

# [Overview of fire safety management management essay](https://assignbuster.com/overview-of-fire-safety-management-management-essay/)

Fire Safety Management refers as “ the application by a manager of policy, standards, tools, information and practices to the task of analyzing, evaluating and controlling fire safety. (Howarth, 1999).

Furthermore, Rimmington (1991) suggested that “ Fire Safety Management hold an importance in a manager’s plan and safety fire safety interlink between each other. He noted that “ accidents are caused by the lack of management control”. Pickard (1994, p. 8) argued that “ a fire safety strategy for a specific building needs management policies and procedures to ensure the effective operation of the strategy” and it should be done on an ongoing basis where fire safety systems need to be regularly checked and maintained.

However, Shipp (1994) opposed the above statement by pointing out that the public and stakeholders are also accountable for fire safety. Therefore, there is the need for an effective fire safety management so as to be in line with the fire safety legislation and procedures.

## 3. 2 Effective Fire Safety Management

Effective Fire Safety Management is sine qua non for both internal and external safety. Modifications of the organizational and its structure can affect the fire safety and managers must not “ take their eyes off the safety ball”. International standards should be applied by the stakeholders, supervision, training, audit, inspection, risk assessment and dissemination of information should be improved. Effective fire safety management is a key element in the overall fire safety of a building and its occupants. Managers need to plan effectively to combat the potentially disastrous effects of a fire in their building, and to meet the many requirements placed upon them by various pieces of fire legislation applicable to occupied buildings of all types and uses.

It is generally agreed as per Section 5 of the Occupational Safety and Health Act 2005 (OSHA 2005) which stipulates that ‘ Every employer shall so far as reasonably practicable ensure the safety, health and welfare of all his employees’. Therefore, it is a legal and moral obligation as well as the commitment of the management to ensure that safety at work is taken care of.

Chapter 3: Literature Review

## 3. 3 Importance and Limitation of Fire Safety Management

## Importance

## 1. Employees

It will safeguard their lives by providing them with all the necessary precautions and measures to fire safety for the particular places of work and ensure them full protection against fire outbreaks.

It will enable them to follow all safety rules and safe working procedures so that they do not endanger their lives as well as that of the visitors or fellow colleagues;

It will be an essential means for them to know the location or fire extinguishers, emergency evacuation routes and exits, and the designated area where personnel will gather following an evacuation to ensure that everyone is accounted for;

It will provide them with safety means of how to keep emergency evacuation routes and exits clear and unobstructed as specified by S 75 of the OSHA 2005;

It will define the responsibilities of every employees so that the latter can immediately report to a supervisor any fire hazard or unsafe condition observed, any blocked or obstructed fire exit, any damaged or inoperable fire extinguisher, or any fire incident or use of a fire extinguisher in the workplace; and immediately evacuate the building and proceed to the designated gathering area when a fire emergency is announced or sounded by an alarm.

## 2. Employer

It will provide proper guidelines and instructions so as to be in line with the provisions of the OSHA 2005.

It will reduce the financial costs relating to fire safety and a proper fire safety management will consist of different procedures and finding the root cause of fire outbreaks at specific places.

Chapter 3: Literature Review

It will enable the employer to make a review of fire safety policy, plans and programs in a better way to enhance the safety at the workplace.

It will also suggest when the company need to do a fire drill as it will provide the people with the locations of the fire exits and routes, and reinforce a calm exits in case of a fire.

## 3. Government

It will serve as a guideline to improve the fire safety regulations in Mauritius and to make amendments to the provisions relating to fire safety of the OSHA 2005.

Fewer incentives to provide to all those who have been victims of fire and the finance can be used in a more economical way.

It will reduce occupational accidents pertaining to fire and thus, making Mauritius a place free of fire accidents as almost all injuries relating to fire are considered to be very serious.

## 4. Customers

- It will attract many customers as they would be willing to do business with a company which has a low accident rate.

- Having a workplace where safety is valued, ensure that the workers are more motivated to work and consequently, better quality of products.

## Limitation

Lack of financial resources to implement the safety programs and fire safety procedures.

Training programs and fire drills need to be revised in accordance to that particular company therefore it requires time and money.

Chapter 3: Literature Review

In some situations, management is unwilling to cooperate on safety matters instead they are more focused towards improving their profitability.

