

# 20

## CHAPTER

# Technological Changes, Industrial Accidents and Safety, Industrial Health and Hygiene, and Working Environment and Fatigue

### LEARNING OBJECTIVES

After studying this chapter, you should be able to:

1. Explain the concept of technological change and how technological changes benefit all concerned
2. Explain why employees resist change and the adverse impacts of technological changes
3. Explain the factors responsible for industrial accidents and throw light on accidents costs
4. List and describe the steps taken in Indian industries to prevent industrial accidents
5. Explain what industrial health is all about and why it is important
6. List and describe the factors affecting health
7. Explain what mental health is and how can it be overcome
8. Explain what are occupational hazards and diseases
9. Distinguish between physical working environment and psychological environment
10. Differentiate between mental fatigue and physical fatigue
11. Explain the meaning of monotony and how to measure it

## Introduction

In order to extract the best out of people at work, it is essential that they must be contented to the extent possible. It may be feasible to a great extent if technological changes are handled properly, adequate safety measures are undertaken appropriately so as to avoid industrial accidents, industrial health and hygiene are maintained optimally, working environment is made conducive towards higher productivity and causes of fatigue are overcome thoughtfully. In the present chapter, all these issues have been discussed.

## Technological Change

Humans have always been in the quest for finding out ways and means for increasing quantum of output, improving quality of products, reducing cost of production, avoiding wastage, reducing depreciation, reducing boredom, increasing job satisfaction, reducing physical exertion in the process of production and so on. All these requirements call for technological changes which bring about social and economic progress in the country. Automation and rationalisation, which are the two major forms of technological change, have revolutionised the production system all over the world, and now there is hardly any organised industry which has remained untouched by spectacular technological changes, resulting over a period in significant increase in labour productivity.<sup>1</sup> Technological changes are a double-edged weapon. If handled appropriately, these can cause economic turnaround, resulting in overall prosperity and development. However, if not monitored properly, a lot of damage can be done to the economy of an organisation in the form of chaos, industrial accidents, retrenchment and the like.

## The Concept

As stated earlier, a technological change is the outcome of a person's desire to bring about improvement in the output, quality, profits and so on, on the one hand, and reduction in cost of production, wastage, idle time, physical efforts, boredom and so on, on the other. It is this unending desire that is responsible for the emergence of the concept of technological changes which usually happen first in the rich countries as they can afford the heavy expenditure and effort needed for technological changes. Other countries follow suit later on.

## Benefits of Technological Changes

Technological changes transform a country economically as well as socially as they

- Increase productivity
- Increase output

<sup>1</sup> For details, see B. Tulpule, 'Technological Change and Industrial Relations', in *Technological Change and Industrial Relations*, eds. C. P. Thakur and G. S. Arora (New Delhi: Shri Ram Centre for Industrial Relations, 1971).

- Inflate profits
- Improve standard of living of people
- Lead to standardisation of product
- Increase physical comfort of workers
- Reduce cost of production
- Reduce wastage
- Infuse more confidence among workers
- Boost morale
- Cause value addition among workers
- Increase revenue of the government
- Make people more innovative
- Increase the capacity to pay of the employers, leading to better working and living lives of workers.

## **Adverse Impacts of Technological Changes**

Technological changes are not without their dark side as these may

- Cause unemployment due to replacement of people by machines or because of technological changes (for an example, see Exhibit 20.1)
- Need rehabilitation of retrenched employees
- Need more training and/or retraining
- Require outplacement services for surplus labour
- Cause more industrial accidents
- Require transfers
- Cause job dissatisfaction
- Create monotony in some jobs
- Cause resistance to change
- Spoil IR

### **EXHIBIT 20.1 Tata Motors Lays Off 6,000 Temporary Staff in Jamshedpur**

Around 6,000 temporary staff at Tata Motors' Jamshedpur plant were let go, allegedly after the Supreme Court banned the sale of BS-III vehicles from April 1 when stricter emission norms kicked in.

The court ordered on March 29 that only BS - IV-complaint vehicles be sold and registered across the country from April 1, 2017.

Around 25,000 family members will be affected by the company's decision on temporary employees, senior trade union leader D. D. Tripathi said.

**Source:** *Hindustan Times*, 5 April 2017.

## 700 HUMAN RESOURCE MANAGEMENT

Hence, technological changes may be introduced in phases, and employees should be taken into confidence before introducing any technological change.

### **Types of Technological Changes**

Technological changes may be automation, rationalisation, time and motion studies, scientific management, changes in plant and machinery and so on.

### **Resistance to Technological Changes**

Every change is usually resisted at least in its initial stage. Similar is the case with technological change. It is because of its likely adverse effects already discussed earlier. Hence, any technological change should be planned well, preferably in consultation with employees/trade unions, implemented in phases and simultaneously taking necessary steps to neutralise its probable adverse effects.

### **Transfer of Technology**

It is not that simple to replace indigenous technology in developing countries with the state-of-the-art technology of the industrially developed countries. It may be due to non-availability of adequate infrastructure, inadequacy of highly skilled workforce and poor economic condition of the country to which the advanced technology is to be transferred. The suggested mid-way for such a country is to first go for appropriate technology or intermediate technology and then to the state-of-the-art technology over a period of time when circumstances are favourable.

### **Rationalisation**

Automation and rationalisation are the two significant forms of technological changes. In automation, things are self-regulating and technology itself controls the operations. The machine provides data from its own operations and feeds it back to its own controls which govern the process of production. In rationalisation, a basic change is brought about in the structure, and control of industrial activities and its techniques can be applied to the methods and materials as well as to people. Although rationalisation was first introduced in cotton textile industry around 1928, it became popular during the 1950s and 1960s, and many units and industries adopted it, though the outcome of such an exercise was not uniform. Hence, rationalisation may be introduced after a thoughtful consideration, consultation and at appropriate time and when prerequisites necessary for the success of rationalisation are available in the organisation/industry.

Thus, with regard to technological change, it may be concluded that before introducing it, its pros and cons should be properly weighed, it should be well-thought-out and well-planned in consultation with the employees or their trade unions and be introduced in phases. It should be a smooth transfer from indigenous to the state-of-the-art technology, and in between we may have appropriate or intermediate technology and also create essential prerequisites needed for adopting technical change.

## Industrial Accidents and Safety

While technological development in industries has led to higher output, standardised products, better quality, reduced cost of production and so on, it has also created a problem of safety hazards and increased number of industrial accidents. Modern complexity of industrial world has made industrial accidents almost a regular feature of the modern industrial life. As per *Hindustan Times* dated 30 September 2015, in auto plant accidents in Manesar which is a vital industrial hub of Haryana state, about 1,500 workers lost their fingers/hands during 2014. A lot of accidents do take place every year in the automotive industry located in the Gurugram–Manesar belt wherein hundreds of workers sustain serious injuries and many of them lose their fingers and hands.<sup>2</sup> Even ILO reports that industrial injury, disease and death account for about 4 per cent of a country's gross national product. Despite various legal provisions as contained under the Factories Act, 1948; ESI Act, 1948; Employees' Compensation Act, 1923; Central Labour (Regulation and Abolition) Act, 1970; and some other Acts, it has not been possible to eliminate industrial accidents which are happening in almost all the states of the country. An idea about the fatal and non-fatal injuries in factories during 2010 by states/union territories can be had from Table 20.1.

It is also a hard reality that despite the alarming state of affairs with regard to industrial accidents, the employers and the states have not yet taken appropriate steps to check this menace. Post-accident care and accident compensation leave much to be desired. Although in Indian industries, the frequency, nature of injury and the number of workers involved in industrial accidents are far more serious and worrying, the industrially advanced countries of the West also face the same problem. For example, in the USA, in 2003, there were 4.4 million non-fatal injuries/illnesses in the private sector alone, with approximately 1.3 million involving lost work time.<sup>3</sup> However, injury rates are higher for medium-size firms (50–249 workers) than for smaller or larger firms. About 15 workers are killed in American workplace each day. Fatal injuries at work can often be traced to hazardous or unsafe work conditions and practices.<sup>4</sup> In 2002, 5,534 people died as a result of work-related injuries in all the sectors of the US economy.<sup>5</sup> Industrial accidents are extremely costly in both economic and human terms. Even an Australian estimate of \$6.5 billion costs and 1,000,000 lost working weeks per year is a conservative one.<sup>6</sup> Most accidents take place in the manufacturing sector.

Besides economic and moral considerations, there are also legal requirements to ensure health, safety and welfare of people at work. Even a minor accident can bring down the morale of workers and cause production losses.

<sup>2</sup> For detail, see *Hindustan Times*, 6 October 2015.

<sup>3</sup> Quoted from Bureau of Labor Statistics, US Department of Labor, *Labour Review* 11, no. 5 (August 2003).

<sup>4</sup> Quoted by R. C. Sharma, *Industrial Relations and Labour Legislation*, 456, from Ivancevich, *Human Resource Management*, 549.

<sup>5</sup> *Ibid.*

<sup>6</sup> See D. K. Dans, *Occupational Health, Safety and Welfare Legislation: A Public Discussion Document/Minister of Industrial Relations*, D. K. Dans (Perth: Department of Labour and Industry, October 1983).

TABLE 20.1 Industrial Injuries in Factories during 2010 by States/Union Territories

<i>State/Union Territories</i>	<i>Fatal</i>	<i>Non-fatal</i>	<i>Total</i>
Andhra Pradesh	191	1,516	1,707
Assam	6	46	52
Bihar	—	215	215
Chhattisgarh	84	222	306
Goa	12	97	109
Gujarat	221	2,771	2,992
Haryana	18	47	65
Jharkhand	33	65	98
Kerala	..	..	..
Maharashtra	222	2,711	2,933
Manipur	—	—	—
Meghalaya	—	—	—
Nagaland	—	—	—
Odisha	102	478	580
Punjab	22	219	241
Rajasthan	67	789	856
Tamil Nadu	75	882	957
Tripura	1	5	6
West Bengal	—	—	—
Chandigarh	—	2	2
Puducherry	10	46	56
Total	1,064	1,011	11,175

**Source:** Government of India, Ministry of Labour and Employment, Labour Bureau, *Indian Labour Journal* 55, no. 4 (April 2014): 456. Available at [http://labourbureaunew.gov.in/UserContent/ILJ\\_APR\\_2014.pdf](http://labourbureaunew.gov.in/UserContent/ILJ_APR_2014.pdf) (Accessed on 6 December 2017).

