Spring 3-2008

ROLE OF THE FACILITIES MANAGEMENT IN IMPROVING BUSINESS PERFORMANCE

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Exec.MBA Thesis

ROLE OF THE FACILITIES MANAGEMENT IN IMPROVING BUSINESS PERFORMANCE

Prepared for the Degree "Executive Master of Business Administration in International Engineering Management"

Under the supervision of

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Submitted to

University of Business and Technology-UBT Prishtina

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Prishtina
19/03/2008

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1. INTRODUCTION

1.1 STATE OF THE ART

According to many Publications and books written by different Authors, Facility Management is described as a new Management Strategy that is constantly developing and it is becoming one of the very important activities both in the private and public sectors.

Through this work I tried to highlight the range of the job and complexities which the Facility Management contains and the tasks that facility manager is asked to fulfill, its influence in the overall business performance.

Facilities Managers are responsible for an extraordinary array of workplace facilities. The procurement of utilities, the management of waste, the installing of integrated security systems, maintenance and repair, the purchase of office furniture and the costing of cleaning and catering functions are just some of the challenges facing facilities managers. Facilities manager deals on the one hand, for example, with the practical problems of repairs and maintenance and on the other with the complexities of employment, environmental or planning legislation.

According to experts Facility Management is capable of rapidly reducing common costs while at the same time significantly improving productivity. Facilities management is a core element in the "input" section of the business model, covering a wide range of costs and resources which relate to the management of buildings and properties. Facilities managers today may well have to run a department responsible for everything from risk assessments to gas supply, from preparing tendering documents to managing IT systems and car parks. They are usually in the unenviable position of having to request funds for functions unconnected to the core business of the company, which are nevertheless essential. Managing the facilities function can be like running a business in itself, setting and meeting budget targets, cutting costs and making savings. These all have been challenging tasks for facilities managers for some time.

1.2 MOTIVATION

Facilities and support services constitute large costs in most companies. The optimization
Of these services therefore can make a huge impact on a company's total performance.
The ability to achieve economies by pooling the client's needs is a crucial issue. Facility management is the practice of coordinating the physical workplace with the people and work of the organization. It integrates the principles of business administration, architecture and the behavioral and engineering sciences (IFMA).

Fact is that still up today the concept/terminology of Facilities Management is not yet clearly defined, and Facilities Management is relatively new discipline in Europe, however in a part of Europe that we live, it is very little known about Facilities Management and this is one reason more to discuss this issue.

1.3 OBJECTIVES

The aim of the thesis is to contribute to the knowledge of how the businesses, private and public, and also local government with its Public Facilities Management could possibly manage their facilities and the facilities services in the best possible way. Knowing that the property market in Kosovo and region is quiet unsaturated, unstable, characterized by relatively low prices and salaries and poor environmental protection, existing building stock including the infrastructure is in poor condition, so a lot of new buildings and refurbishment of existing ones is needed, most of the residential buildings are poorly or not at all being maintained, it is clear that the region is in need for a proper facility management and property management Companies. In addition, several research questions also arise in this study, the answers to which would significantly contribute to advancing knowledge and best practice, especially in Kosovo:

- What is Facilities Management?
- How Facilities Management is developed through Years?
- Why is it important for the businesses?
- What are the Objectives of Facility Management?
- How could Buildings and Properties be managed?
- How could the Performance be measured in Managing Buildings and Properties
- Is contracting or outsourcing the best choice for every organization?
- What are the real benefits of contracting?
- How to use contracted services efficiently?
- How to tailor Maintenance and repair crew models for different organizations?
- What is Space management and what are the steps to go through?
- What is Computer – Aided Facility Management

I have tried to put special accents to the Building Management as one of the day to day activities of the Facilities Management that can be helpful in the managing of most of the buildings such as commercial Buildings, residential buildings, institutions, industrial plants, hospitals, hotels etc.

This work also contains numerous illustrations and tips to help clarify its points. It is hoped that a core function of the thesis is to encourage more creative thinking concerning how

Facilities Management models can be applied to the benefit of the organizations. I have tried to provide accurate information in regard to the subject matter covered by bringing in sight importance of the Facilities Management and its services, specially focused in Building Management, and its outcomes/benefits, positive impacts in optimization of the business performance, and also life itself, cause life is a business as well!

The aim is achieved by doing a study on international literature, internet resources and by taking closer look on how things are done in theory and practice here and in other countries.

1.4 STRUCTURE OF THE THESIS

The structure of the thesis consists of six chapters (Figure 1).

- The introductory chapter presents the background, statement of the problem, objectives and motivation.
- Chapter 2, Facilities Management, creates a theoretical framework and the definitions for the study on the basis of literature review. This chapter includes the definitions for Facilities Management and Facilities Management services, some historical background and an introduction to strategic approach to FM. Furthermore it will be attempted to describe FM development and the needs in Kosovo, by surveying and SWOT analysis. As an outcome of a SWOT analyze themes such as illegal construction and waste management in Kosovo will be elaborated.
- This chapter will introduce Building Management which can be seen as one of the special disciplines of the Facilities Management
- In chapter four it will be tried to briefly describe the Computer Aided Facilities Management as one of the very special disciplines of the FM, which nevertheless has been not very much explored and not much has been written for it. However it has a big influence and in some cases even crucial in the developing of the Building Management.
- Chapter five will try to bring up concepts that could be possibly used as a model in organizing of the Facilities Management in different companies. It will describe tools and methods of performance measurement, preventive maintenance, energy saving tips; it will present a handout of personal protective equipment that I have put together by using different sources of literature.
- Chapter six contains summary and conclusions and also proposals for continuing of this work.

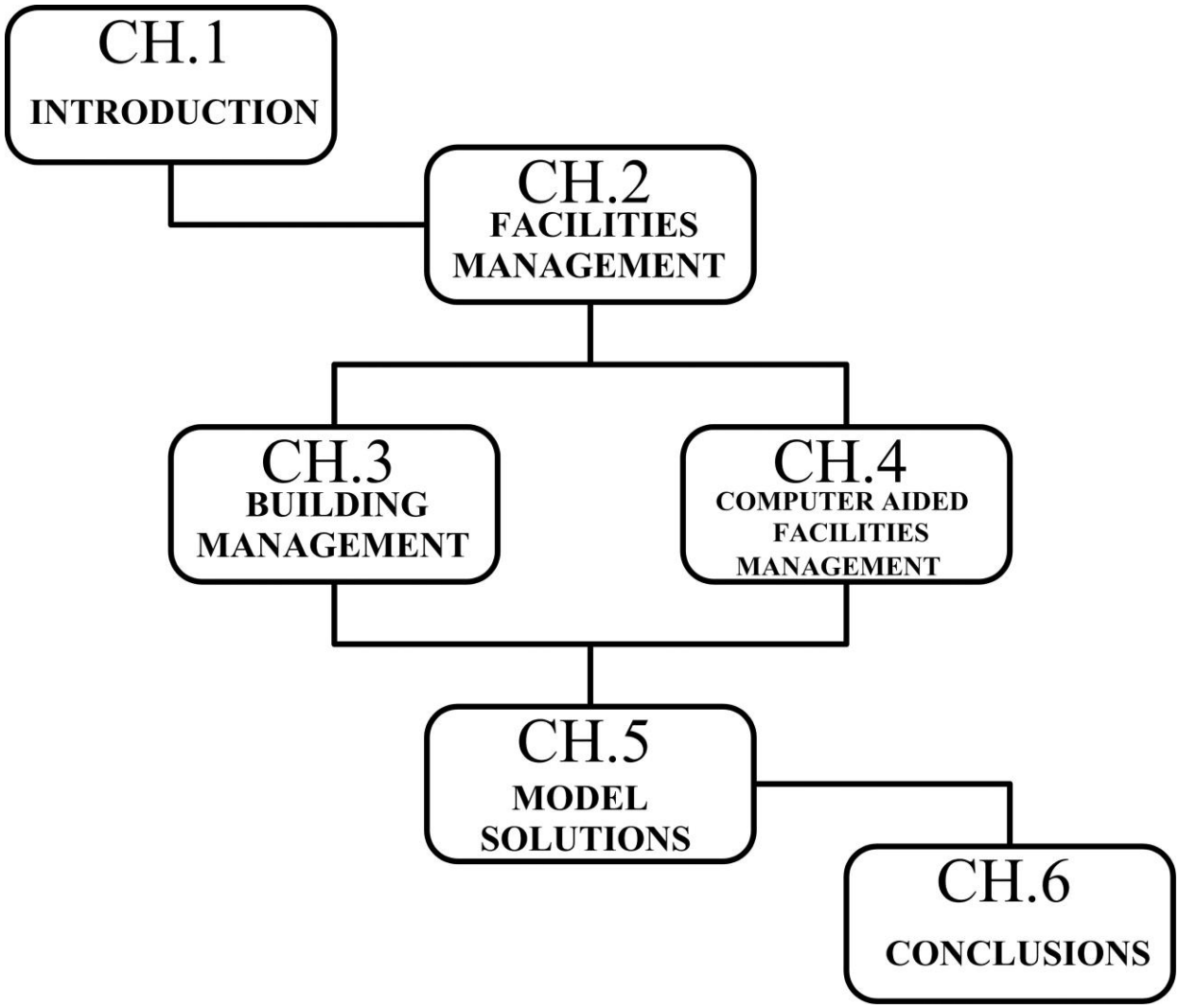


Figure 1: Structure of the thesis

2. FACILITIES MANAGEMENT

2.1 FACILITIES MANAGEMENT CHARACTERISTICS

Facilities management is a management discipline that came out in the 1970's from a practical oriented context, but still up today is not yet clearly defined. Therefore, in this chapter, it will be attempted, to briefly describe the history of origin of the Facilities Management, definitions and the functional areas of Facilities Management.

The scope of the discipline covers all aspects of property, space, environmental control, health and safety and support services, and requires that appropriate control points are established in the organization.

The most important question right at the start: Who needs facility management? The simple answer: Anyone who considers it important that the air conditioning offers a comfortable work environment in the summer, his working environment is healthy, work won't be interrupted by electrical power failure (very important for Kosovo), the elevator functions properly in his residential or office building and the cleaning service guarantees an impeccable company image. Good facility management is generally never consciously noticed, but it is always needed.

In most of the developed countries Facilities has become a key business discipline. A very important characteristic of Facilities Management that should be mentioned is that the market research has identified the need in Facilities management for a kind of hybrid manager, a cross between professional manager and technical professional, combining the ability to make things happen with a level of technical understanding to enable facilities in organizations to be tuned to strategic needs. This requires the development of an appropriate balance of management and technical skills. Such a balance can lead to healthy and ecologically sound buildings in a business context, and resolve the relationship between organizations, the individual, the environment and the business community.

The Facility Management provider is the sole entity in charge of all the services entrusted to it. It manages all its services, adapts its service and organization according to the client's business. In addition to the traditional objectives of Facilities services, Facility Management also extends to technical engineering services.

Facility Management therefore offers a global management service in addition to the services that are commonly called "multi-service" and"multi-technical" services.

First, the focus of FM is the workplace. The workplace in this instance refers to a place where work (of any nature) is carried out. Thus, it is not limited to commercial office buildings but also includes other types of workplaces such as medical, educational and industrial workplaces. Second, FM is applicable to all organizations because they all occupy space for their work. Third, FM plays a supporting role in enhancing the performance of the organization.

Finally, an integrated approach is required in practicing FM. In other words, Facilities Management may be succinctly defined as: The integrated management of the workplace to enhance the performance of the organization.

Professional qualifications and undergraduate and postgraduate courses are increasingly available throughout Europe (in Kosovo not yet available – probably good time to start thinking about it). In order to promote Facilities Management and to represent the interest, many Associations have been formed such as IFMA in USA, FMA in Australia, JFMA in Japan, and in Europe BIFM in United Kingdom, NEFMA in Netherlands, GEFMA in Germany, DFM in Denmark, HUFMA in Hungary and FIFMA in Finland. The associations, academic institutions and research organizations in Europe collaborate through the European Facilities Management Network (EuroFM).

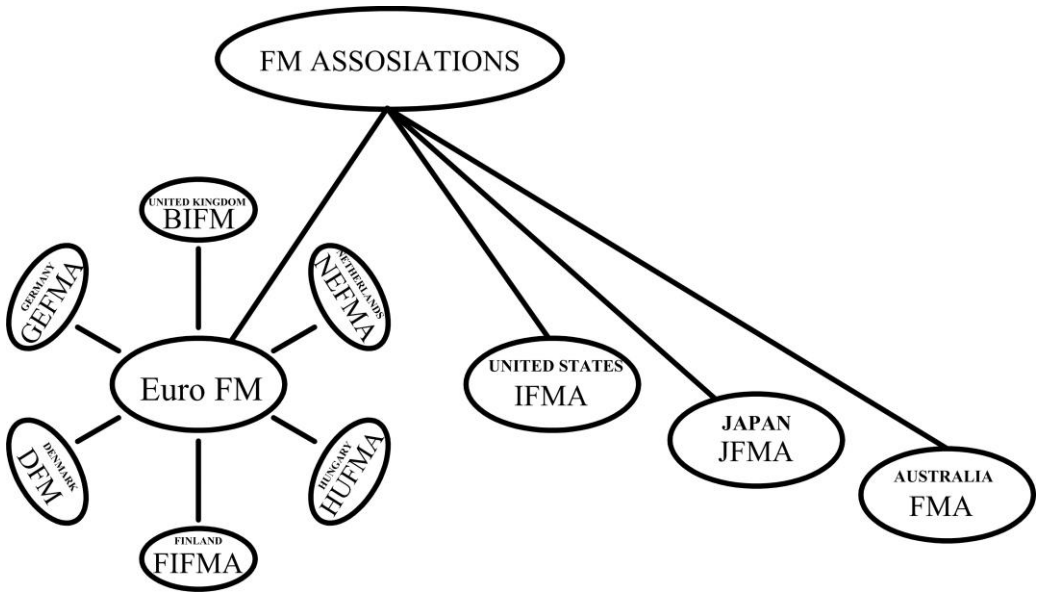


Figure 2: Facilities Management Associations in the World

2.2 THE HISTORY OF ORIGIN OF THE FACILITIES MANAGEMENT

The origins of Facilities Management can be traced back to the late 1800s, when the American railroad companies first conceived of the idea of providing facilities as opposed to providing buildings. Facilities Management entered Europe in mid 1980s from the USA. From its first landing in to the UK and the Western Europe, it has slowly entered Scandinavia through the Netherlands (Figure3.) On its way, many of the American concepts have gone through a big

change while merging to existing local Property Management cultures. The original purpose to support core business with creating the best possible working environment has always been the original goal, but the ways to create it has been a matter of local conditions and traditions.

At the end of the 1980s in the United States, companies began to outsource their support services to external service providers, and Facilities Management was born. The concept rapidly caught on in Europe via the United Kingdom, helped by the voluntary move towards using the private sector for public infrastructures. However, the potential for growth in the European market was halted by legal and business constraints. Today, the concept of Facilities Management has spread to the rest of Europe and is maturing. Facility Management is at the heart of the strategic decisions of your organization.

According to GEFMA, German Facility Management Association the origins of the facility management (FM) come from the U.S. Bureau world and the airline Pan American World Services (PAWS) in the'50s. Targets were productivity increases in operation and maintenance. The PAWS was FM service provider for the US Air Force and is regarded as the first external FM companies. With the establishment of the Facility Management Institute (FMI) in Michigan in the'70s, the FM became subject of study in science. In 1980 National Facility Management Association (NFMA) was founded, and later in 1982 has been renamed in International Facility Management Association (IFMA).

In the mid-80s the term Facilities Management appears in Europe, and hence in Germany, by promising to improve quality and to make savings in all areas of the non core business activities. Facilities Management was than progressively entering the Companies. History does, however, show us that the emergence of Facilities Management was an incremental affair. As the word implies, it emerged as opposed to happening all at once. In many respects it has slowly displaced Real Estate (or property) Management for many organizations, being seen to offer more than an accountant's perspective of the real estate (or property) portfolio. Once it became clear that there was more to ownership of real estate than trading an asset - perhaps as a result of recession when it made more sense to squeeze the last drop of value from the existing portfolio -businesses began to look at how the total costs of real estate ownership impacted on profitability. (Atkin2003a.)

Since the late 1980s, Facilities Management has gradually gained a foothold as a discipline and profession within the property and construction industry. Establishment of professional FM institutions around the world testifies to its growing importance.

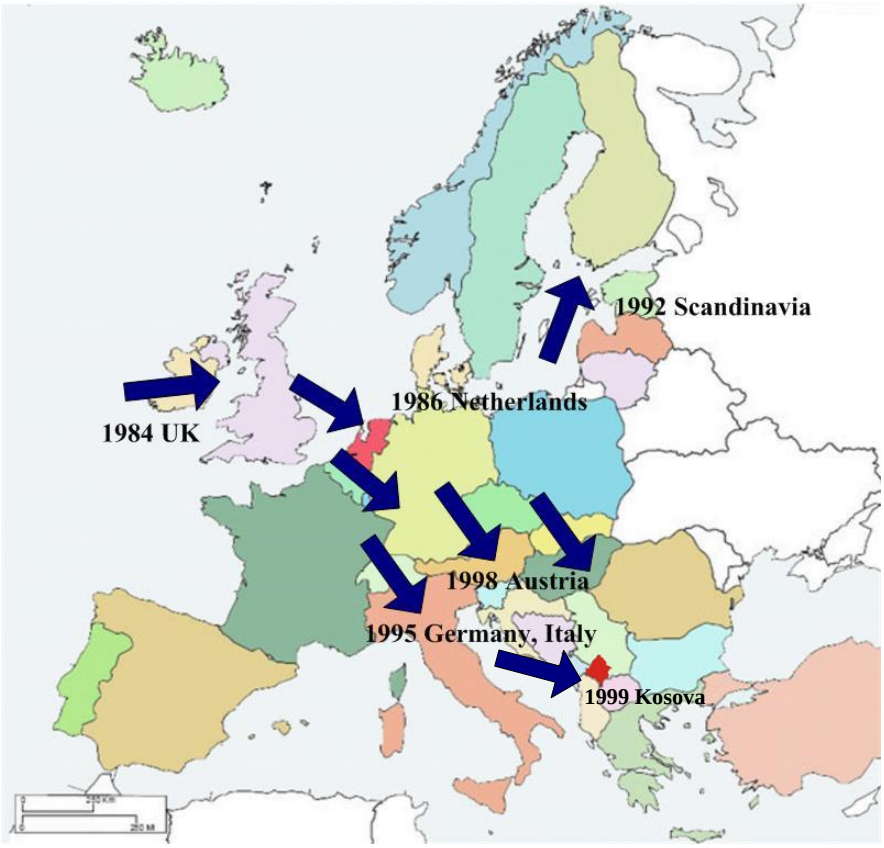


Figure 3: Facilities Management in Europe

2.3 OBJECTIVES OF THE FACILITIES MANAGEMENT

One of the already mentioned objectives of the Facilities Management is the minimizing of costs through overall facilities of the Company. With this approach, furthermore, it will be tried to continue to optimize the operational processes within the Companies. In addition to the primary business, also the non core business areas have to be put in the foreground with all the tasks that have to be fulfilled in conjunction with the core business area. Therefore the Facilities management is responsible for continuously providing necessary resources/services to the company. The resources are mostly of a special nature and therefore should be managed from specialized groups. Therefore the goal of Facilities Management is to optimally integrate these specialized groups and their resources in the Company context.

2.4 FACILITIES MANAGEMENT IN DIFFERENT COUNTRIES

Every country has its own culture and type of organization and leadership resulting in different levels of Facilities Management at different stages of development, which are most probably influenced by budget available. It would be logical, therefore, that the demands set for the facilities manager will differ and the quality realized will be valued differently. Another issue is the economic development of a country, which will influence the attention on serving the core business. Countries start with FM later will skip the first development stages and perhaps directly begin with corporate resource Facilities Management.

The USA and the UK have gone beyond the life cycle of FM and are already thinking about next step, which could be complete outsourcing (Freling 2000, p.10.) A good example would be to take a look at the diversity of composition of the staff of the institutions within the Europe Union. The Eu Ministers for example has a translating department where documents in French are translated into their languages. A visit to this institution made clear the differences in workplace solutions. The Dutch like a team-building floor while Germans prefer a more orderly design. The southern European Countries, on the other hand, use more or less individual workspaces. Also working hours vary enormously in spite of the fact that the climate in Brussels in somewhat constant. (Kloet 2000, p.16.) Organizations will undergo a cultural change as the open market brings in other cultures into the workforce.

American-style cultures will surely develop. However, also in the United States cultural differences still remain. It is up to facility mangers to find the right balance between their own backgrounds and the diverse cultures of customers and European relations. (Kloet 2000, p.16) The European FM network (Euro FM) tries to fill the gap by connecting European universities and polytechnics to the European business and EU subsidies, and in doing so has become strong in the field of research and education. IFMA connects best to the developments worldwide. The IFMA chapters in Europe can be best compared to the national chapters: local facility managers setting up an association in their own language and based on their own culture. The one advantage here is being able to make use of the knowledge, the experience and businesslike approach of the head office in the USA. IFMA is the oldest FM association, but the drawback is they seem too big and too American for Europe. (Kloet 2000, p.17.) The western parts of Europe are still where the main strengths in facilities management development lie. There is activity in France and Germany and signs of development in Italy, Denmark, Finland, but the Netherlands and United Kingdom, it seems, still predominate.

2.5 FACILITIES MANAGEMENT IN KOSOVA

In our Country Facility Management is a completely new discipline that needs first of all to be introduced to the companies both in private and public sector, perhaps this could be a future task for the universities here. The first entry of Facilities Management in Kosovo happened after wars end on 1999 when many foreign organizations, NGOs etc. started operating here. A lot of Local Engineers, Architects, technicians etc. started working with these Organizations and so making first experiences in regards of the Facilities Management.

Many Companies here are not fully aware of the meaning of Facilities Management, and they still refer to it as operations and maintenance like in the old time of the previous communist regime. However there are a few companies that understood right the meaning of the facilities management and the role of it in the business, by having FM sections either in house or by outsourcing. There are also a few Companies that provide Facilities Management services and the tendency is growing. (Figure 4)

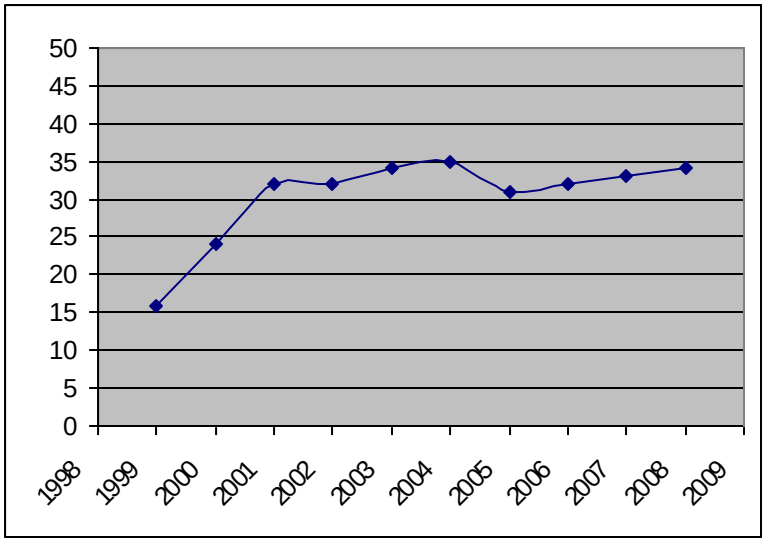


Figure 4: Facilities Management in Kosova

In the figure 4 we can sees a scale of development of Facilities Management in Kosova expressed in percentage through the years. As I mentioned before, it started with entering of different organizations and companies after the war period. and we can see a smooth progress until 2004 and since than it has not developed that much. There is obvious need of the institutional support in order to further develop the FM in Kosova.

As already mentioned before, the property market in Kosovo and region is quiet unsaturated, unstable, characterized by relatively low prices and salaries and poor environmental protection,

existing building stock including the infrastructure is in poor condition, so a lot of new buildings and refurbishment of existing ones is needed, most of the residential buildings are poorly or not at all being maintained, it is clear that the region is in need for a proper facility management and property management Companies. Figure 5 shows the percentage of awareness for Facilities Management amongst Companies throughout Kosovë, which is clear indicator that this Discipline needs real attention, and this could only be achieved through academic institutions, by establishing, if not full study programs, delivery of professional courses in FM. Only so we can develop FM and catch the step with radically changes in Economy and technology.