Lack of trained personnel and lack of sophisticated equipments to fight the source of the fire.

Few awareness campaigns on fire safety and less communication systems between the employer and employees.

## 3. 4 Experts’ reaction on Fire Safety Management

Shipp (1994) stressed out that it is a continuous process that needs to be reviewed so as to be in line with the laws pertaining to fire safety and the possibility of time and cost constraints always arise whereas Todd (1992) concluded that “ Fire Safety Management can not be clipped from time to time”. It is a moral and a legal obligation to meet the requirements of fire safety.

Additionally, Hay (1992) highlighted that a fire risk can be detrimental to a business and can result in both direct and indirect losses. Total safety does not exist in such a dynamic business environment. Thus, the danger factor is always present. Budnick (1986) noted that “ the quantification of a problem does not, itself, assure a better or more accurate solution”

The above fire safety advices reveal that the review and continuous monitoring systems are very important to ensure that every fire hazard are treated at source and timely measures are adopted to improve the workplace. The introduction of a fire safety management model is useful for the analysis and measurement of the existing fire risks and to suggest possible recommendations for management to adopt.

## Proposed Fire Safety Management Model (Howard, 1999)

This model consists of both qualitative and quantitative procedures in the fire safety management process.

Chapter 3: Literature Review

## Formula used is as follows:

## Fire Safety Index: (Fire safety management index X Fire risk index X occupants density factor)

The fire safety management index developed uses ten elements namely:

(1) Organizational arrangements;

(2) risk assessment methodology;

(3) Compliance with fire safety law;

(4) Emergency plans and procedures;

(5) Communication and information;

(6) Reporting and investigating fires;

(7) Training;

(8) Maintenance and standards;

(9) Budget; and

(10) Audit.

The outcomes obtained from the fire safety management model can be applied to a real life situation to determine new strategies and guidelines to be followed in case of fire.

Chapter 3: Literature Review

## Survival strategies in case of fire

Steps to be followed:

Try to smother it

(b)Take refuge and wait for assistance

(c)Evacuation

According to the National Safety Council (NSC), fire is the leading cause of accidental death. Additionally, the National Fire Protection Association (NFPA) statistics deduced that approximately 3% of all workplace fatalities were attributed to fire and human negligence in fire evacuation issue have proved to be very costly. As a result, the study of human behavior in fire evacuation issues is vital.

## 3. 5 People’s Behaviour and Problems in fire evacuation

The quality of information, communications and management determine the human behavior in case of emergency. Howard (1999) noted that precise information should be valued and ensure that the necessary data is not lost in a “ sea of signs”.

## The people aspect

“ People create and solve problems” ( Howarth, 1999). Sime (1990) argued that the concept of “ panic” is used to hold responsible and criticize the public, as a “ let-out clause”. Canter (1990) conducted a behavioral analysis of fire risks issues and his investigation results highlighted the main aggravating factors for instance smoke, information, communication and management or administration. Proulx et al (1991) maintained that “ telling people the truth” will diminish emergencies panic when face with timely decisions to be taken.

## Fire response performance

Fire response performance is defined as the ability of a person to become aware and interpret signs of danger, design and implement measures to survive a fire.

Chapter 3: Literature Review

## The three major factors to determine the degree of fire response performance are as follows:

Fire characteristics

Human characteristics

Building characteristics

## Fire Characteristics

## Smoke yield and toxicity

Occupants rushing to the emergency escape route in a smoky environment had to diverge and go back over the same route. The occupational problems that the occupants were impaired vision, signs of suffocation and scared.

## Human Characteristics

The principal factors of human characteristics are individual, social and situational features.

Chapter 3: Literature Review

## Individual features

Crucial personal characteristics refer to the personality traits of the people in a building, their abilities to observe and interpret situations, their personal background and experience. During a fire outbreak, the people tend to follow what others are doing. Stress resistance varies from individual to individual. The Bandura Social Cognitive theory proved that the environment, motivating factors and emotion are based on a person’s belief.

## Social features

Incident evaluation has shown that people prefer teamwork to individual work.

## Situational features

The situational features are characterized by the location, familiarity with the building and awareness issues.

