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THE FUTURE OF FIRE SAFETY MANAGEMENT
IN LEBANESE ORGANIZATIONS

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at the Lebanese American University

in Partial Fulfillment of the Requirements for
the Degree of Master in Business Administration

By

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The following professors have undertaken to serve as the advisors of the
above candidate and have approved his research work.

Advisors:

Dr. Tarek Mikdashi

Dedication

For those who doubted how far I can go

but above all

for those who never doubted ...

Acknowledgments

It is difficult to find the right words when attempting at giving tribute to my friends for their support which permitted the completion of such a project in such a brief time.

Yet, as I am writing these line I can not but think of one person whose patience and persistence are an example to follow. A person who volunteered to serve in the small army of friends and whose immense contribution to this work rightfully promoted her to the rank of Army Commander, Reem Beydoun.

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CHAPTER ONE : INTRODUCTION

Since the beginning of recorded History, many disastrous Fire incidents have occurred, destroying cities, forests and homes, not to mention the enormous number of victims they left behind. As society changed from craftsman to industrial, Fires took on a greater, yet more threatening, importance. And as towns grew to cities, shops expanded to factories, and factories transformed to industrial centres. Fire became the nightmare at every industry's door. Moreover, the concentration of population around industrial centres and the concentration of several activities to support industry did create enormous Fire hazards and life safety problems. Thus, even though the heat of Fire was used mainly to generate energy in the past centuries, Fire had always been both a benefit and a problem for Man : a Man that failed continuously to practice the minimum of "Common sense" or to follow out established safe prevention measures and practices. Ironically enough, it was found recently that "the causes of Fires " starting " or " spreading" are usually well defined and codified, and these only serve to emphasise that they are caused almost invariably by people .."¹ (To be fair enough as to disregard the power of Nature as an ignition source !)

This is totally realistic view of the erroneous Human behaviour and its role in making Fires " happen", whether the individual's action was deliberate (Arson) or indirect (through ignorance or negligence). This is more reflected in the attitude of mind of most people (and this

¹ Woolhead F.E. "Fire Risk Management." *Fire Safety Management*. University of Edinburgh. 1980.

order to reduce the possibility of Fires breakout, while actually, the whole country witnessed several catastrophic Fire as direct consequences of civil war.

1.2) *The purpose of the Study :*

This study aims basically at assessing how far does the concept of Fire Safety management apply nowadays in our Lebanese organisations and what could be the possible reasons behind the findings. In addition, this study tries to assess both concepts of Fire protection and Fire prevention in organisations, and tries, as modestly and as briefly as possible, to comment the recent draft relating to the Lebanese Fire Safety code, a copy of which was confidentially delivered to serve the purpose of this study alone.

Actually, this draft has been prepared jointly by several Lebanese governmental and private bodies, under the direct supervision of expert engineers from SOLIDERE and DAR AL HANDASAH Engineering Bureau.

CHAPTER TWO

LITERATURE REVIEW

2.1) Differentiating Fire Protection & Fire Prevention Concepts :

Both the concepts of Fire Protection & Fire Prevention had been subject to many confusing interpretations often leading to their understanding as synonymous. One of the reasons of such ambiguity lies in the fact that different Fire Authorities (some times in the same country) have different perceptions regarding the priority or emphasis to be awarded to each. Such divergence in opinions could also exist because of some missing expertise or knowledge in the same field of Fire Safety. Otherwise, this divergence could possibly be attributed to factors such as the degree of public awareness, or even, the country's culture itself (In this respect, the Japanese Example will be discussed further on).

2.1.1) The Fire Protection Approach :

To simplify matters, the approach followed will examine the concept of Fire protection from the fact that Fire prevention alone will never be absolutely 100% successful. Hence the necessity to plan and design in anticipation of potential incidents as to limit damages when Fire do occur. And to be fair enough, no one technology, system or code could by itself succeed in winning alone the battle against Fire. Given these two obvious facts, it was found that

more chances to succeed will be in favour of a rather “Integrated system of balanced protection”¹ which could be sustained by several design features in a coherent way as to reinforce one another and to cover for one another in case of anyone’s failure.

Consequently, it would be much easier to understand the idea of Fire and its development by viewing Fire protection as “ a series of opportunities to intervene against a hostile Fire, arrayed along a timeline of potential growth in Fire severity.”²

These opportunities-strategies are ordered as following :

- 1- Prevention of Ignition.
- 2- Design to slow early Fire growth.
- 3- Detection & Alarm.
- 4- Suppression.
- 5- Confinement of Fire
- 6- Evacuation of occupants.

In order to closely follow the evolution of Fire and the breaking of the lines of defense one after the other, it is useful to consider a typical “Fire Scenario”

¹ Hall John R and Arthur E Cote. “America’s Fire Problem and Fire Protection.” *Fire Protection Handbook*. 16th Ed. Massachusetts: NFPA Publications. 1991. (pp. 1-24).

² Hall (pp.1-24).

Figure 1. Fire Protection vs. Fire Prevention

that could possibly threaten the live (and Property) of any individual at a given time:

Once a Fire has started- which is actually synonymous to the “surrender” of the first and most important line of defense - the first opportunity to reduce the impact of the now existing Fire will be through the design of flammable items constituting the Fire’s Fuel. For it was found that the choice of materials and products and their environment do play an important role in slowing Fire growth (or spreading) along vertical or horizontal surfaces.

Then comes the next opportunity to stop Fire through the intervention of active Fire protection systems. Here, the objective consists of letting the automatic detection systems do the job of informing the occupants of the premises in question about the possible hazard (s) that might endanger their lives. Soon after, automatic suppression systems will get into action, in those areas where Fire did break out at first place before it spreads and grow in a way as to threaten the whole area in question. This actually constitutes the fourth opportunity.

Then, passive Fire protection will be then needed to stop the Fire which would be easily managed as a prelude for extinguishing it completely. This concept of confining the Fire in definite zones is often referred to as Compartmentation.

Finally, when every effort to refrain Fire have unfortunately failed, this leaves no room but to take the decision to evacuate the occupants, provided that all of them are alerted, that escape routes are safe and, of course, that occupants

do know their way out and do actually take a rapid and decisive action to leave the building under Fire.

As a matter of fact, the indecisiveness as well as the passiveness of individuals in the presence of Fires was often observed as a repeated phenomena which was found to represent a quite famous aspect of human behaviour in Fires everywhere in the world. Obviously, this strange phenomena could be better understood specially after considering the fact that most people have not actually seen a real hostile Fire, neither they have the slightest idea of how fast Fire can grow, nor they are familiar with such phenomena as Flash-over, Back-draft, convection or radiation etc... Therefore, in such cases where the building is already designed for safe evacuation, the occupants have to be educated to “The principles of Escape Behaviour”³ which consist of the following steps :

1. Know whether to escape and where to go.
2. Know two ways out.
3. Get out fast.
4. Practice escape.
5. Check paths for safety before proceeding.
6. Crawl low under smoke.

³ Hall (pp. 1-24).

2.1.2) The Fire Prevention Approach :

Eventhough these six strategies/opportunities are necessary to reduce the losses of any potential Fire, more emphasis ought to be drawn on the first yet most powerful strategy, i.e. Fire Prevention. For, as simple as it looks, a Fire that never happens at the first place causes no loss. This obvious fact makes it rational to define Fire Prevention as including “all Fire service activity that decreases the incidence of uncontrolled Fire.”⁴ Actually, this definition reveals both the presence and consequent importance of having efficient and developed Fire Service department, along with possessing the power to make Fire controllable. How could this later action be achieved ? The answer would be by accepting the fact that “Fire prevention can occur through successful action on the heat source, the fuel source, or the behaviour that brings them together.”⁵ Yet, it is important to bear in mind that no one method of attack is clearly preferable, while “ success is most likely to come if all three components are treated as real options at all times.”⁶

To be more specific, changing the heat source or the fuel source is usually accomplished through product re-design. This change could take several forms :

1. Issuing Governmental regulations by which all interested “designing” parties shall abide.

⁴ Ladwig Thomas H. *Industrial Fire Prevention and Protection*. New York: Van Nostrand Reinhold. 1991.

⁵ Hall (pp. 1-24)

⁶ Hall (pp. 1-24)

2. Designing products according to some sort of “general consensus” between parties within the same industry.
3. Setting an Industry-wide program to change product designs, and
4. Designing products according to consumer demand.

On the other hand, a more difficult but long term rewarding task needs to be accomplished: it consists of changing the Human behaviour that might - intentionally or not - bring the fuel and the heat together. In other words, changing the human behaviour is nothing but an engagement to educate different types of audiences, whether grouped according to age, profession, occupancy type, educational background, or even, according to their readiness and acceptance to learn substantial quantities of information relating to a subject that is ambiguous for most of them (For people usually believe that “Fire only happens to the other guy”⁷). Yet, ironically enough, this point of view was found to be strongest in populations with above average risk. This fact might push some to ask of what can be actually done to change the existing prejudices regarding the refusal of Fire as a possible and close enough risk that might endanger us all at a given time. The answer to this “provocative” question begins by insuring an interested audience having both the will to listen and to be taught. Only then, it would be much easier to educate people and motivate them if approached in the right way. This “right way” may involve nothing more than emphasising what to do rather than what not to do. In this respect, the NFPA’s (USA’s National Fire Protection Association) “learn to burn” curriculum, “seeks to teach school children key Fire safety

⁷ Hall (pp. 1-24)

behaviours that can be retained for lifetime”⁸ (even though it is currently applicable in 4 percent of US Schools only.) Thus, more attention should be focused on conveying appropriate Fire Safety messages to pre-school children, elderly people and to small rural communities, specially when bearing in mind that “in any Fire Prevention program, the highest-risk groups tend to be the hardest to reach.”⁹

2.1.3) Comparative Fire Prevention Approaches :

Even though Fire Safety Specialists would largely advise on the necessity of Fire Prevention as a powerful means for combating Fires, yet it was noticed that in actual practice, some countries succeeded more than others in that respect. According to the US Fire Authorities for example, “Fire prevention and code enforcement is one of the major areas of responsibility for the Fire Service.”¹⁰ (Refer to Figure 2 below for a breakdown of the functions underlying Fire prevention.) In the past, such functions were performed in the US on a Limited scale by full-time specialists who might be civilians as well as uniformed personnel. Nowadays, even though Fire suppression personnel have been increasingly active in inspections and code enforcement, a tendency is noticed towards involving Full-time staff employees in such functions. As part of the Fire prevention department in the local Fire brigade, their role will be consisting of inspecting all properties for compliance with codes and ordinances, operating a public education program and investigating Fires to determine the reasons behind their starting and spreading.

⁸ Hall (pp. 1-24)

⁹ Hall (pp. 1-24)

Figure 2. Fire Service Activities

Unfortunately, recent statistics showing the ratio of yearly Fire Prevention Inspections to Fires attended in the US were not accessible, which, if obtained, could have helped to assess the level of US Fire Service's Commitment to Fire Prevention, a measurement that will be later on applied for UK's and Japan's Fire Services.

On the other hand, Fire Safety Education which is expected to "increase knowledge and to develop or change the attitudes and behaviour of men, women and children towards Fire"¹¹ is being given much careful attention in the US nowadays. In this context, The National Fire Protection Association

¹⁰ Ladwig.

¹¹ "Fire Safety Education". *Fire Protection Handbook*. Rev. Jan Gratton. Massachusetts: NFPA. 1991. (pp 4-12)

(NFPA) had established in 1986 the tax-exempt "Learn not to burn" Foundation, which role is "to seek outside sources of funding for Fire safety education projects aimed specifically at high risk populations."¹² The foundation had successfully been able to introduce the most comprehensive Fire safety program available nationally in the U.S. for school children, the "Learn not to burn" curriculum.

This program organises life saving material to be taught year round in schools, and which consists of twenty-two key Fire safety behaviours "which are intended to teach children how to prevent Fire, to protect themselves, their families and friends from Fire and to persuade others to be mindful of the need for Fire safe behaviour at all times."¹³ Yet, the best way to measure how successful the program is would be through considering the number of people saved from burn injuries and even from death because of previous Fire prevention messages and classrooms lessons conveyed by the same program, all of which documented by NFPA itself.

On the other side, and surprisingly enough, the UK's efforts to improve Fire prevention standards were not at all encouraging. For it was published that 95 percent of the Fire legislation in the UK leans towards protecting people from the results of Fire and not to prevent Fire from occurring at first place.¹⁴ One of the reasons behind such deficiency lies in the fact that if prevention is to be taken seriously, then more men necessarily are needed. And more men

¹² "Fire Safety Education" (pp 4-12)

¹³ "Fire Safety Education" (pp 4-12)

¹⁴ Winning A. A. "Fire Protection Standards in the UK." *Fire Engineering Journal*. March 1974. (Pp. 48-50)

means more money to spent by the government on recruiting, training, educating etc... A closer look to Fire prevention practices performed in the UK could easily reveal the importance of man power in this same field: according to a 1973 survey relating to the UK's Fire Precautions Act of 1971 (designating first hotels and boarding houses and which came into operation in June 1972), 43,000 premises were registered out of a known possible total of 96,000 that should have registered and, ironically enough, only 2,000 premises were inspected! This had pushed critics to argue saying that at this rate, and allowing no further changes of occupancy or re-inspections, "it will take the authorities another 34 years to complete only the back log of hotels and boarding houses alone."¹⁵

Why does this problem arise in the UK and not in Japan for example? The reason is simple: it was found that, in Japan, there are the same number of men responsible of Fire prevention as are operational at any one time. So while the average UK brigade covering around a million population employs 30 men in Fire prevention, a similar Japanese Fire brigade would have employed 500 men. Moreover, it was found that Japan's yearly normal ratio of Fire prevention inspections to Fires attended is about 70:1 (100:1 according to other daring sources¹⁶), whereas the UK's was about 3:1!¹⁷ How could one possibly interpret these figures? The answer could be reached through getting a closer look to the Japanese belief and commitment to Fire prevention, a belief that could be better reflected in the so called "Zero Fire Campaigns"¹⁸. In such Japanese campaigns, prizes and recommendations were awarded to the Fire Station with

¹⁵ Winning (pp 48-50)

¹⁶ Rankin S. "Japan's Approach to Fire Prevention." *Fire Engineers Journal*, Dec. 1978. (Pp 26- 30)

¹⁷ Winning (pp 48-50)

the lowest frequency of Fires each month, while, on the other hand, the highest awards were delivered for those Fire stations that achieved “Zero” incidence of Fire in a given month.

Moreover, and contrary to the Japanese Philosophy, there is a growing view in the UK holding that “Firemen join the brigade because they want to put out Fire, so subconsciously, they want more Fires, not fewer.”¹⁸ This view is backed by a parallel one: that relating to how proud a UK station becomes of its frequent Fire calls, and the ironical statement that chooses a good station by merely being “the one which has the greatest number of calls.”²⁰

In order to understand more the huge gap between the application of effective Fire prevention practices in those two countries, one ought to analyse deeper the Japanese methods and approaches. For, in Japan, the Fire defense organisation law defines the duty of Fire defense as to encompass the following duties:

1. To protect the people’s lives, bodies and properties from Fire by every possible way such as prevention, precaution, suppression and rescue.
2. To remove direct causes of disasters in advance.
3. To prevent and reduce the expansion of damages when disasters occur.²¹

As it is noticed, the order of placing “Prevention” is very significant since it is considered a necessity without question and a major activity of the

¹⁸ Rankin (pp 26-30)

¹⁹ Winning (pp 48-50)

²⁰ Winning (pp 48-50)

Fire brigades at which they have achieved outstanding success. So far, and since 1949, the Japanese have engaged in a National Fire Prevention campaign aiming to provoke alertness in each citizen regarding the need to prevent Fire. And contrary to the known English practice of regarding evacuation as the prime importance in Fire incidents, the Japanese do favour more Fire fighting involvement by their building occupants. Accordingly, every building in Japan where more than fifty people assemble, work or live must have a Fire manager, whom should be of management status and approved by the local Fire brigade which will train him for his special duties. Sure enough, this ought to give some idea on both the degree of commitment and motivation the Japanese people enjoy off regarding the issue of maintaining effective Fire prevention practices in their premises at all times.²²

2.1.4) Organising for Fire protection : The role of the public Fire department

Although it is not always the case, public Fire protection is normally a function of the local government i.e. a town, city, municipality, country or organised Fire district. In the U.S., the objectives and organisation of public Fire departments may vary according to resources available, thus ranging from simple to complex.

Yet, it is understood that large industries with greater and eminent hazards will often provide for organised private Fire departments (or Fire teams) at their industrial complexes. In this later case, the private Fire brigades

²¹ Rankin (pp 26-30)

²² Rankin (pp 26-30)

will, of course, be working under the supervision and in direct liaison with the public Fire brigades, not to mention the industry's insurance surveyors.

What will the role of the public Fire brigades comprise? In recent years, the role of the Fire service in many communities has expanded far beyond mere Fire suppression. People are becoming more and more dependent on the Fire department to ensure their protection against a variety of dangers such as Fire, panic, explosion and many other emergency or hazardous event (s) that may occur in the community.

The next section presents the structure of a typical medium sized Fire department which is illustrated in the figure presented on the next page.