**Note:** The Factories Act, 1948, is not implemented in four states/union territories, namely Arunachal Pradesh, Lakshadweep, Mizoram and Sikkim; data is not received from rest of the states/union territories; -- = Nil, .. = Not available.

## Meaning and Definition

According to the Factories Act, 1948, an industrial accident is an occurrence in an industrial establishment, considering bodily injury to a person which makes him/her unfit to resume his/her duties in the next 48 hours.

Thus, in the case of an employee, an accident should render him/her incapable of reporting for duty in the next 48 hours. All accidents are, therefore, tragic for the employees, their families, co-workers and employers. However, an industrial accident is an untoward event which is sudden, unexpected and not designed, and more often than not, inflicts injuries.<sup>7</sup>

## Causes of Work-related Accidents

Causes of accidents have been categorised in different ways by different authors. For example, Ivancevich<sup>8</sup> has categorised occupational accidents into the following three categories:

1. Tasks
2. Working conditions
3. Nature of the employees

Ghanekar<sup>9</sup> has divided the causes of industrial accidents into two categories:

1. Physical causation factors
  - a. Environmental factors
  - b. Work process factors
2. Underlying causation factors

However, causes of industrial accidents<sup>10</sup> can be divided into the following categories:

1. Machine factors/technical factors
2. Non-machine factors
  - a. General factors
  - b. Personal factors

It has been observed that the accidents caused due to *technical factors* are less in number, say around one-fifth of the total number of accidents, but they cause grave injuries and at times prove fatal also. Such causes may include poorly designed machines, tools and equipment, inadequately repaired machines, inadequate safety guards, absence of inadequate fencing of machines, lack of automatic quick stoppage devices, badly maintained machines and so on.

Among the *non-machine factors*, while *general factors* may include a large number of factors, for example, loading or unloading heavy material carelessly, defective work methods, fire, defective electrical fittings, poor working conditions like excessive work hours leading to fatigue, noise, high temperature, poor ventilation, inadequate lighting, horseplay, fighting, boredom, falling down from ladders, pricking of a wire nail or any sharp object carelessly thrown, absence or inadequate safety instructions, improper footrests, wearing loose dress while working on or near machines, flying of hammer heads or

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<sup>7</sup> Sharma, *Industrial Relations and Labour Legislation*, 457.

<sup>8</sup> For details, see Ivancevich, *Human Resource Management*, 550–51.

<sup>9</sup> For details, see A. Ghanekar, *Human Resource Management* (Pune: Everest Publishing House, 1977), 314–15.

<sup>10</sup> See Sharma, *Industrial Relations and Labour Legislation*, 461–64.

chisels while using them, lack of regular inspection, defective layout of plant and machinery, and indiscipline, the *personal factor* may comprise weak hearing power, poor eyesight, nervousness, fear complex, victim of fits, epilepsy, high blood pressure, low blood pressure, emotional instability, absent-mindedness, daydreaming, faulty attitude, irrationality, drug addiction, slow reaction in removing oneself from risky spots/places, poor IQ, frustration, low morale, lack of confidence, depression, exhibitionism, faulty judgement and other personality weaknesses.

There are data to indicate that some employees have more accidents than the average. This is known as an individual's *proneness to accidents*. Accident proneness is, according to Sikula,<sup>11</sup> a condition in which a 'human being is mentally inclined, strongly disposed, attitudinally addicted or personally destined to become continually involved in an ongoing and never ending series of accidents or injuries'. Such a person is also known as *accident repeater*. Experience shows that employees who are under 30 years of age, are unmarried, are impulsive, get easily bored and are newly recruited are more likely than others to have accidents. Accident proneness can be measured by a set of attitude or motivational instruments to a considerable extent.

## Accident Measurement

Flippo<sup>12</sup> has suggested a new set of measures wherein measurement base for all injuries and illness is 100 full-time employees as follows:

$$\frac{N}{H} \times 200,000,$$

where, N stands for the number of injuries and illness and H for the total hours worked by all, hours that 100 employees will work during the year, assuming a 40-hour week and 50 weeks of working.

On the other hand, the National Safety Council (USA) has suggested the following method:

$$\text{Frequency rate} = \frac{\text{Number of Lost-time accident} \times 1,000,000}{\text{Number of employees-Hours worked during the period}}$$

$$\text{Severity rate} = \frac{\text{Number of employees-days lost} \times 1,000,000}{\text{Number of employees-Hours worked during the period}}$$

The frequency rate is the number of lost-time accidents per million man-hours worked, and the severity rate is the number of days lost because of accidents per million man-hours worked. These measures are useful for making a comparative study of organisations using the same indices. On the other hand, the severity rate is the number of days lost because of accidents per million man-hours worked as stated earlier.

<sup>11</sup> A. F. Sikula, *Personnel Administration and Human Resource Management* (New York, NY: John Wiley & Sons, 1977), 375.

<sup>12</sup> Quoted in Sharma, *Industrial Relations and Labour Legislation*, 461, from Flippo, *Personnel Management*, 526.

## **Accident Costs**

It is difficult to measure the physical pain, emotional turbulence and misery an individual or his/her family undergoes due to accidents. Accidents also cause financial loss to employers because of their hampering production and also due to payment for the workmen compensation the employers have to pay to the injured worker or his/her dependents in case an accident proves fatal. Accidents' costs can be of two types as discussed further.

### ***Direct Costs***

These costs may include:

1. Payment of wages payable legally to the injured employee while he/she is off the duty due to physical injury inflicted by the accident.
2. Compensation payable to the injured employee (or his/her dependents in case the accident proves fatal) as per the provisions of the Employees' Compensation Act, 1923, or the ESI Act, 1948, whichever is applicable.
3. Loss in production due to the absence of the injured worker from his/her duties.
4. Cost of medical aid provided to the injured employee.
5. Cost of training to his/her substitute to be engaged as replacement of the injured employee until he/she recovers and reports back to his/her duties.

### ***Indirect Costs/Hidden Costs***

These are much more than direct costs. These may involve cost of lost-time of an injured employee as also other employees who have to stop their work due to accident as they may be helping the injured worker (e.g., taking him/her to the medical care), or just because of sympathy or for any other reason whatsoever. The foreman or supervisor or any other immediate boss may also stop working in order to conduct investigation for identifying the cause of accident or to locate a substitute as replacement of the injured worker or to render necessary help required immediately to help the injured worker or to observe any other formalities legally required as per statutory provisions and so on. Indirect costs also include the cost of time spent by the hospital staff in taking care of the injured worker.

## **Prevention of Accidents**

Most accidents are preventable.<sup>13</sup> For convenience sake, preventive steps can be categorised under the following heads.

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<sup>13</sup> According to H. W. Heinrich, 98 per cent of industrial accidents are preventable if adequate preventive steps are undertaken.

### ***Statutory Steps***

In order to prevent industrial accidents and promote safety of employees, government owes a great responsibility, especially in the developing countries like India. In our country, the government has undertaken the following steps in this direction:

#### ***Factories Act, 1948***

Safety provisions are contained in Chapters IV and IV A of the Factories Act, 1948. The same, in brief, are as follows:

1. **Fencing of machinery (Section 21):** All dangerous and moving parts of a machinery shall be securely fenced.
2. **Work on or near machinery in motion (Section 22):** Any examination, adjustment or lubrication or any part of an operating machinery shall be carried out by trained, male adult, wearing tight-fitting clothes. Women and adolescents are not allowed to carry out the aforesaid work.
3. **Employment of young persons on dangerous machines (Section 23):** No young person (adolescent) shall be allowed to work on certain dangerous machines and certain operations.
4. **Striking gear and devices for cutting of power (Section 24):** Suitable devices for cutting off power in an emergency shall be provided in every room. Besides, suitable striking gear or other efficient mechanical appliances shall be provided and maintained.
5. **Self-acting machines (Section 25):** Self-acting machines and no material carried on it shall be allowed to run within 18 inches from any fixed structure.
6. **Casing of new machinery (Section 26):** Machinery driven by power shall be sunk, encased and effectively guarded against any danger or accident.
7. **Prohibition of employment of women and children near cotton-openers (Section 27):** No woman or child shall be employed in any part of a factory for pressing cotton in which a cotton-opener is at work. However, they can be employed at the delivery end if this has been partitioned and separated from the feed-end of cotton-opener.
8. **Hoists and lifts (Section 28):** Hoists and lifts shall be of sound material and strength.
9. **Lifting machines, chains, ropes and lifting tackles (Section 29):** Lifting machines, chains, ropes and lifting tackles must be sound, well connected and free from defects.
10. **Revolving machinery (Section 30):** Safe speed must be clearly mentioned on a notice to be kept near such machines.
11. **Pressure plant (Section 31):** Safe working pressure shall not be exceeded.
12. **Floors, stairs and means of access (Section 32):** All floors, stairs, doors and means of access shall be of sound construction and properly maintained.
13. **Pits, sumps, openings in floors, etc. (Section 33):** Every fixed vessel, tank, pit or opening in the floor, which may be a source of danger, shall be properly covered or fenced.
14. **Excessive weights (Section 34):** No person in the factory shall carry load which is in excess of the weight prescribed by the appropriate government separately for men, women and children.
15. **Protection of eyes (Section 35):** Effective screens or suitable goggles shall be provided to each worker working in a manufacturing process involving risk of injury to the eyes from excessive light or particles or fragments thrown off in the course of the process.
16. **Precautions against dangerous fumes, gases, etc. (Section 36):** There shall be suitable facilities for extinguishing fire besides safe means of escape.