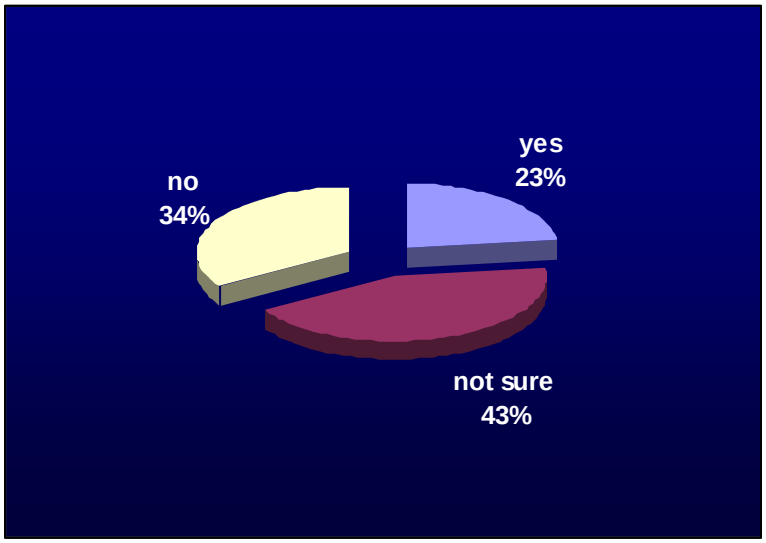


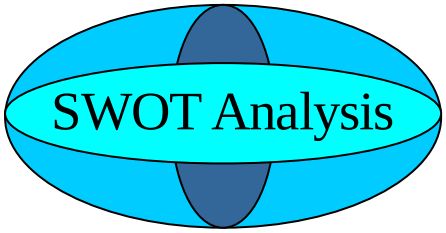
Figure 5: Awareness of Facilities Management in Kosova

Strengths	**Weaknesses**
• Large number of skilled and semi-skilled workers who are hardworking, diligent and professional	• Future funding for investments • To old Infrastructure • Poor maintenance of the

- Very Young population
- Natural resources
- Presence of international community
- Expanding construction industry
- Previous experience in industrial/constructional field
- Potential for future investment
- Necessary refurbishment of buildings and infrastructure

Buildings

- Poor maintenance of the Infrastructure
- Lack of practical experience with FM
- Uncertainties concerning the right form of organization
- Lack of training and seminars
- Lack of technology
- Lack of FM education
- Electricity
- Water supply
- Solid waste Management
- Illegal construction



Opportunities

- improvement of the quality of design and construction
- Local pool of highly qualified candidates
- Local pool of good quality construction contractors
- an influx of professional developers into the market

Threats

- Poor enforcement of planning and environmental legislation
- rapid increases in prices
- high scale of corruption
- Under paid workers
- External political factors

• Improvement of the environmental quality and protection. • Improvement of infrastructure	
External Assessment of the Environment	

Table 1: SWOT analysis in regards to FM

By conducting a SWOT analyze I have tried to bring to the point the necessity and the role that Facilities Management as a new discipline could play in a near future in our Country, so the action plan would be:

- Profiling of the Facilities Management as a unique discipline
- Organization of courses and seminars
- Exchanging of experiences foreign countries
- Through facility management, try to capitalize on the growing trend among companies to outsource non-core activities.
- Immediate action of the municipalities in improving the maintenance of the buildings, infrastructure and environment.
- Encourage companies both private and public to pay more attention to the equipment and technology.
- To train the Facilities Managers by giving them trainings and sending them to the seminars and international FM Conferences.

Through the analysis it can be clearly seen the strength, weaknesses, opportunities and threats regarding some aspects where Facilities Management and Facilities Managers could powerfully play a role. In the next two analyses I will try to bring out points out of the two segments shown in the SWOT analysis and that would be:

- Illegal constructions
- Solid waste management

These are two fields where Facilities Managers could possibly play a huge role, by having impact in technological, financial and managerial aspects and also in decision making process that is a very crucial point because as we know, decision requires a precision and therefore a

multi purpose discipline and strategy like Facilities Management will be of a great impact. The next step will be the analysis done through a project regarding the illegal constructions throughout Kosovo.

2.5.1 TREATMENT OF ILLEGAL CONSTRUCTION

In our country, soon after the war in 1999, as often happens in war torn Countries, illegal constructions started growing rapidly until now, and it is becoming really critical. It is considered that 20 000 illegal buildings are built throughout Kosova, and this has a very negative impact in the daily life such as in infrastructure, environment, living standard, architectonic image etc. Now that our government and its institutions are constantly being consolidated, this problem should be addressed and solved in the most appropriate way although it will be not an easy task. The Goals and Objectives in treating this matter are:

- To react / fight this phenomenon in the most appropriate and effective way
- To improve living conditions
- to respect the norms and regulations
- create a better image Of our country
- protect the reputation of the institutions,
- improving environment
- improving the infrastructure

There have been selected three proposals for solving this problem and we will go through as follows below. For illustration some Photos from City of Prishtina have been attached, pointing with arrows some of the areas that need attention.
However there are several questions that arise during the decision making process of the above mentioned theme like for example what is decision making?

Decision making is the process of defining problems and choosing a course of action from among alternatives. Decision making is often associated with problem solving, since many managerial decisions focus on finding solutions to existing and/or anticipated problems. Problems are not limited to difficult or negative situations; they can include opportunities or positive situations that present alternatives.
As a manager, decision making is at the center of your job. You must continually decide what is to be done, who is to do it, and how, when, and where it is to be done. Although these decisions may appear to be separate, they are often interrelated. Each decision is affected by, and builds upon, previous ones.

You can always learn how to make more thoughtful decisions to and improve the quality of your decisions. Decision making is a skill that can be developed by learning the steps, practicing, and exerting effort. At the same time, ensure that employees learn to make their own decisions more effectively. You can not make all the decisions necessary to run a department. Many daily decisions are made by the employees who do the work and at the other hand more complex decisions are made by high level management.

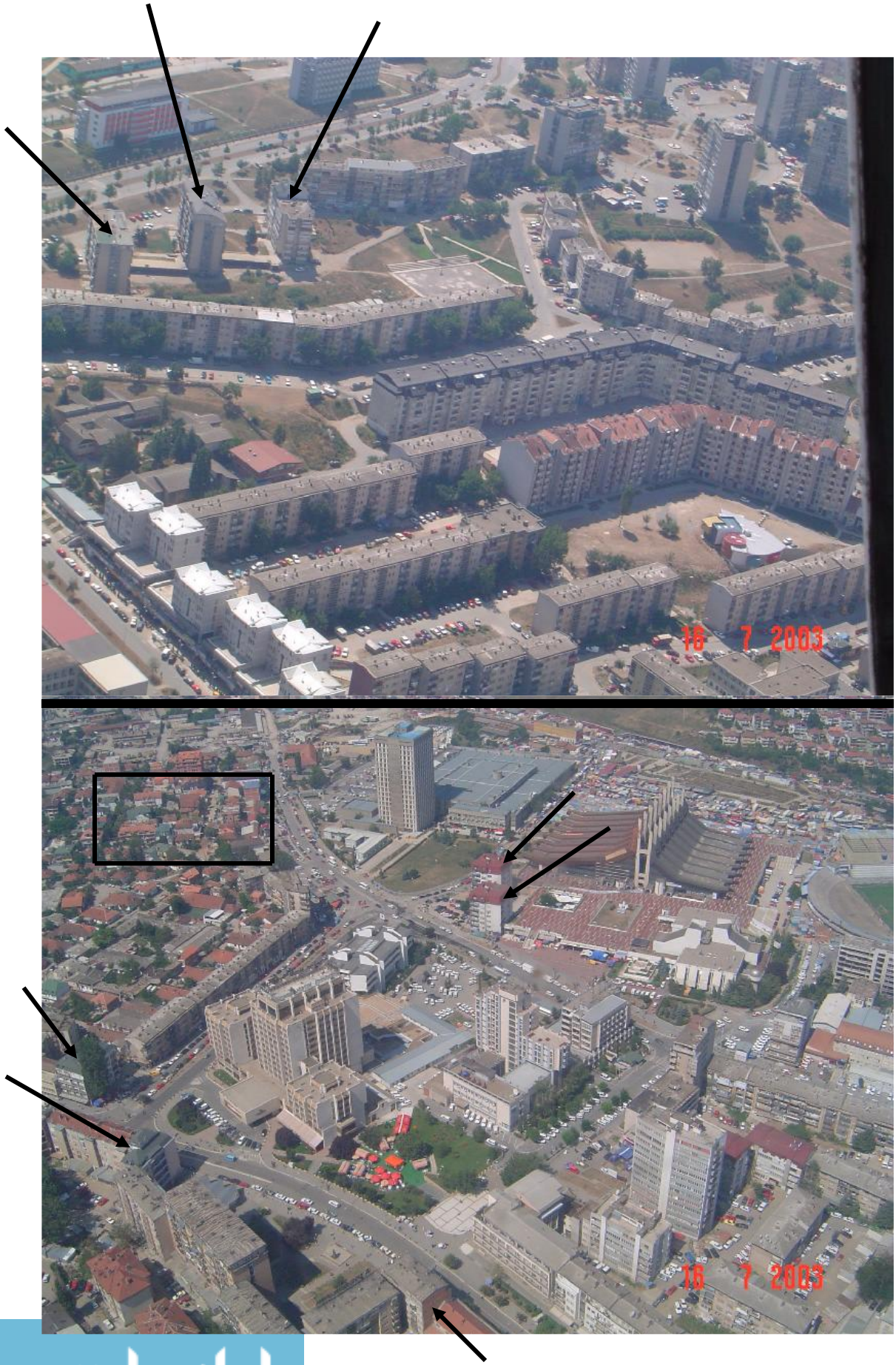
What is the decision-making process? In making non-programmed managerial decisions, managers should follow the six steps of the decision-making process. The six steps are:

- Define the problem.
- Analyze the problem using available information.
- Establish decision criteria-the factors that will be used to evaluate alternatives.
- Develop alternative solutions.
- Evaluate the alternatives carefully and select the "best" solution-the most feasible under the circumstances.
- Follow up and appraise the consequences of the decision

Defining a problem can require a fair amount of time, but it is time well spent. It should not be preceded in the decision-making process until the problem relevant to the situation has been specifically identified. The effective manager will use problem solving not only to take corrective action, but also as a means to make improvements in the organization.

In some situations, managers may feel they do not have enough time to go through the decision-making process. Frequently, a manager, a coworker, or an employee approaches the manager, presents a problem, and looks to the manager for an immediate answer. Most problems do not require an immediate answer, however, and managers cannot afford to make decisions without adequate consideration. Many managers get themselves into trouble by making hasty decisions.

The process of decision making in the chosen matter will undergo the decision making tools such as, plus minus tally, pros and cons, rating scale criteria and ICE (Importance – weighted criteria evaluation).



Treatment of Illegal Construction

Proposed Solutions:

- Destroying/Demolishing of illegal buildings
- Legalization / amnesty
- New urban planning for specific areas

The outcome of the research would be the third solution "New Urban planning in specific areas" and the reason why is shown further down.

Why is this option selected?

The Reason why this solution has been chosen is because I believe that, this solution incorporates ideas, interests and benefits of relevant factors mentioned in initial proposal (such as: Institutions, Community and NGO's – Civil Society)

Institutions -

- There should be Analysis and assessments of current situation, in identifying and researching of most affected areas.
- The institutions should offer proposals and solutions to the community (project proposals of new urban plans for specific areas, followed by legal issues)

Community

- The involvement in this aspect should be based on their active (Community's activity) participation on decision-making process, through public discussions.

NGO's-

- Civil Society role should be based on improvement of offered solutions through organizing thematic workshops on related issues, based on their interest like in the field of environment protection.
- The objective of this approach is: to satisfy interests and demands of parties involved.

Why are options one and two eliminated?

- *Destroying/demolishing illegal buildings*

Destroying all illegal buildings will have impact in:

a) Social aspects
b) Economical aspects
c) Technical aspects

- *Legalization – Amnesty*

For this option it is thought that it will have a negative impact to the society and at the same time will encourage the others (society) to build further illegal buildings/structures.

Furthermore we are going to present an assessment/analyses that were done with all three proposed options, by using the decision analysis tools such as "pros and cons", +- tally, rating scale criteria and ICE.

Pros and Cons of the proposed Options

- **Destroying/demolishing illegal constructions**

Pros

a) Re establishing an urban order
b) Reducing the risk to the structure of existing buildings
c) Keeping up of architectural and building standards

Cons

a) Negative social impact
b) Extra expenses for Government
c) Legal conflict between involved parts (Goverment vs. Citizens)

- **Legalization / Amnesty**

Pros

a) Housing solution for a certain group of citizens
b) Low cost of implementation

Cons

a) Overloading of existing infrastructure
b) Barriers for Urban Planning Implementation
c) Damage of architectural image

- **New Urban Plan for specific areas**

Pros

a) Improvement of living conditions
b) Solving of infrastructure
c) Establishing fundamental base for future development

Cons

a) Takes time and costs a lot

PLUS – MINUS TALLY

Options / Criteria	Destroying Illegal Constructions	Legalization of Illegal Constructions	New Urban Plan for Specific Areas
COST	0 10.000.000 €	+ + 500 000 €	--- 15.000.000 €
Social Impact	0 Decreased number of housing units (Possible riots)	0 Status Quo Disappointment of those who respected the law	+ + + Increasing number of families with housing
Environmental Improvement	0 Saving planned environment structure	- - - No improvements	+ + + Improves Environmental Structure
Living Conditions	0 Improvement of public facilities	- - Decreases level of living standard	+ + + New Positive Developments of living conditions
Awareness	0 Community gains trust to the authorities	- - Bad influence	+ + + Good image of institutions Increases awareness
Architectural Image	0 Return to the previous planned image	- - - - Loosing of architectonic balance	+ + + + Standard norms and regulation Developing new modern concepts

Total score: New Urban plan is ahead with 4 +

Table 2: plus-minus tally

RATING SCALE CRITERIA

Social Impact

Increased Number of families without Housing — **New Urban Plan**

Status Quo — **legalization**

Decrease number of families with housing — **destroy**

Cost

15 000 000 € — **New Urban Plan**

10 000 000 € — **destroy**

500 000 € — **Legalization**

Environmental Improvement

Improving — **New Urban Plan**

Saving — **Destroy**

Legalization

Damage

Living Conditions

New developments — **New Urban Plan**

decrease living standard — **legalization**

destroy

improves public Facilities

Awareness

Good image Of Institut. — **New Urban Plan**

trust . — **Destroy**

Bad image of Inst. — **Legalization**

Architectural Image

Standard norms and regulations — **New Urban Plan**

previous planned image — **destroy**

loosing arch. Bal. — **Legalization**

IMPORTANCE – WEIGHTED CRITERIA EVOLUATION – ICE

C R I T E R I A	*Importance %*	O P T I O N S			Weighted score (Importance x options)		
		Destroy	Legalize	New Urban	*Destroy*	*Legalize*	New Urban
Cost	*20*	30	80	20	6	16	4
Social Impact	*29*	5	40	90	1.45	11.6	26.1
Environmental Improvement	*12*	45	5	85	5.4	0.6	10.2
Living Conditions	*23*	35	10	83	8.05	2.3	19.09
Increase Awareness	*5*	80	0	40	40	0	20
Architectural Image	*11*	65	0	100	7.15	0	11
Total	*100*				68.05	30.5	90.39

Table 3: Importance - weighted criteria evaluation - ICE

Summary

There was an introduction of the problem and there were provided three options for solving it. The first two options Destroying and Legalization were two choices with short-term effects. But, both of the options caused enough other problems specified in steps of decision analysis:

First option

a. Destroying could cause a lot of social problems and also would have a pretty high cost and technical difficulties also, and as a very bad outcome we will have a lot of homeless and unemployed people. As a comparison we can mention the Zimbabwean government campaign to clear slum areas/illegal structures across the country in 2005, that according to the United Nations estimates, has led to the unemployment of 700.000 people and affected further at least 2, 4 million people countrywide.

The second option

b. Legalization costs are very low, but as very bad outcomes are: no improvements of living conditions because of overloading of the infrastructure, disrespecting of architectural/building standards and norms, and also there is no improvement on the architectural image of the country at all.

The third option

c. New urban planning comes as a result of combining of two options and launches as well new strategy in order to avoid bad outcomes specified in process of decision analysis. After the process of decision analysis that was conducted this solution was show to be the most suitable one because:

For specific urban conditions of Kosova, (as we know our country doesn't have urban plans since 20 years and more, because of discrimination policy of the ex Serbians government until 1999), new urban planning would have positive impact:

- Would orient investments of building industry to urban zones
- Would satisfy: social, economical, infrastructural, environmental needs of citizens
- Would make possible renovations/alterations, interventions in existing zones.
- Would make life easier by reducing population in overcrowded areas

2.5.2 SOLID WASTE MANAGEMENT

Solid waste management includes all activities that seek to minimize the health, environmental and aesthetic impacts of solid wastes. Solid waste can be defined as material that no longer has any value to the person who is responsible for it, and is not intended to be discharged through a pipe. It does not normally include human excreta. It is generated by domestic, commercial, industrial, healthcare, agricultural and mineral extraction activities and accumulates in streets and public places. The words “garbage”, “trash”, “refuse” and “rubbish” are used to refer to some forms of solid waste. Here in Kosovo, as in many other countries, wastes from houses, streets, shops, offices, industries and hospitals are usually the responsibility of municipal or other governmental authorities. I see it as point where the Facilities Managers could play a big role. Many people feel that solid waste management is a simple affair - simply putting waste into a vehicle and unloading it at a dump. If this were true, then why do so many towns in our Country suffer from uncollected refuse blocking streets and drains, harboring flies and rats, and degrading urban environments? Successful solid waste management is rarely achieved without thought, effort and much learning from mistakes.

Engineers may feel that any engineer, without special training or experience, can solve solid waste management problems. There is much evidence to show that this is not true, perhaps mainly because solid waste management is much more than a technological issue - it usually involves managing a large workforce and working together closely with the public. The preparation and management of a good solid waste management system needs inputs from a range of disciplines, and careful consideration of local conditions. Problems with maintenance and financial aspects are common. Engineers often make mistakes in the selection of equipment, since vehicles and machines which work well in industrialized countries are often grossly inadequate in developing countries. If solid wastes are not managed properly, there are many negative impacts that may result. Some of the most important are mentioned in the following list.

- Uncollected wastes often end up in drains, causing blockages which result in flooding and insanitary conditions.
- Flies breed in some constituents of solid wastes, and flies are very effective vectors that spread disease.
- Mosquitoes breed in blocked drains and in rainwater that is retained in discarded cans, tires and other objects. Mosquitoes spread disease, including malaria and dengue.
- Rats find shelter and food in waste dumps. Rats consume and spoil food, spread disease, damage electrical cables and other materials and inflict unpleasant bites.
- The open burning of waste causes air pollution; the products of combustion include dioxins which are particularly hazardous.

- Uncollected waste degrades the urban environment, discouraging efforts to keep streets and open spaces in a clean and attractive condition. Solid waste management is a clear indicator of the effectiveness of a municipal administration - if the provision of this service is inadequate large numbers of citizens (voters) are aware of it. Plastic bags are a particular aesthetic nuisance and they cause the death of grazing animals which eat them.
- Waste collection workers face particular occupational hazards, including strains from lifting, injuries from sharp objects and traffic accidents.
- Dumps of waste and abandoned vehicles block streets and other access ways.
- Dangerous items (such as broken glass, razor blades, hypodermic needles and other healthcare wastes, spray cans and potentially explosive containers and chemicals from industries) may pose risks of injury or poisoning, particularly to children and people who sort through the waste.
- Heavy refuse collection trucks can cause significant damage to the surfaces of roads that were not designed for such weights.
- Waste items that are recycled without being cleaned effectively or sterilized can transmit infection to later users. (Examples are bottles and medical supplies.)
- Polluted water flowing from waste dumps and disposal sites can cause serious pollution of water supplies. Chemical wastes (especially persistent organics) may be fatal or have serious effects if ingested, inhaled or touched and can cause widespread pollution of water supplies.
- Large quantities of waste that have not been placed according to good engineering practice can slip and collapse, burying and killing people.
- Waste that is treated or disposed of in unsatisfactory ways can cause a severe aesthetic nuisance in terms of smell and appearance.
- Fires on disposal sites can cause major air pollution, causing illness and reducing visibility, making disposal sites dangerously unstable, causing explosions of cans, and possibly spreading to adjacent property.
- Former disposal sites provide very poor foundation support for large buildings, so buildings constructed on former sites are prone to collapse.

Another important point to be mentioned is the transportation of waste. Waste collection-transfer-transportation plays a central but often understated role in the waste management system. It can, after all, account for 60% -80% of the total cost of waste disposal and thus any improvement in its organization and implementation would result in considerable saving, therefore the role of the facilities manager in this case is essential. The opportunity to influence the volume and composition of the waste stream lies at the start of the waste management process. As the volume of waste increases, waste transportation is uneconomical if waste is transported over long distance in small vehicle. The use of transfer stations has become

economical for urban areas that generate large waste quantities and which are a long distance a way from the waste processing or disposal facilities. A transfer station is economically justified when the savings in haul costs exceed its operational and financing costs. Sufficient savings are often generated when the distance from the collection area to the landfill exceeds 30-60 kilometers, but this distance varies greatly with the amount of waste, capital and financing costs, operation costs, size of trucks, and local conditions. In addition to the previous reason, transfer station assist in separation of recyclable materials, assist in the inspection for hazardous waste, and keep small vehicles out of the landfill.

2.5.2.1 URBAN SOLID WASTE MANAGEMENT

The overall goal of urban solid waste management is to collect, treat and dispose of solid wastes generated by all urban population groups in an environmentally and socially satisfactory manner using the most economical means available. Local governments are usually authorized to have responsibility for providing solid waste management services, and most local government laws give them exclusive ownership over waste once it has been placed outside a home or establishment for collection. As cities grow economically, business activity and consumption patterns drive up solid waste quantities. At the same time, increased traffic congestion adversely affects the productivity of the solid waste fleet. Productivity loss is exacerbated by longer hauls required of the fleet, as open lands for disposal are further and further away from urban centers. The challenge is to rationalize worker and vehicle performance, while expanding services to a growing urban population. In developing countries, it is common for municipalities to spend 20-50 percent of their available recurrent budget on solid waste management. Yet, it is also common that 30-60 percent of all the urban solid waste in developing countries is uncollected and less than 50 percent of the population is served. In some cases, as much as 80 percent of the collection and transport equipment is out of service, in need of repair or maintenance. In most developing countries, open dumping with open burning is the norm

Large municipalities and metropolitan regions are encouraged by the Bank to routinely undertake city-wide strategic planning to design and implement integrated solid waste systems that are responsive to dynamic demographic and industrial growth, and numerous Bank projects have financed strategic plan development. Strategic planning starts with the formulation of long-term goals, based on the local urban needs, followed by a medium- and short-term action plan to meet the goals. The strategy and action plan should identify a clear set of integrated actions, responsible parties and needed human, physical and financial resources. Opportunities and concepts for private sector involvement are commonly included among the examined options, as the private sector's costs and productivity output require special consideration.

For designing of the effective solid waste management, there are many factors that must be considered which vary from place to place. Amongst them are:

The waste itself - Typical domestic waste from industrialized countries has a high content of packaging made of paper, plastic, glass and metal, and so the waste has a low density. (In other words one person can lift a typical bin when it is full.) The large amount of paper and the use of pre-processed food result in low proportions of moisture in the waste. In many developing countries there is a high proportion of sand (because of the materials used for paving and construction, and climatic factors) which makes the waste very dense. (If the waste is dense it means that two people may have difficulty in lifting a typical bin when it is full.) In addition, the waste may contain large amounts of moisture because of the high usage of fresh fruit and vegetables. There are several important consequences of this density factor. Perhaps the main one is that containers, vehicles and systems that operate well with low-density wastes in industrialized countries are not suitable or reliable when the wastes are heavy. The combination of the extra weight, the abrasiveness of the sand and the corrosiveness caused by the water content, can cause very rapid deterioration of equipment.