2.1.4.1) The Fire department structure:

Fire departments, like many other organisations, are made up of people working together in a co-ordinated effort to achieve a common set of objectives. As such, work is divided among the individuals and operating units according to a specific plan. This same plan emanates from the individual functions that must be performed by each and every one, i.e. Fire prevention, training, Fire suppression, etc...

Moreover, as departments increase in size, more extensive co-ordination is required between operating units (and consequently between individuals), specially in the case of medium and large-sized Fire departments.

In such types of departments, line functions normally refer “ to these activities directly involved with Fire suppression operations”²³, without neglecting the participation in other duties. For, at highest officer levels within the department, line responsibilities become fewer while staff responsibilities increase. On the other hand, staff functions in general include “those activities that do not involve dealing with day-to-day emergency incidents”²⁴, beginning with the powerful Fire prevention duties and passing by training of personnel, periodic maintenance of apparatus and physical facilities, communicating frequently with the public, personnel and financial management and, finally, conducting research and planning.

Of course, like in any other organisation, rules and regulations are necessary to govern operations, especially knowing the hazardous nature of much of the activity which mandates a clear understanding of expected performance. Therefore, the standard operating procedures ought to be well outlined, preferably in writing, so as to have everybody aware of them and also aware that any failure to meet those expectations will be sanctioned through specific disciplinary action.

²³ “Fire Department Organisation.” Rev. Earle G. Roberts. *Fire Protection Handbook*. Massachusetts: NFPA. 1991. (pp 34-41)

²⁴ “Fire Department Organisation” (pp 34-41)

Figure 3. Typical Organisation Structure of a Medium Sized Fire Department²³

²³ "Fire Department Organisation." *Fire Protection Handbook*. Massachusetts: NFPA, 1991. (p. 9-39)

2.1.5) The insurer's role in Fire prevention :

American business and industry often respond to insurance and code requirements under the belief that such requirements will bring about the best protection available for people and property. More often, they convince themselves of some famous myth relating to Fire protection which holds: if it complies with the code, and it is insured, therefore it must be Okay. Yet, it must be remembered that the insurance company is primarily concerned with protecting the property of the insured or his investment. Thus, insurance might be described as "the method of covering any potential loss of a valuable asset without total loss reduction by risk transfer."²⁵ This definition explains very well the absolute need for insurance companies all over the world as no commercial, educational, industrial, or any other kind of organisation can actually afford the cost of replacing the probable maximum losses that may result from Fire or any other catastrophic incident. Therefore, the owner(s) of the new organisation's site (or building) to be erected, extended or rehabilitated must indispensably co-ordinate with the following persons : the architect, the Fire protection officer and the insurer in order to discuss their requirements and hear their opinions at the earliest design stage. Actually, it is often the Fire surveyor who is the principle direct contact between the insured and his insurers. His duties can well expand to cover prevention of Fire, preservation of property and protection.

²⁵ "Managing the Risk- Insurance." *Fire Safety Design*. University of Edinburgh: Department of Architecture and Fire Safety Engineering. 1980.

2.1.5.1) The surveyor's duties :

First, the surveyor's duties will often begin by an inspection made to the premises for possible hazards identification. Then, the Fire surveyor will recommend the removal of elements likely to cause or aid the spreading of Fire. But if the complete elimination of potential sources of Fire is impossible, means will be suggested for minimising these same sources.

Having accomplished this first task, the Fire Surveyor's next concern will be to suggest ways of containing Fire when it does occur, i.e. preservation of property. Then, he will be recommending the most suitable forms of protection, such as the installation of sprinkler systems, Fire alarms and first-aid Fire appliances so that early warning of a Fire is given a good chance for fair Fire fighting.

Moreover, when the risk in question is big enough and when the resources of the Insurance Company allow to do so, some specialised surveyors are often hired. Thus, in addition of being involved in the planning and installation stage only, "Sprinkler surveyors" for example could carry out regular re-surveys to ensure that any re-organisation at the premise does not impair the efficiency of the system already installed. More often, they will be conducting periodic tests to verify that the sprinklers are being maintained at the required standard.²⁶

On the other hand, a typical surveyor's "risk Assessment" report will include details on how each building is occupied, what materials are actually

²⁶ "Insurance Procedure". *The Architect's Journal*. 16 March 1977.

used or stored, the types of machinery used, the number of people employed, the existence/ status of lighting, heating, power and water supplies, the nearest Fire brigade, and few details about the nature of constructions relating to the walls, roof and floor and how the building is separated from adjoining or adjacent buildings.²⁷

2.1.5.2) The relationship between the Fire Surveyor and the Fire Protection Officer:

By carrying out his duties, the Fire surveyor will often find himself face to face with the Fire protection officer. For, although both are pursuing very similar goals (the first and most important being preventing Fire from happening), yet they sometimes put forward conflicting requirements, a fact which management may find confusing. This is primarily caused by their different motivation : “ The Fire protection officer’s (FPO) prime concern is to safeguard life, while the Fire surveyor, though he realises that safety of life is the first priority, is by virtue of his terms of reference principally concerned with property.”²⁸ Yet, this relationship between the Fire service and the Insurance companies could evolve to take more co-operative and advisory aspect. This could be portrayed in the “Holroyd Committee Report” of 1970 on the Fire service which expressed “the hope that Insurers would continue to put pressure on the management of bad risks by imposing heavy premium surcharges or, simply, by refusing to accept insurance.”²⁹

²⁷ “Insurance Procedure”

²⁸ Bardell Roger. “The Insurer’s Role in Fire Prevention”. *Fire*. June 1976.

²⁹ Bardell.

Actually, this represents one of the functions of the Fire Underwriter who has to decide whether a specific risk is acceptable or not. And if so, how far the surveyor's recommendations should be implemented, and what premium should be charged. Unfortunately enough, the Underwriter's task isn't always rewarding in what relates to improving Fire risks. For, a conscientious underwriter who attempts to protect his client's interests by proposing what he considers to be a 'reasonable requirement' for Fire safety, may find the client unwilling to follow his advice. This is unfortunately true for most of the cases when the client chooses to refer to a more "Economical solution" offered by another insurer who might be prepared to take the risk as it stands. So, though this may save the client's money at first place, yet it could well be against his long terms interests, which makes it regretful that all sections of the insurance market do not follow a similar approach towards imposing strict Fire protection measures. Whether insurance consumers like it or not, "some risks should be uninsurable anywhere in the insurance market in the absence of essential risk improvements."³⁰

³⁰ Bardell.

2.2) Fire Safety Legislation :

2.2.1) The History of Fire Protection regulations

Building regulations relating to Fire protection are very famous throughout History. Over the years, such regulations have developed into specific codes and standards which were forwarded by professional committees concerned with Fire protection. In many cases, a certain code dealing with a hazard of great importance may be enacted into Law. Yet, it is necessary to distinguish between the meaning of “Law” and that of “Technical standards”. According to Fergusons³¹, law is defined as representing “ the creation of restrictions that may be necessary to the freedom of choice of the individual to ensure the existence of conditions that conform to minimum standards of safety.” On the other hand, technical standards should define what such minimum standards of safety are, but without restricting the means of achieving such acceptable levels of safety.

Moreover, the standards ought to be clear, understandable and written, so that compliance or non-compliance can be easily monitored. Of course, at the time when the famous law-making Babylonian King, Hammurabi, reigned 4000 years ago, he was able to develop one of the earliest building laws that was simply based on both the concepts of retaliation and direct retribution. This law states that “in the case of collapse of a defective building, the architect is to be put to death if the owner is killed by accident;

³¹ “Legislation.” *Fire Safety Management*. University of Edinburgh: Department of Architecture and

and the architect's son if the son of the owner loses his life."³² Hammurabi's code represents one of the earliest building laws that were primarily concerned with the prevention of collapse. Later on, many building laws evolved containing detailed Fire safety protection measures.

2.2.2) The Purpose of Legislation :

The basic philosophy adopted by legislators states that " if occupants of a building can escape safely from a Fire, the protection of the building is not the responsibility of the law but a matter between the owner and his insurers."³³ Hence, one could accept the purpose of such legislation as two folds:

1. To impose a level of safety such that it is unlikely for the people occupying a building to be hurt by Fire.
2. To protect the community from any Fire in a particular premise or building.

Generally speaking, most of the UK's Legislation is concerned with Fire Protection, and implicitly admits that Fire will take place and that the worst possible consequences of a Fire must be mitigated.

Fire Safety Engineering. 1980.

³² "Building and Fire Codes and Standards." *Fire Protection Handbook*. Massachusetts: NFPA. 1991.

³³ "Current Fire Safety Legislation." *Design Against Fire*. University of Edinburgh: Department of Architecture and Fire Safety Engineering. 1980.

2.2.3) The UK's Fire precautions act of 1971 :

In an attempt to rationalise and to group some twenty-three minor statutory provisions all relating to the Fire safety provisions applied in certain premises, a consolidating and unifying Act was proposed in 1971 which, in time, would embrace the Fire safety requirements for all buildings. In other words, the Fire precautions Act of 1971, in addition of being concerned mainly with the protection of life, seeks to “bring within the frame work of one Act, administered by one government department and enforced by one set of authorities (the Fire authorities), the Fire protection measures in respect of different classes of premises which had hitherto been spread over a number of acts, administered by a number of departments, and enforced by a multitude of authorities, from district councils to licensing justices.”³⁴ This proposal was accepted by the government as an “Enabling Act “ which means that it applies to no building in particular, but the Minister of State has the power to issue “designating orders” which specify the types of buildings to be brought under this same Act, and which parts of the Act should apply. Until 1981, three of such orders have been designated, applying to :

- 1) Hotels & Boarding Houses.
- 2) Offices, Shops & Railway premises.
- 3) Factories.

Yet, the most important feature of the Act is reflected in the individual certification of designated premises. Consequently, and under section 6 of the Act, a Fire certificate must specify in relation to any individual premise, its use,

³⁴ Rudd G. T. “The Statutory Constraints”. *Fire Safety Management*. University of Edinburgh:

means of escape, and arrangements for their use, the means for fighting Fire (number, type and exact location of Fire fighting equipment), and the means for giving warning in case of Fire. Furthermore, the same Fire certificate may impose requirements for ensuring that the means of escape are properly maintained and kept free from obstruction and that all other works are properly maintained, for instructing occupants and training them, for limiting the total number of people and, finally, for maintaining imperative arrangements and considering seriously any other precautions in relation to risk.

2.2.4) Application of Fire safety Legislation

Figures published in the UK in 1973 assessing the degree of implementation of 1971's Fire precautions Act did reveal shocking results: in the first "designating order" relating to hotels and boarding Houses, "only 43,000 premises were registered, out of known possible 69,000 that should have registered ; and only 2,000 inspected!"³⁵

Some Fire Safety experts argued about how slow and ridiculous the rate of inspections seems to be, which will mean obviously that it will take another 34 years to complete that order's alone inspections !

Other statistics published in 1975, revealed that " only one tenth of the hotels and boarding houses liable to certification under the 1971 Act had been inspected and certified."³⁶ Both statistical figures couldn't but reveal the fact that the benefits gained in adopting necessary Fire precautions, even within the

Department of Architecture and Fire Safety Engineering. 1980. (pp 1-17)

³⁵ Winning (pp 48-50)

limited scope of the existing law, are offset by the slow rate of progress in actual designated orders, not to mention future ones yet to be declared.

At this point, and because of the fact that carrying out the inspection and certification of any "order" will be moving in a fairly slow rate, the UK's joint Fire prevention committee of the central Fire brigades' advisory councils decided that occupancies ought to be ranked according to their life risk. Further research confirmed the belief of the committee that "priority should be accorded for the most part to places where people are likely to be asleep when Fire occurs."³⁷

As a result, and apart from private residential premises, "the highest life risk was to be found in boarding houses and hotels, welfare and charity homes, and hospitals."³⁸ Yet, it is useful to mention that the difference between these mentioned categories is not as great as to suggest inflexibility in order of priorities, specially when many circumstances may vary with passage of time.

2.2.5) The Fire safety codes and standards :

For many years now, building codes dealt mainly with structural safety under Fire or earthquake conditions. As time passed by, codes have developed into documents prescribing minimum requirements for structural stability, Fire resistance, means of egress, sanitation, lighting, ventilation, and built-in safety equipment.

³⁶ Rudd. (pp 1-17)

³⁷ Rudd. (pp 1-17)

³⁸ Rudd. (pp 1-17)

On the other hand, specific Fire prevention codes came “to regulate the hazards of Fire and explosion associated with the storage, handling, and use of hazardous substances, materials, and devices and hazardous conditions associated with the use or occupancy of building or premise.”³⁹ As such, while the requirements for exits and Fire Extinguishing equipment are found in the Building code, the maintenance of such items is covered in the Fire prevention code, making both codes complementary to each other. It is useful to remind here that Fire prevention actually includes all Fire Service activity that decreases the incidence of uncontrolled Fire. The activities related to Fire prevention focus on inspection, which includes engineering and code enforcement, public Fire safety education, and Fire investigation.

Today, the largest, most democratic and accessible voluntary standards in the world are the National Fire Protection Association’s (NFPA) codes and standards. Their usage is spread from government to industry, from institutions and laboratories to installers, designers, insurance representatives, and scientists. They are continuously formulated and up-dated through NFPA committees composed of highly qualified professionals and organisations. Moreover, many describe them as the “cook book” of Fire safety.

Usually, Fire prevention codes are adopted into law by the state council or community, and often outline specific Fire prevention requirements and enforcement procedures. Moreover, they contain an administrative section that provides the legal framework and organisation for the Fire prevention program, outlining the code’s applicability to occupancy types and whether it applies to new or existing buildings, or both.

³⁹ “Building and Fire Codes and Standards”

In addition to what preceded, the code may define the enforcement authority of the Fire prevention officials in question, including their lawful rights of entry for mandatory inspections of private properties and occupancies. Normally, occupancies subject to inspection include places of public assembly, educational, institutional, mercantile, business, industrial, manufacturing, storage and special hazards structures. The inspector conducting such duties should be able to convince property owners &/or occupants to maintain Fire-safe conditions. Yet, it is of extreme importance to note that “the inspector who relies only on police power cannot accomplish as much as the inspector who relies on salesmanship.”⁴⁰

Furthermore, the Fire inspector, and under the same lawful rights granted to him by the same code, may issue orders to correct hazardous conditions within a building, ranging from simple warnings or notices of violation, to legal warrants or court orders.

The Fire prevention officer, has, as well, the right to order evacuation of an unsafe building or premise, the duties of investigating Fires, the issuance of specific activity permits and Fire certificates or licenses, and of course, the duty to keep records of all preceding activities.

Yet, even though Fire protection codes are made to increase people's awareness and to protect them as well, many managers do erroneously perceive them as the best protection possible for people and property. This a completely wrong perception. For, it is a great fallacy, if not a myth, to consider a

⁴⁰ “Fire Prevention and Code Enforcement.” Rev. Robert B. Skip Smith. *Fire Protection Handbook*. Massachusetts: NFPA. 1991.

particular business or industry to be safe only because “it meets the code.”⁴¹ This confusing situation is actually due to management’s lack of understanding and expertise in the area of Fire prevention and protection. In this case, there should be extensive reliance and co-ordination between the Fire insurance carrier, the Fire inspector and management’s delegate in order to provide adequate Fire protection.

2.2.6) Commenting Fire safety Legislation :

One of the comments relating to Fire safety legislation argues that “the present day Law is rather a mixture of general statements of intent and detailed technical requirements.”⁴² Consequently, what we will be witnessing is the enforcement of what was described as “Letter of law” rather than “the spirit of the law”.⁴³ Other comments dare to relate the reasons for confusion and failure in design to the frequent amendments of regulations, the municipality of controlling authorities, the twisted legal phrasing of regulations and the inflexibility due to specific technical requirements being included in the statutory instrument, to name some.⁴⁴

⁴¹ Ladwig,

⁴² “Legislation”.

⁴³ “Legislation”.

⁴⁴ Franklin P. et al. “International Perspectives on Standards and Codes: United Kingdom.” *International Life Safety and Egress Seminar*. University of Edinburgh: Department of Architecture and Fire Safety Engineering. 1981.

2.3) Fire safety in Building design :

Major Fire outbreaks in the past jeopardized whole cities because of poor buildings design, poor city layout, combustible construction, and of course, because of “the ever present” lack of understanding or implementation of adequate Fire protection measures. Several disasters witnessed in the U.S. during the past 100 years or so, have brought about reforms in the then existing codes. This was later on reflected in the changes brought to the construction methods and materials used, and to the design of Fire suppression systems.

On the other hand, the same disasters “introduced” what was perceived as “Fire proof” construction methods which were intended to save buildings from potential Fire risks. Unfortunately enough, buildings kept on burning, while the legend of “Fire proof” constructions turned to be a great fallacy with Fires such as New York’s Parker building incident in 1908.⁴⁵

2.3.1) Building codes & standards :

When referring to the topic of Fire safety in Buildings, it is necessary to re-define the relationship between buildings and Fire codes. One must remember that codes are usually developed through the negotiations of various individuals and organisations who have different interests with regard to the

⁴⁵ Ludwig.

resulting code. Yet, some codes and standards are not legislated into Law until they are adopted, in whole or in part, by state or local jurisdictions.