## Building Characteristics

## Environmental aspect

These factors are responsible for the obstruction of passage and safe access and egress namely:

Signs, signals and demarcating lines

(b)Well known location

(c)Plan and design of the building

(d)The ease of visibility

Chapter 3: Literature Review

There exist factors which directly or indirectly affect the evacuation velocity in staircases:

Evacuees rushing and panicking from different areas;

Evacuees taking time to move from one place to another;

Unsuitable footwear (tight shoes, high heels etc);

The number of people present in the staircase;

Size of the staircase

In certain situations, human beings will always make mistakes, and there is a limit to what can be done to modify behaviour itself. Thus, there is the need to consider integrating human behaviour in fire safety management to be able to determine:

Behaviours that cause or prevent fires;

Behaviours that affect fires; and

Behaviours that increase or reduce harm from fires.

## 3. 6 Integrating human behavior and response issues in fire safety management of facilities

Integrating human factors issues into engineered fire safety design consist of incorporating fire detector activation times and travel times in a computer model, sometimes with safety factors, and developing an available safe egress time (Proulx, 1995). Moreover, the human factors should be included in the life safety assessment (Beck and Yung, 1995; Beck 1997; Magnusson et al., 1995; Magnusson, 1997)

Chapter 3: Literature Review

The behavioral and physiological aspects of human beings need to be analyzed in depth to design Fire Safety measures, training needs requirements and emergency procedures based on the characteristics and performance of humans.

## Behavioral Aspect

## Behavioral response to fire

Human’s reaction to alarm system and fire cues need to be taken into account. Incident evaluation demonstrated that people are slow to distinguish between a real and fake fire alarm signal. (Magnusson, 1997).

Bryan (1991) highlighted that there are six basic phases of a decision making process relating to fire issues are namely:

## Recognition

## Validation

## Definition

## Evaluation

## Commitment

## Reassessment

Chapter 3: Literature Review

## Recognition

Identification of fire risks

## Validation

Seeking for more information to confirm the fire threats

## Definition

Describing the degree of exposure to smoke, flames, heat.

## Evaluation

Check for effectiveness of the measures and new strategy to adopt

## Commitment

Make use of the actions decided in the evaluation phase.

## Reassessment

If the actions are ineffective in putting out the fire, the evacuees will be stressed and more panicked.

Another way to understand how people act in fire is to view actions in the light of four Socio-Psychological concepts (Proulx, 1994a).

Chapter 3: Literature Review

## 3. 7 Contributory Factors to the ones mentioned above

## Avoidance

People knowingly refuse to admit and face unpleasant situation so as not to affect them psychologically.

## Commitment

People usually do not like to be disturbed when performing their daily tasks.

## Affiliation

People will act as a follower and want to be lead by a group of people.

## Role

The role of an individual in a fire determines the sharing of actions.

Fahy and Proulx (1996) concluded that emergency actions are categorized in groups of “ investigate”, “ seek information”, “ seek refuge”, “ assist others”, “ prepare to evacuate”, “ evacuate”, “ alert others or report accident” and “ wait”.

The Canadian Research did an experiment on evacuation drills and concluded that people delay time is increased during evacuation; they took 30 seconds to 14 minutes to evacuate despite the clear audibility of the fire alarm system (Proulx, 1994 b; Proulx et al; 1994; 1995 b)

## Physiological Aspect

Physiological response to fire effects

Physiological response to conditions that are closely linked to Life safety hazard assessments is considered to be an integral part of a fire safety management plan.

Chapter 3: Literature Review

## Temperature

Effects of temperature vary with the length of time exposed to heat, the amount of relative humidity and the “ breathability” of closing worn.

Both temperature and exposure time are needed to determine the risk of burn injuries. (Hartzell. 1991).

## Heat flux

It describes the amount of heat transferred to the skin.

## Obscuration

Two negative physical effects of smoke are impaired vision and toxicity.

## Oxygen depletion

A reduction in the percentage of oxygen leads to physiological effect.

Chapter 3: Literature Review

## Exposure to gases

Carbon monoxide is injurious to health and statistics have proved that half of the deaths are due to the exposure to the Carbon Monoxide and 30 % of the fire fatalities relate to the mixture with other products (Hartzell, 1986).

Moreover, the Fire Safety Policy has been provided as good practice, and to help organization comply with the moral and legal obligations of the Occupational Safety and Health Act 2005. It is imperative to use the health and safety policy to meet the requirements of the act and to safeguard the working environment.