Another important consideration is the possibility of incinerating the waste (meaning, the burning of waste under controlled conditions to minimize pollution). If the waste contains a high proportion of moisture, or is mostly inert material, it is not suitable for incineration, and so this treatment option is ruled out. Recycling or salvaging operations often reduce the proportion of combustible paper and plastic in waste before it reaches the treatment stage.

Access to waste collection points - Many sources of waste might only be reached by roads or alleys which may be inaccessible to certain methods of transport because of their width, slope, congestion or surface.

Public awareness and attitudes to waste - This can affect the readiness to carry waste to a shared container, the willingness to accept the proximity of a shared container, the willingness to segregate waste to assist recycling, the frequency at which wastes should be collected, the amount of litter and animal excreta that are left on the street, the willingness to pay for waste management services etc.

Selection of equipment - In addition to the factors already mentioned, the selection of waste collection vehicles should be influenced by the types of vehicles and chassis that are already widely used and for which spare parts and maintenance expertise are available. Taxes, duties and import restrictions should also be considered.

2.5.2.2 SOLID WASTE MANAGEMENT IN KOSOVO

Even the Solid waste management in Kosovo has significantly improved during the last two years; generally we can say that solid waste management in Kosovo needs improvement. A new

and quite confusing waste law in 2006 has encouraged anarchy; municipalities have not started to assume their new responsibilities and the Regulator (WWRO- water and waste regulatory office) has been unable to prevent illegal operators to collect waste from businesses and institutions, thus threatening the existence of the regional utilities. In 2005, the utilities had extra staff that they could not afford, given their unstable financial situation. The utilities have decided to decrease their number of employees and re-structure current departments in 2006.
In 2006, utilities were unable to pay their debts to the Tax Administration of Kosovo (TAK), given their weak financial situation. In 2006, the utilities reported almost 3 million € of debts (VAT, income taxes, contribution) to the Tax Administration of Kosovo (TAK) in their 2006 Financial Statements (see table 4).

Utility	Amount of debt (€) to TAK at end of 2006
Prishtinë's Pastrimi	1,555,301
Prizren's Eko-Regjioni	523,785
Ferizaj's Pastërtia	5,265
Gjilan's Higjiena	5,075
Pejë's Ambienti	435,703
Gjakovë's Çabrati	N.A.
Mitrovicë's Uniteti	229,714
Total	2,754,843

Table 4: Debts of waste utilities to the tax administration of Kosovo in 2006
Source:EPSTISA

For example, one of the departments of Mitrovicë's Uniteti had stopped its operation; Uniteti's management decided to lay off the employees of this department. All utilities have evaluated their current work force and taken decisions to lay off employees close to retirement and to restructure their departments. There has been a special emphasis on fee collectors because in 2008 the utilities will not need them any more, given that municipalities will be responsible for fee collection. Therefore, the utilities will either lay off their fee collectors or allocate them to other departments that need more employees.

Currently, some local and international privately-owned waste management companies (e.g., Zahiri, TOIFOR, and MSS) operate in the service area of the regional utilities and are now doing the work that the utilities once used to do. Actually, these companies operate illegally without a

valid licence issued by WWRO(water and waste regulatory office). Recently, some institutions (i.e., UN, KFOR) have signed contracts with private waste management companies. Utilities have already brought up these illegal activities to WWRO's attention, but until now these activities have not stopped. However, recently, the regional utilities have lost many private and public contracts to private companies, because these companies were bidding almost 50% less than the regional waste utilities. Private waste utilities have several advantages:

- Concentrated on profit margin;
- Advanced Customer Relationship Management;
- Not overstaffed;
- Flexible to optimise workforce;
- Inexpensive (although sometimes inadequate) technical equipment;
- Perform only in lucrative market segments;
- No costs for licences;
- Not subject to WWRO's regulations.

Once private companies are forced to comply with the same regulatory framework, most of their advantages will disappear; they will always, however, optimise their labour force. In the meantime, Public owned Enterprises could use private waste management companies as subcontractors to lower their costs and win tenders. In the long run, competition will improve the quality and reduce the costs of waste management services in Kosovo. Due to the fact that all of the companies work with loss, there is a need for implementing of cost saving strategy. The steps of cost saving strategy from the facilities management point of view would be:

- Reallocate other staff to other tasks to avoid redundancies;
- Improve motivation of managers and workers;
- Optimise collection routes;
- Select efficient collection systems; and
- Improve control of fuel expenses.
- Provide investments required to replace old equipment, put in place a leaner organisational structure, and extend the services;
- Estimate money required to reach the targets and identify sources to cover the financial gaps;
- Be prepared to implement the waste law, especially get adjusted to the role of municipalities in waste management and get prepared to win future tenders.

Further down we can see some of the plans of seven waste utilities to change their organisational structure modify their offices as follows:

- Pastërtia: build a common headquarters for the four served municipalities in 2008;

- Çabrati: combine their administrative and technical premises in 2008;
- Higjiena: build a common headquarters for the three served municipalities in 2007/2008;
- Uniteti: plan to extend its headquarters in 2007-2009 to meet the needs of all served municipalities;
- Ambienti: expand its headquarters in 2007;
- Pastrimi: expand its headquarters in 2007 to serve 4 of 5 municipalities; the Podujevo unit will remain due to the long distance to Prishtina;
- Eco-Regjioni: plan to have three offices in the future: headquarters in Prizren for Prizren and Suhareka (extension planned for 2007/2008); unit in Rahovec or Xerxe, depending on the location of a transfer station (planned for 2007/2008); and unit in Dragash (due to traffic problems in winter).

According to some researches done in the past two years all of the seven regional utilities are overstaffed, compared to the waste amount collected and the requirements of non-core businesses. Laying off existing overstaff would only worsen Kosovo's already high rate of unemployment. Extending waste collection services would help protect the environment and solve the problem of overstaff. This productive use of existing overstaff was reflected in the labour cost estimates in the seven business plans. The extension of service area depends on the willingness/ability of served clients to pay for the waste collection. Given the weak economic situation of the seven regional utilities, it is not possible to serve more people without collecting revenues for these extended services. All seven waste utilities planned in their business plans to increase the number of served and billed households in 2006.

	December 2005	Plan for 2006	December 2006
Pastërtia	9,602	11,507	10,129
Çabrati	8,525	11,684	8,248
Higjiena	12,097	12,985	13,037
Uniteti	8,733	10,312	9,144
Ambienti	10,276	12,766	10,560
Pastrimi	36,337	44,794	40,011
Eko-Regjioni	21,359	27,648	22,196
Total	**106,929**	**131,696**	**113,325**

Table 5: billed households

Source: EPTISA

Although all utilities increased the number of billed households, only one of them (Higjiena) reached the planned target. Instead of a planned increase of 23% in billed households, the increase was only 6%, primarily due to the bad payment habits of households and businesses. Even after intensive preparation for the extension together with local officials and after promises of newly served inhabitants to pay the fee, the fee collection rate remained very low, which forced the utilities to remove containers in some villages. Without a sustainable solution for financing the costs of waste collection, extending waste collection will not be possible.

Staff of waste utilities are paid monthly and usually do not get any overtime. Even if they work harder, they are not paid more. To increase staff productivity and reduce unit costs (i.e., collect more waste at the same time with the same labour and fuel costs), utilities could use several incentives:

- Pay staff on a hourly basis;
- Pay overtime (even more than regular time);
- Provide incentives for reaching certain targets (e.g., second load per shift);
- Link wages of fee collectors to fee collection; and
- Link salaries of managers to the performance of the utility.

The utilities have not used enough these payment incentives to improve the workers' motivation to collect more waste at the same time due to their weak financial situation and also due to their fear of never ending discussions on workers compensation. The utilities should use this possibility to improve the effectiveness of waste collection once the financial situation of waste companies improves.

Optimization of collection routes

Collection route planning is one of the most effective cost saving tools. Fleet managers, who are directly in charge of the drivers, should design the plan and review it periodically. They could reach substantial savings once they dissolve unneeded unit garages and unify the whole fleet into one. On a given route, a shift should collect two full loads (i.e., 120 1.1m³ containers) with a frequency of about 25 containers per hour to minimise fuel and labour. The collection routes should be reviewed and redefined frequently to avoid overlapping and fragmentation to minimise wasted time (i.e., when the same roads are used too many times) and reduce operating costs (i.e., fuel, wear and tear of trucks).Only the responsible managers in the utility can optimise the routes because they know the local road conditions and different sources of waste generation.

Selection of efficient collection systems

In Kosovo, there are three types of systems for collecting mixed municipal waste:

- Compactor trucks with 1.1m³ containers;
- Tractors collecting door-to door; and
- Skip trucks for 5 or 7 m³ containers.

Unit costs of collection (mainly labour and fuel costs) vary from €15/t for a compactor truck with 1.1m³ containers to €25/t for other systems. Therefore, wherever possible, compactor trucks should be used; tractors should be used only for narrow streets. Bigger (5 or 7m³) containers, which have to be changed once they are full, should be used only for waste that cannot be collected with 1.1m³ containers (e.g., bulky waste such as construction materials and debris). The choice of waste collection system has a big impact on unit costs, especially labour and fuel.

Improving maintenance

Maintenance of technical equipments has particular importance, because utilities in Kosovo are composed mainly from old vehicles, and on the other hand road infrastructure is in quite bad condition. In table 6 you can see a sample of maintenance procedures which comprises; daily, weekly, every 10,000 km, and every 20,000 km controls .So this refers to the preventive maintenance that says" spend today to save tomorrow".
According to the well known manufacturer "IVECO" there are two types of services called M1 and M2 in regard to the vehicle maintenance:

M1 Service

1. Change engine oil.
2. Change engine oil filters.
3. Change fuel filters.
4. Check operation of dry air cleaner restriction indicator.
5. Check operation of cab tilting device and warning lamp.
6. Tighten intercooler clamps and pipes (where fitted)
7. Mod.95E Check level of brake system fluid and pad/disc wear
   Mod.135E Check brake shoe wear.
8. General greasing (at list once a year). If the vehicle is fitted with an automatic lubrication system, grease the propeller shafts in any case.
9. Check trailer pintle hook tightening torque.

10. Also check:
    - Check tightening of air intake system collars and hoses.
    - Check all mechanical assemblies for leaks.
    - Check cooling system and brake hydraulic system pipes for leaks (95E).
    - Check dry air filter seal
    - Change oil in oil bathe air cleaner (where fitted)
    - Check tilting system pipes for leaks.
    - Road test and check handling operations.

M2 Includes M1 services plus cited below Services:

1. Check antifreeze concentration
2. Check condition and tension of all drive belts.
3. Check headlamp alignment.
4. Check wheel nut tightening torques.
5. Change fuel pre filter.

Vehicle System or Part	Check before each journey	Check Weekly	Check every 10,000 kms	Check every 20,000 kms	Procedure description
Alcohol injector (where fitted)					Check level of anti freezing fluid in tank of braking system (only in winter or in particularly damp climates).
Air reservoirs					Drain condensate from air reservoirs (only in winter or in particularly damp climates).
Air reservoirs					Operate the appropriate air reservoir drain tap (see picture) to drain the reservoirs (only in

					the warm season or in particularly dry climates)
Air cleaner indicator					Check operation of dry air cleaner indicator
Alcohol injector (where fitted)					Check level of anti freezing fluid in tank (4) of braking system (only in the warm season or in particularly dry climates)
Batteries					Check the battery electrolyte level using the level mark (I) on the battery casing as a guide; if necessary, top up using distilled water with batteries at rest and cold. (Not applicable to maintenance free batteries)
Belts					Check condition and tension of all drive belts.
Brake system fluid level					(Mod. 95E only) Check level of brake fluid. For topping up, do it in your own workshop garage or turn an authorized workshop.
Brake system fluid level					Mod. 95E Check level of brake system fluid and pad/disc wear

Cab tilting device					Check operation of cab tilting device and warning lamp
Cab unlatched warning lamp					Check operation of cab unlatched warning light.
Oil and oil filter					Replace oil filter with every oil change. If distance covered is less than specified for this type of service, change engine oil at least once a year.
Clutch fluid level					Check level in clutch fluid reservoir. For topping up, if needed, use only Tutela DOT SPECIAL Tutela PLUS[3] 240 ºC.
Exhaust system					Exhaust system visual check
Engine coolant fluid level					When cold engine is, check engine coolant level. It should be between MAX and MIN reference mark on header tank. Top up through cooling liquid filler, if needed.
Engine oil level					Use dipstick to check engine oil level. Top up through oil filler, if necessary.
Fuel filter					Slacken tap for draining water which may have accumulated in fuel filters, or depending on model, drain by loosening tap in fuel pre-filter.
Fuel filter					Change fuel filters.
General greasing					General greasing (at list once a year). If the vehicle is fitted with a automatic lubrication system, grease

					the propeller shafts in any case.
Intercooler					Tighten intercooler clamps and pipes (where fitted)
Jack					Operate jack a few times under no load to check and preserve its efficiency. As regards checking and maintenance instructions, refer to documentation provided by the manufacturer
Power steering fluid level					Remove cap from power steering fluid reservoir and check that, with engine running and wheels in straight ahead position, the fluid level reaches up to the top mark on dipstick. With engine switched off and wheels in straight ahead position, the fluid level should be 1 or 2 cm above the top reference mark on dipstick. If necessary, top up after removing filler cap.
Tires					Check tire wear and pressure (don't forget the spare wheel!) If necessary, inflate to the specified pressure. Other necessary instructions learn from the PM guide.
Windscreen washer fluid level					Check level of fluid in windscreen washer tank. Use a mixture of windscreen washer additive and water to top up, if necessary. Also check nozzles for

					blockages; use a needle for cleaning them, if necessary.
Windscreen wipers					Replace yearly or when smearing or chattering.
Also check					Air cleaner restriction indicator (visual check). Tire conditions. Operation of service, Parking and exhaust brakes. Operation of lights, warning indicators and windscreen wipers.
Also check					Visual check of oil level and condition of oil bath air filter (where available).Exhaust system (visual check).
Also check					Check tightening of air intake system collars and hoses. Check all mechanical assemblies for leaks. Check cooling system and brake hydraulic system pipes for leaks (95E).Check dry air filter seal Change oil in oil bathe air cleaner (where fitted)Check tilting system pipes for leaks. Road test and check handling operations.
Also check					Check antifreeze concentration, Check condition and tension of all drive belts, Check headlamp alignment. Check wheel nut tightening torques. Change fuel pre filter.

Table 6: Maintenance procedures

2.6 DEFINITIONS OF FACILITIES MANAGEMENT

The FM has various definitions. The definition and scope of Facilities Management remains a contentious issue and the definitions depend on the local culture, organizations interests and people's personal interests. In spite of the controversial differences in definitions, the conclusive meanings are becoming more integral through the heavy internationalizing. Over the years, researchers and practitioners alike have provided many definitions that specify the objectives and scope of FM. However, the definitions have prevented a common platform that is so crucial for a consistent theoretical development in FM.

According to some of the Scientists Facility Management refers to buildings in use, to the planning, design, management of occupied buildings and their associated building systems, equipment and furniture to enable and to enhance the organization's ability to meet its business or programmatic objectives. It is the practice of coordinating the physical workplace with the people and work of the organization, to integrate the principles of business administration, architecture and the behavioral and engineering sciences. Facility Management thus refers to organizational effectiveness.

Facilities Management can encompass"

- Real estate management
- Life cycle cost analysis
- Financial management
- Change management
- Human resource management
- Health and safety
- Contract management
- Building maintenance
- Domestic services
- Utilities supplies

Facilities Management is a vital strategic discipline because it 'translates' the high-level, strategic change required by senior decision makers into day to day reality for people in their work or living space. The modern form of Real Estate Management, according to Leväinen can be seen from three different viewpoints (Figure 6), which are called Asset Management (AM), Property Management (PM) and Facilities Management (FM) .In Asset Management the owner and investor concentrate on the profitability of business, in

Property Management the technical manager concentrates on the building and its equipment, whilst in Facilities Management, the occupant of a workplace is interested in the space and services supporting his/her work or company's production. Similarly the object of interest is different: capital (AM), building (PM) or space and service (FM).

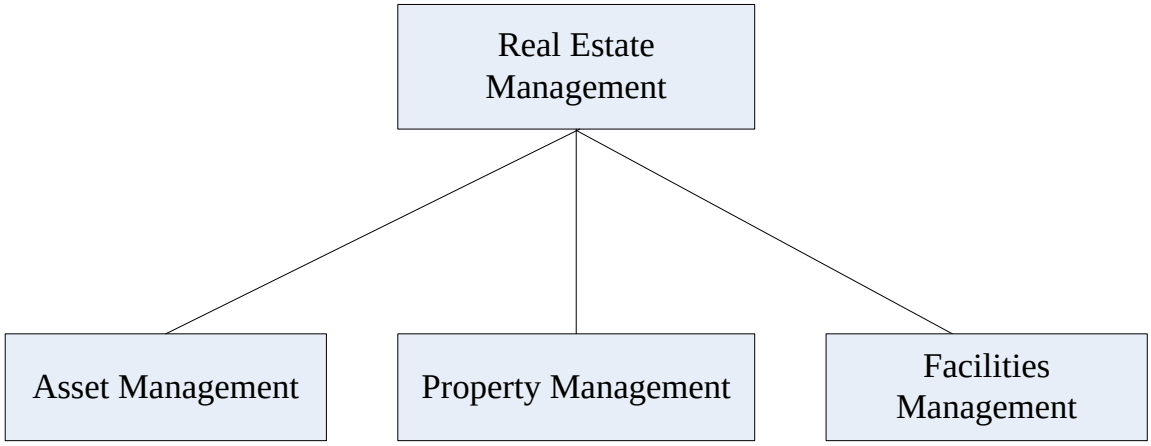


Figure 6: Viewport of Facilities Management

In Nordic FM (2003), Nordic Facilities Management Network, definition, FM is also seen as an integrated approach to operating maintaining, improving and adapting buildings and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of organization. It consist also asset management and parts of operational management (Figure 7).

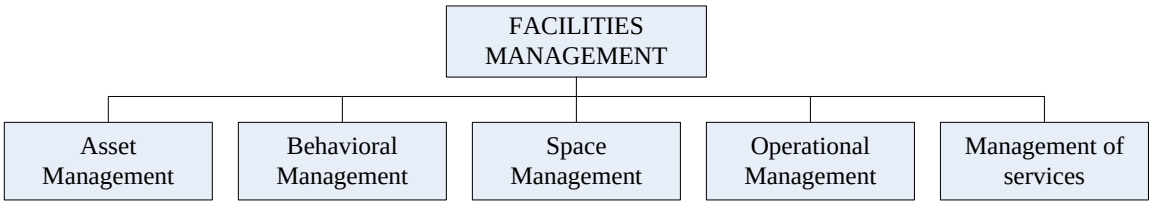


Figure 7: Facilities Management according to Nordic FM

International Facilities Management Association describes the work of a facility manager as potentially covering the following duties and functions:

- facility strategic and tactical planning
- facility financial forecasting and budgeting
- real estate procurement, leasing and disposal
- procurement of furnishings, equipment and outside facility services
- facility construction, renovation and relocation
- health, safety and security
- environmental issues
- development of corporate facility policies and procedures
- quality management, including benchmarking and best practice
- architecture and engineering planning and design
- space planning and management
- building operations, maintenance and engineering
- supervision of business services such as reprographics, transportation and catering
- telecommunications

Anyhow the term Facilities Management leaves a huge space for interpretation in many different ways as can be seen from the table 4. For example Nutt (2000), affirms that the FM plays strategic role in the business organization. The early definition provided by Becker (1990) suggests that FM is only concerned with the hardware such as buildings, furniture and equipments. Later definitions, however, included "software" such as people, process, environment, health and safety in the responsibilities of FM (e.g. Alexander 1996; Then 1999). Others have taken the definition further by expanding the scope of FM to cover the entire property life cycle of designing, building, financing and operating. (Tay & Ooi 2001) IFMA's definition integrates the principles of business administration, architecture and the behavioral and engineering sciences. BIFM's clear and well-focused expression of Facilities Management does not, however, stress the contribution that well-managed facilities can make to an organization's core business. Varcoe (2000) projects that organizations and consortia will seek to provide a complete infrastructure for business by embracing other "working environment" components such as IT, finance and human recourses. Also, Freling (2000), the president of BIMS, says that all the service that supports that core-business should belong to FM, even Human Resource Management (HRM). He prefers to speak of Service Management or Business Infrastructure Management (BIM) instead of Facilities Management.

Author	Definitions of Facilities Management
Becker (1990)	FM is responsible for co-ordinating all efforts related to planning, desingning and managing buildings and their systems, equipment and furniture to enhance the organisation´s ability to compete succesfully in a repidly changing world
Nourse (1990)	FM unit is seldom aware of the overall corporate strategic planning, and does not have a bottom-lihne emphasis.
Cotts & Lee (1992)	The practice of co-ordinating the physical workplace with the people and work of an organisation; integrates the principles of business administration, architecture, and the behavioural anf engineering science.
Regterschot (1993)	Facilities Management is the integral management (planning and monitoring) and realization of housing, services and means that must contribute to an effective, flexible and creative realization of an organisation's objectives in an ever changing environment.
Park (1994)	Facilities Management is the structuring of building plant and contents to enhance the creation of the end product. As with all systems it is the generated benefit to the business or activity that matters, not the system itself.
Barrett (1995)	FM is an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of that organisation.
Alexander (1996)	The process by which an organisation delivers and suistains support services in a quality environment to meet startegic needs.
Then (1999)	The practice of FM is concerned with the delivery of the enbling workplace environment -the optimum functional space that supports the business processes and human recources.
Hinks and McNay (1999)	…common interpretations of the FM remit: maintenence management; space management and accommodation standards; project management for new-built and alterations; the general premises management of the building stock; and the administration of the associated support services.
Varcoe (2000)	…a focus on the management and delivery of the business "outouts" of the both these entites (the real estate and construction industry); namely the productive use of building assets as workplaces.
Nutt (2000)	The primary function of FM is resource management, at startegic and operational levels of support. Generic types of resource management central to the FM function are the management of financial resources, physical resources, human resources, and the management of resources of information and knowledge.
Van den Ende (2000)	Facility Management is the effective, efficient and integral management of all facilities, thus enabling organisations to continuously meet their objectives and achieve an optimum feeling of well-being for people in their workplace.
IFMA (2003a)	Facilities Management is a practise of coordinating the physical workplace with the people and work of the organisation. It integrates the principles of business administration, architecture and the behavioural and engineering sciences.
FIFMA (2003)	The purpose of Facilities Management is to produce, maintain and develop real estate and support services for the strategic needs of organisation core business.
BIFM (2003)	As the practise of coordinating the physical workplace eith the people and work of an organisation.
Nordic FM (2003)	FM is also seen as an integrated approach to operating maintaining, improving and apadting buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of organisation.

Table 7: Definitions of FM

Facilities Management is described by Barrett (1995) as an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of that organization. With such a definition in mind it should be easy to see why some people have begun to talk of Facilities Management as though it were Business Infrastructure Management. In Nordic FM (2003), Nordic Facilities Management Network, definition, FM is also seen as an integrated approach to operating maintaining, improving and adapting buildings and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of organization.

Based on the many definitions for facilities management provided by various authors it will be attempted to produce a best possible comprehensive and general definition. The intuitive approach to this problem initially leads to the thought that the facilities Management must be a management of facilities. Generally it is known that the Management is the process of getting activities completed efficiently and effectively with and through other people, so management is a coordination of actions and procedures. The translation or the meaning of the English word facilities leaves also a huge space for various interpretations. For example "Facilities is equipment that makes it possible or easier to do something", so in the context of a Company it can be said that the facility is equipment that supports the core activities of the Company. Now if we ad the two terms of definition than we get:

Facilities Management is a purposeful or determined coordination of actions and processes for integration of the all resources of the Company or Organization, to give the best possible support to the primary business performance.