Building codes are “Laws that set forth minimum requirements for design and construction of buildings and structures.”⁴⁶ These minimum requirements are often given minimal attention from the part of buildings’ designers, in favour of other priorities like functionality, cost-effectiveness, timeliness and aesthetic appeal. For, both designers and their clients are eager to meet the minimum safety standards of the local building code, assuming incorrectly that the codes provide complete solutions “rather than minimal ones”. Moreover, some buildings’ owners might find Fire as representing a tolerable risk, which will be balanced between the provisions of Fire insurance and/ or the availability of dependable public protection.

2.3.2) Building codes & Fire Protection :

Large losses of life or property are virtually unknown in buildings that comply with modern Fire protection requirements, which is not but a reflection of the effectiveness of modern Fire safety codes. On the other hand, so many other buildings do not comply with such codes, for reasons such as the lack of their retroactive application. Moreover, the concept of Universality,⁴⁷ which simply means that any successful Fire safety program must “go” where Fire usually “attend” (i.e., in rural communities, poor neighbourhoods, pre-schoolers, the elderly and existing multi-owner buildings), is often disregarded.

⁴⁶ “Building and Fire Codes and Standards”

⁴⁷ Hall

How can one assess the impact of Building codes on Fire protection? A clear enough example lies in the establishment of the height and area criteria for particular buildings based on their intended uses.

As such, building codes might establish also Fire limits or Fire districts in certain areas of a municipality, thus allowing only for specific types of construction within these Fire limits. The aim of such a restriction is to help reduce the conflagration potential of the more densely populated areas. Also, many other requirements for Fire protection are found in building codes such as:

- 1) The enclosure of vertical openings (stair shafts/ Elevator shafts).
- 2) The provision of exits for evacuation of occupants
- 3) The requirements for flame spread.
- 4) The provisions for manual and automatic Fire suppression systems.⁴⁸

Yet, the relationship between Building and Fire codes is found some times ambiguous. For it is often difficult to differentiate between what items should go into the Fire code, and those to be included in a Building code. Usually, every requirement dealing specifically with the construction of a building is part of the building code. While, for example, the Fire prevention code could possibly include information on Fire hazards in a building, which is usually dealt with by the Fire official. Thus, requirements such as Exits and Fire extinguishing equipment are generally found in building codes; while the maintenance of such items and the issuance of appropriate "Fire Certificates" are covered in the Fire prevention codes.

⁴⁸ "Building and Fire Codes and Standards"

2.3.3) The “Systems approach” applied to the Fire problem :

The issue of Fire safety in Buildings involves a great number of variables, not to mention the difficulties one might encounter while trying to obtain relevant and detailed data. In brief, Fire safety can be incorporated into building design by adopting one of the following three methods”⁴⁹:

1. Through the use of “specification oriented” building codes and standards, which requirements are based on previous Fire experiences and are known to be generally strict. They usually spell out in detail what material can be used, the building size, and how components shall be assembled.
2. Through the use of “performance oriented” codes to overcome the inflexibility of “specification” codes. One of the major disadvantages of this approach is that each building components is considered on an Ad-Hoc basis. This makes it very difficult to define the Fire safety performance of the separate components, as it will also be for the reciprocal measurement of this same performance. For, when considering the building as one whole entity, it is not necessarily true that if all individual components perform in a satisfactory manner, consequently the building- as a whole- is considered safe. As realistic as it might seem, some components have higher probability of success than others.

In other words, performance codes exactly detail the objective to be reached and establish the criteria for determining whether the objective has been

⁴⁹ “Systems Concept for Building Fire Safety”. Rev. John Watts Jr. *Fire Protection Handbook*.

reached or not. (This is quite flexible for both designers and builders to choose among different construction methods and materials.)

3. Through the use of “Systems analysis” that incorporates an integrated method, including the aesthetic, functional, structural, electrical and mechanical sub-systems. As such, buildings can be designed for Fire safety through the use of this concept of systems analysis, rather than strictly complying to the existing codes. Even though this approach requires a higher degree of professional technology, it will make it easier to achieve greater level of cost effectiveness than other methods do.

In order to understand this new approach, it is better first to define both the words “System” & “Systems Analysis”. A “System” is nothing but a set of components that work together for an overall objective,⁵⁰ while “Systems Analysis” is simply “the methodical study of an entity as a whole”.⁵¹ Moreover, “methodical” actually means to act according to a specific plan, not randomly nor casually. Thus, one can easily understand from what proceeded that “Systems Analysis” may also be defined as a “systematic application of knowledge, skills, logic and intuition to solve a specific problem about a certain system.”⁵²

But how could one apply this new approach to Fire safety? The answer will be through adopting what is called “the Fire Safety Concepts Tree” which is nothing but “the graphic form of the consensus of the NFPA committee on

Massachusetts: NFPA. 1991.

⁵⁰ “Systems Concept for Building Fire Safety”

⁵¹ “Systems Concept for Building Fire Safety”

⁵² “Systems Concept for Building Fire Safety”

systems concepts for Fire Protection in structures.”⁵³ Yet, it is useful to mention here that this graphic representation could not possibly be considered as the only way in which factors involved in Fire safety can be organised.

2.3.4) *Fire safety objectives in Buildings* :

Figures 4 to 7 below present the elements that must be considered in building Fire safety and the interrelation among those elements as extracted from section 1-chapter 3 of the *Fire Protection Handbook*. In this study, the discussion will be limited to the upper levels of the tree presented in the figure. Thus, it makes it easier for a building (the system) to be analysed or designed by progressively moving through the various concepts in a logical and methodical manner (systems analysis). It is useful to mention here that “reading” the tree could be easier to grasp when one is at lower levels, aiming high, at the Fire safety objective(s). Needless to mention here that lower levels are not at all synonymous to lesser importance of performance. On the contrary, they represent a means for achieving the next higher level.⁵⁴

As for the Fire safety objectives(s), they tend to describe “ the degree to which the building should protect its occupants, property and contents, continuity of operations, and neighbours.”⁵⁵ Yet, the “Concepts Tree” imposes conditions to be met in order to attain the desirable objectives, but without providing the minimum condition required to achieve those objectives. Thus, according to the “Tree”, the Fire safety objectives can be met if Fire ignition can be prevented or if, given ignition, the Fire could be managed.

⁵³ “Systems Concept for Building Fire Safety”

⁵⁴ “Systems Concept for Building Fire Safety”

Figure 4. The Principal Branches of the Fire Safety Concepts Tree

Figure 5. The "Prevent Fire Ignition" Branch of the Fire Safety Concepts Tree

Figure 6. The "Manage Fire Impact" Branch/ Manage Fire Section

Figure 7. The "Manage Fire Impact" Branch/Manage Exposed Section

Moreover, the “ Prevent Fire ignition” branch essentially forms a Fire prevention code, where the responsibility for achieving the goal of Fire prevention is essentially an owner/occupant responsibility. However, the designer may be able to incorporate certain features into the building that might assist the owner/occupant in preventing Fires.

On the other hand, as Fire ignition in buildings could not possibly be prevented 100%, the “Manage Fire impact” branch of the Fire safety concepts tree may be considered as a building code by the design team. Therefore, according to the logic of the “Tree”, the impact of the Fire can be managed either through the “ Manage Fire” or “ Manage exposed” branches. Actually, the “OR” gate indicates that the possibility of reaching the objectives through both avenues will increase the probability of success over using one branch only. While, on the other hand, and under “Manage Fire”, one of the options present is to control Fire by construction, which involves two necessary conditions: control the movement of Fire and provide structural stability. Here, both conditions are necessary (referred to by the “AND” gate) in order to achieve the control of Fire by construction.

In brief, the “Fire safety concepts tree” can be adapted for a number of different functions, particularly through its descriptive feature relating to the main requirements of both the Building code and the Fire prevention code.

⁵⁵ “Systems Concept for Building Fire Safety”

2.4) Fire Safety Management within organisations

The increasing threat of a severe direct or indirect loss in large businesses as a result of a major Fire &/or explosion, has now become a major concern to many executives and members of senior management. This has been the main reason behind the rise of "The Fire safety management" concept as to represent both a possible and rational solution in that it organises the taking of whatever steps that are considered appropriate to minimise the likelihood, and mitigate the consequences, of Fire within organisations. In this definition, "safety" will be referring of course to the "safety of life". But since the concept of safety is rather subjective for most people, it might refer as well to the safety from injury, and in the broadest context, to the safeguarding of general well being. Moreover, life safety could well extend from the employees of the organisation to nearby neighbours, or even, to the community as a whole.

On the other hand, the responsibility for Fire safety is not at all restricted to the private organisation. On the contrary, and even though it is unequally divided, Fire safety is the responsibility of government bodies, insurance companies and the private organisation in question. As such, the organisation usually follows the regional Fire protection codes enforced by the government (through the Fire Service Personnel), of course in liaison with insurance companies which role will consist sometimes of endorsing the decisions of the Fire Brigades or may extend to require special Fire Safety precautions to be adopted by management.

⁵⁶ Rudd

In brief, the role of insurance companies is vital in that it creates a reasonable economic (and safe !) climate for the maintenance of the economy.

2.4.1) The Fire safety management structure :

Management structures do usually differ according to the size of the organisation in question. Consequently, it's easy to locate three principal types of management structures:

The first management structure refers to the single site or small / local group organisation, with an unrelated product line or services facility. Usually, in this case, management control is represented through a rather simple hierarchical pyramid formation, and the Fire safety functions would be delegated invariably to someone in the lower management (a shop foreman for example). In such small organisations, the size of the establishment plays as essential role regarding the assigning of numerous other responsibilities to one person alone. For, in such companies, accepting too many responsibilities and succeeding in each and every one is a demonstration of one's personal achievement and capabilities that will be often rewarded.

The second management level deals with the reasonably sized group of organisations. Usually, this type of organisations is a multi-site, national or regional group, with possible centralised control. Here, the Fire control activity is of course functional and the Fire managers are functionally responsible for Fire safety standards and conditions for all the different sites of the organisation. This makes it easy for setting appropriate standards which could be audited periodically to ensure that they were being properly understood and

complied with. This actually reflects an efficient and cost effective system where it is possible for the Fire safety manager to reduce costs substantially on many project proposals because of this close involvement in their safety analysis.

The third management level relates to large multinational organisations, possessing a huge number of smaller, yet independent companies, offering a variety - and sometimes unrelated - products and services. One of the advantages of such organisations lies in the fact that executive management is often stimulated to adhere to the management of risk. Therefore, being a large organisation will indirectly justify spending more money in issues like Fire safety. In this respect, the Fire safety manager could often need professional opinions and advice, usually given by special advisory Fire safety consultants.⁵⁷

2.4.2) The role of the Fire safety management :

Fire "Protectionists" are among those dedicated individuals whom duties include the prevention and/or control of Fires, and who continually strive to reduce the probability of such Fire incidents and consequent victims. While it is true that nobody can prevent all Fires or explosions from happening, it is yet possible to avoid most potential major loss situations (whether of life or property) if they are correctly monitored, identified and reported. Only then can Fire safety management and loss control be achieved. For, the objective of Fire safety management in a commercial organisation consists of "preventing a loss which could be catastrophic with as little, or no, expenditures of money as

⁵⁷ Woolhead.

Figure 8. Fire Safety Management Pyramid

possible.”⁵⁸ The basic concept behind this objective is to look for what in fact is going to be the cause of Fire in any particular area and to ensure that, no matter how simple and “naïve” the probable cause or how small the potential Fire is, its nature should be well analysed and understood by the Fire safety manager.

Moreover, this same Fire safety manager must have sufficient knowledge and expertise to advise his board of directors of what his safety policy should be, and specially not to be constrained by board decisions, which may take the form of instructions to blindly comply with “ minimum requirements “ of legislation. Therefore, the manager ought to conduct a Fire safety plan which will be as much cost-effective as complying with the pertinent law of the country. Once again, the size of the organisation has an important role to play in deciding the functions of the Fire safety manager, thus allowing for a three - level function : at works (local), group and executive levels.

At the first level, the Fire safety manager could be expected to carry out a number of functions other than those related to Fire safety, which will help explaining why such “ title” is difficult to trace within most, small sized, organisations. But, where such a position actually exists within a specific organisation, the Fire safety manager’s tasks should include the following:

- 1- The continuing evaluation of potential risks as they might affect life safety, and communicating Fire safety plans and proposals to management.

⁵⁸ Diggle W. N. “The Practice of Fire Safety Management in the Chemical Industry”. *Fire Safety Management*. University of Edinburgh: Department of Architecture and Fire Safety Engineering. 1980.

- 2- Training all personnel periodically in “ First aid” Fire fighting and Fire safety.
- 3- Ensuring that the Fire Protection Systems be maintained in optimal conditions, at all times.
- 4- Advising on possible problems arising from changes or interruptions in plant operations.
- 5- Making a continuing assessment of the risk of the plant to the locality and vice versa.
- 6 Making detailed reports of each Fire incident, irrespective of its size and consequences, for group and executive levels (if any).
- 7- Co-ordinate and liaise with all relevant bodies, whether the Fire service or the insurance company.
- 8- Make the best efforts to integrate Fire safety with general safety.

Moreover, these previous functions might need a small team in some organisations, while in others, it could be a part-time function of a member of the management, or even inclusive in the duties of the “ repair and maintenance officer”, like in small organisations.

At the second level, the Group’s Fire safety manager functions might include the following :

- 1) To be responsible for adequate Fire Safety in the Group.
- 2) To identify the trends in Fire incident patterns from incident reports and to consult with the work (local) manager.
- 3) To propose Fire Safety schemes for all departments in the Group with respect to continuity of production and safety of life.

- 4 To be able to manipulate the budget within the group according to specific needs.
- 5) To assess the acceptable levels of risk and the means to reducing such risk to a tolerable level.
- 6) To consult periodically the executive management for reporting and advice, and to provide necessary information for statistical processing.

Finally, at the third level, the executive's Fire safety manager functions will include the following :⁶⁵

- 1 Co-ordinating all Fire safety activity within the corporation with the objective of reaching life safety and loss prevention.
- 2- Using a team approach (could be one man with outside consultants) to decide corporate Policy on Fire safety and decide on the acceptable levels of risks for a particular operation.
- 3- To make continual re-assessment of the levels of Fire safety that exist and the means to ameliorate existing conditions.
- 4- To advise group and local Fire safety managers on every aspect of Fire safety.
- 5- To liaise with the Fire brigades and insurance companies.⁵⁹

⁵⁹ Woolhead.

2.4.3) Applying Fire prevention practices in Fire safety management : Two case studies

As it was mentioned earlier, Fire prevention could be best achieved by removing the heat-source, the fuel source, or by changing the human behaviour that bring them (intentionally or non-intentionally) together. Whether one accepts it or not, it was found that Man had been directly or indirectly the cause of most Fires in History, and it is Man himself who should learn to deal with their consequences. Knowing this fact and many others relating to Human behaviour in relation to Fires, Marks and Spencer, the famous UK chain of stores (251 national stores serving more than 13 million people a week and with an annual turnover of 625 million Sterling Pounds in the late seventies), is very well known to regard "PREVENTION" as even more important than measures to control Fires⁶⁰ (i.e. "PROTECTION").

In fact, Marks and Spencer had organised a Fire and safety committee in 1957 which had been in charge of establishing "in-house" codes of practice (with private "approvals" !), in addition to advising all stores on technical matters relating to Fire prevention. This committee, in which many management groups are represented, meets periodically at the head office and is directly responsible to the board of directors. Moreover, this committee works very closely in liaison with all the other sections of the Building group- the electrical, heating and ventilation, mechanical handling, refrigeration, architects, equipment and supplies, etc.. and other company's departments, thus favouring early discussion of Fire problems from the early design stage of any project.

⁶⁰ "How Marks and Spencer Plan Against Fire." *Fire Prevention*. 105. (pp 15-21)

Moreover, the Fire and safety committee's responsibilities are not only concerned with the Marks and Spencer staff (discussed thoroughly later on), but also extend to protecting the company's premises from the possible carelessness of outside contractors.

This briefly explains why the company, through its famous Building group, insists that all contractors agree to comply with the company's "private" regulations concerning Fire precautions during building design and operations.

On the other hand, the "Industrial management liaison group" at Marks and Spencer is responsible of assuring that those periodically supplying the company also adhere to reasonable Fire safety precautions. This aspect of Fire prevention is only one of the many responsibilities of that group, whose duties also include offering advice to manufacturers on how they can best protect their factories and products, drawing lessons from Fires elsewhere, supplying Fire safety checklists, and strongly encouraging the manufacturers to constantly liaise with the local Fire brigade.

This was a brief description of M & S's Fire prevention practices relating to outside contractors and suppliers. Yet, more concern is given to Fire prevention in all stores, warehouses and company offices. Staff responsibilities are very clearly outlined in that they must successfully implement the Fire defence plan in every store, under the direct supervision of the store manager. The basic objectives behind such a plan could be summarised in the following:⁶¹

⁶¹ "How Marks and Spencer Plan Against Fire." (pp 15-21)

- 1- To design out the Fire risk.
- 2 To have an alert and well trained staff at all times, who know how to help prevent Fire and exactly what to do in the instance of Fire.
- 3- To provide sprinkler and automatic Fire detection systems as a back-up protection or second “fall-back” line of defence.
- 4- To maintain continuous liaison with the Fire brigade, the local authorities and the various advisory bodies.