17. **Explosive or inflammable dust, gas, etc. (Section 37):** Effective measures shall be taken against accumulation of dust, gases, fumes, vapour and so on if they are likely to explode on ignition.
18. **Precautions in case of fire (Section 38):** There shall be suitable facilities for extinguishing fire besides safe means of escape.
19. **Power to require specifications of defective parts or tests of stability (Section 39):** Orders can be issued for test of any building.
20. **Safety of buildings and machinery (Section 40):** In case repairs are needed to be carried out in any building, the same will have to be carried out.
21. **Safety Officers (Section 40B):** The amendment of 1976 in the Act requires that any factory employing 1,000 or more workers and factories where the workers are exposed to serious risk of bodily injury, poisoning or any particular disease due to certain operations are required to appoint safety officers.
22. **Power to make rules (Section 41):** State governments are empowered to make rules to further provide such devices and measures as laid down in the rules to ensure safety of workers.

Thus, the Factories Act, 1948, is a highly significant step taken by the government to prevent accidents. The occupier of the factory is solely responsible for the safety of workers. Not only this, in all cases, it is mandatory on the part of the owner of the factory to obtain a 'certificate of stability' before commencing any manufacturing process involving use of power in any building.

### ***Other Statutory Steps***

Some other laws providing for safety of workers are as follows:

1. The Mines Act, 1952
2. Indian Railways Act, 1980
3. The Indian Explosives Act, 1884
4. Indian Dock Labourers Act, 1934
5. Inflammable Substance Act, 1952
6. The Employees' Compensation Act, 1923
7. The Insecticides Act, 1968
8. The Atomic Energy (Amendment) Act, 1986
9. The Environment (Protection) Act, 1986

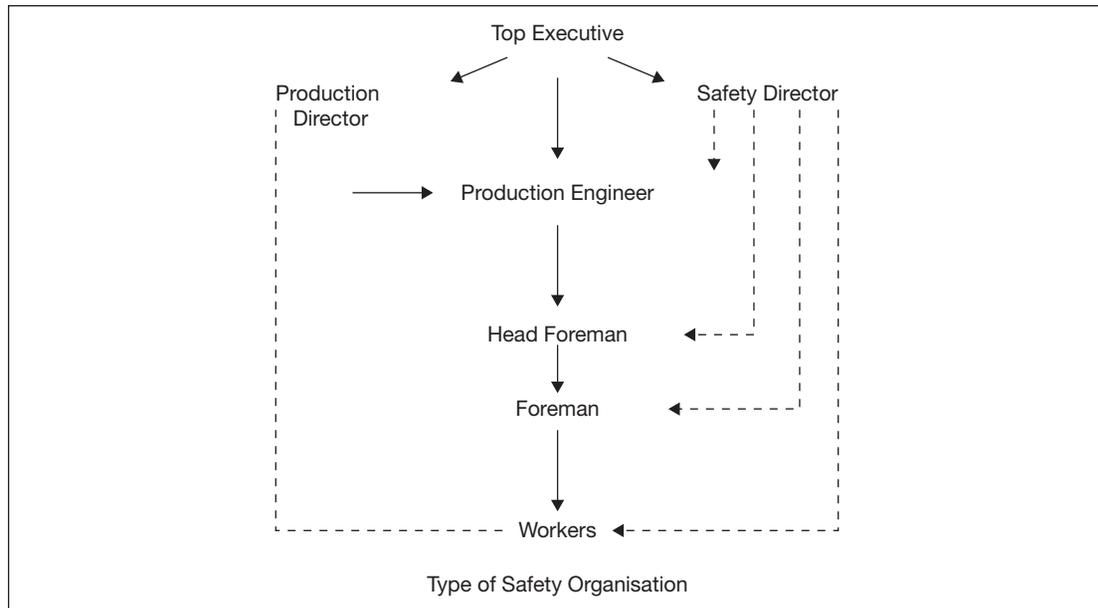
### ***Safety Departments***

It is a significant effort if an organisation constitutes a separate safety department with adequate authority so as to take care of implementation of safety programmes of the organisation. The structure of a safety department may be as follows (Figure 20.1), though it may differ from organisation to organisation depending on the size and nature of production processes undertaken by the organisation.

The safety department<sup>14</sup> may take care of spreading awareness about the significance of safety measures, devising ways and means for improving safety measures, improving safe working conditions and other related issues.

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<sup>14</sup> For details of functions of safety department, see W. D. Scott, R. C. Clothier, and W. R. Spriegel, *Personnel Management* (New Delhi: Tata McGraw-Hill, 1977), 434.



**FIGURE 20.1** Structure of Safety Department

In a good number of companies, usually the safety unit is the part of the HR department. However, in order to go into the depth of safety issues, it is essential to investigate minutely the unsafe conditions prevailing in a particular industry and also to find out the adequate preventive measures and to suggest remedial steps. Some industries constitute safety committees in their trade associations, the structure of which may differ from company to company. However, a safety committee may comprise an executive of the company as its chairperson, the director of safety may be its secretary and foremen and supervisors may be its members. The main functions of safety committees may include evolving safety policies and considering and approving safety proposals. Large organisations may establish departmental employee safety committees which may look into the whole gamut of safety problems. These committees may conduct periodical inspections and suggest safe practices and procedures for the consideration of higher authorities.

### ***Safety Programmes***<sup>15</sup>

In order to prevent accidents, it is advisable that the management of an organisation should have a Central Safety Committee (see Figure 20.2) and also formulate safety programmes which may include engineering a safe plant and operations, educating all employees to act safety, conducting accident analysis, organising safety contests, enforcing the programme vigorously and so on. However, there should be a safety director in the organisation, and the programme should have the support of the top management.

<sup>15</sup> For the details of various elements of a safety programme, see Flippo, *Personnel Management*, 530–34.

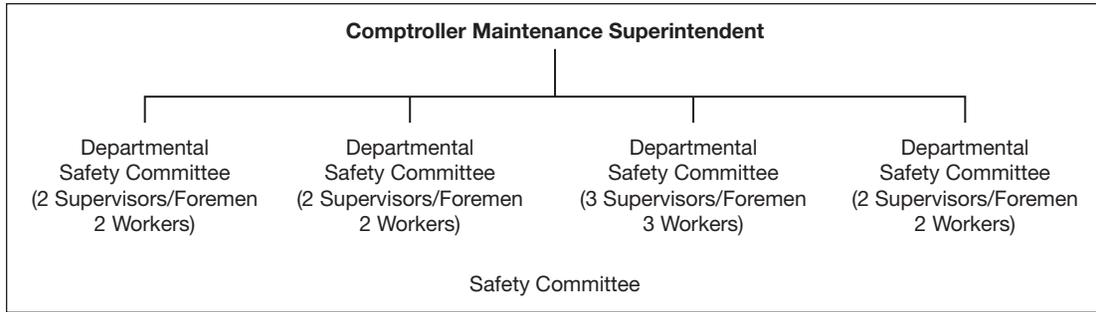


FIGURE 20.2 Central Safety Committee

### Voluntary Steps

Besides the aforementioned steps, the management of an organisation should come forward at its own to take certain preventive steps to restrict accidents. It should focus on providing safe working conditions; imparting appropriate training to the operative staff; inculcating safety habits, safety culture and safety attitudes; motivating workers to follow safety instructions; and so on. The trade unions can also play an important role in this direction by motivating their members to cooperate in the implementation of safety programmes. Similarly, some voluntary bodies like Safety First Association of India should also take lead in this direction. An effort should be made voluntarily to publish some good articles on safety and other related topics. A good magazine or newsletter focusing on issues of safety can also be brought out regularly by the management. Besides, workers should be involved in all issues related to safety.

### Recommendations

It will be pertinent here to make a few recommendations to mitigate the menace of industrial accidents. One of the most important steps to be taken in this direction is to spread safety awareness among all concerned through publishing relevant leaflets and putting notices on noticeboards. It may also be through conducting safety talks, organising seminars and conferences on safety matters, publishing and distributing literature on relevant issues and so on. Second, appropriate training and retraining should be arranged to avoid accidents. All accidents and mishaps should be thoroughly investigated, their root causes should be identified and remedial steps should be taken. However, involving workers at all levels and top management's support is equally important.

## Industrial Health and Hygiene

Since the economic and human costs of inadequate health and hygiene provisions in an organisation may be huge, quite a good number of organisations have started undertaking health and hygiene programmes. This has led to greater employee satisfaction, high morale and enhanced labour productivity

in such organisations as the said programmes yield potential benefits to both employees and employers.

## Industrial Health

Good industrial health is in the interest of all concerned whether directly or indirectly. It is, perhaps, for this reason that not only the ILO<sup>16</sup> but also the Royal Commission on Labour<sup>17</sup> and many other bodies have made strong recommendations in favour of industrial health. Here, it should be noted that industrial health involves both the prevention of diseases and maintenance of positive health. Organisational health<sup>18</sup> refers to

1. Promotion and maintenance of physical, mental and social well-being of workers
2. Protection of workers from risks resulting from factors harmful to health
3. Prevention of ill health caused by poor working conditions
4. Placing the workers in an occupational environment suitable to them
5. Maintaining the workers in an occupational environment conducive to their physical and psychological set-up

Work-related problems may cause even cancer. As per an estimate, 6 per cent of cancers are work-related. For example, 107 Western Australian men and women died of cancer caused by work in 1981.

### ***Why Is Industrial Health Important?***

The need and significance of industrial health is evident from the fact that a number of conventions adopted by the ILO are related to industrial health. Convention no. 115 and Recommendation no. 112 provide for establishment of occupational health in or near a place of employment so as to provide protection to workers against any health hazard likely to be caused by work or conditions in which it is carried out.

Industrial health is beneficial to all the stakeholders in any industry or a unit of it because it helps in increasing the productivity of labour, infuses confidence among workers, boosts their morale, reduces certain hazards the workers are exposed to, reduces rate of absenteeism and labour turnover, reduces indiscipline and industrial accidents, reduces occupational diseases, increases their contentment and so on.

A rating of the employees' health could legitimately be part of a company's balance sheet. It fits in well with the philosophy of sustainability. Obesity and tobacco usage has also been shown to impact productivity. Knowing that one company has a healthier workforce than its competitors could be a competitive

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<sup>16</sup> See Government of India, *The Report of the Labour Investigation Committee* (New Delhi: Government of India, 1949).