2.7 DISCIPLINES OF FACILITIES MANAGEMENT

In the introductory sections to the facility management it has already been indicated that a facility management has an integrated function, which is a set of management tasks that is split in different facility management disciplines and all these disciplines are to be coordinated within the Companies. Depending on the Business and objectives of the management, these disciplines can vary from case to case. The various disciplines of the Facilities management can be seen in the figure 8. These are few disciplines for those is thought that can be coordinated through a central Facilities Management. And further in the table 3 there is deeper breakdown of the disciplines shown.

Figure 8: Facilities Management disciplines

CITS • Network Management • Telecommunication • Cable management **H&R Management** • Personnel Administration **Environmental Management** • Solid waste management • Green areas **Building Management** • Construction • Mechanical • Electrical • Plumbing • Change management • Planning • Maintenance	**Infrastructural Management** • Electricity • Water • Gas • Roads • Parking **Commercial Management** • Financing • Contracting • General administration **Transport Management** • Fleet management **Support services** • Security • Cleaning • Furnishing • Gardening

Table 8: FM disciplines detailed

2.7.1 SERVICES OF THE DISCIPLINES OF FACILITIES MANAGEMENT

As already mentioned in the previous chapter FM can be split into different disciplines and all of these disciplines have their field subdivisions of the function fields. Facilities Management services are very large complex and the listing of different services is troublesome. All service action, which support the organizations core business that come out in organizations facilities, can be seen as Facilities Management services. RAKLI (2001) defines that Facilities Management services are concentrated to facilities characteristics and they support user's activities. Facilities management disciplines and services can be also shown in a four dimensional structure according to Loew figure 9.

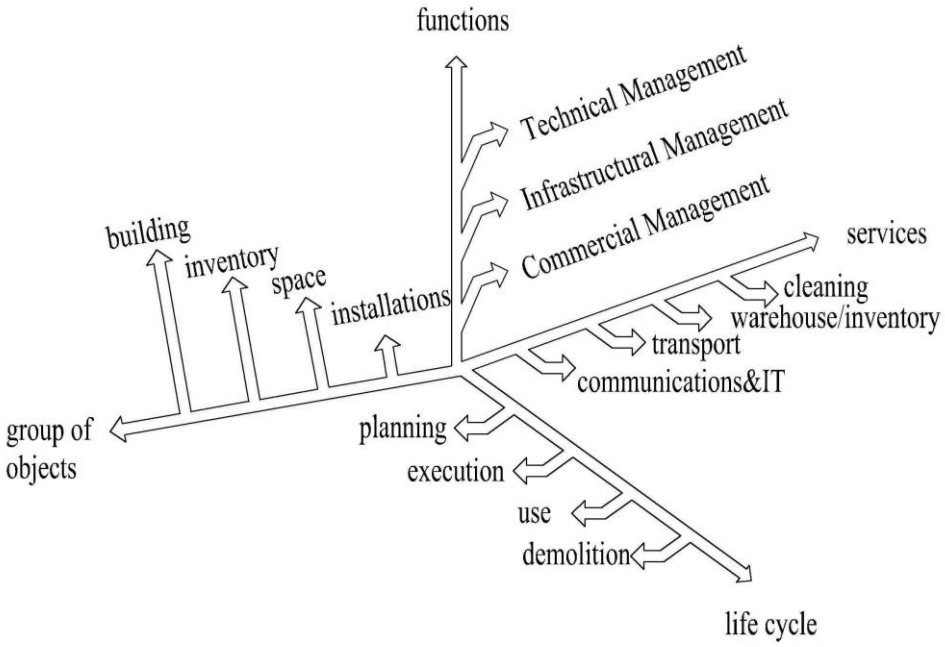


Figure 9: Four dimensional FM structure

I will try to give some explanation of the life cycle of the facilities. First of all, concept Idea for facilities is articulated and project planning and design/planning begins. This stage includes activities such as preliminary R&D(research and development); verification of need and requirements; assessment of technical feasibility, costs, benefits and risks; development of conceptual design; exploration of funding partnership possibilities; and definition of conceptual (as opposed to final) cost, schedule and performance goals. Development Project planning and design are completed and proposal is submitted. During this stage, R&D, prototypes/test beds (if

applicable), risk analysis, final designs and planning for system integration are completed; final cost, schedule and performance baselines are established; a Work Breakdown Structure (WBS) is created; Internal Management Plan and external Project Execution Plan are finalized; Execution stage includes construction and/or acquisition; system integration, commissioning, testing, acceptance; transition to operations; and management of these efforts. Than comes operation & Use of the facility for its intended purpose. Maintenance includes the day-to-day work required to support and conduct research and education activities, to ensure that the facility is operating efficiently and cost-effectively, and to provide small- and intermediate-scale technical enhancements when needed to maintain state-of-the-art research capabilities.
During the demolition/termination stage the information learned during the Operations & Maintenance stage and through various reviews of the results of research and education activities and facility management is used to determine whether the facility will be renewed, upgraded, or terminated.

2.7.2 THE SERVICE QUALITY CONCEPT

Literature study has given many definitions of service quality, but most agree that it concerns the process of delivering services and the interaction between clients and the providers' resources. As stated earlier, service is performed to fulfill a purpose – the client's need. Deming's theories (1982) explain that the consumers are the most important part of a production line. What counts, as stated by Grönroos (2000), therefore is the quality of the service as perceived by the client. The two main aspects of delivering services are about identifying the client's expectations and requirements and then trying to satisfy them with a good delivery process that leads to a good result (Deming, 1982). It is important to emphasize that clients often do not buy just products or services, but results. According to Gummesson (1993), services are "something which can be bought and sold but which you cannot drop on your foot". Grönroos (2000) has defined services to be "an activity of more or less intangible nature that normally, but not necessarily, takes place in interactions between the customer and service employees and/or physical resources or goods and/or the service provider, which are provided as solutions to clients problems". The definitions often stress that there are both tangible and intangible sides of a service, especially concerning FM services. There are several definitions of what a service is, mostly depending on the watchers perspective when looking at the activity. Our view is that services is an activity that the consumer is offered that provides valuable benefits, activities that he cannot perform for himself or that he chooses not to perform for himself. The services further on contain different degrees of interaction between the clients and the provider.

Many of today's industries still are focused on costs and do not emphasize quality.

Crosby (1979), for example, stated this focus by arguing that cost savings in working with quality more than make up for the direct costs that these efforts bring. A major reason to outsource your facilities is to cut costs. Linder *et al.* (2001) though argue that conventional outsourcing cannot increase cost savings forever. They also state that many firms have moved towards more dynamic and collaborative relationships in order to create value beyond cost cutting, and that this trend is pushing the relationship to become more transformational in its sharing of ownership to create value for both parties.

Furthermore, poor service quality not only causes unnecessary costs for the provider but also for the client (Kasper, 1999). Quality work in services could therefore become a win-win strategy that benefits all contract participants. Example of cost savings might be less rework, a reduced number of inspections and higher sales due to customer satisfaction. Psychological cost savings, like raised motivation, are involved as well. It is important to notice that these cost savings are on a long-term basis and in a short-term perspective inspection and prevention costs often increase with increased quality. According to (Heskett 1997) value is created when quality (results and process quality) exceeds the costs (price and costs for acquiring the service) through the Customer Value Equation (see figure 10).Value adding work is therefore a matter of reducing the denominator and improving the numerator. Consequently, efforts of improvement should lower the price for the client's support services and the acquiring costs, and improve the process quality and the results delivered to the client.

$$\text{Value} = \frac{\text{Results produced for the client} + \text{Process quality}}{\text{Price to the client} + \text{Costs of acquiring the service}}$$

Figure 10: The Customer Value Equation (Heskett,1997 p. 40).

2.8 STRATEGIC AND OPERATIONAL FACILITIES MANAGEMENT

Generally the facility manager is responsible for effective and efficient provision of facilities and services to support a company organization in achieving its primary objectives. This implies there are to facets to a facility manager's task. One is operational, and is the continuous provision

of facilities and services here and now to support employees and the company as a whole. The other is strategic with eye to the future, to anticipating and meeting future needs. According to Waardhuizen Operational FM focuses on:

- preventing damage and maintaining buildings and installations in good condition, and security
- providing facilities and services to employees –internal customers
- Creating and maintaining a comfortable and efficient working environment.

The facility manager's task is thus to ensure that all facilities and services, many of which are closely interrelated, are synchronized to maximize and optimize to benefit to employees and the company. His department is thus the contact point for all of these facilities and services, and for reporting malfunctions. The facility manager operates horizontally and vertically within the organization, as shown diagrammatically in figure 11. The internal customer is on the right-hand side of the horizontal line, with external parties such as suppliers, service providers and consultants, on the left. Under the vertical line, there is the facility organization –a broad scale of services and focal areas. Above the line is middle of top management. The facility manager is an intermediary between all these areas, which he and his team are supporting in the company's endeavors to attain its objectives. (Waardhuizen 1999, p.12.)

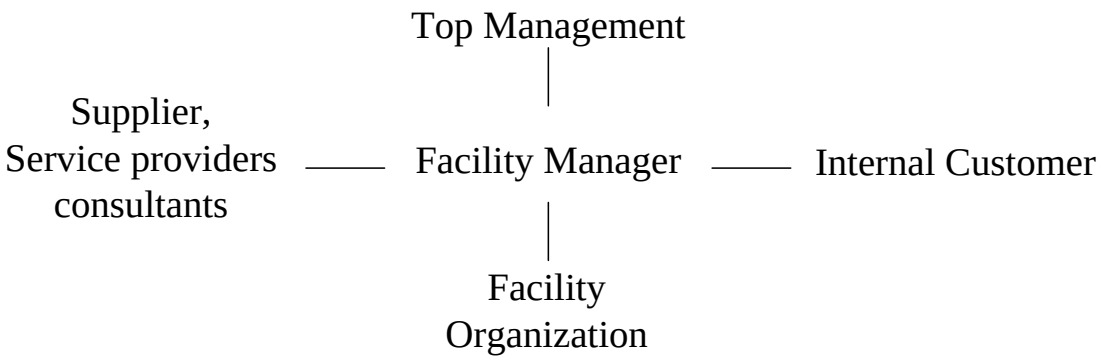


Figure 11: The Central role of the Facilities Manager

Strategic FM is the bringing together of corporate strategic management and facilities management. In simple terms, the aim of Strategic Facilities Management is to achieve a strategic fit between core business needs and the provision of facilities management and physical infrastructure.

3. BUILDING MANAGEMENT

3.1 BUILDING MANAGEMENT CHARACTERISTICS

Building Management is a discipline that very closely stands to the Facilities Management in general. The term Building Management associates for many people maintenance of the buildings, but in reality BM is very much more than only maintenance. It involves in itself many activities such as Construction, Building Solutions, risk management, space management, construction management, building maintenance, project management, contract management, move processes, work orders an warranties, utilities, renovation/alteration projects, structural fire protection, energy management, cleaning and janitorial services, ground maintenance and snow removal etc. Building management is the process required to achieve and sustain defined levels of building performance in functional, financial and technical terms, throughout the life of the building, from acquisition to disposal.

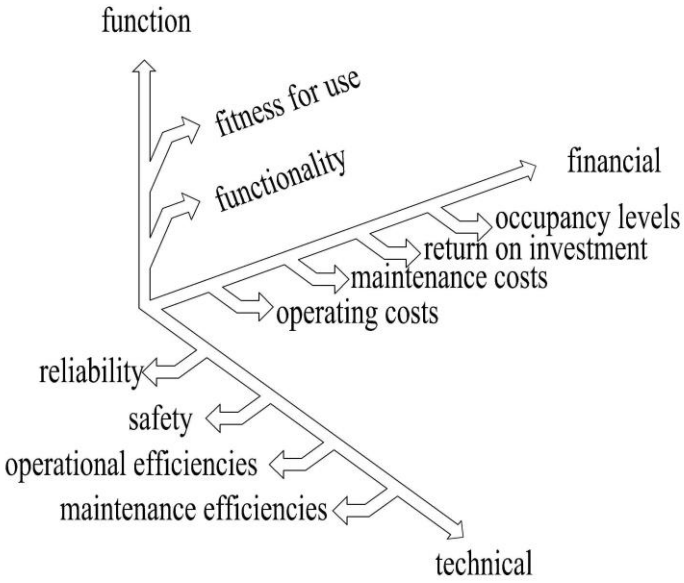


Figure 12: Building performance areas

From the figure 12 we can see the areas of performance of the Building management which are function area, financial area and a technical area where the functional performance is the functionality and fitness for use, financial performance are operational and maintenance costs, return on investment and occupancy level and technical performance are maintenance and

operational efficiencies, safety and reliability of the building. We can see Building Management as task of facilities management in managing built facilities to meet organizational requirements.

The built environment should provide users with an essentially democratic setting, enriching their opportunities by maximizing the degree of choice available to them (Centre for Facilities Management).The total workspace in which building occupants perform, includes the social and managerial environment as well as the physical setting for work. Working environments have the potential to contribute to all the proposed elements which are concerned with improving organizational effectiveness. It is founded n the belief that such an environment can maintain commitment amongst the members of the organization, provide communication amongst operating units, project a positive and responsible image, enable change, improve productivity and transform materials and components into value for the customer. (Keith Alexander 1996, p.98). The overall performance of the building should be assessed by the combined performance of the building as it is affected by the technical capability of the building (figure 12), the technological environment, the business and its processes and, perhaps most importantly, the individuals involved. So according to that, it is to be considered that building performance is not static and a knowledge of trends in business and technology are required to be able to predict the changing demands.

A key part of the Building Manager's role is to ensure that the building stock available performs suitably for the tasks required for all aspects, both now and in foreseeable future.

The objectives of building management are to:

- achieve specified building performance levels in terms of:

1. functionality (fitness for use)
2. physical condition
3. technical operation (including reliability, and continuity of use)
4. financial performance

- manage risk
- ensure the needs and expectations of building occupants and users are met
- protect and enhance the interests of the building's owner
- complement the owner's overall portfolio management objectives

The following are the typical duties and responsibilities expected of personnel assigned to the Building Management Functional Area:

- Ensuring that sufficient resources are budgeted in a timely manner to accomplish the Building management/maintenance
- Providing the highest confidence in the reliable performance of structures, systems and components important to safety through proactive maintenance practices.
- Ensuring that a cost-effective and efficient maintenance program is developed and

implemented, by having special consideration of safety and health, reliability, quality, and environmental protection objectives.

- Ensuring that the responsibility, authority, and accountability for maintenance and managing of the building services are clearly defined appropriately assigned and executed.
- Ensuring that operational awareness review and analysis capability exists for evaluation of maintenance program performance and effectiveness.
- Ensuring that where maintenance requirements or accepted maintenance standards cannot be met, such instances are appropriately documented and acknowledged, when requested.
- Ensuring that the requirements and standards for service and maintenance facilities are incorporated into contracts and subcontracts, including support services contracts, as appropriate.
- Ensuring resources must be effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment must be a priority whenever activities are planned or performed.
- Establish standard operating procedures.

Further down you can see a table that contents most important questions for the Building Manager.

1	When was the building built and what shape is it in?
2	When the last upgrade and what was are the future prospects for this complex?
3	Does it have hot water, steam, forced air, natural gas, and electrical and/oil-fired equipment?
4	What is the size o the complex in square meters, how many floors there are?
5	Where are the main electrical and mechanical rooms located?
6	What is the size of electrical input/output of the building?
7	What types of lighting system are in use throughout the building?
8	Is the complex secured and is there lighting outside of the building?
9	How is the building landscaped? Is there proper drainage away from the building to ensure flooding does not occur through during heavy rains?
10	What are conditions of the roof and do they provide adequate drainage?
11	What is the present condition of the foundation?

12	Does the building have elevators and are they maintained and inspected each year by certified contractor?
13	Are there enough emergency exits? Are the paths to these exits kept clear at all times?
16	Is emergency lighting available during power failures?
17	Is sufficient lighting available to the parking lots to help insure the safety of personnel who are required to work after dark or who are in shift work?
18	Are the fire sprinkler systems verified by proper authorities and in good working conditions?
19	When was the last time fire hoses were replaced and fire extinguishers checked and tested?
20	Is the building occupied or operated 24 hours a day 7 days a week, or 12 hours a day 5 days a week or 8 hours a day 5 days a week?
21	How elaborate is the computers controls management system for the building?

Table 9: Important questions for Building Manager

3.2 BUILDING MAINTENANCE CHARACTERISTICS

Under the Building Management, there is the requirement for the establishment and maintenance of a special fund to cover, among others, expenses related to any maintenance and repair works. Building maintenance involves in itself a variety of activities that have direct impact to the building life cycle. Some of these activities are:

- HVAC maintenance
- Electrical/lighting maintenance
- Ground maintenance/gardening
- Carpentry, metal works and locksmith
- Roofing Maintenance
- Parking Garage Maintenance
- Snow Removal and De-icing
- Painting of interior and exterior areas
- Cleaning
- Generator maintenance
- Alteration/renovation works
- Maintenance of the plumbing systems

All properties and facilities need maintaining and, for many, maintenance is at the core of the facilities management and Building Management role. Organizations are beginning to realize that planned preventative maintenance is more economical than ad hoc replacement of parts when they fail. As well as ensuring a planned maintenance schedule is effective, facilities managers must be careful to comply with statutory requirements relating to both electrical systems' testing and workers' safety. Facilities managers also need a strategy in place for maintaining critical IT equipment.

3.2.1 COSTS FOR MAINTENANCE

Costs for maintaining different types of building range from thousands of euros per $100m^2$ per year for air conditioned offices down to hundreds of euros per 100 m^2 per year for warehouses according to Frank Boot. Annual maintenance expenditure typically covers areas such as decorations, fabric, services, cleaning, utilities, administrative costs, overheads and external works. Sources of information on costs include Building Cost Information Service (BCIS) and Occupiers' Property Databank (OPD). When maintaining properties, fabric costs relate to the floor to wall ratio, the density of partitioning, the standards of fittings and frequency of use. Any services maintenance program will depend on the quality, age and condition of the heating, ventilation and air conditioning systems installed. The amount of churn within a company will also affect maintenance costs.

3.2.2 TYPES OF MAINTENANCE

According to British Standards, maintenance is a combination of all technical and associated administrative actions needed to retain an item or system in (or restore it to) a state in which it can perform its required function efficiently and as expected. Essentially there are two types of maintenance:

1. planned (programmed, preventative and cyclical)
2. Unplanned (reactive, normal response and emergency response)

Planned maintenance is maintenance organized and executed with forethought, control and application of records. It encompasses condition based maintenance, which is progressed following information received about a system or structure's condition from routine or continuous monitoring processes. It also includes in itself a walk through inspections that are very important factor of preventive maintenance. A walk-through inspection should include the office premises, its air-conditioning system and any other ventilation installations. The purpose of the inspection is to identify irregularities. Where necessary, assistance should be sought from the building manager. I would like to mention a few important factors:

1 Human exposure and comfort levels

1.1 How many occupants are there in each work area?

1.2 What time are the occupants in the building?

1.3 Is the indoor temperature regulated by thermostats? Where are they located? Have they been correctly positioned following building alterations? Are they set to the correct temperature?

1.4 Is there discomfort from heat radiation from visual display units?

1.5 Is there discomfort due to radiant heat from warm window surfaces?

1.6 Are temperature, relative humidity and air flow rates checked regularly during working hours?

1.7 Does air reach all parts of the office or are there dead spaces?

1.8 Are there any flickering fluorescent tubes? Are fluorescent tubes regularly replaced before there are obvious signs of wear?

1.9 Is the building still being used for the purpose it was intended? Have partitions/walls been added or removed? Have occupancy levels changed?

2 Potential sources of contaminants

2.1 Are there occupants smoking in any room or area?

2.2 Are there office equipment giving off gases or fumes? If so, are the equipment supplied with separate exhaust ventilation? Does the exhaust convey air to the exterior of the building or into corridors or into the air-conditioning system?

2.3 Are there furniture, furnishings, carpets, etc. that emit noticeable odours? Have detergents, pesticides or other chemicals been used in the building?

2.4 Are renovation works being undertaken in any part of the building? Are they done during working hours?

2.5 Is there a kitchen or pantry where cooking is done? Is exhaust ventilation provided there?

2.6 Is the building adequately cleaned? Is regular dusting of office furniture, ledges, shelves, etc. carried out to help keep dust to a minimum? Are the carpets vacuum-cleaned regularly?

3 Ventilation and air-conditioning

3.1 How many supply air and extract air vents are there in each room or area? Is there at least one each in every room?

3.2 Are vents located in positions that will permit the best air circulation?

3.3 Are supply air or extract air vents blocked in any way by partitions, files or other structures that obstruct air flow? Has dust collected around the air vents?

3.4 Is the air-conditioning system turned off any time during the day?

3.5 Is the system turned off after office hours? Are there still occupants in the building after office hours?

3.6 Where is the outdoor air intake duct located? Is it near the cooling tower in this building or is it near adjacent buildings? Is it at street level or near a car park? Is it blocked up? Are heavy

industries located nearby? Is there any construction work going on nearby? Is outdoor air actually getting into the building?

3.7 Are filters being used? Are they adequate? Are they being bypassed? How often are they cleaned or replaced?

3.8 Is there a regular schedule for cleaning and maintenance of the air-conditioning system in the building? Are all the components of the air-conditioning system regularly inspected for leaks, breaches, etc.?

Unplanned maintenance includes breakdown, corrective and emergency maintenance. A repair is the restoration of an item or system to an acceptable state through renewing, replacing or mending worn out or damaged parts. It is typically considered that the ups and downs of unplanned maintenance work should be run alongside planned work schedules. The reaction to unknown and unplanned events can thus be offset against meeting statutory obligations and service needs.

3.2.3 CONDITION ASSESSMENTS

Sound property management involves regularly checking a building's health. Condition assessments are now recognized as key tools for both strategic capital planning and tactical project prioritization. Such systems integrate life-cycle data and condition assessment information with other facilities management technology systems, such as computerized monitoring and management systems and project management software. Facilities managers can identify problems at their earliest stages and evaluate a building's future maintenance and repair needs through a systematic approach to assessing the condition of a variety of building components and systems. These may include building structure, building envelope, mechanical systems, electrical systems, interior finishes and lift safety. Building assessment protocols are applied to each component or system defining the scope of the audit for that category, the procedure to be followed and items that should typically be measured. Check sheets highlighting potential problem areas should be provided to assist facilities managers in conducting the assessments. From there, facilities managers will be able to judge how much work would be involved in repairing areas that require attention. The protocols can also be used to refer to relevant coding standards to assist companies in evaluating how well a given area complies with appropriate standards.

3.2.4 SAFETY OF THE EMPLOYEE

Effective maintenance is key to ensuring a healthy and safe workplace. Managers who control premises have a legal duty to ensure the safety of employees. Facilities managers also have to be satisfied that any contractors working on site are complying with health and safety guidance and regulations, and that they have conducted risk assessments where necessary. Compliance with health and safety should typically be embedded in specifications or Service Level Agreements from the outset, and regular two-way communication on health and safety matters is recommended. Workplace injuries (or worse) are substantially reduced through the adoption of rigorous risk assessment practices, which highlight areas where maintenance is necessary. Risk assessments can be conducted using software systems or on paper and should be undertaken for workplace tasks or issues such as:

- air quality, humidity and temperature
- manual handling
- first aid facilities
- static on carpets
- cleaning
- adequate lighting
- cable runs and any 'rogue' trailing leads
- control of substances hazardous to health
- noise.

Facilities managers should compile a risk register, where known risks can be ranked from low to high. As insurance companies will give reduced premiums against companies which can demonstrate where risks are low rather than high, the facilities manager who acts proactively here will be fondly welcomed by the finance department.

3.2.5 BUILDING SAFETY

One of the most important issues for the Facilities Manager/Building Manager is the safety of the Building, which automatically impacts the safety of the employee. Further down in the figure 13 we can see a diagram that represents the building safety from two points of views, which are the design point of view and a management point of view.

Design point of view implies questions such as: how is the building designed, is there a good design/good assignment of the fire escape routes within the building, are there enough escape

routes, what is the height of the ceilings, how is the electrical supply and distribution designed, how is the water supply installation designed, is there a sprinkler system installed etc.

And from the management point of view there are also several points that need attention such as: Building service condition, exit route condition, emergency plan, facilities management arrangements etc.