Moreover, in addition to following the overall Fire defence plan, all stores are supplied with a booklet called “Fire precautions”⁶² prepared by the company’s Building group, which underlines and explains the duties and precautions necessary to achieving adequate Fire prevention. Moreover, the booklet details the regular duties such as those to be carried out daily at the opening and closing times of all stores, those relating to Fire alarm response, Fire fighting and exit maintenance and the duties concerned with staff training. In addition, it contains special Fire prevention rules, a list of forbidden behaviours (smoking in restricted areas, etc.), a list of previously approved cleaning and maintenance equipment, and the criteria for night watchmen selection and training and many other detailed instruction on what action to take in the event of Fire.

Actually, the most important feature in the booklet is reflected in the efforts made to train and motivate employees to achieve the highest possible levels of Fire safety. The cover page of the booklet stresses that the staff’s help and co-operation are necessary to achieve such levels.

⁶² Marks and Spencer. *Fire Precautions*.

For, “no system, however good, can succeed on its own”, and that “Fire prevention is a direct concern.”⁶³

On the other hand, Trust Houses Forte Ltd, one of the largest hotel, catering and leisure groups in the world (operating or associated with over 880 hotels and holiday villages and over 3,000 restaurants and catering outlets scattered in some forty countries), is also famous of its good organisation for Fire prevention. Actually, Trust Houses Forte Ltd (THF) had linked, in the mid seventies, Fire prevention and risk management concepts to insurance.⁶⁴

Thus, the Group insurance advisor was made directly responsible for Fire prevention within the group ; he reports to the director of administration, who is also a member of the board of directors. Moreover, a team of full-time Fire prevention officers reports directly to the Group Insurance Advisor. The team is formed of former Fire brigade officers, whom service careers were mainly concerned with Fire prevention and each of whom will be covering a specific geographical area. Their duties consist of giving on the spot criticism and advice, in addition to special Fire safety inspection report form, copies of which go to their “unit” manager, to the responsible director, and to the Group insurance advisor. Thus, the Fire prevention officers will be aiming at a “common standard which meets both legal and insurance requirements.”⁶⁵

On the other hand, THF is equally proud of its reputation for its professional staff training, which is considered by many as one of the corner stones of the group’s Fire protection policy. Actually, THF undertakes levelled

⁶³ Marks and Spencer

⁶⁴ “How Trust Houses Forte Ltd. Organises Fire Prevention.” *Fire Prevention*. 126. (pp 21-25)

and periodical type of training for all its staff members, and detailed records are kept for this purpose : those who actually received training and those who did not are not registered. And because of some language problem difficulties, THF chose to concentrate its training on “simple, basic Fire prevention”, while much importance had been attached to the use of visual aids. Moreover, detailed guidelines are set down for the stages at which particular aspects of the training are to be communicated to each staff group. Some sections of the package deal with the following topics :

- 1- Theory of Fire.
- 2- Preventing Fires
- 3- First steps on discovering a Fire.
- 4- Calling the Fire brigade.
- 5- The Fire plan.
- 6- Fighting a Fire.
- 7- Use of Extinguishers and Fire fighting equipment.
- 8- Hints in dealing with Fires.
- 9- Further Fire Safety information.⁶⁶

Consequently, it is very clear how THF approaches and manages its Fire safety : its effective solution is rather “ a combination of thorough staff training and regular inspection under the control of the Group’s insurance department.”⁶⁷

⁶⁵ “How Trust Houses Forte Ltd. Organises Fire Prevention.”

⁶⁶ “How Trust Houses Forte Ltd. Organises Fire Prevention.”

⁶⁷ “How Trust Houses Forte Ltd. Organises Fire Prevention.”

2.4.4) Fire loss management :

Because few companies could ever survive a major Fire loss in today's environment of severe Business competition, more emphasis was put to know how people could possibly aid in loss minimisation. For, according to statistics published by some major US property insurance companies, it was found that “the factor with the largest effect on the size of a loss by Fire or explosion is what people actually do or fail to do.”⁶⁸

In this respect, some examples could be given to show the kind of improper decisions yet to be fought:

- 1) The failure to inspect, and maintain, different kinds of suppression equipment
- 2) The decisions to omit automatic Fire suppression systems
- 3) The violation of known and basic safe practices
- 4) The use of improper building materials

Obviously enough, the major part of these violations relates to the lack of application of sound Fire prevention measures, the reasons of which could vary from the absence of employees' motivation to arrive to a total ignorance of — possible outcomes resulting from a danger as “nebulous” as Fire.

Hence, it was necessary to have a “Fire conscientious” management which should be involved in conducting effective Loss control programs within their organisations. Of course, the success of such programs relies heavily - if not totally dependent- on management's involvement and continuous support.

⁶⁸ Barry Thomas F, Richard W. Asa and Charles H. Moye. “Fire Loss Prevention and Control

What does “Management loss control programs” actually mean ? Here, and contrary to the concept of “Fire Safety management” where the safety of life was the prime concern, “Management loss control programs are procedures utilised for the protection of assets from loss due to Fire or other causes.”⁶⁹

2.4.4.1) The loss control program :

In such a program, management (in relatively medium and large sized organisations) could be divided into three levels or echelons, each contributing to overall loss prevention and control:

- THE EXECUTIVE MANAGEMENT, consisting usually of the board of directors and Company Officers.
- 2- THE MIDDLE MANAGEMENT, consisting mainly of facility managers, department heads and related staff managers.
- 3- THE LINE MANAGEMENT, consisting of supervisors and section chiefs who will direct each phase of the operations.⁷⁰

In the first and highest managerial level, executive management's primary role is to guide the organisation to produce a profit. Moreover, their task should include the supporting of Loss prevention/control programs and their insistence upon regularly updating them to monitor potential progress.

Management.” *Fire Protection Handbook*. Massachusetts: NFPA. 1991. (pp 9:14- 28)

⁶⁹ Barry (pp 9:14-28)

⁷⁰ Barry (pp 9:14-28)

In the second managerial level, middle management is directly responsible for the development, implementation, and monitoring of cost-effective loss control programs. The person in charge (loss control manager or other title depending on the organisation) must have direct access to the decision makers at the executive management level.

Here, the responsibilities of a loss control manager might actually include: overall supervision of the implementation of the program, anticipating hazards by formulating Fire prevention plans, educating and training employees in Fire prevention practices, delegating specific duties to employees, co-ordinating the overall program with different departments and with the public Fire department and insurance company, and finally, reviewing periodically the efficiency of the entire loss control program. This later responsibility might involve as well the carrying out of a loss appraisal survey in order to remove (or at least reduce) the threat or loss to a more acceptable level.

The third and lower level of management is responsible for regular and daily enforcement of company policy. Consequently, with regard to his employees and work areas under his supervision, the line manager will be responsible of the following:

- 1- Training company personnel to implement individual duties in a loss control program.
- 2- Working with the loss control manager and appropriate staff in selecting adequate employees for the private Fire brigade.
- 3- Maintaining and inspecting Fire protection equipment.

- 4- Inspiring employees to develop a Fire conscious attitude and proper respect for the Loss control program .
- 5- Insisting that adequate access to all protection equipment and exits be maintained at all times.
- 6- Reporting any occupancy change that may affect loss control.
- 7- Supervising emergency actions when a Fire or other property - related incident occurs.
- 8- Working together with the Loss control manager and staff to ensure that Fire exit drills are held regularly.⁷¹

In general, and when it is a question of managing Fire loss, it must be well kept in mind that “ it is not the Fires themselves that are the greatest concern, but their effects are the ones that matter.”⁷² Therefore, although the primary purpose of any Fire prevention strategy is to protect lives, organisations have special responsibilities to their own viability and to that of the community with respect to loss prevention. A Fire or explosion occurring in any organisation will, in addition to the direct losses incurred in the structure and equipment (which are usually covered by insurance companies), have other ripple effects taking the following forms :

- 1) Loosing customers through their shifting to other suppliers to whom they risk of becoming loyal.
- 2 Insurance rarely succeeds in replacing all structures and equipment, which will force the organisation to draw from its assets to cover these costs.
- 3 Large claims paid by insurance companies are often the stimulus for increasing the insurance premiums.

⁷¹ Barry (pp 9:14-28)

⁷² Woolhead

- 4) Repairs and reconstruction take time, during which professional and experienced staff may find permanent job elsewhere.
- 5) Business records may be destroyed, which will require a costly and time consuming process of reconstructing accounts, inventories, etc..
- 6) If the Fire spreads to some neighbouring properties, the owner(s) may sue to recover damage.
- 7) When returning back to operation, many employees will express signs of demotivation and anxiety.
- 8) Purchases from other suppliers will increase, and effort will be shifting to a later stage of production or even another type of production.
- 9) In some cases, the cumulative effect of these possibilities may leave no choice but to declare bankruptcy and permanently closing the facility.

In brief, and according to some estimates, “consequential losses were calculated as running at somewhere between 1.4 and 4 times the cost of direct losses from Fire.”⁷³ Thus, it is found that, the ability of a firm to keep operating despite the loss of part of its usual spectrum of customers is determined by the degree of its integration within the industry. For, “the more heavily integrated it is, the more vulnerable it will be to disruption of production.”⁷⁴ Therefore, and in order to encounter such disaster through ensuring the organisation’s continuity in the event of Fire, even at some increase in the cost of production, a Fire conscious board must go beyond the statutory requirements and establish a suitable “fall-back” position to ensure overall continuity of production.

⁷³ Rudd

⁷⁴ Rudd

Needless to pin-point here the importance of knowing that Fire risk management can be practised only from within an organisation, whether industrial or commercial, while external advisors can only alert or assist in identifying and evaluating areas of potential high loss.

2.5) Fire protection in Lebanon : The development of the first national code:

2.5.1) Background information :

During the period of civil war in Lebanon, and subsequent to the launch of the peace process, the preoccupation of consecutive governments with the political and economic situation dominated their agendas. Little work was conducted on the modernisation of the Lebanese public institutions and the upgrading of legislation, especially as with regards to ensuring the safety and well being of the Lebanese citizens.

So , with the absence of Fire safety standards and the lack in Fire brigades and civil defense's efforts to enlighten the public as to the appropriate Fire safety measures, public and private institutions had to rely on their own individual judgements for deciding which means of Fire prevention and protection are best to be applied to their organisations . The following section aims at describing the application of Fire safety management in Lebanon by examining both public efforts for the implementation of sound safety measures and the initiatives of private organisations for safeguarding their human and physical resources from the threat of Fire.

2.5.2.) The Lebanese Fire protection code draft:

Following the formation of the Hariri government in 1992, a national reconstruction program was launched aiming at restoring the shattered infrastructure and stimulating economic growth. The large pool of construction projects underway directed much attention to the standards and norms governing the construction industry, including Fire safety standards.

Traditionally, Lebanese building laws have been quite timid in respect to imposing strict Fire safety measures to be adopted at early stages of buildings design. Actually, few articles of the building law tackled this critical subject, yet different interpretations were possible to admit, and which often differed from one engineer to another.

For, the eighth article of the Lebanese Building Law (which relates to special safety and health requirements) states in paragraph 3 that "all entries to Fuel tanks in buildings' basements shall be equipped with two Fire extinguishers having a capacity not less than five litres each."⁷⁵

Here, the approved types of Extinguishers were not mentioned, neither was the adequate extinguishing agent to be used. Moreover, the same article states further on that in high - rise buildings (exceeding 40 meters in height),
"a building Fire protection proposal shall be submitted following the known French, British, German or US standards without necessarily engaging the building's management in any commitment whatsoever, while complete responsibility and compliance falls on the project's engineer."⁷⁶

⁷⁵ Ministry of Public Works. " Building Laws". (p. 88)

⁷⁶ Ministry of Public Works. " Building Laws". (p. 89)

Once again, this statement leaves engineers free enough to choose the most cost-effective protection strategy applicable, without much concern for the effectiveness of the strategy in terms of human lives saved.

Moreover, the 12th article of the same building law and which relates to building complexes states that such complexes “shall be equipped with necessary Fire protection means and equipment.”⁷⁷ The words “necessary”, “means” and “equipment” are actually too vague and too ambiguous even for a Fire protection specialist to decide upon which optimal solution to choose, specially when he can always refer to the cheapest and simplest method of protection.

Knowing these facts and because the opportunity was there for the first time after the end of the civil war to reconstruct the Beirut City Centre (which makes it easier to completely re-design “Fire protected” buildings), many executives from LIBNOR, SOLIDERE and several other consulting and engineering firms have held meetings for 18 months in order to organise for the future of Fire safe building design. The results were developed into provisions for public safety and Fire protection which were unofficially published as a possible code draft in December 1995. The provisions could be well considered by many as the first true attempt to establish a national Fire code in Lebanon.

Actually, these provisions establish essential Fire protection measures to be adopted in some 265 buildings in the city centre, thus, constituting phase one. The second phase will embody all new erected buildings not only in the

⁷⁷ Ministry of Public Works. “Building Laws”. (p. 94)

city centre but all over the Lebanese territories. In a later third stage, Fire protection measures should spread to cover all existing buildings in Lebanon.

For this purpose, and because protecting Human lives was given priority over protecting the property, buildings in general were classified in categories according to variables such as people/assets load, accessibility, height, familiarity of occupants with the building in question, their capacity/possibility of escaping without special help or while sleeping etc.. Other variables concerning the building itself might include how big a Fire can develop within the building in question and the consequent risks of explosion or Fire spreading.

Consequently, occupancies were divided into the following categories :

- 1- Places of assembly (including cinemas, theatres, music halls, restaurants, worshipping sites, etc..)
- 2- Sporting clubs, museums, etc .. (where more than 50 persons could possibly meet).
- 3- Cultural occupancies (including universities, schools, institutes, colleges, etc...) where groups of 6 people and more could possibly meet.
- 4- Health-care occupancies (including hospitals, nurseries, welfare associations, houses for the elderly, etc..)
- 5- Penal occupancies.
- 6- Residential occupancies.
- 7- Mercantile occupancies.
- 8- Business occupancies.
- 9- Industrial occupancies.
- 10- Storage occupancies.

According to the national Fire code's draft, all previously classified categories will be , at some time in the future, equipped with adequate Fire protection measures as to preserve lives and property. These protection measures could vary from designing buildings as to slow early Fire growth, to installing detection and alarm systems, suppression systems and special compartmentation as to control and limit Fire spread. Also, evacuation of occupants is given necessary and particular attention specially in that the draft explains thoroughly in a dedicated chapter, the importance of having adequate means of Egress for assuring safe and timely evacuation of occupants away from Fire, smoke and gases. However, the "draft" mentions further on that the protection measures-undertaken "shall exclusively follow known international standards, whether West European or American ones". It states later on that "no occupancy permit will be delivered to buildings or premises' owner(s) unless the occupancies in question do comply with the necessary recommendations."⁷⁸ Therefore, in order to obtain the permit, a series of steps should be followed and which could be summarised in the following :

- 1- Preparing a preview of the potential occupants of the building which should be respected afterwards.
- Identifying the relation and proximity of the building to other adjacent buildings.
- 3- Identifying the nature of the structures and materials used in erecting the building.
- 4- Details on heating, air conditioning, the nature of the Fuel used, etc..

⁷⁸ Lebanese Republic: Ministry of Public Works- Civil Planning Administration. *Provisions for Public Safety (Fire Prevention)*. Draft. December 1995.

- 5- Specifying additional or emergency power stations and their Fire protection.
- 6 Providing the blue prints/maps of the occupancy in question showing the nearest Fire hydrant(s), exit routes, Fire Alarms placement, Fire points, Fire retardant materials, and Fire doors.
- 7- Specifying exact location of dangerous materials in buildings and occupancies.
- 8- Specifying Fire suppression systems' location, with specification of the location of the main water tank.

CONCLUSION

The nature of the correlation between Fire safety management and both Fire protection and Fire prevention concepts has become clear to us now. For, Fire safety management, and in order to reach its objective in preventing future Fire loss, could not but rely on Fire protection and Fire prevention in order to organise the taking of whatever steps to minimise the likelihood and mitigate the consequences of Fire in organisations. Yet, it was noticed that Fire prevention is often accorded less attention and importance by most Fire departments (except for the Japanese example), as well as by management in organisations.

One possible reason behind such problem could be attributed to the fact that legislation in general and building laws in particular dealt mainly with Fire protection and with specific codes and standards. As a result, the new Fire protection code ought to take into consideration these facts and impose a tighter control on the extent of public abidance through its provisions. Of course, the most competent body to which such delicate mission should be assigned is the

Fire Brigades, whose officers should be well taught and trained first. Then, they should be given enough power to enforce the code and sanction its discrepancies when necessary.

It is true, however, that arriving to this ideal situation demands a lot of effort and resources. Nevertheless, the code's draft itself which was prepared by prominent engineers and consultants represents the first step in attaining an acceptable, if not remarkable, level of Fire safety.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1) Basic Approach

The absence of Fire safety standards during the years of war and the hindered issuance of the Lebanese Fire Protection Code compelled private organizations, each on an individual basis, to set and adopt their own criteria for necessary Fire fighting means.