<sup>17</sup> See, J. H. Whitely, *Report of the Royal Commission of Labour*, (London: H. M. Stationary Office, 1931).

<sup>18</sup> For details of Organisational Health, see International Labour Organisation, *Report of the ILO Committee on Organisational Health* (Geneva: ILO, 2003).

advantage. Investors may also benefit from knowing about the mental health and well-being of a firm's employees.<sup>19</sup>

Industrial health is viewed by experts as a moral responsibility of the employers. They should owe their responsibility towards providing medical and health care to workers as well as their family members because employers are great beneficiary of good health of industrial workers. Creation and maintenance of a healthy and conducive environment where workers are employed or where they reside or even where they often meet are in the interest of all concerned. The Health Survey and Development Committee (HSDC)<sup>20</sup> holds the same view.

### **Factors Affecting Health**

There is a long list of factors affecting health in the positive direction. However, some of the important factors in this regard are as follows:

1. **Frequent medical check-up:** A medical check-up helps in detecting and diagnosing the disease(s) a worker may be suffering from or is likely to suffer from. In such a case, both preventive and curative steps can be undertaken by the organisation concerned. However, medical check-ups should be made compulsory. Medical check-ups also involve the following issues:
  - a. **Coverage:** The first issue involved in the medical check-up is that who should be medically examined and when and how. Michael Jucius<sup>21</sup> has made certain suggestions in this regard. He has also expressed his views on the frequency<sup>22</sup> (when) of medical examinations and the types<sup>23</sup> (how) of medical tests to be conducted.
  - b. **Facilities for medical examinations:** But for a few organisations, most organisations are totally indifferent on this front. Such facilities have a great importance and should be made available at place(s) which are easily accessible by workers. For example, the medical staff employed to provide such facilities should be qualified, trained and experienced. Hence, their number, professional qualifications, experience, behaviour, dedication to their profession and their specialisation should be up to the mark. Similarly, the medical tools, equipment, laboratories, sanitary conditions and the like should also be of prescribed standards. In our Indian organisations, while such facilities are reasonably good wherever ESI dispensaries are located, in most other organisations, there is hardly any such facility available, except first-aid facilities. In some organisations, facilities such as urine tests, chest X-rays, blood tests and sugar tests are available, though their quality and standards leave much to be desired in many of these organisations.
  - c. **Medical and health records:** Record of past medical history of an employee is very significant in diagnosing, prescribing and curing a patient. Although, by and large, Indian

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<sup>19</sup> *The Economics Times*, 29 March 2006.

<sup>20</sup> Sir Bhore Joseph, *Report of the Health Survey and Development Committee (HSDC)*, (Delhi: National Health Portal of India, 1943).

<sup>21</sup> See, Jucius, *Personnel Management*, 390–94.

<sup>22</sup> *Ibid.*

<sup>23</sup> *Ibid.*

## 712 HUMAN RESOURCE MANAGEMENT

industrial organisations are not conscious in this regard, there are some organisations which maintain records in this respect.

2. **Health services:** Health services may render the following services:
  - a. Medically examining the candidates at the time of their joining their new jobs
  - b. Conducting periodical medical check-ups of employees
  - c. Extending health services to the members of families of employees
  - d. Conducting periodical plant surveys to detect sources of occupational diseases and unsafe working conditions
  - e. Arranging first-aid courses and so on

### ***Statutory Health Provisions in Indian Industries***

It is Chapter III of the Factories Act, 1948 (as amended up to date), that contains health provisions under Sections 11–20 (for details, see Chapter 11 of this book).

### ***Mental Health***

'Mental' health and 'physical' health are complimentary to each other. Neither can sustain itself for long in the absence of the other. Mental health enables a worker to adapt himself/herself to the realities of actual working life. Mental ill health leads to several adverse consequences such as high rate of absenteeism and labour turnover and poor human relations. It also leads to high rates of accidents because emotionally ill workers are more likely to violate safety rules and instructions and thus meet accidents. It is unfortunate that despite severe consequences of mental illness, it is not being paid adequate attention by factory employers.

### ***Types of Mentally Ill Workers***

Although there is no watertight classification of mentally ill workers, they can be divided into the following categories:

1. Obsessional type workers
2. Anxiety type workers
3. Hysterical type workers

### ***Preventative and Remedial Steps of Mental Illness***

Since mental illness can create a lot of problems in the smooth running of a factory, it is advisable to take preventive steps and remedial steps in case preventive steps do not prove effective. In this regard, the following steps may be suggested:

1. Making workers aware about the nature and significance
2. Making psychiatric counselling available
3. Improving of work environment in the factory
4. Improving human relations
5. Providing emotional support

6. Receiving and extending cooperation to outside psychiatric specialists and institutions
7. Focusing on the role to be played by supervisory staff in preventing mental illness
8. Enlarging and enriching jobs according to the aptitude and competency of the workers
9. Providing job satisfaction to workers
10. Associating the workers in decision-making
11. Providing opportunities to workers for their self-development and growth

### ***Role of Psychiatrist***

The role of a psychiatrist in a factory is more diagnostic in nature than anything else. He/she is supposed to go into the depth of mental illness; discuss with the experts, top management and union people; and take appropriate steps to root out the causes giving rise to mental illness. He/she is also supposed to educate the workers in this direction, infuse confidence and boost morale of the workers. He/she should do his/her best in rehabilitating the chronic patient-workers. He/she should also play an active role in the treatment of mentally ill workers and getting them rid of their problems.

### ***Stress Management***

Workers experience stress due to several factors. For example, while to some workers it is due to pressure of work, to others it may be due to emotional discomfort or role conflict or physiological issues. Although there is no doubt that stress plays negative roles such as making the worker feel tired or bored, making him/her become accident prone, and may cause serious consequences, sometimes even causing death of the worker, stress has got a positive side too. Stress prompts a worker to get his/her job done within time or getting the targets accomplished within the stipulated period.

Keeping the negative aspect of stress into consideration, it will be in the fitness of things to take preventive steps such as appropriate diet, physical exercise, yoga, meditation, counselling, entertainment facilities, proper working and living environment, and proper engagement and involvement of workers and their representatives in relevant matters. The emotional well-being of employees is something that organisations cannot ignore. While some people have it in them to tackle stress, others can do it with some support. And this is where an organisation can play a crucial role. Some tips from experts on this are as follows:

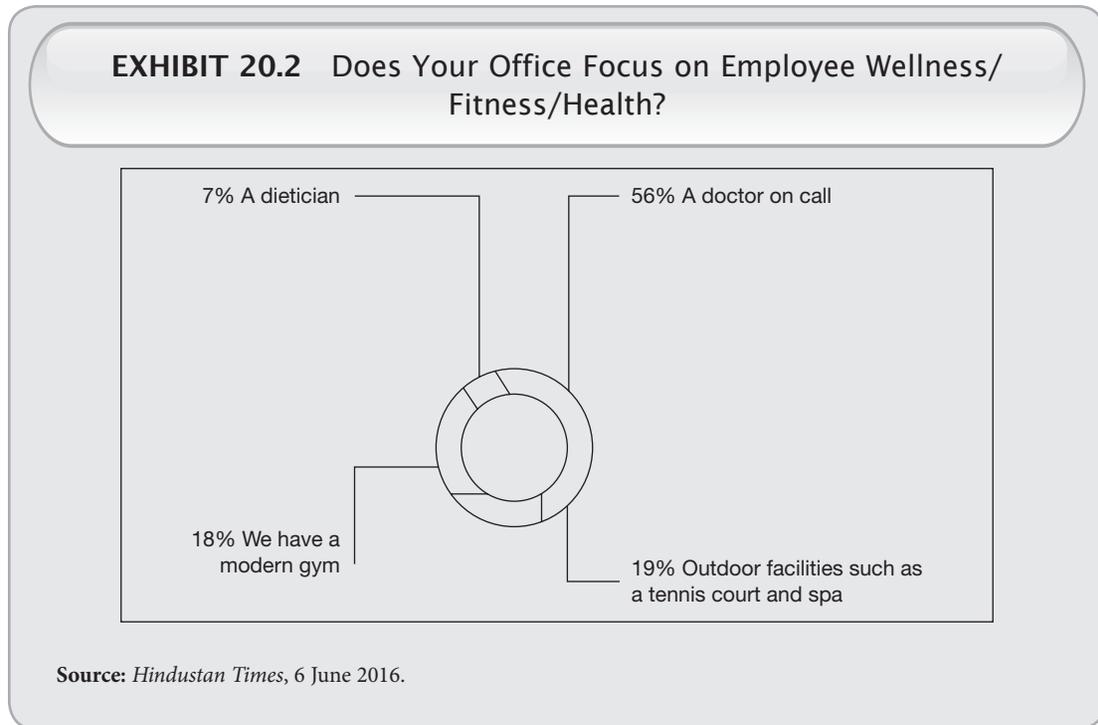
- Work–life balance
- Positive office environment
- Engage with employees
- Offer job assurance
- Communicate and connect<sup>24</sup>

### ***Wellness Approach***

Wellness focuses on avoiding things which are harmful to health such as taking drugs and indulging in drinking and smoking, and stressing on inculcating good habits and practices such as taking good and

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<sup>24</sup> For details, see *The Economic Times*, 14 June 2016.



nutritious diet, having regular physical exercises, and having optimistic and positive attitude. Today, many good companies follow the wellness approach as they give due priority to it.

A survey contracted by Shine.com from across sectors in India in which over 700 employees participated revealed that most organisations do not focus much on employee wellness/fitness/health (see Exhibit 20.2).

However, a wellness programme can be effective and give desired result if the workers are aware of its anatomy and are involved in its formulation as well as implementation. Such a programme should be open to all the workers and it should be well publicised and well financed by the management. Wherever required, duly competent people should be procured to make the programme a true success. Top management's support is always needed for the success of a wellness programme.