Regarding the fire safety there are several factors which could be divided into three groups:

Pre-emergency planning:

- Have a written evacuation plan and evacuation map
- Train occupants in safe occupancy and evacuation procedures
- Assign evacuation management duties to responsible individuals (e.g. Resident Advisor, Supervisors or others)
- Conduct routine inspections for broken or missing fire protection equipment; fix immediately
- Periodically inspect and remove improper or excessive wall hangings, blockage of sprinklers, alarms, detectors, improper storage of combustible materials, use of candles, halogen lamps, hotplates, etc.

  Ensure that fire doors are closed at all times
- Conduct periodic fire drills and assess adequacy of response
- Minimize your liability by taking prompt corrective action as needed

If a fire occurs:

- Follow your evacuation plan
- Evacuate personnel to a designated assembly area
- Take a headcount in the assembly area to ensure that everyone is accounted for
- Ensure that personnel familiar with the fire remain in the evacuation area to provide information to the Fire Department if requested
- Have a responsible facility person report to the Fire Department's Incident Commander (white hat) for instructions
- The Incident Commander (typically the officer in charge from the Fire Department) controls the scene; obey all instructions
- Prevent re-entry of personnel into the building

After a fire:

- Await the "All Clear" instruction from the Incident Commander
- Inspectional Services Department (ISD) will assess the suitability of the building for re-occupancy

- ISD may seek technical or other assistance from the building manager, engineers, plumbers, electricians, EH&S Department or others
- ISD ensures that the building alarm system is restored
- The Fire Investigation Unit may interview personnel, obtain photos or collect other evidence to support an investigation

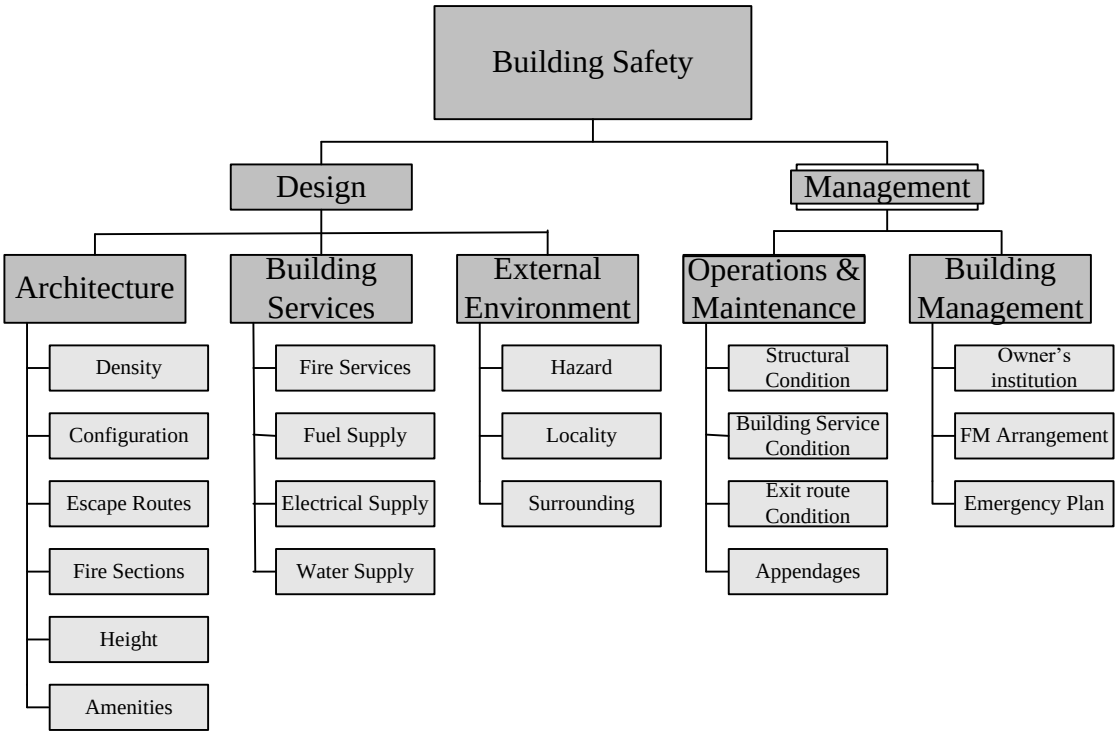


Figure 13: Building safety

3.3 PREVENTIVE MAINTENANCE

Preventive maintenance is maintenance carried out at predetermined intervals or according to prescribed criteria, with the intention of reducing the probability of failure or performance degradation of a system or structure. A preventive maintenance program allocates specific maintenance tasks to particular periods in a timetable. Preventive maintenance programs save money and eliminate downtime. Maintenance programs range from basic essential checks to comprehensive tests run according to manufacturers' specifications. Generally, full maintenance

programs are carried out at the end of a season when systems are shut down after several months of operation e.g. central heating plants are shut down in spring. This ensures readiness for the next period of operation. Ideally, a system should also be checked out immediately before start-up to make sure it is ready when needed. This applies particularly to heating systems in the buildings but is equally valid in industrial premises. Providing site owners authorize a full inspection and maintenance program, with replacement of parts where required, they should be able to rely on the findings of such a program for the forthcoming season of operation. Of course the preventive maintenance schedule depends on the type of the building so it can be tailored for residential, commercial or for industrial plant buildings, but however it is essential for all.

Many plant operations people feel their maintenance problems would be over if they had the money for new equipment or for an expensive computer system with support staff. Unfortunately, new equipment is not the answer. Without upfront and continuous preventive maintenance, new equipment also breaks down. Additionally, without planning and preparation, the most high tech computer system will fail to generate the desired results. Instead, the answer lies in finding an easy-to-follow and economically feasible approach to preventive maintenance.

However the term Preventive Maintenance refers to any activity that is designed to:

- Predict the onset of component failure,
- Detect a failure before it has an impact on the asset function,
- Repair or replace asset before failure occurs.

Preventive Maintenance has two features, an activity to be performed, and a frequency at which the activity is performed. A reduction in waste in Preventive Maintenance can target either the Preventive Maintenance activity or its frequency.

Preventive Maintenance frequencies can be varied according to deterioration and failure rates, operating strategy, (i.e. windows of opportunity), the cost of performing the activity and the penalty associated with asset failure. Decision models for timing of inspection, repair and replacement should be based on asset failure data. Collecting accurate failure data for optimizing frequencies for a wide range of assets is regarded as problematic. In the absence of data for such decision support, the setting of frequencies by “personal judgment” is widely recommended and practiced. Anyhow the common Preventive Maintenance frequencies are

- Monthly
- Quarterly (3 monthly)
- Semi annually
- Annually

3.4 REFURBISHMENT/RESTORATION/ALTERATION

Refurbishment (**restoration**) is the process of major maintenance or minor repair of an item, either aesthetically or mechanically. Often, antiques such as furniture are refurbished to bring back their original luster by applying new paint or wood stain, fixing loose joints with glue or nails, and cleaning or replacing hardware such as drawer pulls.

Same counts for the buildings in general too. Usually by refurbishment/restoration of the building following works are undertaken: Painting, plastering, changing of carpets/flooring, replacing of wiring, lightening etc.

So if a building is "refurbished", it usually becomes a renovation. If there are changes within the design of the building than that is called alteration.

Antique, classic and muscle cars are frequently restored, both cosmetically and mechanically. In most jurisdictions, restored cars that pass an inspection can be registered for legal use on the road. Many classic car owners enjoy taking their rare restored vehicles to car shows or out for recreational driving.

Computers and laptops that are refurbished usually means that it did not initially pass quality standards of the manufacturer. They then fix or recertify the unit and sell it at a discount price (Up to 30% off). Most of them carry a 30 day store warranty and 90 days with manufacturer.

Open-box, returned and/or repaired electronics of all kinds are frequently sold as refurbished, almost always with a guarantee of functionality and at a small discount. Refurbishment is especially common with more expensive types of electronics such as video game consoles and computer monitors, likely because these items have relatively high return rates (attributed to a combination of buyer's remorse and the fact that categories of electronics have a direct cost-to-complexity relationship; complex gadgets are more likely than simpler ones to have one or two defective components) and benefit more, sales-wise, from price-proportional discounts than cheaper items.

3.5 MAINTENANCE REPAIR AND OPERATIONS

Maintenance, Repair and Operations is fixing any sort of mechanical or electrical device should it become out of order or broken (repair) as well as performing the routine actions which keep the device in working order (maintenance) or prevent trouble from arising (preventive maintenance).(Wikipedia)

The European Federation of National Maintenance Societies defines maintenance as: All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. The actions include the combination of all technical and

corresponding administrative, managerial, and supervision actions. In telecommunication, the term maintenance has the following meanings:

1. Any activity, such as tests, measurements, replacements, adjustments and repairs, intended to retain or restore a functional unit in or to a specified state in which the unit can perform its required functions.
2. [For material], All action taken to retain material in a serviceable condition or to restore it to serviceability. It includes inspection, testing, servicing, classification as to serviceability, repair, rebuilding, and reclamation.
3. [For material], All supply and repair action taken to keep a force in condition to carry out its mission.
4. [For material], The routine recurring work required to keep a facility (plant, building, structure, ground facility, utility system, or other real property) in such condition that it may be continuously used, at its original or designed capacity and efficiency for its intended purpose.

Source: from Federal Standard 1037C and from MIL-STD-188 and from the Department of Defense Dictionary of Military and Associated Terms

Manufacturers and Industrial Supply Companies often refer to MRO as opposed to Original Equipment Manufacture (OEM). OEM includes any activity related to the direct manufacture of goods, where MRO refers to any maintenance and repair activity to keep a manufacturing plant running.

Industrial Supply Companies can generally be sorted into two types:

- The ones who cater to the MRO market generally carry a broad range of items such as fasteners, conveyors, cleaning goods, plumbing, and tools to keep a plant running.
- OEM supply companies generally provide a smaller range of goods in much larger quantities with much lower prices, selling materials that will be regularly consumed in the manufacturing process to create the finished item.

3.6 MAINTENANCE REPAIR AND OPERATIONS SOFTWARE

In many organizations because of the number of devices or products that need to be maintained or the complexity of systems, there is a need to manage the information with software packages. This is particularly the case in aerospace (e.g. airline fleets), military installations, large plants (e.g. manufacturing, power generation, petrochemical) and ships.

These software tools help engineers and technicians in increasing the availability of systems and reducing costs and repair times as well as reducing material supply time and increasing material availability by improving supply chain communication.

As MRO involves working with an organization's products, resources, suppliers and customers, MRO packages have to interface with many enterprise business software systems (PLM, ERP, SCM, CRM). One of the functions of such software is the configuration of bills of materials or BOMs, taking the component parts list from engineering (eBOM) and manufacturing (mBOM) and updating it from "as delivered" through "as maintained" to "as used". Another function is project planning logistics, for example identifying the critical path on the list of tasks to be carried out (inspection, diagnosis, locate/order parts and service) to calculate turnaround times (TAT).

Other tasks that software can perform:

- Planning operations,
- Managing execution of events,
- Management of assets (parts, tools and equipment inventories),

Knowledge-base data on:

- Maintenance service history,
- Serial numbered parts,
- Reliability data: MTBF (mean time between failures), MTTB, MTBR (mean time between removals),
- Maintenance and repair documentation and best practices,
- Warranty/guarantee documents.

Many of these tasks are addressed in Computerized Maintenance Management Systems (CMMS)

Some of the most common programs used for computerized maintenance management are:

- FACS – field and asset control system
- WOW – work order for windows
- Business Object
- Galileo
- Mercury

With either of these programs can be operated in the field of maintenance and operations. These programs enable storing of different types of works for many different trades, registering of labor costs, material costs, spare parts data base, generating preventive maintenance work orders etc.

4. COMPUTER AIDED FACILITIES MANAGEMENT

4.1 CHARACTERISTICS OF COMPUTER AIDED FACILITIES MANAGEMENT

The International Facility Management Association (IFMA) defines facility management as the practice of coordinating the physical workplace with the people and work of the organization. As such, facility management has been practiced, whether specifically identified as its own discipline or not, since the inception of the business organization. It has evolved over the years through the development and codification of processes into a clearly defined field of expertise.

The establishment of IFMA, the professional association for facility managers, in 1980 was a significant step in this evolution. IFMA classifies facility management responsibilities into several major functional areas:

- Long-range and annual facility planning
- Facility financial forecasting
- Real estate acquisition and/or disposal
- Work specifications, installation and space management
- Architectural and engineering planning and design
- New construction and/or renovation
- Maintenance and operations management
- Telecommunications integration, security and general administrative services

Computer Aided Facilities Management (CAFM) evolved in the late 1980s leveraging the PC to automate the collection and maintenance of facilities management information. CAFM systems provided the facility manager with the tools to track and report on facilities information. Typically, CAFM systems track and maintain:

- Floor plans
- Building and property information
- Space characteristics and usage
- Employee and occupancy data
- Workplace assets (furniture and equipment)
- Business continuity and safety information
- LAN and telecom information

While CAFM systems have delivered real benefits and their use has grown, their value has been limited by their inability to distribute information to those beyond facility management. As a result, many CAFM solutions have been relegated to personal productivity or, at best, departmental tools. **Computerized Maintenance Management System** (CMMS) is also known as **Enterprise Asset Management**.

A CMMS software package maintains a computer database of information about an organization's maintenance operations. This information is intended to help maintenance workers do their jobs more effectively (for example, determining which storerooms contain the spare parts they need) and to help management make informed decisions (for example, calculating the cost of maintenance for each piece of equipment used by the organization, possibly leading to better allocation of resources). The information may also be useful when dealing with third parties; if, for example, an organization is involved in a liability case, the data in a CMMS database can serve as evidence that proper safety maintenance has been performed.
CMMS is very useful for tracking the operation and maintenance activities. Thanks to CMMS we are able to identify most of the costs and where the money is spent in very efficient way.
CMMS packages may be used by any organization that must perform maintenance on equipment and property. Some CMMS products focus on particular industry sectors (e.g. the maintenance of vehicle fleets or health care facilities). Other products aim to be more general. To identify CMMS vendors, we can search for CMMS using any Internet search engine.
Different CMMS packages offer a wide range of capabilities and cover a correspondingly wide range of prices. A typical package deals with some or all of the following:

- Work orders: Scheduling jobs, assigning personnel, reserving materials, recording costs, and tracking relevant information such as the cause of the problem (if any), downtime involved (if any), and recommendations for future action
- Preventive maintenance (PM): Keeping track of PM inspections and jobs, including step-by-step instructions or check-lists, lists of materials required, and other pertinent details. Typically, the CMMS schedules PM jobs automatically based on schedules and/or meter readings. Different software packages use different techniques for reporting when a job should be performed.
- Asset management: Recording data about equipment and property including specifications, warranty information, service contracts, spare parts, purchase date, expected lifetime, and anything else that might be of help to management or maintenance workers.
- Inventory control: Management of spare parts, tools, and other materials including the reservation of materials for particular jobs, recording where materials are stored, determining when more materials should be purchased, tracking shipment receipts, and taking inventory.
- Safety: Management of permits and other documentation required for the processing of safety requirements. These safety requirements can include lockout-tag out, confined space, foreign material exclusion (FME), electrical safety, and others.

CMMS packages can produce status reports and documents giving details or summaries of maintenance activities. The more sophisticated the package, the more analysis facilities are available.

Many CMMS packages can be either web-based, meaning they are hosted by the company selling the product on an outside server, or LAN based, meaning that the company buying the software hosts the product on their own server.

CMMS packages are closely related to Facilities Management system packages (also called Facility Management Software). For the purposes of many organizations, the two are interchangeable.

There are a number of CMMS packages available on the market today, however, in recent years some organizations are starting to license their CMMS software for free including ASPCMMS Application Service Providers (open source), CMMS Maintenance Software (ASP open source). One of the most accessible and freely offered is Maintenance Assistant Free CMMS, which bases its software on community driven development, and boasts a powerful proprietary free CMMS that can run on any OS9 Operation System) and in any localized language. As many SMEs(Small and medium enterprises) are learning the power of employing Maintenance Management Systems, the option for powerful CMMS systems without a catch will offer an attractive incentive.

As organizations strategize their way to the marketplace, their focus is on bottom line results and are focusing on optimizing their infrastructure costs through accurate planning, minimizing inventory wastage, and effective use of processes, reducing manual dependency and optimal utilization of available resources. But most of the organizations while executing the stated activities face a major bottleneck of non availability of relevant, real time, comprehensive information as the information and its data is scattered across multiple layers, locations and departments. Computer Aided Facilities Management (CAFM) applies the concept of Facilities Management (FM) and brings it alive by recording and tracking FM-related activities through the use of CAD technology. CAFM systems provide a database of facilities-related information linked to digital floor plans, giving the facility manager the tools to track and report them.

FM information (such as assets and work) requests are recorded and tracked in ‘layers’ over the CAD drawing file. This FM information is linked together in a database for ease of data entry and retrieval. Typically, CAFM systems track data such as building and real estate inventory, space characteristics and use, departmental occupancy, and furniture, equipment, IT and telecom assets. A CAFM application should aid organizations in optimizing business infrastructure usage. It must provide a complete view of an enterprise-wide infrastructure and facilities. It should be able to integrate data from different sources and generates a wide-range of customized reports. The manager or the facilities – in charge can get real time status of assets and facilities usage in the form of customized reports on multiple parameters, for all layers and fields of

operation without any constraint of time and location. An efficient CAFM solution assures rapid deployment, reduces risks and offers technologies and services enabling integration with other existing systems, if any, like virtual help desk, e-HR, e-Travel etc. CAFM should be a workforce centric system, should appeal to organizations with dispersed facilities, to manage their geographically spread out assets. The product should essentially track enterprise assets and facilities, and maps them with the users (workforce).

4.2 CAD – COMPUTER AIDED DESIGN

CAD (Computer-Aided Design/ Drafting) can be described as the use of computers for creating and editing drawings. Before the 1980s, most drawings, including maps, floor plans, and engineering designs, were created using paper and ink or drawn using expensive time-sharing CAD systems. In 1963, Ivan Sutherland did the PhD thesis 'Sketchpad' at MIT. Highly precise drawings could be created, manipulated, duplicated, and stored. The software provided a scale of 2000:1, offering many acres of drawing space. This was the first step towards CAD. Later in 1980, Mike Riddle wrote 'MicroCAD', later known as 'Interact', and ultimately called 'AutoCAD'.In 1984, Smith and Davies found Micro-Control Systems to build cheap 3D digitizers; shortly thereafter, they released 'CADKEY', the first all-3D PC CAD product. Cericor, a software development firm, released the first ever Object Oriented CAD in 1986 (later acquired by HP). In the mid 1990's Autodesk acquired Woodbourne with their parametric solid modeler - precursor of Mechanical Desktop. Soon after, AutoCAD 13 was released in 1996, with object-oriented kernel for 2D and 3D. Visio released 'IntelliCAD', an inexpensive replacement for AutoCAD. In 1999, AutoCAD 2000 was released. Revit Technology Corporation founded in 1997 launched "Revit software", its first parametric building modeler developed for the AEC (Architecture, Engineering and CAD) industry. Soon after, Revit was acquired by Autodesk in 2002. Many of the first CAD applications were in the manufacturing, architectural, and mapping realms, and many cadastral base maps (surveys, and maps with scale up to 1:2500) were created using PC-based CAD solutions. In CAD software the drawings were frequently organized in layers. Drawing entities took their attributes (color, line type, and feature type) from the layer on which they were created, which was a simple and effective way to organize data but required careful quality control to ensure consistency. CAD was also characterized by powerful tools for designing real-world objects. These tools enabled users to create precise geometric objects and move and edit them with no loss of precision. Because CAD comes from a world where engineering tolerances of fractions of a centimeter or inch are important, full attention is given to managing data without losing precision.

4.3 THREE DIMENSIONAL CAD

It is very easy to communicate information about complex objects when represented as 3D Models instead of representing it on a group of 2D drawings. With a 3D Model, even an amateur layman can easily grasp the shape and details of an object by looking at the realistic images of the virtual model, instead of trying to visualize and imagine the possible shape of the object by looking at the 2D drawings. This is very important as such images are directly understandable not only by the engineers, but by all the project participants who come from a wide variety of backgrounds, which makes presentation, evaluation, and decision making substantially easier. The importance of visualization is especially big in customer-oriented companies, as visual evaluation of the products can be done together with the customers even if no physical prototype exists (this is specially true in the construction industry). In 3D CAD, the data is stored as lines, planes and surfaces creating a 3D object when viewed as a group. The object is recognized as a group of lines, planes and surfaces by the software, with no additional information about the objects. The great advantage of 3D models is that they eliminate the drawing translation process – the time it takes to make sense of a 2D drawing. A few complex drawings can be so difficult to read only their designers really understand them. In contrast, users only faintly familiar with a product modeled in solids (3-dimensional) know exactly what it is. And that's the point – understanding is near simultaneous, and collaboration and communication becomes a by-product**.**