A survey has been conducted for providing an overview of the Fire safety management most commonly applied by private organizations and pinpointing deficient areas. It attempts at answering such questions as: What are the most commonly used Fire fighting techniques? How far do organizations stress the concept of Fire prevention's as compared to Fire protection? Is management assigning the responsibility of Fire safety to qualified individuals and are they providing them with the necessary authority for implementing sound Fire safety management, etc...?

3.2) Data Collection

In order to respond to such question, and due to the absence of published information on the issue of Fire safety management practices in Lebanon, the application of Fire safety management in private organizations was assessed employing a quantitative research approach.

Quantitative research attempts at depicting the characteristics of the market and determining the frequency of occurrence of key phenomena by administering a questionnaire to a sample of respondents in a brief time span. Formal and structured research procedures are employed for controlling bias in the cross-sectional data.

The approach to data collection has been highly structured for rendering the individuals' responses as comparable as possible. Each respondent was asked the same questions in the same order as other respondents. This practice allowed the interrogation to be standardized so that the differences in respondents' answers will be attributed to genuine variations and not to divergences in the presentation manner of the questions.

The additional advantages of administering face-to-face structured questionnaires include:

- Introducing less bias to the answers on average than the bias that is normally introduced by allowing respondents to fill in the questionnaires themselves.
- Ensuring that the respondents fully understand the framework prior to answering
- Structuring the questions in a clear and unambiguous manner while allowing the interrogator to explain any unclear points
- Ensuring that the person in charge of Fire safety management answers the questionnaire himself and not delegate it to a subordinate
- Ensuring that the respondents answer the questions in order with no prior knowledge of what the questionnaire includes. This eliminates

the risk of answers to early questions being influenced with the respondents' knowledge of subsequent questions and enhances consistency through out the sample.

3.2.1) Secondary Data:

Because of the rather technical aspect of the Fire protection theme under which falls Fire safety management practices in general, previously published data relating to the subject was not quite easy to find. Moreover, when such resources were "discovered", it was a great disappointment to learn that they have not been recently updated.

Therefore, in order to maintain a certain level of pertinent and updated information, more importance was accorded to recent and internationally recognized publications to serve the objectives of this study. Thus, the *Fire Protection Handbook* - first published in 1896 by US's National Fire Protection Association (NFPA) and considered by many ever since as the international "cook book" of Fire protection and prevention - was heavily relied upon in conducting this study through its more recent 1991 edition.

Yet, the University of Edinburgh's course on Fire safety management was of great help in its contribution to this work, not to mention a few subject-related books and a number of articles and seminar papers published in some renowned specialized periodicals. On the other hand, the newly developed "Lebanese National Fire Code" draft has also been heavily relied on, especially that it has been drafted only one month prior to the submission of this study.

3.2.2) Primary Data:

Another major source of data collected was interviews conducted with executives from the Fire brigades and civil defense organizations. Interviewed officials were asked a series of questions relating to identifying their mission and action plans, daily duties, human and physical resources, training and recruitment frequencies, Fire prevention versus Fire suppression activities and their exposure to or participation in developing the new Fire code, to name some. Moreover, SOLIDERE's representative at the Council of Development and Reconstruction (CDR) was interviewed knowing his prime role in preparing and documenting the National Fire Code draft. He was asked about the reasons behind developing the code at this period of time, its applicability with regards to the actual modest resources of both the Fire brigades and civil defense bodies, its scope in covering old and existing buildings in addition to the ones to be erected, the powers vested in SOLIDERE to control the right implementation of these provisions, and the possibility of future amendments and/or further clarifications to the existing draft, among others.

CHAPTER FOUR

RESULTS AND FINDINGS

4.1) Survey Methodology

For the purpose of assessing Fire safety management in private organizations, a survey was conducted on the organizations which suffer most the threat of catastrophic Fires, namely: Hospitals, factories, hotels, philanthropic associations, boarding houses, and commercial centers. A sample of 46 organizations falling under the above categories has been constructed as follows:

No.	Category	No. of Respondents	%
1	Hospitals	9	20
2	Hotels	14	30
3	Factories	15	33
4	Philanthropic associations	3	7
5	Boarding Houses	2	4
6	Others**	3	6
Total		46	100

* Philanthropic Associations include *Dar Al-Ajazah Al-Islami*, *Dar Al-Aytam Al-Islamiah*, and *Mohammad Khaled Institutions for Social Care*

** Others designates two commercial centers and a theater

The respondents were selected from the Great Beirut area and the industrial areas of Shweifaf and Dekwaneh. The institutions included in the sample are of various sizes with 51% employing less than 50 employees and the balance employing between 50 and 500 (as to weigh their relative occupancy load). Similarly, half of the institutions having resident clients, like hotels, hospitals and boarding houses, reported an average capacity of less than 50 clients, where the other half of the sample accommodated on average up to 500 clients per day.

The data collection method employed in communicating with the 46 respondents is the administration of a 20-minutes questionnaire to the individuals responsible for Fire safety in private organizations in a face-to-face setting. The answers provided verbally by the respondents are filled down by the interrogator on-the-spot to eliminate the errors that may result from recalling answers.

An English translation of the questionnaire is presented in Appendix A. The section below provides a compilation of the survey's results together with an analysis of the major trends.

4.2) Survey Results

The answers to the questionnaires have been entered on a Microsoft Excel 4.0 Spreadsheet following which the answers to each question were grouped under the six organization categories: hospitals, hotels, factories, philanthropic associations, boarding houses and others. The issues addressed in the questionnaire can be classified as following under the following six categories:

- I. Availability of Fire protection equipment in organizations
- II. Stimulators for adopting Fire protection measures
- III. Major causes of Fire in organizations and their frequency of occurrence
- IV. Fire safety manager: his qualifications, responsibilities and authorities
- V. The role assumed by the Fire brigades and civil defense organizations in Fire prevention in Lebanon
- VI. Fire insurance coverage in organizations

The analysis of the survey results presented below is divided into sub-sections, each addressing questions pertaining to a specific issue as identified under the above categories.

4.2.1) Availability of Fire Protection Equipment in Organizations

Fire protection measures can be generally classified into six categories comprising the prevention of ignition, design of products, Fire detection, Fire suppression, Fire confinement and evacuation of

occupants. The interviewed organizations have been asked a set of questions for determining the most frequently employed Fire protection means and their dependability.

The survey results indicate that in all categories, manual Fire extinguishers are the most popular being applied by around 98 percent of the interviewed organizations. They are followed closely by Fire hoses (47.82%) and Fire alarms (28.26%). The least applied Fire protection measures comprise the sprinkler system (17.39%), Fire doors (15.21%), and Fire resisting material (8.69%).

Of the organizations interviewed, 68% believe their Fire protection systems to be sufficient for fighting and controlling probable Fires. They base their judgment on their prior experience, the number and type of Fire equipment used, the Fire safety training and maintenance activities conducted, the assurances of Fire equipment suppliers, and the belief that their organizations face the threat of small Fires only which can be effectively handled by the existing systems. On the other hand, 19% of the respondents have rated their systems as deficient based on their experience, the inappropriate number and type of Fire equipment installed, and the lack of alarm systems and effective training. The remaining respondents indicated that they cannot evaluate the adequacy of their Fire fighting equipment due to the fact that the equipment has not yet been tested in a real life situation or due to their personal lack of prior experience.

When asked about the best means for Fire prevention, 32% of all organizations named promoting awareness and providing safety instructions to be one of the most effective Fire prevention means. (This is in harmony with the fact that organizations believe that the human error is responsible for more than 50% of Fires). Next in importance came ensuring the safety of electrical installations and sources of fuel which was pointed out in 18% of the responses. Forbidding smoking during work, conducting periodic maintenance and avoiding probable causes of Fire were named as other good measures for preventing Fires from igniting by 10-13% of the responses. Finally, surveillance visits and isolating flammable material were pointed to in 7 and 4 percent of the answers, respectively. Around 4% answered this question by saying that the best means for preventing Fire is achieved by the use of Fire extinguishers, which clearly reflects the confusion between Fire prevention and Fire suppression, a fact that we pointed at previously in chapter two.

On the other hand, 76% of the total respondents informed us that they already apply these prevention measures in their organizations, while 24% hope to apply them in the future.

Given the fact that most respondents referred to safety instructions and to promoting awareness as representing the prime Fire prevention measures to be undertaken, it would be reasonable to expect that such organizations provide rigorous Fire safety instructions to clients and employees, and to conduct periodic training seminars on Fire safety management. Surprisingly, however, when asked to supply a printed

copy of their Fire fighting plans, 85% of the respondents answered that they do not have any documented plan. This has revealed a significant contradiction with previous answers which could be understood as a manner to hide the deficiency in applying proper prevention measures. Out of the remaining 15% who claimed to have a documented plan available, only one organization was able to locate and provide a copy of the plan.

As for the written instructions regarding necessary Fire safety precautions to be followed by employees, more than 73% of the respondents turned out to have never issued any written documents in this regard. Moreover, only 26% of the institutions' interviewees have positioned Fire escape plans behind room doors, a matter of critical importance, especially in the cases of hotels and boarding houses.

Regarding the training conducted at the interviewed organizations, it turned out that 91% of the institutions have never undertaken a Fire drill. The organizations who did conduct a Fire drill comprised two hospitals and one hotel, and their Fire evacuation practice was held in a period not longer than six months ago. As for teaching employees on how to use Fire extinguishers in cases of probable Fire, the majority of the respondents indicated that between 51 and 70% of the organizations' employees were incapable of utilizing Fire extinguishers, mainly due to the lack of appropriate training. This constitutes a kind of failure from the part of the Fire protection officer in assuming one of his basic duties which consists of training all the institution's employees on the appropriate use of portable Fire extinguishers.

Moreover, following inquiring when the last training on Fire protection was conducted, 45% of the answers indicated that no training was ever conducted at the organization and another 28% of the respondents could not remember at all when was the last training conducted. Only 28% of the interviewed institutions had organized training sessions, mostly conducted within the past year. In more than 50% of the cases, the training was attended by less than 10 employees, a highly deficient number given that all organization employees should be knowledgeable in Fire safety basics, specially knowing that 76% of the organizations interviewed had a staff of more than 25 employees.

On the other hand, almost half of the seminars were found to be provided by general managers or the organizations' internal maintenance officers. In 21% of the cases, the training was conducted by the Fire equipment suppliers and only 14% of the respondents indicated that the seminar lecturers came from the Fire brigades or civil defense. This is a major shortcoming as the prime role of the Fire brigades and civil defense organizations should be directed towards the promotion of sound Fire safety measures nation wide. Strangely enough, this 14% rate contradicts what we have previously heard from both Fire Brigades and Civil Defense officials who were sorry to reveal to us the fact that no Fire prevention efforts are being conducted nowadays.

The central issues discussed in the Fire safety training seminars conducted in organizations included using Fire extinguishers (38% of the cases), Fire burns treatment (19%), evacuation of occupants (19%), avoiding Fire causes (13%), maintenance of Fire protection equipment (6%), and general preventive measures (6%).

The frequency distribution of the issues treated in the training seminars supports the reasoning that Fire suppression is given priority over Fire prevention in Lebanon.

4.2.2) Stimulators for Adopting Fire Protection Measures

Given the deficiency in legislation regarding Fire safety in Lebanon, companies have been asked what reasons have compelled them to install Fire protection equipment in their organizations. Around 43% of the respondents indicated that they are aware of laws regulating Fire protection practices in Lebanon. However, as expected, less than 5% of the companies installed Fire fighting equipment out of compliance with such legislation. This is quite acceptable especially when one already notes the absence of any national Fire code to be followed. Moreover, most of the respondents (80%) answered that their implementation of Fire safety measures originated from their need to protect employees, clients and properties at their organizations. Only 14% indicated that Fire safety measures have been adopted following the request of insurance companies. The remaining 2% has engaged in Fire protection in parallel with practices implemented by organizations in the same line of operations.

In harmony with the above findings, the party demanding the implementation of Fire safety measures was found to be from within the organization, (the owner/general manager of the organization, in 60% of the cases). The Fire equipment suppliers and insurance companies offered (or demanded) Fire protection measures in 16% and 8% of the cases, respectively.

Here, one realizes how reluctant local insurance companies are in imposing the minimum Fire protection requirements as a necessary condition to accept the Fire risk in question.

4.2.3.) Major Causes of Fire in Organizations and their Frequency of Occurrence

The incidence of Fire in Lebanese organizations is a major indicator of the need for implementing sound Fire safety measures. Almost half of the respondents replied that they did encounter a Fire outbreak in their organizations, with the lowest percentage of Fires reported in hotels (yet, this result should not necessarily make us hastily deduce that hotels are the safest premises in town). Moreover, all of the philanthropic associations and boarding houses interviewed reported Fire outbreaks in their organizations, a clear indication of their high risk. Two thirds of hospitals and factories interviewed had also suffered from Fire damages.

When asked how immense the Fire threat was, 13% reported great danger, 4% reported moderate danger, 57% replied that the Fire threat was minimal and 26% said that the Fire was so small that there was no danger whatsoever. It is worth noting that the greatest danger was reported in hospitals and factories. (This could probably be one of the reasons why insurance companies request specific Fire protection measures to be implemented in hospitals and factories.)

Upon the incidence of Fire, individuals in charge of Fire protection reported the incidence to top management in most of the cases, generally by issuing an official report on the incidence (73%) and sometimes verbally (27%). Top management was found to be satisfied as to the way the Fire has been handled in 16% of the cases and dissatisfied in another 16% of the cases. In both cases, individuals involved in curbing the Fire spread or causing it have received rewards or warnings, pending on the causes of the Fire and the outcome of the Fire suppression. However, almost half of the respondents replied that management's reaction was to apply additional measures for improving the Fire safety system and providing instructions to the workers. In 57% of the cases, the individuals responsible for Fire protection considered themselves to be directly responsible for the incidence of the Fire and agreed with management as to the measures taken following the accident.

Based on their experiences in Fire safety management, an overwhelming 97% of the respondents believed that the human error can be a direct cause behind Fires (with most of the respondents relating more than 50% of the Fire incidences to human error). Consequently, the methods adopted by organizations to minimize human contribution to Fire outbreaks included providing instructions to the employees and residents as to the dangers of Fire, prohibiting smoking in certain zones, ensuring the safety of electricity and fuel sources, and conducting periodic maintenance of the machines, in addition to constant surveillance.

Although the two Fire prevention means most commonly adopted include providing awareness and periodic surveillance of the premises, yet, the surveillance of the premises- which could be hardly accepted as an essential means of Fire prevention- will be found more popular and much easier to perform.

4.2.4) Fire Safety Manager: his qualifications, responsibilities and authorities

Actually, the title of Fire Safety Manager was found to be rather too professional as well as embarrassing for most interviewees which made us prefer to use the term “Fire Protection Officer” in order to reach the same objective with maximum collaboration and understanding.

Fire protection functions in any organization are critical and sensitive responsibilities that should be assigned to the right individual. The degree of care in assigning this job to any one person indicates the level of management awareness as to the importance of Fire safety management in addition to being a major determinant of the adequacy and effectiveness of the Fire protection measures employed.

The responsibility for Fire protection in the interviewed organizations has been primarily assigned to maintenance and security officers (43%) with only one manufacturing organization employing a Fire protection engineer. It is noticeable that in 39% of the cases, general managers are directly in charge of Fire protection.

While this figure could be acceptable in small sized organizations, it is highly inappropriate in medium and large sized organizations as the general manager would not be able to dedicate much of his time for Fire protection, may not be knowledgeable enough in this area and is not available at all hours in the organization premises to react in case of Fire. (For example, in factories operating 24 hours a day, it is unlikely that the general manager will be present at the factory during the night shifts). In the cases where Fire officers were hired, they have been largely screened and appointed directly by top management.

The ages of Fire protection officers ranged between 20 and more than 50 years old and the respondents were almost equally divided among the 20-30, 30-40, 40-50, and 50 years plus age brackets. Around 36% of the respondents have been employed in the organization for a period not exceeding the past two years while 24% have been employed for a period ranging between 3 and 5 years. Only 40% of the Fire protection officers have been working at the interviewed organizations for more than a five years period.

Moreover, around 67% percent of the Fire protection officers are university graduates of which 26% have a mechanical or electrical engineering specialty. The rest of the respondents either have a technical educational background (12%) or a secondary/intermediate educational level (18%). Only one respondent was a recognized Fire protection officer. Over half of the respondents indicated that their experience was the major reason behind their appointment in their position, while 38% pointed to their education's role in their appointment.

One Fire protection officer in a manufacturing organization had seven years experience of working in the civil defense organization and another working at a hotel is an ex-Fireman.

The responsibilities of Fire protection officers included: assessing the adequacy and readiness of all Fire fighting extinguishers and equipment (43%), coordinating with Fire equipment suppliers (20%), providing fair safety instructions to employees and clients (18%), conducting surveillance of premises (10%), and guaranteeing safety of workers and machines (2%). Ironically enough, these numbers reveal that Lebanese Fire protection officers directly relate safeguarding human lives to maintaining Fire protection equipment (mainly Fire extinguishers) in proper condition, thus totally disregarding Fire prevention as essential to protecting people. The reason behind such findings could be explained by the absence of professional exposure to Fire safety education and/or necessary experience.