## Fire safety legislation

Some countries provide laws to cater for disabled such as “ defend-in place strategy”.

Health and Safety Executive reports have clearly shown that code violations are frequent.

Additionally, the techniques and procedures that are used to ensure fire safety are presently, technology based and the normal practice is ignored. Sime (1999, 2001) developed an Occupant Response Shelter Escape Time (ORSET) model. Fire Safety Policies equip people with the necessary tools to tackle the fire safety issues both in the society and political arena.

He added that this model considers the theoretical aspect of fire safety (Engineering and Architecture) as well as the human behavior (psychology, facilities management).

Chapter 3: Literature Review

Consequently, Sime focuses his study on how people act according to the information provided to them. Safe means of escape and emergency exits increase the chance of being survived. Jin suggested that walking behavior in a smoky environment is completely different from a non smoky one.

Moreover, findings from the Arundel Park Fire tragedy (1956) showed that occupants re-enter a burning building to rescue their friends or colleagues.

Incident evaluators have proved that an evacuation delay strategy leads to a higher fire death rate. Evacuation behavior refers to the behavior of people during an escape.

## Feelings in the situation

People would be scared, stressed and panicked in case of fire. Wood (1972) and Bryan et al. (1977) made an investigation which showed that 37. 3 % of the people agree to put out the fire and only 2 % would trigger a fire alarm. Incident evaluators pointed out that in many cases men are more proactive than women when fighting a fire.

## 3. 8 Use of Fire Alarms to create awareness

## Is fire alarm enough?

NIOSH studies have shown that “ Smoke” is a determinant factor in fire safety evacuation (Project people, Bryan, 1973). Proulx, (1993) highlighted that evacuees prefer the known exits rather than the unknown ones. The fire alarm system shall be inspected and maintained by a competent person once yearly. Benthorn and Frantzich (1996) to get answers to such questions as “ Do the subjects perceive and understand signs that are of importance in an evacuation situation?” Bellamy et al., 1990, noted that very few people understand a fire ring signal as a real fire alarm signal.

Chapter 3: Literature Review

## Indeed, is a fire alarm signal enough to trigger occupant evacuation in public buildings?

Public buildings consist of mostly visitors who may not be well aware of the layout of the premises and when a fire alarm triggers, occupants will follow the action of others.

According to Proulx (1998), the meaning of fire alarm signal i. e “ fire alarm signal = leave immediately.

## Is there a problem with the fire alarm system?

It has been noticed that when the fire rescue team arrive on the spot, the occupants are still busy doing their work activities. Benthorn and Franzich (1996) made a deep analysis in their IKEA warehouse, Sweden and stressed out that only 19 % of occupants correctly identified the fire alarm system. The Temporal-Three pattern, described in ISO 8201 will be adopted worldwide shortly. Fleischmann (1998) and Proulx and pineau (1996) highlighted that people respond quickly to fire alarm signal in government offices.

## Human reponse to fire alarm signals?

Occupants often get confused about the real fire alarm signals. The best approach to be adopted is to support the non-voice alarm system with a new one.

## Behavioral response to fire alarms

People delay to react to a fire alarm signal, even after they have identified it as a fire cue as such, is that they are uncertain if the alarm is “ real”. Delayed evacuation occurs because occupants ignore fire alarm signals and thus, fire wardens are useful. Human behavior should be taken into account when designing a building. Furthermore, additional exits are required for emergency purposes, free from obstruction

Chapter 3: Literature Review

To bring fire safety policy into line with people’s actual behaviour during a fire, it is recommended that the scientific knowledge available from the field of psychonomics should be utilised.

## Psychonomics and fire safety

The Dutch Psychonomic Society describes the concept as follows:

Psychonomics deals with processes, such as observing, locomotion, learning, deciding, thinking, getting emotional, speaking, writing, which occur in numerous situations, at child and adult, individually and socially. It deals not only with the logos (doctrine) of behaviour, but also and in particular with the nomos, the laws that describes and predicts the behaviour.

Psychonomics is concerned with discovering the laws which govern human behaviour. These lead to an understanding of how people process information. In the field of fire safety, the focus of psychonomics is on human behaviour in buildings, both before as well as during a fire. Psychonomics addresses the reciprocal influence between fire and human characteristics, and between building and human characteristics.

Chapter 3: Literature Review