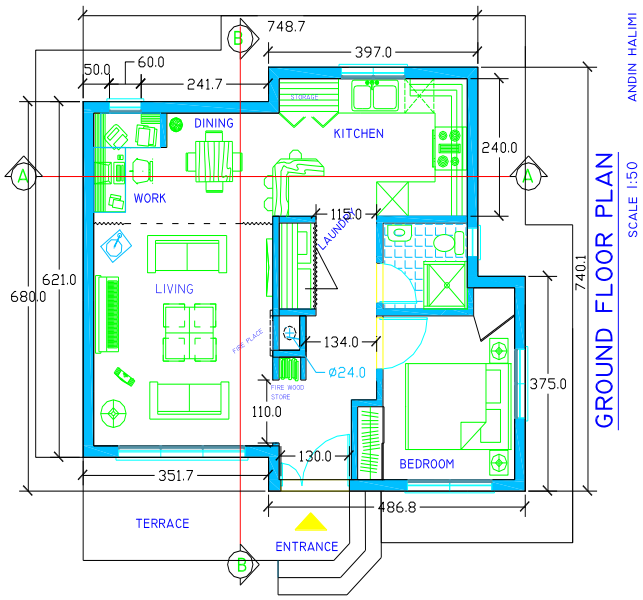


Figure 14: floor plan - architectural design

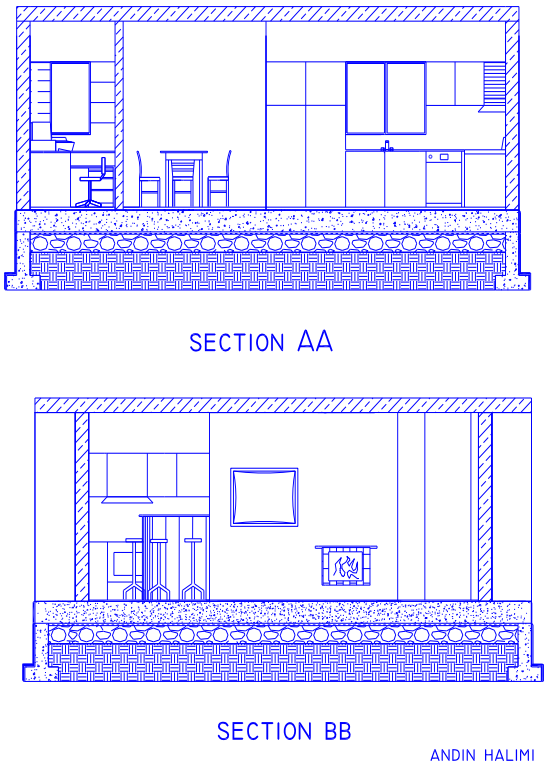


Figure 15: Cross sections

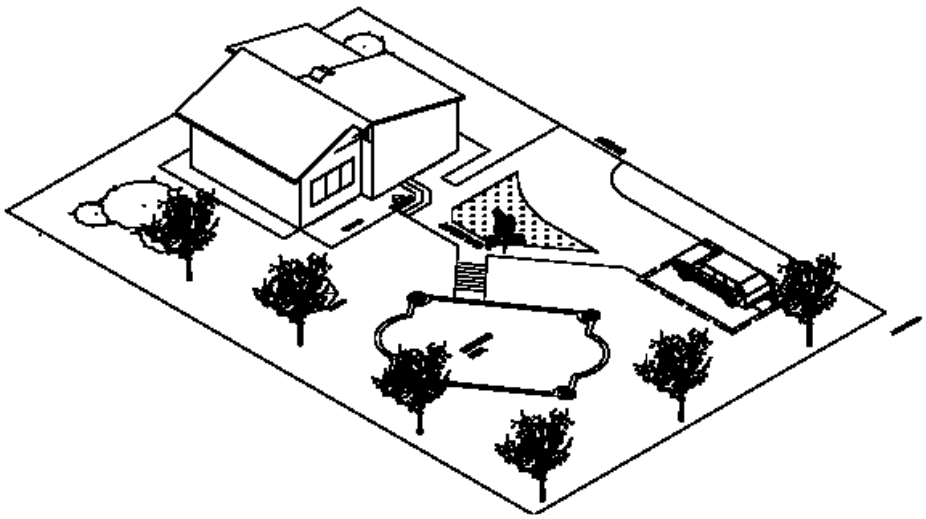


Figure 16: 3 D visualization

Figure 17: perspective view
Source: Besnike Shala diploma work

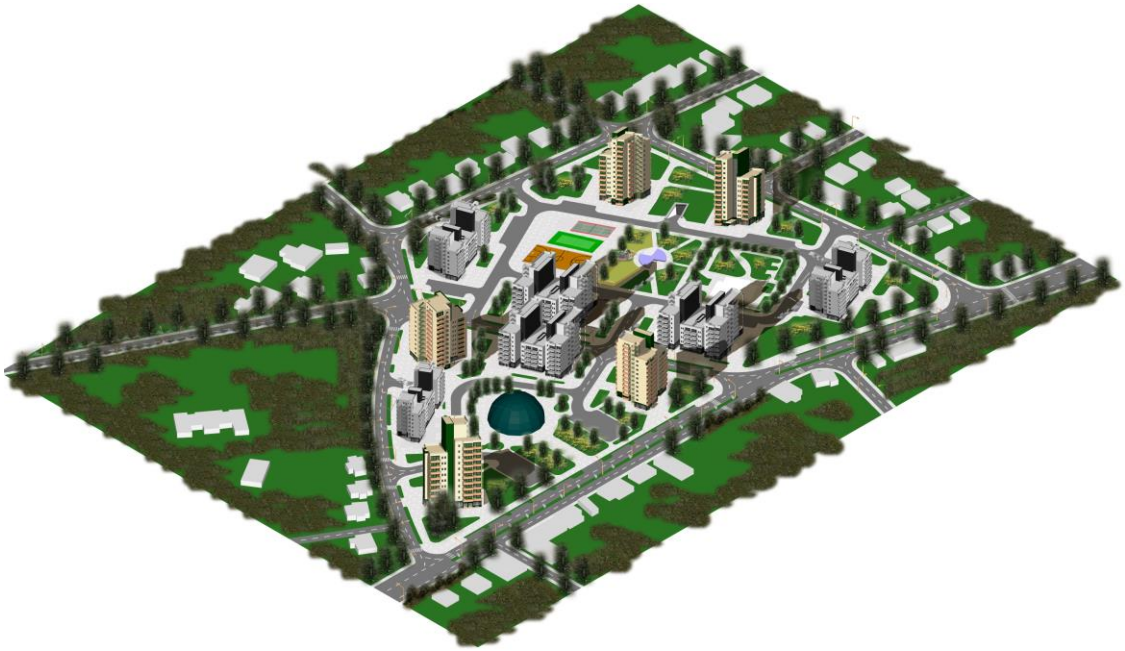


Figure 18: situation 3D view
Source: Besnike Shala diploma work

4.4 3DPM TECHNOLOGY FOR FACILITIES MANAGEMENT

3D parametric modeling technology was first introduced about 15 years ago, but still only a few sectors in Architecture, Engineering, and Construction (AEC) have successfully adopted the technology in production. This is a report of the second phase of an early successful collaboration project between an industry sector, academia and a CAD vendor to develop an intelligent 3D parametric CAD system for the pre-cast concrete industry in North America. (Ghang Lee)

The 3D Parametric Building Modeling software is being used by many users for Facilities Management purposes. The completed 3DPM represents the as-built facility after the construction has been completed, provided the changes are well documented into the model. The attribute data associated with the components, which can be viewed by the users at any time, provides information such as the date of installation, the date when the component needs to be serviced, etc. All this information can be viewed in the form of schedules and reports and can be organized and tweaked to show the useful and relevant information. These models thus help the users in identifying the objects/components needing attention knowing what kind of attention is needed (e.g.; servicing, maintenance or replacement) and the exact location of the object within the facility.

4.5 GEOGRAPHIC INFORMATION SYSTEM - GIS

A geographic information system (GIS), also known as a geographical information system or geospatial information system, is any system for capturing, storing, analyzing and managing data and associated attributes which are spatially referenced to Earth. (Wikipedia)

In the strictest sense, it is any information system capable of integrating, storing, editing, analyzing, sharing, and displaying geographically referenced information. In a more generic sense, GIS is a tool that allows users to create interactive queries (user created searches), analyze the spatial information, edit data, maps, and present the results of all these operations. Geographic information science is the science underlying the geographic concepts, applications and systems, taught in degree and GIS Certificate programs at many universities.

Geographic information system technology can be used for scientific investigations, resource management, asset management, environmental impact assessment, urban planning, cartography, criminology, history, sales, marketing, and logistics. For example, GIS might allow emergency planners to easily calculate emergency response times in the event of a natural disaster, GIS might be used to find wetlands that need protection from pollution, or GIS can be used by a company to site a new business to take advantage of a previously underserved market.

Figure 19: Gilbert's version (1958) of John Snow's 1885 map

When Geographic Information Systems (GIS) was introduced in the early 1950's, its early use was limited to small group of researchers. Botanists, meteorologists, and transportation planners began automating the process of thematic mapping. These researchers' efforts represent the early attempts at computerized cartography. GIS can also be defined as:

Geographic: The system is concerned with data relating to geography and geographic scales of measurement. This is referenced by some coordinate system or locations on the surface of the earth.

Information: The system allows for the storage and extraction of specific and meaningful attribute information. These data are connected to some geography, and are organized around a model of the real world.

Systems: An automated system should include an integrated set of procedures for the input, storage, manipulation, and output of geographic information. GIS relies on the integration of three areas of computer technology. A relational database management system to store graphic and non-graphic data; cartographic capabilities to depict, graph, and plot geographic information; and spatial analytical capabilities to facilitate manipulation and spatial analysis.

5. MODEL SOLUTIONS

5.1 PERSONAL PROTECTIVE EQUIPMENT (PPE)

When we were talking about employee safety, I mentioned that Managers who control premises have a legal duty to ensure the safety of employees. Facilities managers also have to be satisfied that any contractors working on site are complying with health and safety guidance and regulations, and that they have conducted risk assessments where necessary.

This guidance gives details on what is expected from employers in order to comply with the Personal Protective Equipment at Work Regulations 1992. Personal protective equipment (PPE) must be supplied at work where the risks to employees cannot be effectively controlled in other ways.

Employers have basic duties concerning the provision and use of personal protective equipment (PPE) at work and this document, explains what you need to do to meet the requirements of the Personal Protective Equipment at Work Regulations.

PPE is defined in the Regulations as 'all equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects him against one or more risks to his health or safety', e.g. safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. Hearing protection and respiratory protective equipment provided for most work situations are not covered by these Regulations because other regulations apply to them. However, these items need to be compatible with any other PPE provided. Cycle helmets or crash helmets worn by employees on the roads are not covered by the Regulations. Motorcycle helmets are legally required for motorcyclists under road traffic legislation.

What do the Regulations require?

The main requirement of the PPE at Work Regulations is that personal protective equipment is to be supplied and used at work wherever there are risks to health and safety that cannot be adequately controlled in other ways. The Regulations also require that PPE:

- is properly assessed before use to ensure it is suitable;
- is maintained and stored properly;
- is provided with instructions on how to use it safely; and
- is used correctly by employees.

An employer cannot ask for money from an employee for PPE, whether it is returnable or not. This includes agency workers if they are legally regarded as your employees. If employment has been terminated and the employee keeps the PPE without the employer's permission, then, as long as it has been made clear in the contract of employment, the employer may be able to deduct the cost of the replacement from any wages owed.

Assessing suitable PPE

To allow the right type of PPE to be chosen, carefully consider the different hazards in the workplace. This will enable you to assess which types of PPE are suitable to protect against the hazard and for the job to be done. Ask your supplier for advice on the different types of PPE available and how suitable they are for different tasks. It may be necessary in a few particularly difficult cases to obtain advice from specialist sources and from the PPE manufacturer. Another useful source of information is the British Safety Industry Federation. Consider the following when assessing whether PPE is suitable:

- Is it appropriate for the risks involved and the conditions at the place where exposure to the risk may occur? For example, eye protection designed for providing protection against agricultural pesticides will not offer adequate face protection for someone using an angle grinder to cut steel or stone.
- Does it prevent or adequately control the risks involved without increasing the overall level of risk?
- Can it be adjusted to fit the wearer correctly?
- Has the state of health of those who will be wearing it been taken into account?
- What are the needs of the job and the demands it places on the wearer? For example, the length of time the PPE needs to be worn, the physical effort required to do the job and the requirements for visibility and communication.
- If more than one item of PPE is being worn, are they compatible? For example, does a particular type of respirator make it difficult to get eye protection to fit properly?

The hazards and types of PPE

Eyes

Hazards: chemical or metal splash, dust, projectiles, gas and vapor, radiation.
Options: safety spectacles, goggles, face shields, visors.

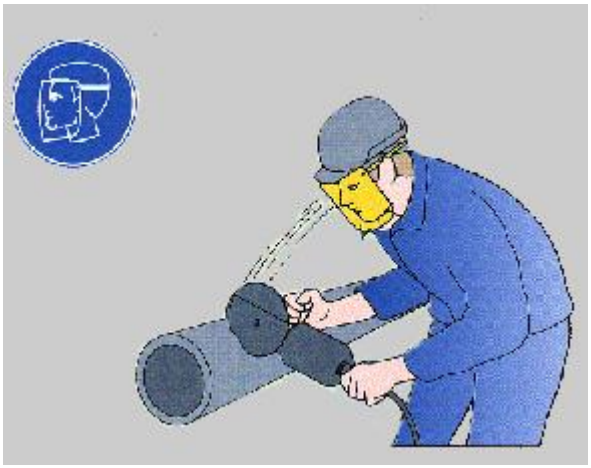


Figure 20: Eye hazards

<u>Head</u>

Hazards: impact from falling or flying objects, risk of head bumping, hair entanglement.

Options: a range of helmets and bump caps.

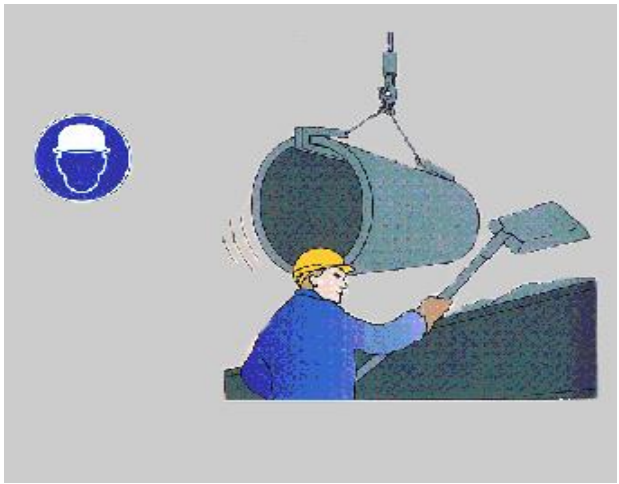


Figure 21: Head hazards

Breathing

Hazards: dust, vapor, gas, oxygen-deficient atmospheres.

Options: disposable filtering face piece or respirator, half- or full-face respirators, air-fed helmets, breathing apparatus.

Figure 22: Breathing hazard

Protecting the body

Hazards: temperature extremes, adverse weather, chemical or metal splash, spray from pressure leaks or spray guns, impact or penetration, contaminated dust, excessive wear or entanglement of own clothing. **Options:** conventional or disposable overalls, boiler suits, specialist protective clothing, e.g. chain-mail aprons, high-visibility clothing.

Figure 23: Body protection

Hands and arms

Hazards: abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, skin infection, disease or contamination.

Options: gloves, gauntlets, mitts, wrist cuffs, armlets.

Figure 24: Hands and Arms

Feet and legs

Hazards: wet, electrostatic build-up, slipping, cuts and punctures, falling objects, metal and chemical splash, abrasion.

Options: safety boots and shoes with protective toe caps and penetration-resistant mid-sole, gaiters, leggings, spats.

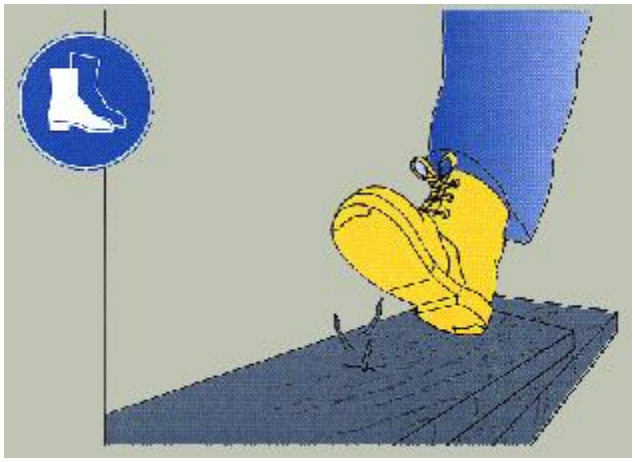


Figure 25: Feet and legs

Training

- Make sure anyone using PPE is aware of why it is needed, when it is to be used, repaired or replaced and its limitations.
- Train and instruct people how to use it properly and make sure they are doing this.
- Because PPE is the last resort after other methods of protection have been considered, it is important that users wear it all the time they are exposed to the risk. Never allow exemptions for those jobs which take 'just a few minutes'.
- Check regularly that PPE is being used and investigate fully any reasons why it is not. Safety signs can be useful reminders to wear PPE.

Maintenance

Make sure equipment is:

- well looked after and properly stored when it is not being used, for example in a dry, clean cupboard, or in the case of smaller items, such as eye protection, in a box or case;
- kept clean and in good repair - follow the manufacturer's maintenance schedule (including recommended replacement periods and shelf lives). Simple maintenance can be carried out by the trained wearer, but more intricate repairs should only be done by specialists. Make sure suitable replacement PPE is always readily available.

CE marking

Ensure any PPE you buy is 'CE' marked and complies with the requirements of the Personal Protective Equipment Regulations 2002. The CE marking signifies that the PPE satisfies certain basic safety requirements and in some cases will have been tested and certified by an independent body.

Other regulations

The PPE at Work Regulations do not apply where the following six sets of regulations require the provision and use of PPE against these hazards. For example, gloves used to prevent dangerous chemicals penetrating the skin would be covered by the Control of Substances Hazardous to Health Regulations 2002 (as amended). The regulations are:

- The Control of Lead at Work Regulations 2002.

- The Ionising Radiations Regulations 1999.
- The Control of Asbestos at Work Regulations 2002.
- The Control of Substances Hazardous to Health Regulations 2002.
- The Noise at Work Regulations 1989.
- The Construction (Head Protection) Regulations 1989.

Key points to remember

Are there ways (other than PPE) in which the risk can be adequately controlled, e.g. engineering controls? If not, check that:

- PPE is provided;
- it offers adequate protection for its intended use;
- those using it are adequately trained in its safe use;
- it is properly maintained and any defects are reported;
- it is returned to its proper storage after use.

Standards Directory

This document is designed as a simple reference to the European Harmonised Standards [EN's] currently applicable to Safety Equipment.

General PPE Standards

EN 348				

Clothing [Protective] Standards

EN 340	EN 373	EN 381-1	EN 381-2	EN 381-3
EN 381-5	EN 381-8	EN 381-9	EN 412	EN 463
EN 464	EN 465	EN 465/A1	EN 466	EN 466/A1
EN 467	EN 467/A1	EN 468	EN 469	EN 470-1
EN 470-1/A1	EN 471	EN510	EN 530	EN 351
EN 531/A1	EN 532	EN 533	EN 863	EN 1073-1
EN 1049-1	EN 1049-2	EN 1050	EN 1082-1	EN 1421-1

EN 1486	EN 60895	EN 60984	EN 60984/A11	

Ergonomic Standards for PPE

EN 13921-1	EN 13921-3	EN 13921-4	EN 13921-6	

Eyewear [Protective] and Face Protection Standards

EN 165	EN 166	EN 153-1	EN 168	EN 169
EN 170	EN 171	EN 172	EN 174	EN 175
EN 207	EN 208	EN379	EN 379/A1	EN 1731
EN 1731/A1	EN 1836	EN 1868	EN 1938	EN 13178

Fall Arrest Standards

EN 341	EN 341/A1	EN 381-1	EN 353-2	EN 354
EN 355	EN 358	EN 360	EN 361	EN 362
EN 363	EN 364	EN 365	EN 568	EN 795
EN 813	EN 892	EN 958	EN 1095	EN 1891
EN 12277	EN 12278			

Floatation Devices Standards

EN ISO 12402-4	EN ISO 12402-9			

Footwear [Protective] Standards

EN 344	EN 344/A1	EN 344-2	EN 345	EN 345A
EN 345-2	EN 346	EN 346/A1	EN 346-2	EN 347
EN 347/A1	EN 347-2	EN 341	EN 12568	

Gloves [Protective] Standards

EN 374-1	EN 374-2	EN 374-3	EN 388	EN 407
EN 420	EN 659	EN ISO 10819	EN 50237	EN 60903
EN 60903/A11				

Head Protection Standards

EN 397	EN 433	EN 812	EN 960	EN 960/A1
EN 966	EN 967	EN 1077	EN 1078	EN 1080
EN 1384	EN 1385			

Hearing Protection Standards

EN 352-1	EN 352-2	EN 352-3	EN 458	EN ISO 4869-2
EN 24869-1	EN 24869-3			

Heat and Flam Protection Standards

EN 366	EN 367			

Life Jackets [Protective] Standards

EN 393	EN 393/A1	EN 394	EN 395	EN 395/A1
EN 396	EN 396/A1	EN 399	EN 399/A1	

Liquid Chemical Protection Standards

EN 368	EN 369			

Respiratory Protection Standards

EN 132	EN 133	EN 134	EN 135	EN 136
EN 137	EN 138	EN 139	EN 140	EN 141
EN 142	EN 143	EN 144-1	EN 144-2	EN 145
EN 146	EN 147	EN 148-1	EN 148-2	EN 148-3
EN 149	EN 250	EN 269	EN 270	EN 271
EN 371	EN 372	EN 400	EN 401	EN 402
EN 403	EN 404	EN 405	EN 1061	EN 1146
EN 1146/A1	EN 12941	EN 12942		

Table 10: PPE Standards

Are there health hazards at cleaning work?

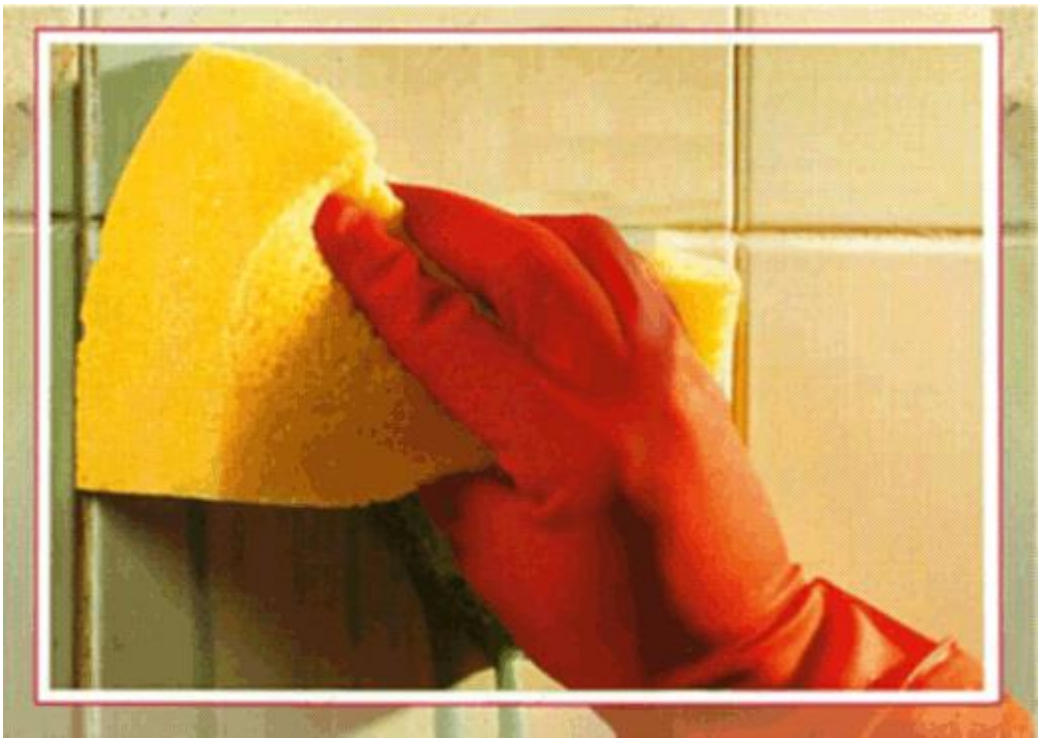
Skin damages are in the cleaning trade the most far frequent work conditional diseases. Nevertheless, by aid and preventive measures every building cleaner can decrease this risk.

It is treacherous that many illnesses become often apparent only after longer time and are not taken seriously in the initial stage. Health permanent damages can be the result.

How can cleaners in the buildings protect themselves, can be described as follows.

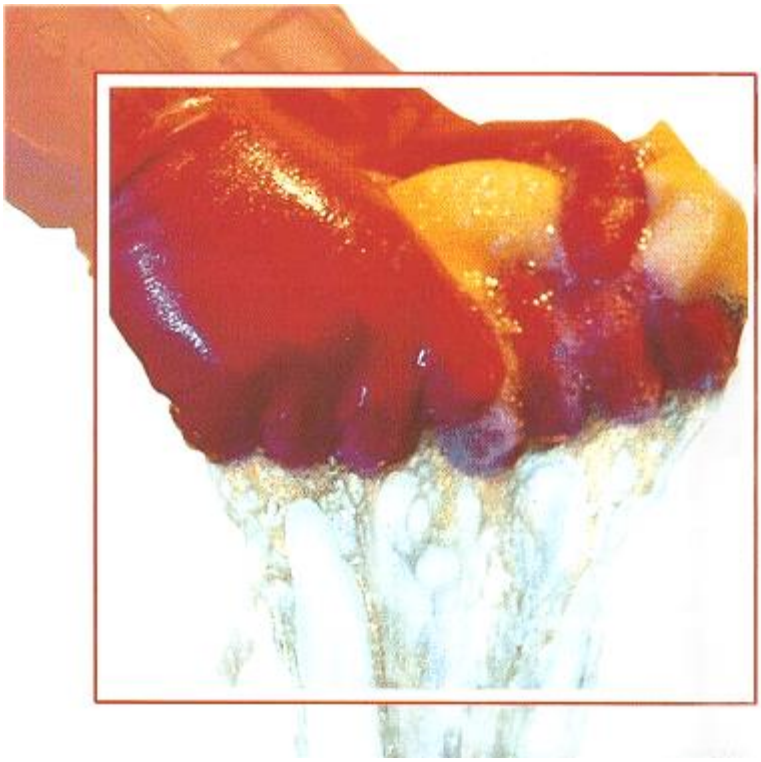
Health hazards at cleaning work:

- skin diseases
- infection illnesses
- Illnesses by chemical cleaning agents



How can cleaners protect their skin?

Cleaning agents can damage the skin. Washing active substances degrease also in watered form the skin. Cleaning agents with acid or alkaline effect (for example, sanitary cleaner) can effect to irritations or even to acid burns of the skin.