Moreover, the Fire protection officers were found to report directly to management to which they refer in case they face problems related to Fire safety. Only two Fire protection officers indicated that they would refer to the Fire brigade in case of problems with Fire protection and another two answered that they would refer to the insurance company. On the other hand, the Fire protection officers had in most of the cases (76%) the authority to enforce sanctions against irresponsible employees who may cause Fire ignition or might be involved as well in some irrational behavior that might lead to such an undesirable situation.

These powers are of particular importance as they imply that the employees would take Fire safety measures for serious, otherwise they would suffer direct punishment or worse, unemployment.

4.2.5.) The Role Assumed by the Fire Brigades and Civil Defense Organizaitons in Fire Prevention

Fire brigades and civil defense institutions are asked to assume the leading role in enhancing and promoting Fire prevention worldwide through inspection of premises, providing Fire safety education and investigating the possible causes of Fire for updating standard prevention procedures. However, this has not been the case in Lebanon where Fire brigades and civil defense agencies have limited their tasks merely to Fire suppression. This can be easily detected by inspecting the respondents' replies to questions pertaining to their interaction with Fire brigades and civil defense organizations.

Most of the respondents (82%) indicated that their organization was never visited by Fire brigades nor civil defense officers. In only 13% of the cases, Fire brigade and civil defense officers visited the institutions and were accompanied by the maintenance officer in charge of Fire protection in the organization.

Yet, one should be skeptical as to the accuracy of these figures since they reflect that both the Fire department and civil defense organizations are performing their task regarding Fire prevention.

Actually, executives from both organizations confirmed in two separate interviews their actual incapacity of performing Fire prevention inspections at the time being, even though they are actually planning to re-engage in such activities in the near future. Therefore, these figures could be well attributed to the respondents' lack of pertinent information or biases in answering this question.

Furthermore, 52% of the respondents did not know that the Fire brigades and civil defense agencies are supposed to inspect their premises or provide them with a Fire certificate. In effect, when Fire protection officers were asked if they can provide the phone number of the nearest Fire brigade, 71% could not provide it. They explained that it can be obtained from the administration office or the phone directory! This proves the degree of lack of communication between Fire protection officers at the various institutions and Fire brigades. It also shows that Fire brigades and civil defense agencies have been largely involved in Fire suppression and neglecting their important role in Fire prevention.

4.2.6) Fire Insurance Coverage in Organizations

Given the absence of known Fire protection standards, and the lack of awareness campaigns conducted by Fire brigades, organizations would be left to their own judgment and discretion in deciding the adequate Fire protection measures to be applied unless some norms be specified by Fire insurance companies. Insurance companies, thus, are expected to assume an essential role in setting minimum standards of Fire safety for institutions to comply with.

When asked whether their organizations are insured against Fire risk, 75% of the respondents answered positively. Around 16% answered that no Fire risk coverage has been secured and the remaining percentage did not know an answer.

Out of the organizations having a Fire insurance coverage, 49% indicated that the insurance company has not requested the application of specific Fire safety measures, while 51% answered positively. This percentage highly differs in the case of factories. It turned out that 70% of the factories having Fire insurance coverage have been requested to apply specific Fire safety measures. This indicates that insurance companies adopt more stringent policies when it comes to covering the risk of Fire at factories, probably assuming that Fire damage at factories is extensive. On the other hand, the percentage of hospitals that have been requested to take special Fire safety measures is relatively high amounting to 83%. Conversely, Fire insurance companies have applied lenient measures when dealing with hotels, philanthropic associations, boarding houses and office centers.

In effect, the results above are confirmed by the fact that only 50% of the respondents indicated that an insurance company representative has visited their premises for inspecting the Fire safety measures applied and this percentage was contributed almost in total by respondents of factories, hospitals and hotels.

Thus, in general, insurance companies are not assuming an effective role in the enforcement of effective safety measures and their involvement in setting standards for Fire protection is visible only in factories, hotels and hospitals. This questions the effectiveness and adequacy of Fire protection means in boarding houses and philanthropic associations despite their high concentration in occupants day and night. It also poses serious threats to the Fire safety means adopted in office centers and theaters where cases of Fire ignition have proven to be catastrophic world wide.

Conclusion

The Fire safety management survey conducted at private organizations produced disappointing results. With the absence of Lebanese legislation regarding Fire protection, surveyed institutions have implemented only minimal safety measures that are in many cases inadequate to cover the potential threat of Fire. This deficiency is accentuated by the fact that Fire insurance companies decline in most cases to demand the implementation of acceptable Fire safety measures at the insured organizations. It has also been noted that the deficiency in Fire protection also springs from the weak role assumed by Fire brigades and civil defense organizations in the promotion of appropriate Fire prevention means, whether through educational campaigns, inspection or investigation.

Thus, it is only fair to deduce that private institutions in Lebanon are still far from implementing proper Fire safety measures. Yet, it is encouraging that the government has finally realized the importance of Fire safety and is, as such, in the process of developing the National Fire Protection Code. Private organizations also seem to have become increasingly aware of their need for Fire protection, and as such, have embarked on Fire safety policies over the past year. However, it seems that the concept of Fire safety management is yet to be developed in Lebanon.

Finally, it is important to note that the results of the survey are far from being conclusive. The survey sample inspected comprises only 46 private organizations and is not expected to produce population representative information. Yet, given that the survey aims at providing a glimpse on the commonly applied Fire safety procedures in Lebanon, it is to our belief that the survey has succeeded in providing an acceptable approximation as to the conditions prevailing in the market.

CONCLUSION & RECOMMENDATIONS

5.1)The concept of Fire safety management :

Fire safety management was previously defined in this study as consisting of taking whatever steps to minimise the likelihood and mitigate the consequences of Fire in an organisation. In order to understand better this concept and its evident relationship with both Fire protection and Fire prevention approaches, it could be very useful to examine and analyse the wording of this same definition. First, through “organising” (which is one of the seven known management functions), the manager decides “what jobs will have to be filled and the duties and responsibilities attached to each one”¹. Of course, this definition implicitly admits the existence of a certain group of people forming an entity, that works together to achieve certain desired goals and objectives. On the other hand, the “steps” that could minimise the likelihood of Fire in an organisation are nothing but the same “steps” that any rational man should follow in order to prevent Fire from happening at first place.

To be more precise, it is of great importance to remember that Fire prevention could be well achieved through successful action on the behaviour that brings the heat source and the fuel source together, among other options. For, changing Human behaviour (which could be

¹ Dale. Management Theory and Practice. New York: McGraw-Hill. 1992.

perceived as synonymous to Fire safety education), is both a challenging and difficult management task that should be accorded enough effort and patience, specially with the existence of possible divergence in educational backgrounds and motivational spirits among the organisation's employees.

However, it is true that no matter how aware, educated or motivated an employee may become, this can never delete the possibility of Fire occurring within his organisation. Consequently, its better for the business' management to be prepared for that "rather expected" situation which may threaten both the organisation's existence and achievement of pre-set objectives, not to mention the lives of the endangered employees or even the community as a whole. Thus, one should remember always that by resorting to the previously mentioned Fire protection strategies/options, the rational business management could limit the consequences of Fire to their minimum before it becomes too late to do so.

Putting things together, Fire Safety Business Management is a necessity for each and every existing organisation to survive and to grow in the future. Variables such as the size of the organisation in question or the titles of the person (s) in charge of Fire safety are of little importance compared to the danger itself. Yet, it is of great benefit and importance that employees in all levels in the organisation assume correctly their role in Fire safety, with emphasis on upper level executives' duties in that respect. For, if management lacks the interest in teaching Fire safety education, training all employees and evaluating them periodically, this

might unfortunately be reflected in a sort of undesired employees' apathy vis-à-vis the subject.

Consequently, every individual within the organisation should be well taught about the true objectives behind the training for Fire safety. Such objectives could go beyond minimising the opportunity of personal injury, loss of life or property damage, thus better seek to avoid unemployment in the case of severe property destruction. However, it must be noticed that with Fire prevention training, it is virtually impossible to be sure how successful or even how cost effective the training has actually been.

Yet, some aspects that need always to be stressed upon by management should include, at the same time, implementing rational prevention procedures and knowing how to raise an early warning in case of a Fire incident (as to get the Fire brigades as soon as possible to the Fire Scene).

Fire Safety Manager's Responsibilities and Duties

- Carry out Fire risk assessment of his work place
- Write a Fire emergency plan (in collaboration with the Fire brigades) based on the previous risk assessment
- Provide adequate and continuous Fire safety information and training for all the work force
- Consider Fire Prevention as important as Fire Protection
- Provide adequate means for fighting Fires in the organisation
- Organise periodical maintenance and testing of Fire equipment
- Provide adequate means of escape and ensure these can be safely and effectively used
- Provide adequate Fire warning arrangements
- Undertake Fire safety management training himself
- Keep relevant Fire records of all incidents, equipment, training session, etc...
- Ensure that employees will regard general Fire safety measures as directly related to their personal safety and well being

5.2) The National Fire Code Draft :

Some might consider it daring that a college student (with no engineering or technical background whatsoever) thinks he is capable of suggesting or even commenting the “National Fire Code” draft prepared by experienced engineers and reputable consulting firms. Yet, the following wouldn't but constitute a modest (as well as brief) attempt for understanding and familiarising with the draft which, by itself, should be considered the first corner stone to seriously solve the problem of Fire safety in Lebanon.

Moreover, one must not underestimate nor ignore the huge efforts placed by the team of professional engineers and consultants, who worked jointly in order to get it ready in a record time for its implementation in the early reconstruction and restoration phases of the Beirut city centre. Briefly speaking, four points were found deserving more clarification(s) and comment :

5.2.1) Concerning the title of the code's draft :

The cover page of the available Arabic draft copy states the following : “Provisions relating to Public Safety : Fire Prevention”. Such title couldn't but suggest to the reader that the document at hand relates to defining, organising and monitoring the “Fire prevention” activities within the country, which usually are the role and tasks of the local Fire service authorities. Yet, this was not actually the case because the code mainly outlined necessary “Fire Protection” measures to be adopted in buildings. Accordingly, page two of the draft mentions that for preserving the lives of people and for protecting their properties,

recommendations were prepared as to follow and respect certain building procedures such as designing to slow early Fire growth, referring to compartmentation to confine Fires, specifying the need for Electro-mechanical Fire suppression systems and the necessity of mentioning the number and positioning of adequate exit accesses as to help evacuating the building's occupants. Actually, all these choices represent nothing but the famous "Fire protection" (and not prevention) strategies mentioned earlier in this study.

5.2.2) Concerning the Extent of applicability of the code draft :

- The case of new buildings to be erected :

Even though the draft at hand indicates the need for adopting new Fire Protection measures in designing and erecting new buildings, yet it does not clearly explain how the local authorities will be capable of monitoring the implementation of the new code, given the extent of geographical spread. For, we should well note that in the case of new buildings to be erected, the draft did not give place for priorities in designating "special orders" or categories of buildings to begin with nor did it specify particular geographic areas for adoption. Thus, it is difficult to foresee how the authorities will succeed in synchronising their efforts simultaneously to cover all the Lebanese territories. Moreover, the government will not accept to apply these requirements in the capital or in large cities for example (where it has closer and tougher control), and neglect them in other minor towns or villages.

This actually leaves the public in doubt of how accurately these requirements for new buildings will be applicable and respected, in the total absence of experienced and trained Fire prevention officers within the Fire brigades.

- The case of existing buildings :

On the other hand, the draft does not mention explicitly “when” it will actually be considered as an enabling act for existing buildings. For in such a case, it won’t be applying to no building in particular but it will rather be the job of the Minister of State to issue “designating orders”. These orders should specify the types of buildings to be brought under this same act according to certain priorities related to the degree of Fire danger relative to the occupants load and by the readiness of the local Fire Brigades. Usually, the tendency is directed towards giving priority those occupancies with higher occupants load, and where Fire could break out while occupants are asleep or unable to reach safe exits (Ex: Hotel, Hospitals and Boarding houses) due to unfamiliarity with the building. Actually, this was referred to in page seven of the draft, yet without specifying the exact “occupancy load” permitted per premise area. Similar priorities should be explicitly mentioned in the code, specially knowing that most Lebanese organisations falling in these special occupancies actually lack the minimum requirements for Fire protection.

On the other hand, the code will be also facing some resistance in its application in residential multi-storeys buildings where private owners might belong to low income group brackets. This will undoubtedly hinder their ability to successfully apply the code and comply with its requirements.

5.2.3) Concerning the implementation of the code draft :

As previously mentioned in the study, Fire prevention includes all Fire service activity that decreases the incidence of uncontrolled Fire. For Fire prevention to be efficient, a highly trained and equipped personnel is needed, which role will necessarily extend far beyond mere Fire suppression to encompass activities such as Fire inspection (Code enforcement and building design), Fire investigation and Public Fire safety education.

Therefore, knowing these facts and the ones relating to the slow development of the Lebanese Fire service, it would be too early to talk about effective enforcement of the code. Moreover, one should note the existence of two separate public bodies responsible of Fire suppression in Lebanon : The Fire Brigades and Civil Defence. This conflicting situation should pose an embarrassing question regarding the capacity and responsibility of each body in performing future Fire Prevention duties, and which one to choose for this delicate task in the absence of actual co-ordination between the two bodies.

On the other hand, and because of the temporary incompetence of both the Fire brigades and civil defence corps, a new private body consisting of reputable International Fire safety auditors are being summoned by SOLIDERE. Their job will be to help monitor and assess the implementation of the draft's Fire protection measures in the different phases of reconstruction of Beirut city centre, (As an initial phase). The role of this newly formed body could possibly extend later on to cover all the Lebanese territories.

5.2.4) Concerning public participation in setting Fire safety codes:

It was easy to know from interviews conducted with Executives from SOLIDERE, the Fire Brigades and the Civil Defence corps that the participation of the later two bodies in preparing the code draft was quite marginal. Therefore, even though two reputable French Fire safety experts have contributed much to the draft,² still more involvement of the Local Fire Authorities is needed. The reason behind this relates to their daily and direct exposure to peculiarities relating to the Lebanese population's understanding and abidance by general Fire safety concepts (specially architects, buildings, owners and public as well as private organisations' management). Also, the special difficulties they have encountered during their operations in the country's crowded areas and congested streets are of great importance, specially knowing that the local Fire service had been relying completely on its own water supplies, modest vehicles, and protections systems to suppress all sorts of Fire incidents.

² Yamout, Hani, SOLIDERE. Personal Interview. December 10, 1995.

(Actually the draft's prime concern was to stress on the necessity that each building shall possess its own water supplies for future Fire suppression activities.)

On the other hand, the participation of private companies (or individuals operating in the Fire Safety Business) in the same discussions could also contribute in solving some implementation problems that may arise later on, leading to waste in time and money, if not jeopardising overall safety.

In that respect, it would be suggested that minimum requirements for pre-qualification of Fire safety sub-contractors are agreed upon, in addition to setting uniform and nationally accepted installation procedures that will conform with known international standards (U.L., B.S or similar).

Once again, it is usually the task of the Fire Service inspectors to judge upon the competency of the installers (a special permit should be checked), thus monitoring the conformity of their installations to follow known norms and, when necessary, take necessary measures in case of substantial breaches.

5.3) The Future of Fire safety business management within Lebanese organisations

Because the responsibility of Fire Safety management is unequally divided between the Fire service, the insurance companies and the individual organisations, it is essential to search for the one factor that both influences and controls them all together. Of course, no one could think of a better guiding factor than Legislation. For, in the absence of Law and its related powers of sanction, the responsibility of individual organisations for Fire Protection is of prime importance, even though many Lebanese organisations were found reluctant to adopt basic and sound Fire safety education (such as training all employees on the use of portable Fire Extinguishers, for example).

However, this study has also showed that many organisations were too careless as to possess the minimum Fire protection equipment, while others didn't believe much in the necessity of insuring their business against probable Fire dangers. On the other hand, and when clear Fire safety codes will be established, the Fire service authorities should not at all rely on the " good will" of organisations and individuals to abide by the new laws, but rather go and perform all of their functions, including necessary periodical inspections and Fire safety education.

Moreover, it should also be well stressed that it is not the job of the Fire prevention officer (from the Fire brigades) to replace or perform the role of management executives in what relates to deciding upon basic Fire safety matters.

He should rather advise upon discrepancies he thinks should be given more attention in order to minimise the likely hood of Fire incidents. As such, the final say is for the management itself to abide by known, rational safety procedures following a specific Fire code.

What does the future looks like ? Fire Safety management within Lebanese organisations could be well enhanced if the following suggestions are treated seriously :

- 1- Allow for clear role & task description for both the Fire brigades and Civil defence bodies as to terminate the existent (and future) overlapping in missions and responsibilities, especially in the Fire suppression field.
- 2- Adopt a new Fire prevention Legislation to complement the already prepared code draft. Such a Legislation, by being more prevention oriented and aimed at “Marketing” sound Fire safety issues, should outline clearly the responsibilities and duties expected from all the parties involved in such a program .
- 3- Establishing a “National Fire service training centre” which objectives ought to include training and supplying the Fire service with experienced Fire men as well as highly trained Fire prevention officers. These officers should be given enough powers to sanction any possible breaches of the local Fire safety code.