## Industrial Hygiene

In most organisations in our country, the concept of industrial hygiene has not got the desired priority. Hence, it is only in a few organisations that we come across industrial hygienists who are responsible for conducting survey of hazards and do the needful to eliminate them or, at least, minimise them. They are supposed to suggest both preventive steps and remedial steps and help the management in ensuing proper industrial hygiene. In addition to improving material environment, they also focus on personal hygiene and emphasise on the effectiveness of proper cleanliness and healthy habits and practices.

### **Occupational Health Services**

Rapid and complex industrialisation has led to ever-increasing health hazards and thus necessitating the occupational health services whose main job is to diagnose and identify the sources of occupational hazards. For the success of an organisation, it is essential that there should be physical and mental well-being of its employees and protection against all health hazards arising due to poor working conditions or the typical nature of work. It is here that the role of occupational health services comes in. However, it is the hazards involved in a particular organisation as also its location, and nature of operations, that determine the nature, scope, role and size of its occupational health services. Of course, there is no denying the fact that occupational health services need to focus on preventive steps.

### **Occupational Hazards**

There can be several occupational hazards<sup>25</sup> such as chemical hazards, mechanical hazards, psychological hazards, health hazards and biological hazards which may arise due to faulty training, poor maintenance, design flaws, unfavourable work environment, operating errors, lack of precautions and so on. Occupational hazards may slowly and cumulatively (often irresponsibly) lead to deterioration of health. The affected worker may develop a chronic or lifelong threatening illness or disability.

### **Occupational Diseases**

The presence of industrial poisonous and non-poisonous dust, particles and elements in the working environment of certain factories is not uncommon. So is the case with physical/work environment. Occupational diseases are the outcome of this phenomenon. Initiating or coming in contact with such dust or particles affects the body system of affected workers. It may affect their kidneys, lungs, respiratory system and so on. Some of the common occupational diseases include manganese poisoning, silicosis, lead poisoning, bagassosis, mercury poisoning, phosphorous poisoning, anthrax and so on.

## **Working Environment and Fatigue**

### **Working Environment**

It is not easy for any organisation to accomplish its objectives unless it offers a congenial working environment to its personnel. It is perhaps for this reason that working environment in almost all the industrial countries has improved markedly during the last and current centuries. Improvement in working environment is also the outcome of increasing social concern by management, pressure from employees and their unions, improved technology, and tighter legal and regulatory requirements.

In different factories, offices and other professional premises, the worker is required to work under certain conditions. He/she may be required to continue his/her effort, of a definite kind, at some specific place. His/her health stands to be influenced greatly by virtue of the fact that whether his/her place of work is adequately and properly ventilated or not. Provision of adequate lighting is an essential condition

<sup>25</sup> For details, see Sharma, *Industrial Relations and Labour Legislation*, 481–82.

and one which justifiably occupies the worker's mind, since it will influence his/her eyesight, thereby his/her fatigue and consequently his/her efficiency and the quality of his/her output. It is well known that noise can be a disturbing element and may put one off one's work. One of the conditions of work is that there be little if any noise; hence, this must be taken into consideration. Temperature or the climate is another factor that influences the potential of a worker, as it is known that in certain temperatures, a worker cannot work well, while in more moderate or suitable temperature, his/her work takes a turn for the better. Temperature, therefore, must also be taken into consideration when looking out for the place of work. In addition to these physical conditions, there are many other psychological conditions that also influence the worker and consequently his/her work. Of these, some are the behaviour of those in authority, mutual relationships among the workers, their respective family lives, incentives to work and so on.

### ***Types of Working Environment***

In this manner, the working environment can be divided into two classes:

1. Physical working environment
2. Psychological working environment

Physical working environment may include

1. Intensity, location, distribution and colour of light
2. Ventilation
3. Temperature
4. Noise
5. Rest pauses
6. Hours of work
7. Music
8. Other physical factors

On the other hand, psychological working environment may include:

1. Behaviour of superiors
2. Mutual relations of workers
3. Satisfaction of life's needs
4. Security in profession
5. Incentives in industry

Now, let us discuss all these in detail.

### ***Physical Working Environment***

Following are the main factors in the physical working environment:

1. **Intensity, location, distribution and colour of light:** The type and intensity of light should differ with the age of the workers as well as with the occupation that they have adopted. As a

normal rule, individuals over 30 years of age require light of a greater intensity than their younger counterparts. If the objects handled are minute, then naturally the light must be fairly bright while at work. On the other hand, if the objects handled are of a large size and the workers are fairly young, intense light is not necessary. Light provided should never be intense enough to cause glare and never dim enough to cause strain in concentrating upon an object to be worked at. Work that requires light of high intensity also requires the use of special protective glasses, as is the case with welding where the light of a very high intensity is produced by the welding flame. Protection from its harmful effects is achieved by the use of coloured glasses.

The source of light should be so located as to avoid falling directly upon the eyes; instead, it should fall on the instrument that is to be manipulated and then also in a manner as to avoid all reflection into the eyes of the person handling it. Hence, light should be evenly distributed and for this purpose, tube lighting has been found to be superior to bulb lamps, which are now considered obsolete.

Daylight is naturally uniform in its distribution; it is only when the work is done at night that the problem of uniform and even lighting arises, and it is a problem that requires expert handling and planning. Besides the intensity and location of light, it is necessary to pay attention to its colour. It has been uniformly experienced in a large number of cases that the light that resembles daylight very nearly is the best and most beneficial. Hence, white light has been considered to be better. And in coloured lights, the best is the light yellow, but a healthy yellow and not a sickly pale yellow. All other coloured lights harm the eyes in one or the other way.

2. **Ventilation:** Inflow of fresh air is essential in a place of work, as its absence tends to increase the fatigue and laziness or drowsiness of the workers.

Air easily becomes contaminated in places where large numbers of individuals work together, such as mines, factories and offices. For this, the use of exhaust fans is particularly desirable. Fresh air should be freely and easily available in places of work. Health is adversely affected if the percentage of oxygen in the air is varied even within very narrow limits. According to Poffenberger, when the percentage of oxygen in the air tends to fall below 14 per cent, the workers show signs of adverse effect. Ventilation also influences the body temperature of the workers, and if the body temperature varies, it leads to fatigue and drowsiness. Another important factor is the presence as well as the percentage of humidity in the air. Excessive humidity is very harmful for the health of workers.

3. **Temperature:** Like illumination, temperature of the working premises also has a considerable and direct influence on the workers' health. It has been found that working in too high or too low temperature leads to diseases and accidents. Proper temperature maintains good health of the workers and reduces the number of accidents as external conditions do not divert the attention of the workers and thus reduce their efficiency. H. M. Vernon found that in the British mines, in temperatures above 75°F, there were greater number of accidents while the perception and sensibility of workers were also adversely affected. Extreme temperatures in working areas cause discomfort to the workers, so much so that the quality as well as quantity of their output is reduced. Temperature further influences the ventilation in a room, as an adequate temperature is essential for proper ventilation and free flow of air.
4. **Noise:** Excessive noise normally distracts attention and obstructs smooth working. It is for this reason that in every industry now, attention is paid to the noise produced and efforts are

made to curb noise that distracts attention. But mild noise of a continuous nature is often found to be more soothing than disturbing, and when it is discontinued, it disturbs the attention of people used to it. The truth of the matter is that only excessive noise is harmful and has the worst effect on the audio system. Keeping these observation into consideration, efforts should be made to regulate noise.

5. **Rest pauses:** Whatever the ability and endurance of an individual, even if he/she be abnormal in this respect, he/she cannot work continuously for a long period of time. After a certain period of time, he/she feels the need for a rest, and his/her need has been found to have psychological justification as it has been observed that better results can be obtained by working in shifts and periods than by working continuously. Increases of between 10 and 20 per cent in production have been found to occur as a result of provision of rest in between work. The length and frequency of rest that is required depends upon the nature of work, the endurance and age of the worker and the general conditions of work. Hard work requires relatively longer rest pauses. Similarly, women, young children and old people require longer and greater number of rest pauses than young men. Nowadays, in practically every profession and occupation, rests of 15–60 minutes are provided once or more so that the worker may be able to take refreshments and restore his/her vitality otherwise. Rest in between hours of work not only removes fatigue, but it also eliminates the element of monotony and boredom, thereby regenerating enthusiasm and vitality.
6. **Hours of work:** In professions in which the hours of work are long and improperly planned, the workers get completely fatigued by the time they stop working and find themselves confronted with the problem of continuously decreasing efficiency. In addition to this, such professions become prey to all kinds of very serious problems of human relationships. When a worker is compelled to work for long hours beyond his/her physical endurance limits, he/she becomes diseased and loses his/her efficiency. Besides, his/her irritability increases significantly. For this reason, in most progressive nations, the government promulgates certain orders whereby the hours of work for different occupations, for individuals of different ages and different sexes, are determined. If need for more work arises, the employer is faced with either the alternative of indulging in illegal activity or remunerating the worker for this extra labour. But if he/she chooses to evade these laws, he/she incurs the displeasure of the law, and this will never serve his/her interest.

To discuss, for example, 'hours of work', in India, a salaried individual works 40 hours every week under the generally accepted norm of 9-to-5 job schedules; individuals in main job-salaried employment in major economies work relatively less (see Exhibit 20.3).

A recent survey on workplace flexibility by Randstad India reveals that around 40 per cent of Indian employees work for more than 45 hours per week (for more details, see Exhibit 20.4).

7. **Music:** One of the latest factors that have come into prominence is music. From their experiments, W. A. Keir and H. C. Smith concluded that music has a beneficial and desirable impact upon the mental condition of workers and, thus, it helps to induce some increase in their productive capacity. One often sees people singing at their work, a phenomenon particularly obvious in the case of Indian women working at the grinder or in the fields or even when at their domestic chores. The rhythm in music has a beneficial effect on the rate of working.

Tatas in India provide music in their various factories. In Western countries, particularly in the USA, the use of music in factories and other workplaces is steadily on the increase.

### EXHIBIT 20.3 Average Usual Weekly Hours Worked on the Main Job-salaried Employment (2014)

Country	Hours worked (weekly)
Greece	38.8
USA	38.6
UK	36.5
Australia	35.9
Italy	35.4
Germany	34.5
Switzerland	34.4
Norway	33.9
Denmark	32.5
Netherlands	28.9

Source: *Times of India*, 9 June 2016.