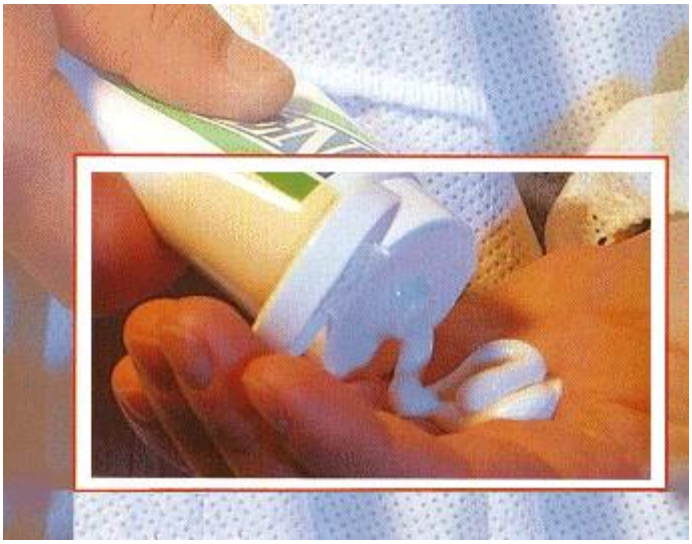


Aggressive cleaning agents can damage the skin

Also glass cleaning agents can stress the skin

Skin damages posing in:

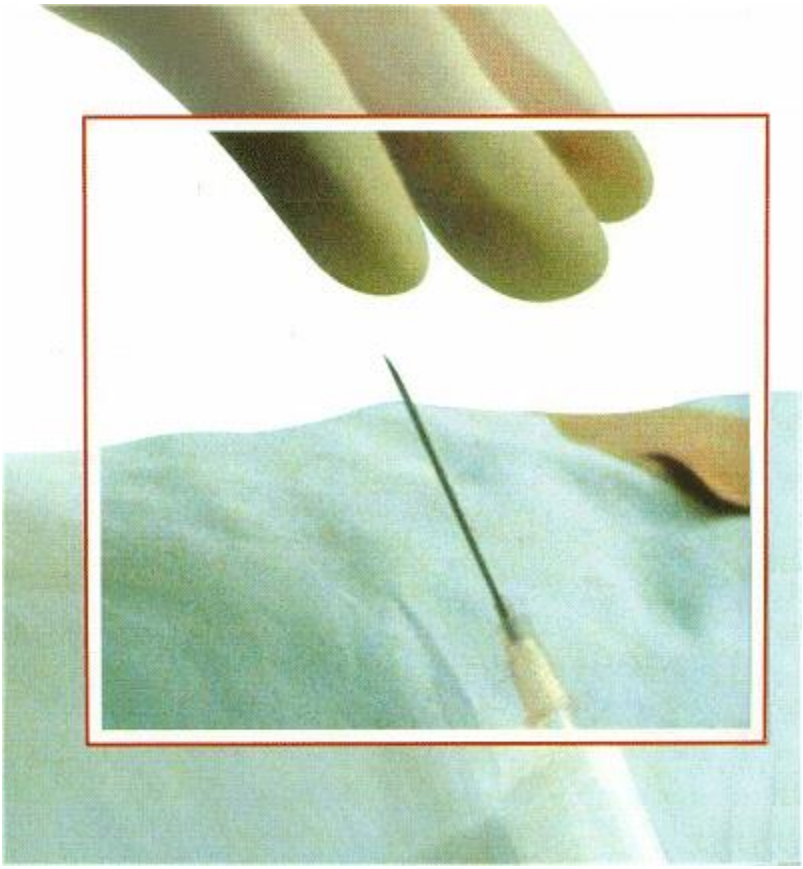
- dry and cracked skin,
- itch erythematic,
- Swelling
- blistery rash
- weeping wounds and
- Incrustations.



Preventive measures:

- At wet and humid works carry liquid-dense gloves (long-version). Put on underneath cotton gloves.
- With the contact to concentrated substances use gloves resistant to chemicals, safety glasses and protective clothing (pay attention to the operating instructions).
- Using of skin protection and skin cleaning agents, which are tuned to the respective danger?

Infection hazard in medical areas



How can cleaners protect themselves from infections?

The threat to get an infection with illness exists especially in medical facilities like hospitals and medical laboratories. Illness can get into the body by skin, mucous membrane, respiration or digestive ways. Cut or sting injuries by used instruments or drain tubes are especially dangerous if they are not decontaminated in special containers.

Preventive measures:

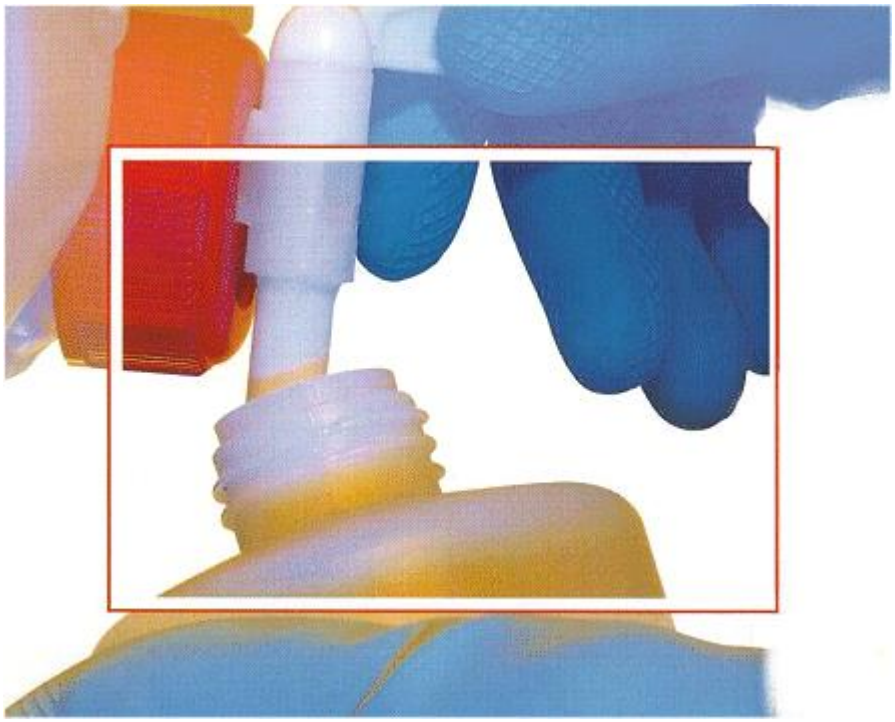
- Cut and sting injuries avoid by syringes:
- do not grab into waste bags and other refuse bins
- do not crush waste bags with the hands
- do not carry waste bags near to the body
- After sting injuries visit a doctor

- Pay attention to rules of Hygiene:
- carry liquid-dense gloves (long-version)
- do not eat, drink or smoke in areas with infection danger
- clean the skin after working end carefully
- keep working clothes separate from normal clothes
- Pay attention to Vaccination recommendations

Decontaminate syringes and drain tubes only in special containers

After working clean and disinfect the skin-carefully

Hazardous contents



How can cleaners protect themselves from harmful substances?

The cleaning agents can contain health hazard substances. Moreover belong, for example, acids, lyes, organic solvents and disinfectants. Acids and lyes irritate and burn the skin, the eyes and the respiratory tract. Solvent-based steam that is inhaled can damage the nervous system and other organs. Disinfectants can trigger allergies, burn skin and mucous membranes.

Wider dangers can originate from the working surroundings of the property:

- Health hazard dust
- Contact with heavy metals
- Toxic substances
- Hearing-damaging noise

Preventive measures:

- Pay attention to the Security instructions and operating instructions on the label
- Avoid direct contact
- carry personal protective equipment
- protective gloves
- protective clothing
- Safety glasses
- Avoid burying and overdosing
- Ventilate the rooms

With danger from the working surroundings:

- obey hygiene measures (do not eat, drink and smoke in the work area)
- In noisy areas carry auditory protection

With corrosive materials: avoid direct skin contact, carry protective equipment

Follow the symbols and security tips

Hospital cleaning

● pay attention to the installed hygiene plan.

● Safety measures have to be co-coordinated between the hospital and the cleaning company according to the risk of infection.

● instruct employees regularly about dangers.

● use vacuum cleaner with particle filters or central withdrawal system.

● make available changing rooms if special working clothes must be worn on the activity.

● create separate safekeeping possibilities for working clothes and normal clothes if the employees are in contact to infectious, toxic, noxious, corrosive, very smell-bothering substances.

● make available washing rooms.

● make available cleaning/disinfectant agent for the hands.

Additional tips for work areas with raised infection danger

(e.g., dialysis, infection units)

● occupy only persons whose state of health is supervised regularly. Arrange medical precaution investigations for the employees. A protective inoculation against hepatitis A and B is recommended.

● make available additional protective clothing according to demand, e.g., liquid-thick gloves①, aprons, footwear②, mask③.

● provide for the protective clothing disinfection, cleaning, maintenance and separate safekeeping. Handle used and dirty protective clothing like hospital laundry.

● before entrance to the lounge or dining area take of the protective clothing.

● use to dry the hands disposable towels or hand dryer.

● in possible contacts with blood, secretions and body tissues carry gloves and protective clothing.

● after injury by instruments/tools (e.g., needle sting injury) visit immediately a doctor.

Additional tips for the contact with hospital laundry

● put the used laundry immediately in robust and marked containers (e.g., containers, textile bags or plastic bags) according to the cleaning procedure.

● do not throw or compress laundry bags

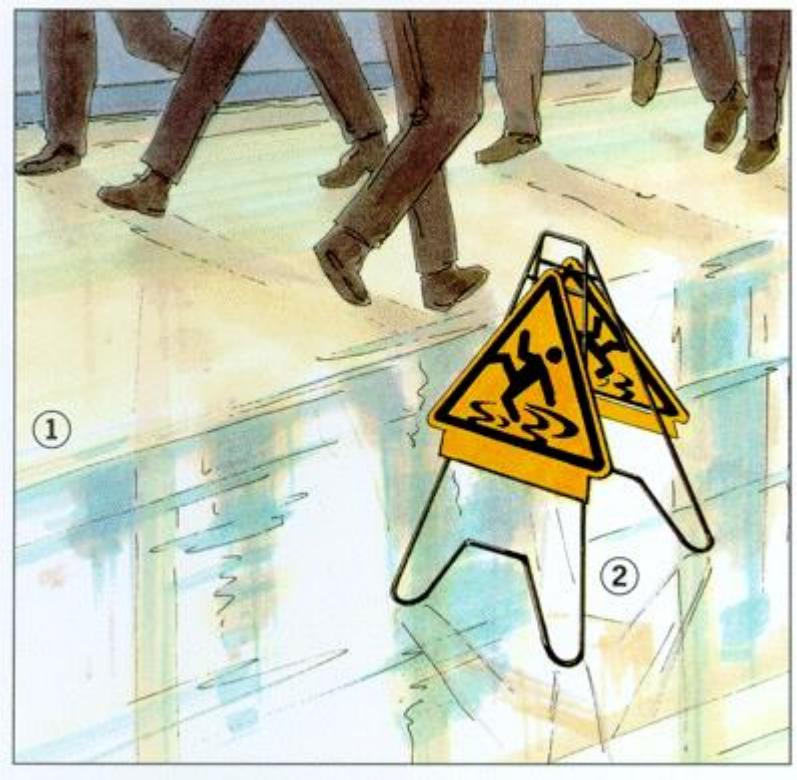
● avoid direct touching of the laundry.

● disinfect infectious laundry, infection suspected laundry wash antiseptic.

Additional tips for the waste disposal

- put sharp and breakable objects (e.g., Syringes and Drain tubes) only in special containers④.
- separate infectious waste from the remaining waste and mark the transport containers.
- seal the waste bags/containers before transport⑤.
- Use trolleys to carry the waste do not move the waste manual.

Building cleaning



- instruct employees before the first working admission in view of the working method.
- make available phone numbers of fire department, emergency doctor, rescue service and police.
- Employees oblige to accept only instructions of supervisors.
- Slippery floor coverings; work only ① in sections.

● separate public traffic areas from working areas put up warnings②.

● during the work carry shoes with non-slip sole.

● Use if necessary watertight protective clothes, e.g., gloves, apron, suits, boots, facial protection.

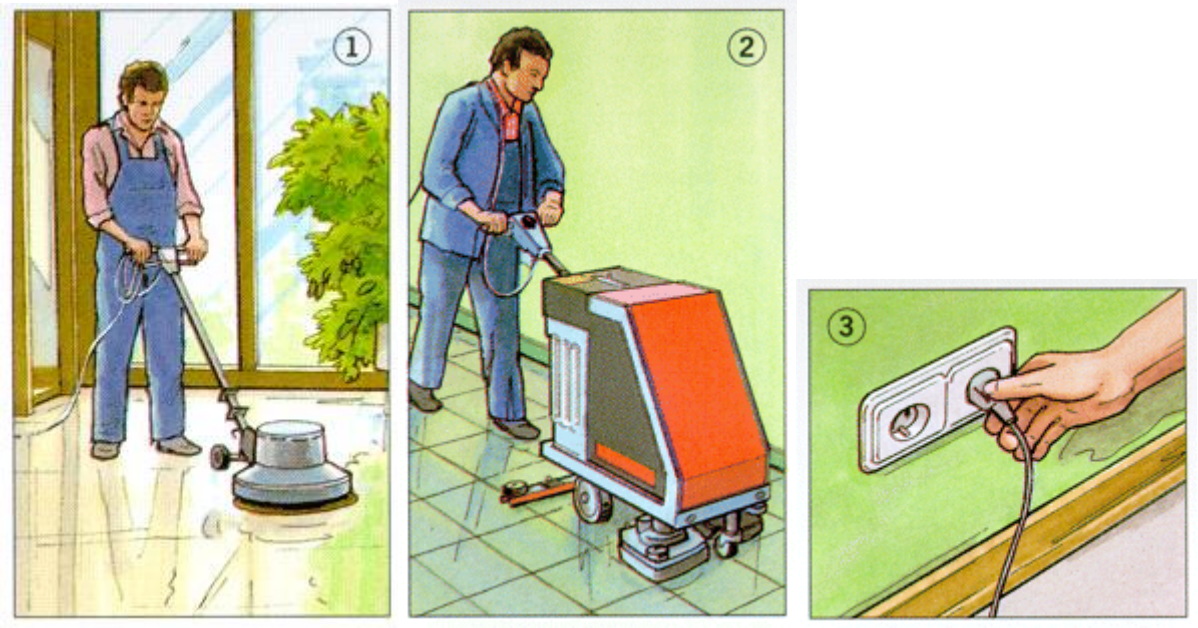
● provide enough leaders and steps. Do not use chairs and other furnishings.

Additional tips for removing of waste

● do not use the hands while emptying refuse bin and wastepaper baskets.
Tip out Containers or take out with the disposable bag③.

● do not crush rubbish in the containers from hand.

Cleaning machines



Provision

● provide only machines that correspond to the conditions in the property.

● Use only special tools and machines for the removal of health dangerous dust.

● Use only explosion-safe machines (the machines do not produce electrostatic loading for cleaning in rooms with explosion danger. .

● The machines, that must be lifted in the property and be carried, are to be equipped with handles.

● Female employees should not put up or carry more than 15 kg. Expectant mother may not lift constantly more than 5 kg and temporary no more than 10 kg.

● machines with more than 100 kg, which are to be moved on rolls, or chassis must be equipped with parking brakes.

● Hold ready for any machine the manual for the use and servicing.

Use and servicing

● introduce the employees in the use and servicing of the machines. Repeat the training in regular time intervals, at least once a year.

● supervise the regular servicing of the machines.

● do not use defective machines, mark machine as not serviceably and inform the property manager immediately.

Additional tips for the operation of electrical machines

● lead electric cables in a loop by the hand ① or over the shoulder ②.

● move electric cables ③ only with the plug from the socket.

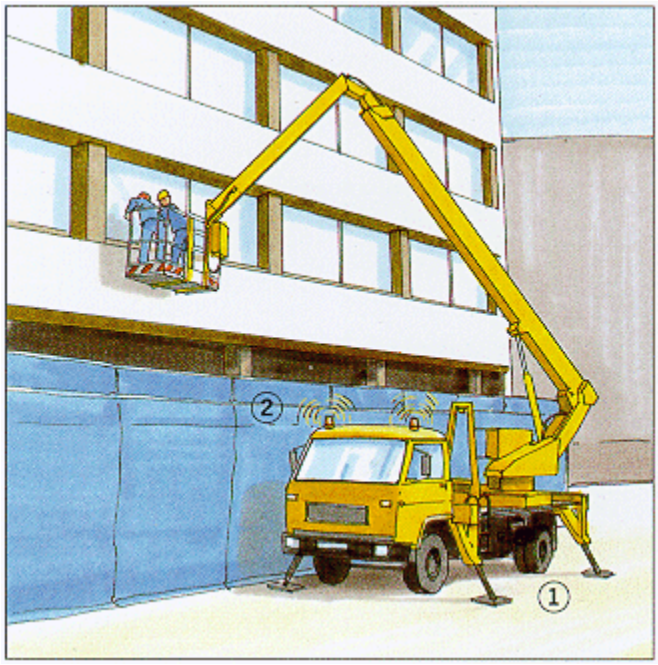
● do not go with cleaning machines above electric cables.

● do not squeeze electric cables. At self-closing doors, protect the cables.

● do not use broken or defective cables and plugs

● Repairs allow carrying out only by electric skilled workers.

Mobile work platforms



● Use only work platforms, which were checked before the first commissioning by an expert.

Installation

● Install work platform according to the manual take care at stability①.

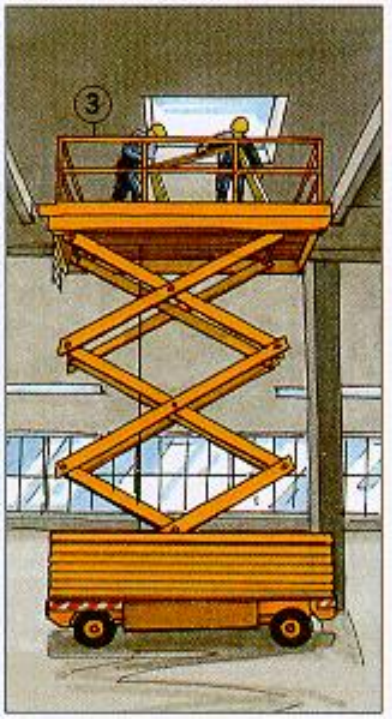
● by installation pay attention to the base, do not install work platforms on unsafe bases.

Operation

● do not overload work platform.

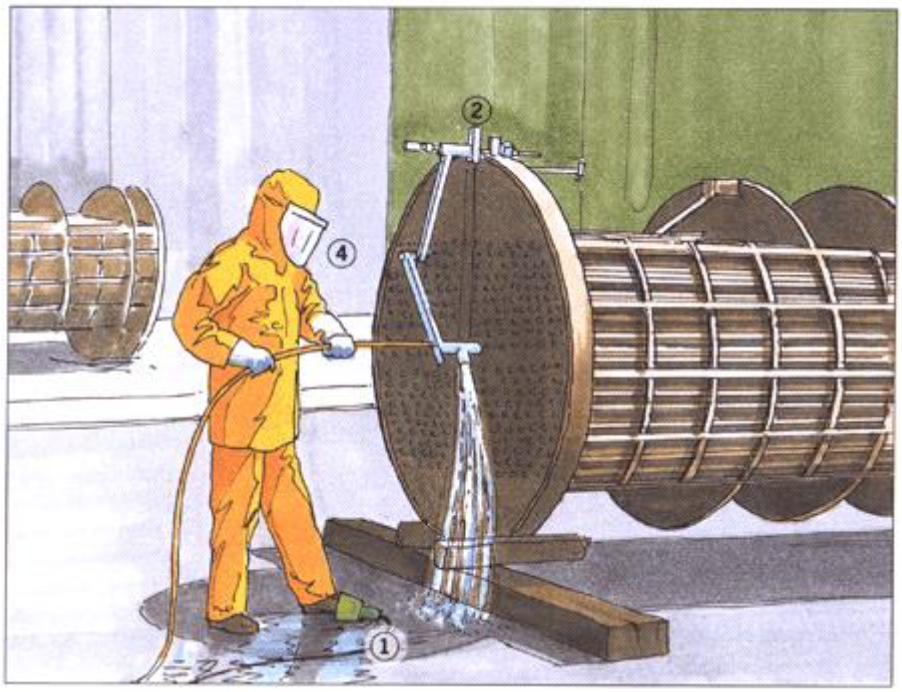
● protect the area under swilled out working platforms, if they lowered in transport areas lower than 4.50 m above ground.

● At works in the public traffic areas, switch on the yellow warning lights②.



- Carry out works under transmission lines, only if the work platform is designed for this works. (work platforms must be isolated at least for 1,000 V)
- Hinged protective railings bring in position ③before start the work.
- Before operation pay attention to the condition and effectiveness of the safety devices.
- for the operation of work platforms use only persons which, are at least 18 years old and reliable, are instructed in the operation

High-pressure cleaner



● before switching on high-pressure cleaners check flexible tubing and safety devices, e.g., pressure and temperature gauge.

Flexible tubing management

● by machines with changeable pump sets pay attention that the flexible tubing and hose equipment complies with the allowed pressure.

● use only flawless flexible tubing and hose equipment

● with operating temperatures more than 100 ° C, the maximum allowed operating temperature must be stated on the flexible tubing's.

Operation

● Size and arrangement of the nozzles tune in the hose equipment according to manufacturer's instructions. The recoil force may not cross 250 N (25 kp) by hand held equipment.

● do not lead flexible tubing above sharp edges, do not cross by vehicles. Avoid loop formations, tension load or bending stress.

● do not pull the machines on flexible tubing.

● do not lock the trigger of the airbrush or foot switches ① of the hose equipment during the operation.

● do not work with high pressure-hose equipment from ladders, use scaffoldings or work platforms③.

● High-pressure jets, never straighten upon persons.

● with interruption of work protect hose equipment against unintentional turning on.

● use personal protective equipment, e.g., suitable boots, trousers, gloves, head protection and face guard, if necessary also breathe protection④.

5.2 ENERGY SAVINGS IN THE BUILDINGS

As I mentioned before the main role of the Facilities Management is to reduce costs and improve the overall performance of the company. According to European Commission for energy 40% of the energy we are using is for buildings and therefore saving of energy were possible is essential role of the Facilities Manager. Legislations on energy efficiency on buildings together with reducing energy use in buildings and improving the energy efficiency in buildings would lead us for successive results for saving energy and improve energy efficiency for a better future. The purpose is to achieve better buildings. All the stages are important from design stage till the finishing including the building household equipments.

In Europe we spend around 90% of our time inside buildings. Our demand for energy such as lighting, heating and cooling, hot water and entertainment in our homes, workplaces, and leisure places consume more energy than any of the other two fields industry or transport. According to the studies of the European Commission for Energy, the energy used indoors accounts for 40% we use entire EU energy consumption which is bound to increase its energy consumption and hence also its carbon dioxide emissions.

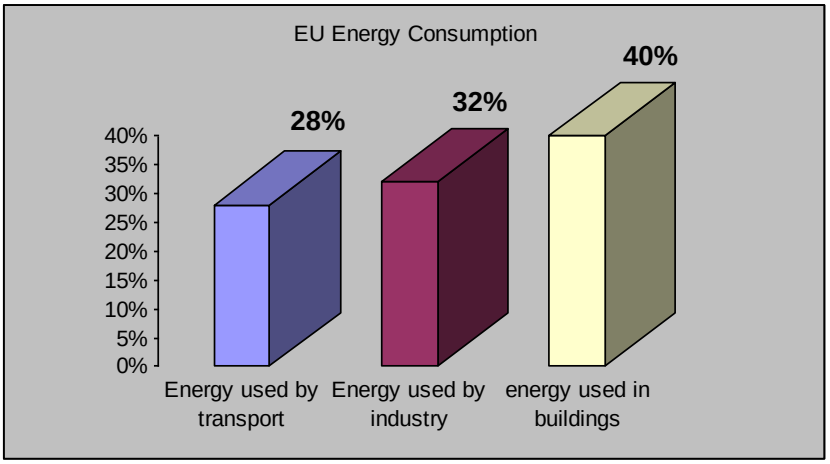


Figure 26: EU energy consumption

I the table below we can see some products that are the major energy consumption in buildings, and it is important to take care about their energy usage performance for saving energy. The table could be as guideline for focusing where energy could be saved for Facilities Managers.