- 4- Supplying the Fire service with necessary Fire Fighting vehicles and equipment as to limit property losses and personal injuries which could be directly attributed to their absence (Ladder vehicles, breathing apparatus etc ..)
 - 5- Consider the “Fire certificate” issued by the Fire brigades as a mandatory requirement before the initiation of any business and in any occupancy after it is being built (here we should well differentiate between the “occupancy permit” usually issued by the municipality and the “Fire certificate” to be issued by the Fire authority). Such a certificate should be renewed yearly after Fire brigades’ inspection and approval.
 - 6- Rationalise insurance practices so that bad risks cannot receive any kind of cover from both Local and International insurance companies. Eventually, bad risks will be judged so by the reports of professional sworn surveyors hired by insurance companies to inspect each and every occupancy prior to the issuance of the policy.
-
- 7- Insist that companies engaging in the Fire safety business respond to a certain acceptable standard whether relating to a minimum capital, expertise and integrity.
 - 8- Educate the public by means of regular “friendly” visits to buildings, schools and institutions in order to cultivate the awareness vis-à-vis Fire dangers in the minds of all.

9- Allowing for government tax exemptions for premises or buildings found equipped with "above average" Fire protection measures.

10- Carry out continuous up-dating of existing Fire safety codes following a certain "Multi- stage" plan in a manner as to allow for immediate implementation of each stage once approved, all in harmony with the capacities of the Local Fire authorities at the time and place of implementation.

Therefore, bearing in mind that the overall objective sought by all is to arrive to an optimum Fire safety status, one can easily understand the necessity of applying each of the ten suggestions simultaneously.

Yet, the main obstacle to the application of effective Fire safety management in public and private organisations is the direct result of the chaotic situation which predominated Lebanon during and subsequent to the civil war. The Lebanese are so used to evading rules and regulations that this has become a sort of "de facto" way of conducting every day business. It is highly probable that Lebanese executives will regard Fire safety standards as another nuisance to evade and will most likely succeed to side-step them.

This Lebanese pull strategy is manifested in the following general characteristics :

1) The existing corruption in most of the administrations of the country's public and private organisations.

- 2) The continuous absence of public committees that are capable of quickly and impartially dealing with people's complaints in case of abuse of authority or when other breaches arise.
- 3) The reluctance of the government in gaining public trust in what relates to efficient and impartial implementation of issues more urgent and threatening than Fire safety.
- 4) The population's general apathy and reluctance to participate in programs seen as "nebulous" and "secondary" as Fire programs, while other daily and more "tangible" difficulties are at their door. (Financial and pollution related problems.)

Despite those existing difficulties, the application of effective Fire safety measures is believed to be possible in the short term and within the limited Geographic area of Beirut's central district. The Beirut city centre will actually be a pioneering example in the application of Fire safety measures in Lebanon as SOLIDERE, the authority supervising the implementation and control of building standards in that area, is "The" most specialised reconstruction company in the country, enjoying of huge financial capabilities and considerable expertise .

So, if this experience succeeds, the possibility of privatising the supervision over the entire building sector (for Fire safety purposes) should be given enough attention and consideration without necessarily leading to an overlapping in authorities with similar public bodies.

A suggested example would be to assign a supervising entity in each of the Five Lebanese caza, which will work in co-operation with the area's Fire authorities, exclusively in what relates to the sound application of Fire Protection standards in early building design. Yet, one should bear in mind that planning and implementing new Fire safety standards will not eliminate all risk of Fires, them mostly being the result of human error- a problem calling for years of Fire safety education.

APPENDIX A: Questionnaire

The Future of Fire Safety Management in Lebanese Organizations

Name of Organization
Address
Category (Hospitals/ Hotels/ Factories/ Philanthropic Assoc./ Boarding Houses/ Others
Name of person in charge of Fire Safety
Position of person in charge of Fire Safety
Age of person in charge of Fire Safety
Education of person in charge of Fire Safety

A. Availability of Fire Protection Equipment in Organizations:

A1). What kind of Fire protection measures are currently available at your institution?

☐ Fire Alarm System	☐ Sprinkler Systems
☐ Fire Extinguishers	☐ Fire Hose
☐ Fire Doors	☐ Fire Resistant Materials

A2). Have any Fire prevention measures been adopted in your organization?

- ☐ Yes ☐ No

A3). Has a Fire plan been developed and documented?

- ☐ Yes ☐ No ☐ Don't Know

A4). Has a Fire escape map been developed and displayed in visible areas of the premise
(a recommended procedure for hotels and boarding houses)?

- ☐ Yes ☐ No

A5). Availability of adequate means of escape, sirens posting and lighting of escape routes ?

- ☐ Adequate means of escape
☐ Adequate siren posting
☐ Adequate lighting of escape routes

B. Stimulators for Adopting Fire Protection Measures:

B1). Who advised management on the Fire protection measures to be applied?

☐ Manager	☐ Fire Extinguishers Supplier
☐ Insurance Co.	☐ Others, specify

B2). Do you believe that the applied protection measures suffice to fight and suppress possible Fires?

- ☐ Yes ☐ No ☐ Don't Know

B3). On what grounds do you base your judgment on the adequacy of the Fire protection measures adopted?

.....

B4). In your opinion, what is the best way(s) to prevent a Fire from occurring?

☐ Awareness & training	☐ Isolating flammable material
☐ No smoking	☐ Surveillance
☐ Safe electricity & fuel	☐ Avoiding causes of fire
☐ Maintenance	☐ Others

B5). Why is the adoption of Fire protection measures necessary in every company?

- ☐ Because they are obligatory by law
- ☐ Because they prevent Fire incidents and save property damages
- ☐ Because they save lives
- ☐ Because they are applied in other institutions
- ☐ Because insurance companies enforce their application

B6). Are you aware of any Lebanese Code enforcing Fire protection measures?

- ☐ Yes ☐ No

C. Major Causes of Fire in Organizations and their Frequency of Occurrence

C1). Do you believe that the "Human Error" (of employees/ guests) is generally the direct cause of most Fires?

☐ Yes

☐ No

C2). What is your percentage estimate of Fires caused by "human error" at your institution?

.....

C3). In your opinion, what is the optimal solution to preventing the "human error" from causing Fire outbreaks?

☐ Awareness & training

☐ Surveillance

☐ No smoking

☐ Avoiding causes of fire

☐ Safe electricity & fuel

☐ Non

☐ Maintenance

☐ Others

C4). Do you have available a list of general Fire precautions to be adhered to by employees?

General Precautions

List of Restrictions

☐ Yes

☐ Yes

☐ No

☐ No

C5). Has your institution witnessed a Fire outbreak which was reported to your Manager?

☐ Yes

☐ No

C6). How dangerous was the Fire outbreak in terms of posing a threat of spreading to the entire premise?

☐ Extremely Dangerous

☐ Moderately Dangerous

☐ Little Dangerous

☐ Not Dangerous

C7). Have you reported this incident to your Manager?

☐ Yes

☐ No

C8). *Have you submitted a written report on the outbreak?*

☐ Yes

☐ No

C9). *What was management's reaction to the Fire outbreak and the Fire suppression effort?*

.....

C10). *Do you agree with management's reaction and do you consider yourself responsible for the incident?*

☐ Yes

☐ No

☐ Indifferent

D. Fire Safety Manager: His Qualifications, Responsibilities, and Authorities

(Questions D1 to D3 relate to the person in charge of Fire fighting, his age and his education. Their answers are to be filled up in the box on the first page of the questionnaire.)

D4). What is the number of employees accommodated at your institution at any point of time?

.....

D5). What is the average number of clients accommodated at your institution at any one point in time?

.....

D6). Why are some employees unfamiliar with Fire precautions?

☐ No training

☐ Ignorance

☐ Fear of fire

☐ Law deficiency

☐ No experience

☐ Non

☐ Negligence

☐ Others

D7). What is the percentage of employees who are unfamiliar with Fire precautions at your institution?

.....

D8). When have you last attended/ conducted a Fire training session?

☐ 1 year

☐ 2 years

☐ Don't remember

D9). How many employees have attended the Fire protection training session?

☐ 1-10

☐ 10-20

☐ Over 25

D10). Identify the main points presented at the Fire protection session?

.....

D11). *Who conducted the training session?*

- ☐ Fire Extinguishers' Supplier
☐ General Manager
☐ Maintenance Officer

- ☐ Civil Defense
☐ Other

D12). *Do you conduct Fire drills at your institution?*

- ☐ Yes ☐ No

D13). *For how long have you been assuming the role of Fire Safety Manager?*

- ☐ 1-2 yrs ☐ 3-5 yrs ☐ over 5 yrs

D14). *What are your duties as a Fire Safety Manager?*

.....

D15). *Who appointed you in this position?*

.....

D16). *Do you hold any qualifications directly related to Fire safety?*

- ☐ Yes ☐ No Specify

D17). *Whom do you refer to in case of problems in Fire protection?*

- ☐ Management ☐ Insurance company
☐ Firemen ☐ No one

D18). *Do you have the authority to take special action against negligent employees?—*

- ☐ Yes ☐ No

D19). *Are you satisfied with the overall Fire safety measures at your institution?*

- ☐ Yes ☐ Indifferent ☐ No Answer ☐ No

D20). *What would you do to enhance Fire safety measures at your institution?*

.....

D21). Have you got the telephone number of the nearest Fire Brigade?

☐ Yes

☐ No

E. The Role Assumed by the Fire Brigades and Civil Defense Organizations in Fire Prevention in Lebanon

E1). Has any officer from the Fire Brigade inspected your premise and examined your Fire protection measures?

☐ Yes

☐ No

E2). Has one of your employees accompanied the Fire Protection Office on his tour of the premise and what were the recommendations provided?

☐ Yes

☐ No

Recommendation:

E3). Have you ever heard of a Fire safety certificate issued by local Fire Brigades?

☐ Yes

☐ No

F. Fire Insurance Coverage in Organization

F1). Is your institution covered by a Fire insurance Policy?

☐ Yes

☐ No

F2). Has the insurance company enforced any specific Fire precaution measures to be applied at your institution?

☐ Yes

☐ No

☐ Don't Know

F3). Has an insurance representative visited your premise to assess the adequacy of Fire safety measures adopted?

☐ Yes

☐ No

APPENDIX B: Results of the Questionnaire

I. Availability of Fire Protection Equipment in Organizations:

A1. Fire protection measures available at institutions visited

Category	No. of Org. Visited	Manual Fire Extinguishers	% of Org. Visited	Fire Alarm	% of Org. Visited	Fire Doors	% of Org. Visited	Fire Hose	% of Org. Visited	Sprinkler System	% of Org. Visited	Fire Resistant Material	% of Org. Visited
Hospitals	9	9	100%	3	33%	1	11%	6	67%	2	22%	0	0%
Hotels	14	13	93%	4	29%	0	0%	4	29%	1	7%	0	0%
Factories	15	15	100%	3	20%	3	20%	8	53%	3	20%	2	13%
Philanthropic Ass.	3	3	100%	0	0%	0	0%	1	33%	1	33%	0	0%
Boarding Houses	2	2	100%	1	50%	1	50%	1	50%	0	0%	1	50%
Others	3	3	100%	2	67%	2	67%	2	67%	1	33%	1	33%
Total	46	45	98	13	28	7	15	22	48	8	17	4	9

A2. Have any Fire prevention measures been adopted in your organization?

Category	Yes	Hope to apply it in the future	Total Responses
Hospitals	6	3	9
Hotels	12	1	13
Factories	13	2	15
Philanthropic Ass.	1	2	3
Boarding Houses	1	1	2
Others	1	2	3
Total	34	11	45
Percent	76%	24%	100 %

A3. Has a Fire plan been developed and documented?

Category	Yes	No	Total Responses
Hospitals	2	7	9
Hotels	1	13	14
Factories	0	15	15
Philanthropic Ass.	1	2	3
Boarding Houses	1	1	2
Others	2	1	3
Total	7	39	46
Percent	15%	85%	100 %

A4. Has a Fire escape map been developed and displayed in visible areas of the premise (a recommended procedure for hotels and boarding houses)?

Category	Yes	No	Total Responses
Hospitals	1	7	8
Hotels	4	9	13
Factories	0	1	1
Philanthropic Ass.	2	1	3
Boarding Houses	0	2	2
Others	0	0	0
Total	7	20	27
Percent	26%	74%	100 %

A5. Availability of adequate means of escape, sirens posting and lighting of escape routes

Category	Means of Escape	Sirens Posting	Lighting of Escape Routes	Non	Total Responses
Hospitals	7	7	5	0	19
Hotels	8	9	5	2	24
Factories	9	8	4	4	25
Philanthropic Ass.	3	3	2	0	8
Boarding Houses	1	1	2	0	4
Others	2	2	1	0	5
Total	30	30	19	6	85
Percent	35%	35%	22%	7%	100 %

II. Stimulators for Adopting Fire Protection Measures:

B1. Who advised management on the Fire protection means to be adopted?

Category	Manager	Insurance Co.	Fire Extinguishers Company	Maintenance/Security	Other	Total
Hospitals	7	0	1	2	2	10
Hotels	6	2	3	3	3	14
Factories	13	2	2			17
Philanthropic Ass.	2	0		1		3
Boarding Houses	0	0	1		1	2
Others	2	0	1	1		4
Total	30	4	8	2	6	50
Percent	60%	8%	16%	4%	12%	100%

B2. Do you believe that the adopted protection measures suffice to fight and suppress possible Fires and suppress their expansion?

Category	Yes	No	Don't Know	Total Responses
Hospitals	6	1	2	9
Hotels	11	1	3	15
Factories	11	4	0	15
Philanthropic Ass.	1	2	0	3
Boarding Houses	1	1	0	2
Others	2	0	1	3
Total	32	9	6	47
Percent	68%	19%	13%	100 %

B3. On what grounds do you base your judgment on the adequacy of the Fire protection measures adopted?

Category/Respondent evaluation	Yes	No	Don't Know
No Prior Exp.			3
Prior experience	12	3	
No Alarm		1	
No Trained Personnel		1	
No. & Type of FE	4	1	
FE Company assurance	3		
Maintenance	1		
Training	3		
Small Fire	3		
Total	26	6	3

B4. In your opinion, what is the best way(s) to prevent a Fire from occurring?

	Hospitals	Hotels	Factories	Philanthropic Ass.	Boarding Houses	Others	Total	Percent
Awareness, Instructions & Training	5	4	10	3	2	3	27	32
No smoking	2	3	5			1	11	13
Safe Electr. & Fuel sources	2	6	5		2		15	18
Maintenance	3	3	1		1		8	10
Isolating flammable Material		1	1			1	3	4
Surveillance		3	3				6	7
Avoiding Causes		3	3		1	1	8	10
FE equipment				2		1	3	4
Others			3				3	4
Total	12	23	31	5	6	7	84	100

B5. Why is the adoption of Fire protection measures necessary in every company?

Category	Conformity with law	Insurance Co.	Protecting Property	Saving People	Conformity with other Institutions	Total Responses
Hospitals	0		8	6	0	17
Hotels	0	3	14	9	0	26
Factories	4	4	15	15	2	40
Philanthropic Ass.	0	1	3	2	0	6
Boarding Houses	0	1	2	1	0	4
Others	0	2	2	1	0	5
Total	4	14	44	34	2	98
Percent	4%	14%	45%	35%	2%	100 %

B6. Are you aware of any Lebanese code enforcing Fire protection measures?

Category	Yes	No	Don't Know	Total Responses
Hospitals	3	5	1	9
Hotels	3	6	5	14
Factories	11	1	3	15
Philanthropic Ass.	2	1	0	3
Boarding Houses	0	1	1	2
Others	1	1	1	3
Total	20	15	11	46
Percent	43%	33%	24%	100 %

III. Major Causes of Fire in Organizations and their Frequency of Occurrence:

C1. Do you believe that the "Human Error" (of employees/ guests) is generally the direct cause of most fires?

Category	Yes	No	Total Responses
Hospitals	8	0	8
Hotels	13	1	14
Factories	15	0	15
Philanthropic Ass.	3	0	3
Boarding Houses	2	0	2
Others	3	0	3
Total	44	1	45
Percent	97%	3%	100 %

C2. What is the percentage of Fires caused by "human error" at your institution?

Category	0-5	6-25	26-50	51-70	71-80	81-90	91-100	Total Responses
Hospitals	2		1		1	2	2	8
Hotels	1		4	3	2	1	1	12
Factories		3	3	2	1	2	2	13
Philanthropic Ass.	1				2			3
Boarding Houses			1		1			2
Others		1						3
Total	4	4	9	7	7	5	5	41
Percent	10%	10%	22%	17%	17%	12%	12%	100 %

C3. In your opinion, what is the optimal solution to preventing the "human error" from causing Fire outbreaks?