### EXHIBIT 20.4 Indians Work the Hardest

- A recent survey on workplace flexibility by Randstad reveals that around 40% employees work more than 45 hours per week against the global standard of 40 hours a week.
- It found that 40% men and 32% women clock more than 45 hours at work every week. On an average women put in 35 hours at work and men work for 39 hours.

Source: *Hindustan Time*, 14 June 2016.

Through a questionnaire, H. C. Smith collected the views of 1,000 workers regarding the provision of music in workplaces and found that as many as 98 per cent of them were in favour of it, as they found considerable pleasure in it. However, experiments in this direction are still on.

8. **Other physical factors:** There are many other physical and material considerations which affect the worker and his/her work. For example, if there is good and clean provision for urinals, lavatories, bathrooms, refreshment rooms, canteens and the like, the worker's time at his/her workplace becomes more pleasant and many of his/her difficulties are removed. A place of work should not be foul smelling neither should it be dirty or dusty, as any of these conditions disgust the worker and his/her efficiency goes down.

### EXHIBIT 20.5 It Is Standing Advice for Staff at EY

STANDING UP LEADS TO UP TO 10% MORE PRODUCTIVITY, LOWERS RISK OF OBESITY.	STANDING MEETINGS ARE SHORTER, MORE LIKELY TO END ON TIME OR EARLY.
INCREASED SENSE OF ALERTNESS, BETTER MOOD, ENERGY AND METABOLISM.	LOWER BLOOD SUGAR HELPS MAINTAIN MUSCLE TONE, MOBILITY, FLEXIBILITY.

**Source:** *The Economics Times*, 21 June 2016.

Today, good organisations are coming up with new ideas and proposals to take care of the physical well-being of their employees by bringing about changes in their working environment. For example, to keep its employees active and agile, consultancy from EY is now nudging them to leave their chairs and use standing workstations which have multiple benefits (see Exhibit 20.5).

### *Psychological Working Environment*

Following are the main factors in the working environment that affect the psychology of workers:

1. **Behaviour of superiors:** Workers are very susceptible to the behaviour of their bosses. If the behaviour of authorities is desirable and good, then the workers' enthusiasm and interest in their work are maintained, but if their behaviour is bad and inconsiderate, then it is potentially a dangerous state as it can lead to conflict and unnecessary tension that has the worst effect upon production. Good behaviour does not imply laxity in administration and in dealing with the workers, as in such circumstances, it is inevitable that the lazy and mischievous individuals in the organisation will have a field day and do not work at all. It is essential that constant attention be paid to the worker's performance, but fact and diplomacy should be employed if it becomes necessary to point out his/her shortcomings. Senior officials and employers who are in the habit of constantly haranguing and bickering with their staff face continuous conflict and non-cooperation. Employees are not inclined to respect and work for people who are irritable, highly inflammable and ingratiating types. Working under a considerate individual not only keeps the worker happy but also inspires him/her to work more and effectively.
2. **Mutual relations of workers:** The nature of relations that exist between the workers themselves has a great psychological bearing in work environment. Where the number of workers is fairly large and the nature of work demands their constant cooperation, better results are obtained if the workers have good relations among themselves. If the relations are not all that are desired, work suffers, particularly the work that requires cooperative effort.
3. **Satisfaction of life's needs:** Every individual has some personal and other family requirements, such as adequate food and housing for his/her family and purchasing power to the extent of his/her other reasonable needs. Besides, there are certain needs that foster self-respect, and these too cannot be neglected. Progress has made it necessary for employers to also pay attention to these aspects of the human personality. Consequently, they have to

### EXHIBIT 20.6 Job Security Top Priority for Indian Millennials

As many as 94% of those born between 1980 and 1995 prioritise job security when looking for work, a research report has said in findings that are quite contrary to popular perception about what was once dubbed the 'Me Me Me Generation' by Time Magazine.

**Source:** *The Economic Times*, 24 May 2016.

initiate and finance certain schemes of labour welfare which involve some expenditure but which also provide many direct and indirect benefits to the worker that place him/her in a very favourable state of mind. Their needs being fulfilled, they are inclined to respect and obey their employers, to work for their better being in turn. They are, thus, helped in leading a pleasant and contented life, and they bend their backs to their work with a will. They develop confidence in their employers and, thus, they are never induced to work contrary to the interests of their organisations.

4. **Security in profession:** If the worker is confident that he/she is secured in his/her job, then his/her performance shows definite improvement. In a profession that offers no security of employment, or in a position in which one can never be confident of remaining safe, a worker cannot work with enthusiasm or with concentration. Hence, a profession must offer security of future employment. Today, millennials prioritise three things when choosing where and how they work—job security, opportunities to learn new skills and money (see Exhibit 20.6).

After a certain predetermined period of service has been completed, the worker should be made permanent in his/her position, as is now done in all government jobs and many private firms. Now most governments in most countries have made laws regarding such employment procedure. Besides this minimal security of job, other inducements are insurance against unemployment, old age insurance and security or insurance in the event of accidents that render the individual incapable of further work. Nowadays, all progressive states, governments and other general employers make provisions for these benefits, as in their absence, it is only natural for the worker to spend time in wondering about his/her future and making efforts to secure it—efforts that enfeeble him/her for his/her regular work.

5. **Incentives in industry:** Motives have an important place in the life of a person. In the absence of motives, no individual can either work hard or do anything to better his/her life or improve his/her work in anyway. Inspiration of this kind is available to the individual in his/her trade in the forms of various kinds of incentives such as increase in wages, praise by authorities, promotion and bonus. Incentives are now an important part of any geared-up industry. In most progressive nations, the workers stand to benefit through bonus, if the production, and thus the earnings of their enterprise, go up. In most professions, an individual is promoted to a senior position if he/she shows satisfactory or more than satisfactory work. If the people in authority are sensible people, they will always praise the extra efforts of their subordinates. Their wages can also be increased so as to induce them to put in more efforts.

### EXHIBIT 20.7 Working to Improve Labour Conditions in Indian Factories: H&M

Swedish fashion retailer Hennes & Mauritz (H&M) is collaborating with trade unions, government as well as the UN to improve workers' conditions after a study found violations in supplying garment factories in India and Cambodia.

The study by the Asia Floor Wage Alliance (AFWA) found workers stitching clothes for H&M in factories in Delhi and Phnom Penh faced problems such as low wages, fixed term contracts, forced overtime and loss of job if pregnant.

**Source:** *Hindustan Times*, 23 May 2016.

Thus, we find that all the aforementioned physical and psychological conditions have considerable importance for industry. Psychologists have now seriously drawn the attention of the industrialists to this aspect. It is necessary not only with regard to economic or fiscal gain but also with regard to humanity that the workers should have opportunity to work in beneficial conditions, both physical and psychological. Workers being part and parcel of the fibre of the nation, the government should also take steps to have such conditions created. When such a system is in existence in industry, the conflicts are materially reduced and the production materially increased with the result that the employer, the employees and the state all are benefited to a considerable extent.

Working conditions, by and large, are not satisfactory in Indian industries, but many are working to improve labour conditions. For example, Swedish fashion retailer Hennes & Mauritz (H&M) is collaborating with trade unions, government as well as the UN to improve workers' conditions (for details, see Exhibit 20.7).

The Western high-street retailer was accused by the Asia Floor Wage Alliance (AFWA), a coalition of trade unions and labour rights groups, of failing on its commitments to clean up its supply chain.

An official from H&M said on 21 May 2016 that the fashion firm has been working actively to improve the lives of textile workers for many years.

### **India's Great Places to Work**

According to *The Economic Times* Great Places to Work study which had 791 participants and involved interviewing 0.155 million employees, Google and American Express India are India's top workplaces (see Exhibit 20.8).

### **Fatigue**

Fatigue is a sort of negative appetite for activity. It arises due to continuous or prolonged work. Interest in work and quantity of output both decline as fatigue increases. Of course, fatigue may be due to excessive physical or mental demands on employees or due to the nature of work assignments. Whatever be the causes, it occupies an important place in industrial psychology.

### EXHIBIT 20.8 Google, Amex Are India's Top Workplaces

#### Making the Cut

1. Google India	2. American Express India	3. Ujjivan Financial Services
4. Teleperformance India	5. Godrej Consumer Products	6. Marriott Hotels India
7. SAP Labs India	8. Oberoi Group	9. Lemon Tree Hotels
10. Intuit India Product Development Centre		

Source: *The Economic Times*, 4 July 2016.

### Types of Fatigue

Fatigue may be mental as well as physical. A brief description of the two is as follows:

1. **Physical fatigue:** As is evident from the name itself, in physical fatigue, one finds physical characteristics of fatigue. Physical efficiency and capacity fall down and physical coordination becomes difficult. For example, a poisonous fluid known as lactic acid is produced in the muscles and the nervous system, and when this increases beyond a certain level, the entire body becomes lax. If it is confined to any one part of the body, then that particular part becomes tired but when exhaustion increases, it is introduced into the blood stream and steadily spreads over the entire body. In addition to lactic acid, the body also produces ammonia and carbon dioxide during fatigue. Both these elements are poisonous and by their influence, the energising elements in the body steadily decrease while the poisonous matter increases. Many psychologists have examined the condition of fatigue, the most valuable work having been done by Miller, Helmholtz and Wundt. Miller confined his study to the state of the nerves in a condition of fatigue. Later on, Helmholtz made a study of the function of the sensory nerves and motor nerves and discovered that in a condition of fatigue, the experience of anything is conveyed to the brain in greater time, while the motor nerves take a longer time to react than under normal conditions. Helmholtz invented the myograph, an instrument used to measure the contraction of muscles. It was later used in 1858 by Wundt in his experiments. This instrument is now used to measure fatigue.
2. **Mental fatigue:** Fatigue may not necessarily be physical because it is sometimes manifested even when one has done no physical work. This is mental fatigue, which is normally apparent after excessive physical fatigue. The symptoms of mental fatigue are absence of desire to work in an emotional condition, lack of interest and concentration, lack of normal efficiency in work, desire to rest and so on. At times one's efficiency does not suffer despite some mental fatigue, but this is a rare case. One example of mental fatigue is boredom in which one experiences mental fatigue because one's energy has not been properly consumed. One important cause of mental fatigue is the absence of motivation and of a proper aptitude. In such a case, an individual loses interest in his/her work, even though he/she is not physically exhausted.

