which has its own benefits in time and cost saving by eliminating doubts and mistakes among all the stakeholders of the project.

These conclusions are considered to be the results of the intensive research work and analysis for the situation of Facility Management and Building Maintenance. However, these results aren't covering the whole picture and sides of this topic. These sides are recommended to be investigated in further and more in-depth research to show the biggest picture of this topic.

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