	Hospitals	Hotels	Factories	Philanthropic Ass.	Boarding Houses	Others	Total	Percent
Awareness & Training	4	8	5	2	1		20	33
No smoking	3		2			1	6	10
Safe Electr. & Fuel sources	2		4	1	1	2	10	17
Maintenance		2					2	3
Surveillance	2	4	5			2	13	22
Avoiding Causes	1	1	1				3	5
Non			2				2	3
Others		1	3				4	7
Total	12	16	22	3	2	5	60	100

C4. Do you have available a list of general Fire precautions to be adhered to by employees?

Category	Good Behavior			Bad Behavior		
	Yes	No	Total Responses	Yes	No	Total Responses
Hospitals	4	5	9	5	4	9
Hotels	3	11	14	1	13	14
Factories	1	13	14	3	11	14
Philanthropic Ass.	1	2	3	2	1	3
Boarding Houses	0	2	2	0	2	2
Others	2	1	3	1	2	3
Total	11	34	45	12	33	45
Percent	24%	76%	100%	27%	73%	100 %

C5. Has your institution witnessed a Fire outbreak which was reported to your manager?

Category	Total Responses	
	Yes	No
Hospitals	6	3
Hotels	2	12
Factories	9	6
Philanthropic Ass.	3	0
Boarding Houses	2	0
Others	0	2
Total	22	23
Percent	49%	51%

C6. Has the Fire outbreak posed a threat of spreading to the entire premise?

Category	Total Responses		
	Great Danger	Moderate	Little
Hospitals	2	0	4
Hotels	0	0	1
Factories	1	1	5
Philanthropic Ass.	0	0	1
Boarding Houses	0	0	2
Others	0	0	0
Total	3	1	13
Percent	13%	4%	57%

C7. Have you reported this incident to your Manager?

Category	Yes	No	Why	Total Responses
Hospitals	5	0	0	5
Hotels	3	0	0	3
Factories	6	1	0	7
Philanthropic Ass.	2	0	0	2
Boarding Houses	2	0	0	2
Others	0	0	0	0
Total	18	1	0	19
Percent	95%	5%	0%	100 %

C8. Have you submitted a written report on the Fire outbreak?

Category	Yes	No	Total Responses
Hospitals	4	2	6
Hotels	6	0	6
Factories	2	4	6
Philanthropic Ass.	2	0	2
Boarding Houses	2	0	2
Others	0	0	0
Total	16	6	22
Percent	73%	27%	100 %

C9. What was management's reaction to the Fire outbreak and the Fire suppression effort?

Category	Hospitals	Hotels	Factories	Philanthropic Ass.	Boarding Houses	Others	Total	Percent
Satisfied	1						1	8
Dissatisfied				1			1	8
Gave rewards		1					1	8
Gave warnings			1				1	8
Improved system		1		1	1		4	31
Gave instructions	1						2	15
Others	1				1		3	23
Total Responses	3	2	4	2	2	0	13	100

C10. Do you agree with management's reaction to the Fire outbreak and do you consider yourself responsible for the incident?

Category	Yes	No	Total Responses
Hospitals		1	1
Hotels			0
Factories	3		3
Philanthropic Ass.		1	1
Boarding Houses	1	1	2
Others			0
Total	4	3	7
Percent	57%	43%	100 %

IV. Fire Safety Manager: His Qualifications, Responsibilities and Authorities:

D1. Who is the staff member in charge of Fire fighting?

Category	Manager	Maintenance Officer	Security	FF Engineer	Other	Unidentified	Total
Hospitals	1	7				1	9
Hotels	7	2	1		3	1	14
Factories	8	4		1	2		15
Philanthropic Ass.	1	2					3
Boarding Houses		2					2
Others	1	2					3
Total	18	19	1	1	5	2	46
Percent	39%	41%	2%	2%	11%	4%	100%

* Others: Include receptionists, accountants & treasurers

D2. Age of person in charge of Fire fighting

Category/ Age Groups	20-30 Years	30-40 Years	40-50 Years	50+ Years	Total Responses
Hospitals	2		1	1	4
Hotels	1	4	1	1	7
Factories	3	3	5	3	14
Philanthropic Ass.					0
Boarding Houses		1			1
Others	1	1		1	3
Total	7	9	7	6	29
Percent	24%	31%	24%	21%	100 %

D3. Education of person in charge of Fire fighting

Category/ Education	Engineering	Other University	Technical	Second-ary	Intermedi-ate	Fire Officer	Total
Hospitals	3	2	1	1	2		9
Hotels	1	6	1	1		1	10
Factories	2	3	1	1	1		8
Philanthropic Ass.	2	1					3
Boarding Houses							1
Others	1	2	1				3
Total	9	14	4	3	3	1	34
Percent	26%	41%	12%	9%	9%	3%	100%

D4. Number of employees accommodated at the institution

Category	0-25	26-50	51-75	76-100	101-200	201-300	301-500	>500	Total
Hospitals	1	1	2	1	2	1		1	9
Hotels	5	4	1	1	1		1		13
Factories	3	6	2			1			12
Philanthropic Ass. Boarding Houses			1			2			3
Others	1		1	1	1				4
Total	10	11	7	3	4	4	1	1	41
Percent	24%	27%	17%	7%	10%	10%	2%	2%	100%

D5. Average number of clients accommodated at the institution

Category	0-25	26-50	51-75	76-100	101-200	201-300	301-500	>500	Total responses
Hospitals	4		1	2		2			9
Hotels	3	6			2	1			12
Factories	1			1					2
Philanthropic Ass. Boarding Houses						1		2	3
Others	1		1	1			1	1	5
Total	9	6	2	3	3	4	0	3	30
Percent	30%	20%	7%	10%	10%	13%	0%	10%	100 %

D6. Why are some employees unfamiliar with Fire precautions?

Category	Hospitals	Hotels	Factories	Philanthropic Ass. Boarding Houses	Others	Total	Percent
No Training	4	6	8	3	2	24	42
Fear of Fire	2	1	3	1		7	12
No Experience	1	1	2		1	5	9
Negligence	2	2	1	2	1	9	16
Ignorance		1	3	1		5	9
Law Deficiency			1			1	2
Non	1	1				2	4
Others	2		2			4	7
Total	12	12	20	7	4	57	100

D7. What is the percentage of employees who are unfamiliar with Fire precautions at your institution?

category	0-5	6-25	26-50	51-70	71-80	81-90	91-100	Total
Hospitals	2	2	2	1				7
Hotels	4	2	1	1	1			9
Factories	1	2	5	1	2	1	1	13
Philanthropic Ass. Boarding Houses	1		2					3
Others	1	2			1			4
Total	9	8	10	3	4	1	1	36
Percent	25%	22%	28%	8%	11%	3%	3%	100%

D8. When have you last attended/ conducted a Fire protection training session?

Category	A Year Ago	Years Ago	Don't Remember	Never	Other	Total Responses
Hospitals	1	0	5	2	0	8
Hotels	3	1	0	7	0	11
Factories	3	0	4	7	0	14
Philanthropic Ass. Boarding Houses	2	0	1	0	0	3
Others	0	0	0	2	0	2
	1	0	1	0	0	2
Total	10	1	11	18	0	40
Percent	25%	3%	28%	45%	0%	100 %

D9. How many employees have attended the Fire protection training session?

Category	1-10	10-25	>25	Total Responses
Hospitals	0	1	2	3
Hotels	3	1	0	4
Factories	4	2	0	6
Philanthropic Ass. Boarding Houses	1	0	1	2
Others	0	0	0	0
	1	0	0	1
Total	9	4	3	16
Percent	56%	25%	19%	100 %

D10. Identify the main points presented at the Fire protection training session

Category	Medication	Fire Causes	Using Fire Extinguishers	Evacuation & Escape Routes	Preventive Measures	Maintenance	Total
Hospitals	1	1	1	1			4
Hotels			2		1		3
Factories	1	1	3	2		1	8
Philanthropic Ass. Boarding Houses	1						1
Others							0
Total	3	2	6	3	1	1	16
Percent	19%	13%	38%	19%	6%	6%	100%

D11. Who conducted the Fire protection training session?

Category	Fire Extinguishers Company	GM	Maintenance Officer	Civil Defense	Other	Total
Hospitals	1	1	2			4
Hotels		1	2		1	4
Factories	2		1	1		4
Philanthropic Ass. Boarding Houses					1	1
Others				1		1
Total	3	2	5	2	2	14
Percent	21%	14%	36%	14%	14%	100%

D12. Do you conduct Fire drills at your institution?

Category	Yes	No	Total Responses
Hospitals	2	7	9
Hotels	1	12	13
Factories	0	15	15
Philanthropic Ass. Boarding Houses	0	3	3
Others	0	2	2
Total	4	40	44
Percent	9%	91%	100%

D13. For how long have you been assuming the role of the Fire Safety Manager?

Category	0-2 years	3-5 years	5-10	10-20	Over 20	Total Responses
Hospitals	3	2	1	4	1	11
Hotels	4	2	3	3	1	13
Factories	5	4		1		10
Philanthropic Ass.	0	2	1	1		4
Boarding Houses	0	0	1			1
Others	3	0				3
Total	15	10	6	9	2	42
Percent	36%	24%	14%	21%	5%	100%

D.14 What are your duties as a Fire Safety Manager?

Category	Hospitals	Hotels	Factories	Philanthropic Ass.	Boarding Houses	Others	Total	Percent
Maintenance of FE	5	7	4	2	1	3	22	43
Coordination with FE	3	3		1	1	2	10	20
Maintenance of Elect.	2	1	1				4	8
Installations								
Employee/Clients instructions	1	4	4				9	18
Surveillance			2	2	1		5	10
Guaranteeing safety of Workers & Machines			1				1	2
Total	11	15	12	5	3	5	51	100

D15. Who appointed you in the position of Fire Safety Manager?

Category	Management	Experience	War	Education	Total Responses
Hospitals	6	1			7
Hotels	7	1	1		9
Factories	8			1	9
Philanthropic Ass.	3				3
Boarding Houses	2				2
Others	2				2
Total	28	2	1	1	32
Percent	88%	6%	3%	3%	100 %

D16. Do you hold any qualifications directly related to Fire safety?

Category	Education	Exp*	Others*	Total Responses
Hospitals	4	5		9
Hotels	5	6	2	13
Factories	4	9	1	14
Philanthropic Ass.	2	1		3
Boarding Houses	1	2	1	4
Others	1	1		2
Total	17	24	4	45
Percent	38%	53%	9%	100 %

* One person at a factory had a 7 years exp. at Civil Defense and another at a hotel establishment is an ex- Fireman

** Others include personal connections, company loyalty and a consultancy office

D17. Whom do you refer to in case of problems in Fire protection?

Category	Management	Firemen	Insurance	Non	Total
Hospitals	5	1		2	8
Hotels	6	1	1	2	10
Factories	8		1		9
Philanthropic Ass.	3				3
Boarding Houses				1	1
Others	1				1
Total	23	2	2	5	32
Percent	72%	6%	6%	16%	100%

D18. Do you have the authority to take special action against negligent employees?

Category	Yes	No	Don't Know	Total Responses
Hospitals	6	3	0	9
Hotels	8	4	0	12
Factories	13	1	0	14
Philanthropic Ass.	2	1	0	3
Boarding Houses	1	0	0	1
Others	1	1	0	2
Total	31	10	0	41
Percent	76%	24%	0%	100 %

D19. Are you satisfied with the overall Fire Safety measures at your institution?

Category	Yes	No	Total Responses
Hospitals	5	3	8
Hotels	6	3	9
Factories	7	5	12
Philanthropic Ass.	0	2	2
Boarding Houses	1	1	2
Others	0	0	0
Total	19	14	33
Percent	58%	42%	100 %

D20. What would you do to enhance Fire Safety measures?

Category	Hospitals	Hotels	Factories	Philanthropic Ass.	Boarding Houses	Others	Total	Percent
Same	3	1	1	1			6	23
Improve	2	2	3	2	1		10	38
Automatic FE	1		1				2	8
Alarm	1	1	1				3	12
Training			1		1		2	8
Sprinkler			1				1	4
Others			2				2	8
Total Responses	7	4	10	3	2	0	26	100

D21. Have you got the telephone no. of the nearest Fire Brigade?

Category	Yes	No*	Total Responses
Hospitals	4	5	9
Hotels	5	5	10
Factories	2	13	15
Philanthropic Ass.	1	2	3
Boarding Houses	0	2	2
Others	0	2	2
Total	12	29	41
Percent	29%	71%	100 %

*46% said the administration has the number, 31% said they can get it from the phone directory, 15% said the security office has the number, and 8% said the operator has it.

V. The Role Assumed by the Fire Brigades and Civil Defense Organizations in Fire Prevention in Lebanon;

E1. Has any officer from a Fire Brigade inspected your premise and examined your Fire protection measures?

Category	Yes	No	Don't Know	Total Responses
Hospitals	1	8	0	9
Hotels	1	12	1	14
Factories	1	12	1	14
Philanthropic Ass.	1	2	0	3
Boarding Houses	1	1	0	2
Others	1	2	0	3
Total	6	37	2	45
Percent	13%	82%	4%	100 %

E2. Has one of your employees accompanied the Fire Protection Officer on his tour of the premise?

Only one respondent answered this question indicating that the maintenance officer accompanied the Fire Protection Officer.

E3. Have you ever heard of a Fire safety certificate issued by the local Fire Brigades?

Category	Yes	No	Total Responses
Hospitals	4	5	9
Hotels	4	7	11
Factories	7	7	14
Philanthropic Ass.	1	2	3
Boarding Houses	1	1	2
Others	3	0	3
Total	20	22	42
Percent	48%	52%	100 %

VI. Fire Insurance Coverage in Organizations:

F1. Is your institution covered by a Fire insurance policy?

Category	Yes	No	Don't Know	Total Responses
Hospitals	5	1	2	8
Hotels	11	2	0	13
Factories	10	3	2	15
Philanthropic Ass.	2	1	0	3
Boarding Houses	2	0	0	2
Others	3	0	0	3
Total	33	7	4	44
Percent	75%	16%	9%	100 %

F2. Has the insurance company enforced any Fire precaution measures?

Category	Yes	No	Don't Know	Total Responses
Hospitals	5	1	3	9
Hotels	5	6	2	13
Factories	7	3	2	12
Philanthropic Ass.	0	1	1	2
Boarding Houses	0	2	0	2
Others	0	3	0	3
Total	17	16	8	41
Percent	41%	39%	20%	100 %

F3. Has an insurance representative visited your premise to assess the adequacy of Fire safety measures adopted?

Category	Yes	No	Don't Know	Total Responses
Hospitals	5	2	2	9
Hotels	7	2	3	12
Factories	6	0	6	12
Philanthropic Ass.	0	1	1	2
Boarding Houses	0	1	1	2
Others	2	0	1	3
Total	20	6	14	40
Percent	50%	15%	35%	100 %

APPENDIX C: Comparative Information

Fire Brigades vs. the Civil Defense Administration in Lebanon*

No.	Comparison Criteria	Fire Brigades	Civil Defense
1.	Year of establishment	1920s	1956
2.	Reports to	The Governor of the City of Beirut	The Ministry of Internal Affairs
3.	Commander's rank	Major	General
4.	Posts	Three posts in Beirut (including the HQ at Mar Michael) plus one post in Tripoli & another in Sidon	51 posts scattered all over Lebanon
5.	Vehicles	29 in Beirut posts	Minimum of one in each post all over Lebanon
6.	Fire suppression operators	180 men	730 men
7.	Fire prevention department	One person in the headquarters (HQ)	59 staff (new trainees will be operating out of different posts in Lebanon)
8.	Declared mission	<ul style="list-style-type: none"> • Fire fighting operations • Helping endangered people in emergency • Monitoring cinemas, theaters & public beaches • Assisting internal security forces & municipal police in case of emergencies & riots • Assisting army forces & civil defense when necessary • Executing whatever missions assigned to perform • Assisting in various social services 	<ul style="list-style-type: none"> • Fire fighting operations • Providing first-aid to injured people • Transporting injured people to hospitals • All sorts of rescue operations (road accidents, buildings collapse, etc...) • Moving bodies of deceased people & accidents' victims to hospitals • Regularly supplying welfare organizations with water • Assisting in various social services

9.	Last recruitment of Fire protection officers	1972 (planned recruitment in 1996)	1991
No.	Comparison Criteria	Fire Brigades	Civil Defense
10.	Nature of training	<ul style="list-style-type: none"> • <u>Mainly Fire fighting</u> • Military discipline • Fire fighting & related rescue operations 	<ul style="list-style-type: none"> • <u>Multi-Purpose</u> • Fire fighting • Rescue • First-aid
11.	Training period	3 months + 3 months	4 to 6 months
12.	Fire fighting missions	Average 600 per year	<ul style="list-style-type: none"> • 3,875 miscellaneous • 919 forest Fires (equivalent to 4,798 total missions in 1994)
13.	Fire prevention activities	<ul style="list-style-type: none"> • Investigation of Fires upon request • Preparing jointly with SOLIDERE for publishing a Fire safety precautions manual 	<ul style="list-style-type: none"> • Investigation of Fires upon request • Training of 58 Fire prevention officers
14.	Ratios of inspections/ suppressions	No inspections	No inspections
15.	Contribution to development of new Fire Safety code	Attended two meetings	Minor contribution

* Mina, N. and A. Abu Daher. Personal Interview. December 05, 1995.

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