People complain of fatigue despite good working conditions if their aptitude is not correct and if there is absence of sufficient motivation.

### ***Differences between Physical and Mental Fatigue***

Although there are differences between physical and mental fatigue, the two should not be taken to be entirely different, for they are intimately related to each other. A person who complains of fatigue is, in fact, suffering from both mental and physical fatigue. Sometimes a person does not notice physical fatigue if a strong motivation is coupled with absence of mental fatigue. In most forms of fatigue, one finds both physical and mental symptoms. According to Watson, mental fatigue is caused by the contraction of the vocal cord. It is also caused by damage to the nerve centres in the higher regions of brain. Mental work cannot be done efficiently in a condition of physical fatigue, nor can physical work be done well in a condition of mental fatigue. For this reason, it is better to define fatigue as a psychosomatic or psychophysical condition, rather than a physical condition in which the individual's mental and physical efficiency is reduced. The truth of the matter is that the physical and mental aspects of fatigue can be distinguished only verbally, because in actual fact, they are not independent of each other.

### ***Causes of Fatigue***

Causes of fatigue may differ from profession to profession. Yet the important causes of fatigue are as follows:

1. **Long hours of work:** In some industries, the hours of work are so long that the workers become exhausted while, in fact, these longer hours of work do not result in a proportionate increase in production. Many researchers have thrown light on this fact. Muscio has mentioned the case of one lady worker who worked only 6 hours instead of the conventional 12 hours a day as observed by the other workers and still showed a higher level of production than any other worker. In this factory, the working hours were from 6:00 am to 8:00 am, 8:30 am to 12:30 pm, 1:30 pm to 5:30 pm and from 8:30 pm to 12:30 am. This particular lady refused to work before breakfast and late at night, explaining that by working for such a long time she could not maintain her efficiency. Over a period of one month, it was seen that she worked for 150 hours as compared to the other workers who worked for 237 hours, despite which she showed more output than the other workers.

It is evident from the research conducted in various countries working on the methods of work that production is higher in shorter working weeks than in longer working weeks.

2. **Abnormal temperature:** Abnormal room temperature is another occupational condition which results in fatigue because if the room is either too hot or too cold in both cases, the mental and physical condition of the workers deteriorate and they soon start feeling tired.
3. **Absence of rest or inadequate pauses:** Working for long hours makes a worker feel tired. If he/she does not take rest and continues to work, then his/her fatigue increases even more rapidly because he/she is working in an exhausted condition. If he/she is allowed to rest as soon as he/she begins to feel exhausted, then he/she returns to his/her work refreshed, and his/her fatigue does not increase. Hence, it is seen that fatigue is eliminated in all working methods

where the workers are allowed to rest for short periods during their working hours because during the period of rest, they regain their energy. Absence of rest period is an occupational condition which promotes fatigue. Even if some workers steal a few minutes of rest where it is not officially provided for, they do not feel relaxed and rested because during that period, their aptitude is not correct. In fact, relaxation of this kind results in greater fatigue. Gilbreth's experiments successfully established that production can be increased by providing periods of rest for the workers, instead of keeping them at work continuously.

4. **Inadequate ventilation:** Non-availability of fresh and clean air in adequate quantity at the place of work makes a worker feel tired. In an office or a factory in which the air is polluted, the incidence of fatigue will be far greater than in any other factory where there is adequate ventilation and fresh air is available.
5. **Inadequate illumination:** Inadequate and improper illumination also causes fatigue because the eyes begin to feel exhausted and dry if the light is not enough or adequately bright. Hence, it is desirable that there should be proper arrangements for illumination in factories and offices, that is, proper lighting from the right direction. For example, in reading or writing, it is desirable that the light source should be placed behind and to the left of the worker. If this is not done, then the eyes suffer great strain. In working on a machine, it is desirable that those instruments should be lit up which are to be seen constantly by the operator. Hence, the light provided should be neither too little nor too much, for in both these conditions, the strain on the eyes leads to fatigue and sometimes to accidents as well.
6. **Defective design of the machinery:** Certain machines are so designed that they tend to exhaust and tire the operator working on them. Hence, modern psychologists give suggestions even in the construction of machines so that they should be designed to minimise fatigue and increase production. This branch of industrial psychology is called engineering psychology. Today, the aim is to design machinery which involves the least possible amount of movement while maintaining the highest level of production. When the workers become used to operating such machine, their fatigue is reduced and their performance goes up.
7. **Absence or improper and inadequate seating arrangement:** It is a well-known fact that a person feels exhausted much earlier if he/she has to operate a machine while standing. That is why the absence of an adequate seat is one occupational condition which causes fatigue.

Another important feature of the seat is that it should not offer too much comfort because in that case, the operator feels sleepy. On the other hand, it should not be so hard that the operator may feel discomfort. Arrangement for a proper seat can help in reducing fatigue to a great extent.

8. **Excessive and irritating noise:** Another factor which increases fatigue is the presence of excessive noise at the place of work. An individual can work for a long time in an atmosphere which is peaceful and free of noise. Some degree of noise can be tolerated, for it has no appreciable effect on work, but when noise rises above a certain level, it creates fatigue. Now experiments are made to find out if the noise produced by the machinery is of high enough a pitch to induce fatigue. If this happens, then efforts are made to reduce the pitch of sound produced and so reduce the level of noise. Karnhouser conducted an experiment on four typists who worked in a noisy environment for four days. The psychologist came to the conclusion that their work went down by 3.2 per cent, while the incidence of errors went up by 23 per cent. In an experiment conducted by Weston, workers engaged in stitching showed 7.5 per cent more production when working in peaceful surrounding than when working in a noisy environment.

9. **Unhealthy conditions:** Fatigue is closely connected with health. If the occupational conditions are such that they do not promote good health, then they are also conducive of fatigue. Unhealthy conditions include such factors as abnormal room temperature, improper ventilation, excessive noise and so on. In addition to these, certain other occupational conditions such as excessive humidity, absence of rest pauses, presence of some disturbing smell, and inadequate arrangement for medicine and medical attendance, or total lack of such facilities, also have a hard impact on the health of the workers with the result that they soon get tired and exhausted.
10. **Inadequate training:** In every profession, there are certain functions which require some training before they can be properly performed. If such functions are entrusted to untrained employees, then these workers get exhausted very soon. Hence, the employees should be trained by the best methods about the easiest and least tiring way of handling certain instruments. They should also be guided in adjusting in the hours of work and the periods of rest according to their individual differences. Hence, the absence of proper training is also an occupational condition which results in fatigue.
11. **Low morale:** Conditions which lead to low morale are also conducive to fatigue. Conditions which result in low morale and harmful attitudes towards the management include hatred, suspicion and jealousy, dissatisfaction with work and absence of any hope, mental unrest and dissatisfaction, uninteresting work, improper rules governing promotions, absence of a proper wage increase, improper methods of distribution of wages, lack of adjustment on the part of management and so on. In all such conditions, fatigue also increases rapidly and leads to physical fatigue. Conditions in which high morale can be generated also lead to energetic work.
12. **Lack of sound sleep:** In factories in which the workers have to work at night and do not get sound sleep, chances of fatigue get increased. To eliminate these, facilities for sleep should be provided for the workers so that they can sleep during their period of rest. Absence of sleep is invariably an exhausting factor, irrespective of the condition which leads to it.
13. **Defective social environment:** The defective social environment of an occupation in which many people work also leads to fatigue. A worker cannot maintain high morale in a condition in which the relations between the employers and employees are not good or in which the atmosphere is one of hatred or suspicion. The result is that in such conditions, the workers feel exhausted very quickly. Since people have now understood the significance of maintaining a healthy social atmosphere at the place of work, efforts are made to make the social atmosphere cooperative and stimulating or encouraging. This must be done so that the worker can work for a long period without feeling bored or tired.

Thus, we find that all occupational conditions which have an adverse influence upon the worker's mental and physical condition are conducive to fatigue because in such conditions, mental and physical fatigue are very rapid. Hence, all such conditions should be corrected if fatigue is to be avoided and if all workers, managements and the government have to work cooperatively.

### ***Reducing Fatigue***

Broadly speaking, the main thing to be done to reduce fatigue is to eliminate all occupational conditions which lead to fatigue. It should always be kept in mind that work invariably results in some degree of

exhaustion and that there can be no way of eliminating fatigue completely. One can only hope to devise means by which fatigue can be reduced or controlled before it becomes excessive. Such means are as follows:

1. **Reduction in hours of work:** Fatigue can be reduced by reducing the hours of work. It has been seen in many experiments that fatigue is reduced when working hours are reduced, whereas the production does not fall proportionately but in many cases, it even goes up. In 1928, Sheppard pointed out that for the previous 30 years, workers were made to work 10 hours a day for 6 days a week in all American industries. On the other hand, the workers are now required to work eight hours, and on Saturdays they are required to work only four hours, while Sunday is a day of rest. But actually, production has increased as a result of this decrease in the hours of work. Many other experiments have substantiated Sheppard's conclusions. Hence, one way of reducing fatigue is to reduce the hours of work. But at the same time, care should be taken to avoid reducing working hours to such an extent that the worker's energy is not fully utilised.  
The most appropriate method is to have sufficient working hours in which the worker can continue to work without feeling totally exhausted. Evidently, the working hours will differ from industry to industry, according to the nature of the work.
2. **By provision for rest pauses, fatigue can also be reduced:** Another way of reducing fatigue is introduction of appropriate and properly timed periods of rest. An appropriate period of rest involves calculation of the total rest period allowed in proportion to the work expected from the worker. And a properly timed rest period implies the time at which this rest should be allowed and the frequency with which it should be allowed. Many experiments on this subject have yielded a fund of valuable facts. According to Vernon, the worker should be allowed to rest after every hour, while according to Sheppard, the worker who works for 8 hours a day should be allowed to rest for 16.6 per cent of the total working time. It is evident that in providing rest periods, one must consider the total rest period in proportion to the working hours as well as the frequency and duration for which it should be given.
3. **Adequate ventilation:** Fatigue can be reduced by improving the ventilation also so that the polluted air is eliminated and fresh air admitted into the factory. Most factories make use of exhaust fans designed to blow the polluted air out of a room or a hall.
4. **Maintenance of normal temperature:** In order to reduce fatigue, it is necessary to maintain the normal room temperature at the place of work. Arrangements should be made to raise the temperature in winters and to lower it in summers. If the temperature is adequate, the workers can work for longer hours without experiencing fatigue. For this reason, many modern factories have provided air-conditioned rooms or other means of reducing the heat during the summers, while heaters and other devices are used to increase the temperature during winters.
5. **Proper and adequate illumination:** Fatigue can also be reduced to some extent if a proper provision is made for lighting up the area in which the workers have to work. For this, it is necessary that the light should come from the right direction and should be of a particular intensity. The advantage in this is that the eyes do not suffer strain and hence the workers do not get tired that early.
6. **Proper seating arrangement:** A proper seating arrangement for the workers also helps to reduce fatigue. As far as possible, the workers should be allowed to work while sitting. The seat should provide normal comfort to avoid fatigue, but it should not be too comfortable for in that case, it will induce sleep. But at the same time, it should also not be uncomfortable.