1	Water Heaters (gas/oil/electric)
2	Personal Computers (desktops & laptops) and computer monitors
3	Imaging equipment: copiers, faxes, printers, scanners, multifunctional devices
4	Consumer electronics: televisions
5	Standby and off-mode losses of Energy using Products(EuPs)
6	Battery chargers and external power supplies
7	Office lighting
8	Public street lighting
9	Residential room conditioning appliances (aircon and ventilation)
10	Electric motors (1-150 kW), water pumps (commercial buildings, drinking water, food, agriculture), circulators in buildings, ventilation fans (nonresidential)
11	Commercial refrigerators and freezers, including chillers, display cabinets and vending machines (vending products without cashier)
12	Domestic refrigerators and freezers
13	Domestic dishwashers and washing machines

Table 11: list of major energy consumers in the buildings according to EU commission

Another important issue is the purchasing of the appliances. By purchasing appliances Facilities Manager should pay attention to the labeling of the product.
Council Directive 92/75/EEC is set on the indication by labeling and standard product information of the consumption of energy and other resources by household appliances.
The Directive applies to the following types of household appliances, even where these are sold for non-household uses:

- refrigerators, freezers and their combinations;
- washing machines, dryers and their combinations;
- dishwashers;
- ovens;
- water heaters and hot-water storage appliances;
- lighting sources;

- Air-conditioning appliances.

The figure below shows a typical labeling of a household product, in this case the washing machine. The label next to the energy scale also shows the eco label, the washing and the spin drying performance and noise capabilities.

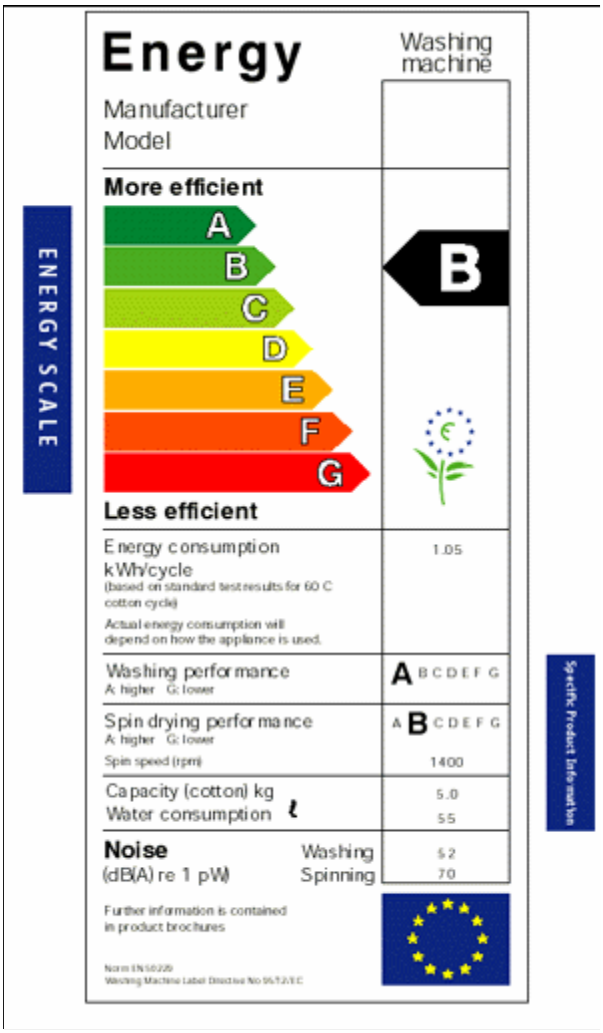


Figure 27: Energy Label of Washing Machine
Source: RESOURCITIES

5.3 ENVIRONMENTAL FRIENDLY FIRE FIGHTING SYSTEM

Here I will try to introduce the newest fire fighting system that could be of a high interest especially for Kosovo Facilities Managers. Fire fighting has reached its apogee with FirePro fire

extinguishing aerosol systems. Using the very latest environmentally friendly technology, which is the result of many years of research and development in one of the worlds leading institutes of technology. This has resulted in FirePro systems being one of, if not the most efficient and effective ways of extinguishing fire without depleting oxygen or damaging the environment we live in. FirePro is a cost effective alternative to halon. Using the very latest generation of stable non-pyrotechnic SBK aerosol-forming compound, which upon activation transforms into a rapidly expanding, highly efficient and highly effective extinguishing aerosol (1gram creates 1litre of aerosol gas). Based on potassium salts, the potassium molecules in the aerosol attack the fire physically and chemically, inhibiting the chain chemical reaction present in combustion.

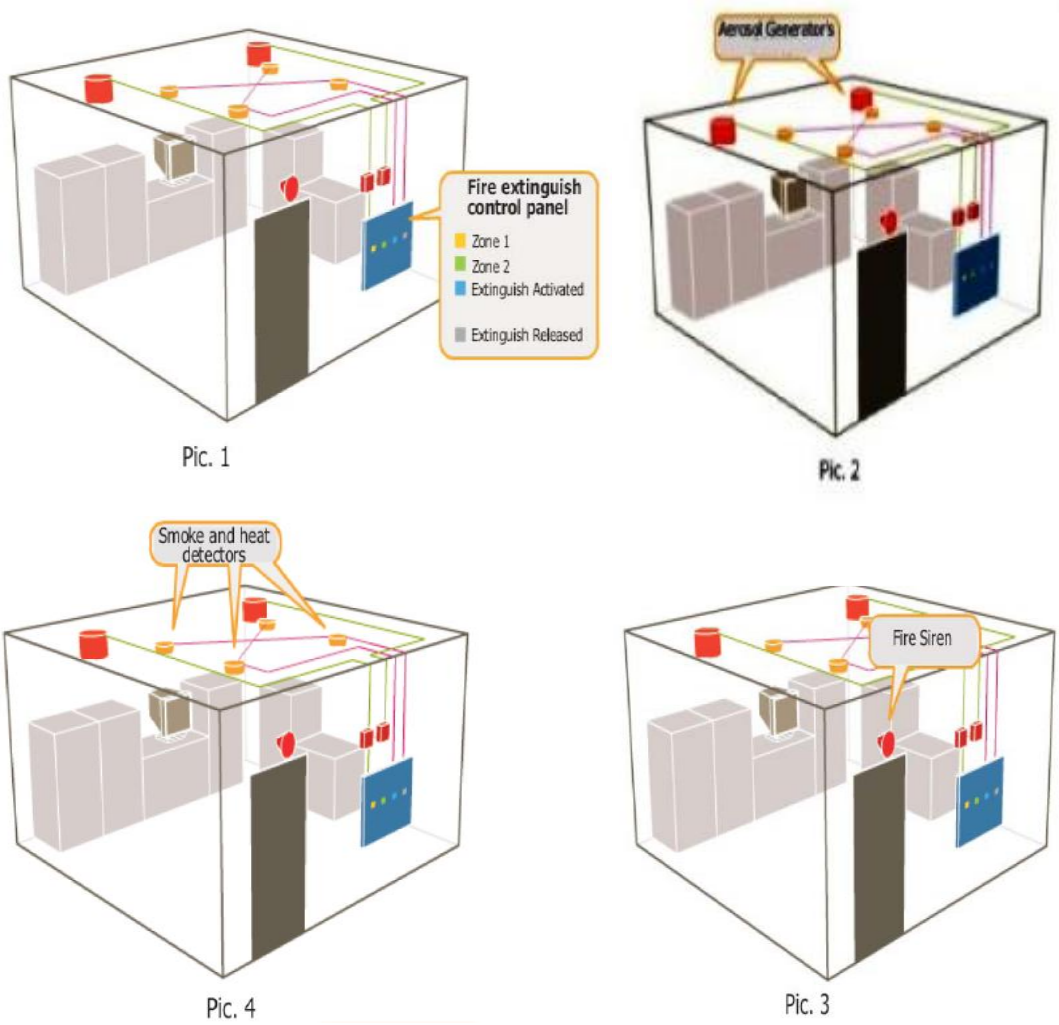


Figure 28: Aerosol functional principle

5.4 VARIOUS SAMPLE MODEL SOLUTIONS

5.4.1 BILL OF QUANTITIES

	XXX BUILDING				
	Bill of quantities				
	Material & Works	**Unit**	**Quantity**	**Unit price**	**Total price**
1	**Demolition/Preparatory works**				
1.1	Removal of the existing wooden ceiling and the old insulation all over the area which is to be refurbished, cleaning of the area, and transportation of debris to the city dump yard.	LS			0.00 €
1.2	Pest control of the roof (possible pigeon fleas presence)	LS			
1.3	Removal of doors and windows which are to be replaced and transportation of debris to the city dump yard.	LS			0.00 €
2	**Roof/ceiling works**				
2.1	Prepare positions for placement of windows (140X80) within the existing pitched roof.	EA	7		0.00 €
2.2	Supply, transport and install glass wool insulation on the roof, in rafter level (warm room), throughout the area of the building which is to be refurbished.	m2			0.00 €
				Total	0.00 €
3	**Walls/New partitions**				
3.1	Supply, transport of material and construction of new plasterboard partitions (2X12.5mm on both sides) over metal studs(50mm), including the mineral wool insulation 40mm, acoustic sealant, joint tape, angles, etc- as per the drawings and technical specification provided	m2			0.00 €
				Total	0.00 €
4	**Floor works**				
4.1	Isolation of the floor in toilet as per technical specs.	m2			0.00 €
5	**Painting/Plastering works**				
5.1	Treating of interior walls with emulsion	m2			0.00

	primer paint				
5.2	Treating of walls and ceiling with wall filler and painting with white interior paint 2x	m2			
				Total	0.00 €
6	**Ceramic works**				
6.1	Provide and fix first class ceramic tiles on toilet walls, dim. 20x30, including edge rounded profiles.	m2			0.00 €
6.2	Provide and fix first class ceramic tiles on the floor of the toilettes dim. 20x20	m2			0.00 €
				Total	0.00 €
7	**Doors/Windows**				
7.1	Provide and install wooden office doors, dim 90x205. **(D1)**	EA			0.00 €
7.2	Provide and install double wing wooden door dim ….x ... **(D2)**	EA			0.00 €
7.3	Provide and install PVC windows dim. 140X80 on the new opened positions within the roof of the building **(W1)**	EA			0.00 €
				Total	0.00 €
8	**Heating System**				
8.1	Provision and installation of the radiators within the refurbished area of the building according to the drawings and technical specs..	LS			0.00 €
				Total	0.00 €
9	**Electrical works**				
9.1	Provide and distribute electrical cables? 3x2.5, 3x1.5, fuses??? Distribution box??				
				Total	0.00 €
10	**Water supply/sanitary elements installation**				
10.1	Provide and install required water pipes within the toilet with all the required accessories and fittings, previously checking the existing condition of the old system.	M'			0.00 €
1	**Demolition/Preparatory works**	**0.00 €**			

2	**Roof/ceiling works**	**0.00 €**
3	**Walls/New partitions**	**0.00 €**
4	**Flooring works**	**0.00 €**
5	**Painting works**	**0.00 €**
6	**Ceramic works**	**0.00 €**
7	**Heating System**	**0.00 €**
8	**Electrical works**	**0.00 €**
9	**Water supply/sanitary elements installation**	**0.00 €**
10	**Different works**	**0.00 €**
	Total	**0.00 €**

Table 12: Bill of quantities sample

5.4.2 PREVENTIVE MAINTENANCE CHECK LIST

Weekly Electrical Checklist for all Offices, toilets, Foyers and Corridors.
Building Location and Name:……
Floor #:……Period:……
Name and Sig.:……..

#	Item	Checked W1/W2/W3/W4	Remarks
1	Check and test all Fluorescent tubes and light bulbs.	☐☐☐☐	
2	Check and test all electrical sockets and switches	☐☐☐☐	
3	Check all connections to be safe and secure	☐☐☐☐	
4	Check all extension cords to avoid overloading	☐☐☐☐	
5	Check and test all emergency lights	☐☐☐☐	
6	Check and test smoke detectors/alarms	☐☐☐☐	
7	Check all fuses and circuit breakers, contactors etc in Dist. Panel	☐☐☐☐	
8	Check all trace heaters on ext. water pipes	☐☐☐☐	

9	Check all extractor fans	☐☐☐☐	

Table 13: Electrical check list

Weekly Plumbing Checklist for, toilets and other related installations.
Building Location and Name:……
Floor #:…… Period:…….....
Name and Sig.:……..

#	Item	Checked W1/W2/W3/W4	Remarks
1	Check and test all Toilet cisterns	☐☐☐☐	
2	Check all Bowls	☐☐☐☐	
3	Check all Hand wash basins	☐☐☐☐	
4	Check and test all Water taps	☐☐☐☐	
5	Check and test all Urinals	☐☐☐☐	
6	Check and inspect for possible water leaks	☐☐☐☐	
7	Check all water pipe connections are secured	☐☐☐☐	
8	Check all water pipe brackets are secured	☐☐☐☐	
9	Check all water tanks and ext water pipes	☐☐☐☐	
10	Check all pump stations and water pumps.	☐☐☐☐	
11	Check all valves	☐☐☐☐	
12	Check all sewerage lines and manholes	☐☐☐☐	
13	Check all Fire hydrants	☐☐☐☐	
14	Check all water supply lines and water meters	☐☐☐☐	

Table 14: Plumbing check list

Weekly Heating Plant and generator maintenance Checklist
Building Location and Name:……
Floor #:…….Period:…….....
Name and Sig.:…….

#	Item	Checked W1/W2/W3/W4	Remarks
1	Check and test all Heating Plants	☐☐☐☐	
2	Check and clean Heating Plants	☐☐☐☐	
3	Check all fuel flow meter	☐☐☐☐	
4	Check all radiators and valves	☐☐☐☐	
5	Check all pipes	☐☐☐☐	
6	Check for water leaks	☐☐☐☐	
7	Check and set temperature where needed	☐☐☐☐	
8	Check water pressure in the system	☐☐☐☐	
9	Check water tanks	☐☐☐☐	
10	Check water pumps and thermostats	☐☐☐☐	
11	Check all burners	☐☐☐☐	
12	GENERATORS	☐☐☐☐	
13	Check oil level	☐☐☐☐	
14	Check water level in the cooler	☐☐☐☐	
15	Check filters	☐☐☐☐	
16	Check programming	☐☐☐☐	
17	Check emergency switches	☐☐☐☐	

Table 15: Heating system and generator check list

Weekly Painting, locksmith & carpentry Checklist for Offices, toilets, Corridors, Foyers and other installations.
Building Location and Name:……
Floor #:…….. Period:……..
Name and Sig:……

#	Item	Checked W1/W2/W3/W4	Remarks
1	Check all Walls and Partitions & ceilings	☐☐☐☐	
2	Check all Doors/windows	☐☐☐☐	
3	Check all wooden/metal Stairs	☐☐☐☐	
4	Check all wooden or metal railing	☐☐☐☐	
5	Check all Door &window locks& handle	☐☐☐☐	
6	Check all Window/door hinges & mechanism	☐☐☐☐	
7	Check all windows/doors if they are closing/ opening properly	☐☐☐☐	
8	Check all Shelves and Cupboards are safe and secured	☐☐☐☐	
9	Check all Table are stable and secured	☐☐☐☐	
10	Check all wooden floors and skirting	☐☐☐☐	
11	Check fire extinguishers if they are secured/fixed	☐☐☐☐	

Table 16: Weekly Painting, locksmith & carpentry check list

5.4.3 BUILDING DIARY

In addition to their usual operations Facilities Managers often have to manage projects also. The table below shows a sample of a building diary table that enables an efficient following and managing of a project.

Building-diary

Build. No:

Designation: | **No.:**

Customer:

Site engineer: | **Date:**

Weather condition (morning)	Time/Temperature	Weather condition (afternoon)	Time/Temperature
Time	°C	Time	°C
Time	°C	Time	°C

Number of workers on the building site:

Personnel:			Company
		number	
		number	
		number	
		number	
		number	
		number	
		number	
		number	
Σ			
Trucks		number	
Digger		number	

Executed work:

Unit	Description

Special occurrences:

signature site engineer

signature project officer

Table 17: Building Diary

5.4.4 SPACE ALLOCATION

VIENNA — **Planned number of occupants/office square meters**

Code	Building **ALPHA**	Occupants Space for	Occupants Current no.	Square meters offices only
HQ 18	Main Building	315		2967
HQ 18	Block A	45		433
HQ 18	Block B	44		425
HQ 18	Block C	45		437
HQ 18	Block D	45		435
HQ 18	Block E	45		436
HQ 18	Block 4	45		430
HQ 18	CITS Building	33		312
HQ 18	Archives Building	20		195
HQ 45	Supply/ITStores			
HQ 51	IT Traning Center	38		385
HQ 52	Recreation Facilities			
	TOTAL ALPHA	**905**		**8629**

Code	Building **BRAVO**	Occupants Space for	Occupants Current no.	Square meters
HQ 59	Block A	44		
HQ 59	Block B	44		
HQ 59	Block C	16		
HQ 59	Block D	29		
HQ 59	Block E	4		
	TOTAL BRAVO	**137**		**1301**

OVERVIEW SPACE ALLOCATION			
LOCATION	Occupants **Space for**	Current no.	Office space / m2
PRISHTINA	**1362**		**12587**
Mitrovica	**406**		**4067**
Peja	**105**		**1005**
Gjilani	**120**		**1165**
Prizren	**85**		**834**
Ferizaj			
Total space available	**2078**		**19658**

NUMBER OF OCCUPANTS IN THE REGIONS			
LOCATION	Occupants **Planned**	Current no.	Office space / m2
WEST Region			
EAST Region			
North Region			
Airport			
	184		

Table 18: space allocation sample

Location	Camp/Building Name	Floor	Room No.	Room Type	Length	Width	Height	Space [m2]	Volume [m3]	perimeter [m]
Pristina	AHQ Mainbuilding	Fourth Floor	400	office	5.67	4.66	3.10	26.42	81.91	20.66
Pristina	AHQ Mainbuilding	Fourth Floor	401	office	7.12	4.85	3.10	34.53	107.05	23.94
Pristina	AHQ Mainbuilding	Fourth Floor	402	office	7.12	4.75	3.10	33.82	104.84	23.74
Pristina	AHQ Mainbuilding	Fourth Floor	403	office	4.72	3.55	3.10	16.76	51.94	16.54
Pristina	AHQ Mainbuilding	Fourth Floor	403a	office	7.21	4.65	3.10	33.53	103.93	23.72
Pristina	AHQ Mainbuilding	Fourth Floor	403b	office	4.72	3.55	3.10	16.76	51.94	16.54
Pristina	AHQ Mainbuilding	Fourth Floor	404	conference room	7.21	9.46	3.10	68.21	211.44	33.34
Pristina	AHQ Mainbuilding	Fourth Floor	405	office	4.66	3.55	3.10	16.54	51.28	16.42
Pristina	AHQ Mainbuilding	Fourth Floor	405a	office	7.21	4.71	3.10	33.96	105.27	23.84
Pristina	AHQ Mainbuilding	Fourth Floor	405b	office	4.66	3.55	3.10	16.54	51.28	16.42
Pristina	AHQ Mainbuilding	Fourth Floor	405c	office	7.21	4.65	3.10	33.53	103.93	23.72
Pristina	AHQ Mainbuilding	Fourth Floor	406	emergency exit				16.60	0.00	0.00

Table 19: premises data base sample

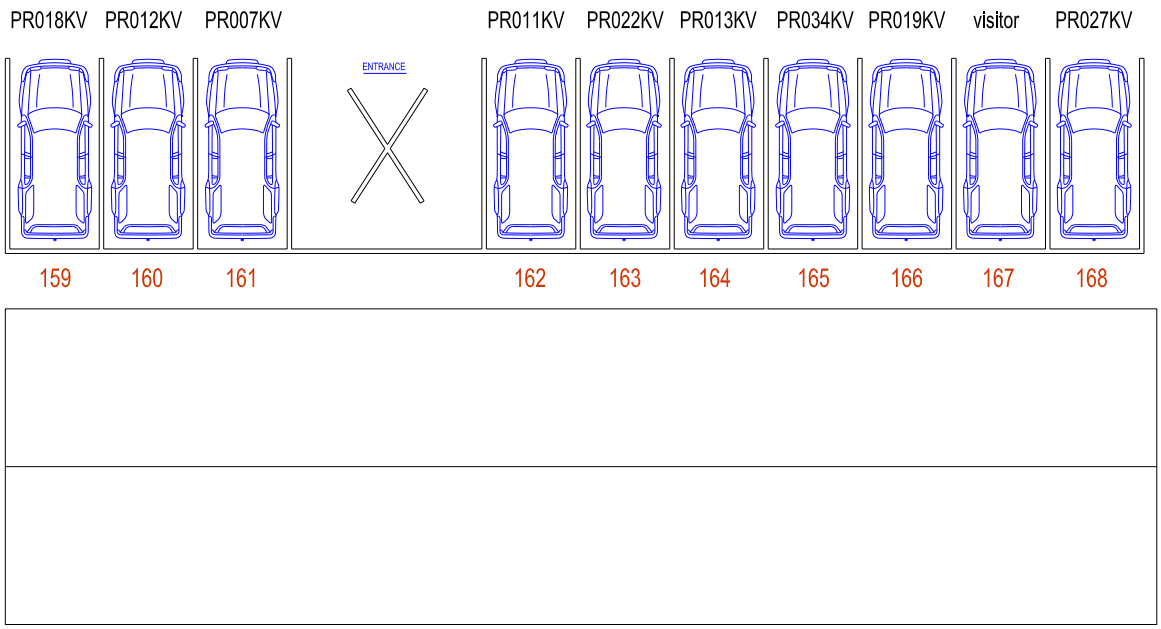


Figure 29: parking allocation sample

6. CONCLUSION

On the base of the different themes that I have treated so far in this paper it may be concluded that in the future Facilities Management development might be very different according to the different situations of the driving forces such as social economy and local business development, but nevertheless its main goals and objective remains the reducing of the costs and increasing of the efficiency within the companies. Besides that, some other factors will also influence the Facilities Management development, especially in Kosova, such as sufficiently qualified employees, improved educational institutions, improved transport system, cooperation among the local and international companies, etc.

Even though the Facilities Management is not a core activity in most of the Companies, however it will remain a very important part of the business in general. For example When we were talking about the energy, it was concluded that 40 per cent of the overall energy consumption is spent within the buildings, and that shows us that there is a need and potential of energy saving (cost saving) and that is something that will be challenging for the Facilities Managers in the future, for in this world we live, the energy consumption is constantly increasing. This issue is more than important in Kosova where we have a lack of electrical energy.

One of the most important factors that could be and should be influenced by Facilities Managers especially in Kosova is the Facilities Management in Public sector, which is really in a poor condition, and mentioned before almost all public companies work with loss. Therefore the role of the Facilities management would be essential for the public sector.

One more important thing is the specialization of the local firms in the areas of Facilities Management in order to support the outsourcing in the public sector. The good local business cooperation will save money and time for involved parties and create a tight relationship among them, which is very important for Kosova in order to maintain the local companies during the competition. Another issue is the importance of human resources. Employees are the most valuable resources to a firm. Especially, when business expands, the qualified staffs become more and more important. Also a good co-operation relationship among the local universities, research institutes and companies will be a benefit to all parties. The University can provide qualified specialist and management staff for local companies, at the same time the University can improve its reputation and attract more students.

If the employees are the most valuable resource to the firm, than it can be concluded, that safety issue has to be a priority. In our country it needs to be done much more in regards to the safety of the employees, though the short guide to the personal protective equipment in the chapter five, could be very important to every company for in house or contracted firms, and should also be influenced by the governing authorities by reinforcing the safety rule law. If a company has well trained and protected employees, it is on the right way of facilitating the optimum business performance. A healthy and well protected employee is always at work, is always a benefit for a Company.

Finally I would like to assume that during this work through its chapters and themes, could be shown, how and in what areas of function, Facilities Management could play its role in facilitating optimum business performance.

Continuous improvement is a key to success. Improvement requires flexibility, but sometimes flexible is to rigid, so man has to be fluid!

ACKNOWLEDGEMENT

This thesis is not only a result of my own efforts, but an outcome of all the enthusiastic people involved in supporting my work. Hence, I would like to express my appreciation to all those who have supported me during this work.

My deepest appreciation goes to my Thesis supervisor and Mentor, Prof.Dr. Edmond Hajrizi, for his patience, flexibility, guidance and support throughout this project.

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Prishtina, Republic of Kosova (March 2008)

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