7. **Better design of machines:** The shape and size of the machine operated by the worker also influence fatigue. If the machine is so designed that it can be run efficiently by making the minimum possible movements, the worker will not feel exhausted.
8. **Reducing noise:** As excessive noise also induces fatigue, it is desirable to have some control over the amount of noise at or near the workplace, if fatigue is to be avoided. This can be done in many ways. It is more difficult to reduce the noise made by the machines installed in the factories, but efforts should be made to control the noise produced. If the noise in the factory or office is less, the workers will feel less tired.
9. **Healthy work environment:** If the working conditions are conducive to health, the fatigue also remains at a low level because the worker's health and his/her fatigue are directly related to each other. In order to create healthy conditions, it is necessary to pay attention to ventilation, sufficient light, absence of noise, proper room temperature, control over the humidity, medical facilities, adequate arrangement for rest and food, and so on. All these things keep the worker in proper spirits.
10. **Adequate arrangements for sleep:** In many kinds of work, it is necessary to provide some arrangement for sleep. Even if the worker is given a chance to sleep on a comfortable bed for only half an hour out of the total working time, much of his/her fatigue disappears. Such an arrangement is particularly useful for the worker working in night shifts and involving physical exertion.
11. **Adequate training:** The worker feels less fatigue in operating a machine for which he/she has been trained because he/she does not make any unnecessary movements. Hence, professional training can also help to reduce fatigue.
12. **Proper social atmosphere:** Even the social atmosphere plays an important role in reducing the workers' fatigue. The workers' enthusiasm can be easily maintained and fatigue kept at a low level if good relations with the management can be created and if the general atmosphere is one of cooperation and mutual understanding.
13. **High morale:** High morale can also help to reduce fatigue among the workers. Maintenance of high morale requires an attitude favourable to the management, self-generated discipline, group administration, enthusiasm, mental satisfaction and peace, respect for and confidence in the management, and so on. If these factors are present, then the incidence of fatigue is much lower and the level of morale much higher.

These days, many other means are being adopted to reduce the workers' fatigue. For example, in many factories, arrangements have been made to play music to the workers while they are engaged in their work because the workers feel less tired if they sing as they work. Many new experiments are being conducted on this aspect these days. Besides, change in the nature of work also helps to keep the workers' interest alive. Hence, efforts are made to make the work interesting in many different ways. As industrial psychology progresses, many new ways of reducing fatigue will definitely come to light.

### ***Criteria of Fatigue***

As a matter of fact, the criteria of fatigue implies the symptoms by which its presence can be diagnosed and recognised. In order to understand this, it is essential to keep in mind the various aspects of fatigue.

Since fatigue is a psycho-physical condition, its symptoms are both mental and physical. Fatigue can be recognised by the following factors:

1. **Poor muscular condition:** If one feels tired, then the muscles lose their power to contract and expand. Hence, psychologically, fatigue is a muscular condition, and fatigue of the muscles to contract and expand is one criterion of fatigue.
2. **Feeling of physical exhaustion:** One of the main symptoms of fatigue is the feeling of fatigue even if the individual is not feeling physically exhausted. In the state of exhaustion, the desire of work is noticeably reduced and the desire to rest is clearly heightened. Generally, it also leads to a fall in the individual's production, though this is not universally true. In the state of exhaustion, the individual's feeling about work changes and he/she does not feel like working.
3. **Nervous slackness:** Mental exhaustion is indicated by nervous slackness. Sometimes it is caused by muscular fatigue, but it also has many other causes. In a state of nervous exhaustion, the nerves lose their power to react with the result that the individual cannot work efficiently. Many experiments have established that in a condition of exhaustion, the nerves and muscles do not have the power to react properly or to achieve the normal state of excitation. As a result of this slackness, the sense organs do not react properly. The sense of smell is particularly influenced while the powers of seeing, hearing and touching are also adversely affected.
4. **Chemical changes:** When a worker works continuously, the production of acetic acid and other poisonous chemicals also increases in his/her body. In a healthy body, oxygen is properly distributed through the blood stream with the result that poisonous matter is eliminated from the body. When the muscles become tired, this process of elimination does not work sufficiently. This leads to a fall in the quantity of glycogen in the body along with an increase in the quantity of poisonous matter. In this manner, many chemical changes occur in the body during fatigue. Therefore, chemical changes can reveal the state of tiredness.
5. **Change in the blood chemistry:** An analysis of a person's blood can also reveal if a person is exhausted or not. If some of the tired person's blood is introduced in the blood of some healthy person, one will find the symptoms there too. The same is true of the muscles also. On the one hand, the blood stream helps to eliminate poisonous matter from the body, but, on the other hand, it also helps to distribute the fatigue all over the body. For this reason, the whole body shows signs of exhaustion even when only one part of the body is bearing all the strain. If any one part of the body is put to excessive use, then that part shows signs of fatigue earlier but soon these symptoms can be seen all over the body because exhaustion is communicated by the blood.
6. **Changed mental condition:** Another symptom of fatigue is the change in the mental condition because in an exhausted condition, the individual experiences deterioration of his/her mental powers and a loss of interest. He/she cannot concentrate upon anything for a long time and becomes bored with work. Because of its influence upon the mind, fatigue is considered a psycho-physical phenomenon.

7. **Acceleration in the number of accidents:** It has been revealed by an analysis of accidents that the majority of accidents occur either in the morning or late in the evening. This fact has been generally substantiated by studies in Germany, England and America. One can estimate the extent of industrial fatigue from the number of accidents. For these reasons, now provisions are made for introducing rest periods in the early hours and in the late evenings. This pattern of accidents can be seen in almost any industry, but while the morning accidents are uniformly present, the late evening accidents follow various patterns in different industries. Accidents in the late evening take place more rapidly, and the total number is much more than that of accidents in the morning. One can see a difference in the number of accidents that take place during the morning and the night shifts. Thus, the relationship between fatigue and accidents is well established.

However, fatigue is not the sole cause of accidents and for this reason, an increase in accidents is not a criterion of increasing fatigue. Many other factors apart from fatigue often prove more important in causing accidents. For example, women are more accident-prone than men. Although it cannot be denied that in a state of exhaustion, the individual becomes restless, he/she cannot control his/her movements properly, he/she may even go to sleep, he/she may lack concentration, fatigue cannot be accepted as the sole cause of accidents.

8. **Reduced production:** Fatigue may also be expressed in terms of fall in production. As has already been mentioned in connecting with accidents, the early morning shift and the late evening shift result in more accidents and also in a fall in production. The cause of this fall in production is believed to be fatigue because as fatigue increases, the efficiency of the worker decreases.

During the first hour in the morning, the production rate rises steeply because this is the warming up period. The warming up can be due to numerous mental and physical causes. And the period consumed in warming up to one's work will depend as much upon the work as upon the individual differences between one worker and another. Two factors which are responsible for the rate of the worker's performance are the worker's health and the nature of the conditions under which he/she has to work. It is normally seen that production reaches its highest peak in the third hour, after which production again begins to fall due to fatigue. It is for this reason that a rest period is provided after the third hour of work.

There are many other symptoms of physical and mental fatigue which can also be accepted as the criteria of fatigue. Fatigue can be recognised by such mental and physical conditions as change in respiration, blood circulation, blood pressure, disinterest, lack of concentration and slackness. Nowadays, many scientific instruments are also used to measure the extent of tiredness.

## Monotony

Monotony is also a mental condition. It is reflected in labour output. Monotonous operations tend to result in shift of interest, with intervals of disinterest and daydreaming. Monotony is not a characteristic

of work, rather it is an impact of work and the mental condition of a worker. The major causes leading to monotony may include the routine nature of work to repeat the same work, lack of change in work, lack of variety in movements and so on. Sometimes, the purpose of the work also makes a work monotonous. If the worker does not think the work useful and positive, he/she will feel monotony and boredom in that work. Excessive division of work, mechanisation of operations and lack of human relations have also contributed to the problem of monotony.

## Measures to Remove Monotony

The following steps are useful to remove monotony:

1. **Job enlargement:** It involves a horizontal loading or expansion or the adding of more tasks of the same general nature or type. It provides the necessary change for the worker, and he/she does not feel boredom and monotony in the work.
2. **Job enrichment:** It is an extension of job enlargement. The difference between job enrichment and job enlargement lies in the nature of addition to the job. Job enrichment involves vertical loading, adding and giving more challenges. Thus, it applies to improvement of job in such a way that it has more wide dimensions, more opportunities for achievement, recognition, responsibility, achievement and growth.
3. **Job rotation:** It involves the change in work and workplaces. If possible, job rotation should also be applied to overcome monotony.
4. **Provision of music:** The provision of music also makes the work interesting and pleasing. Researchers have proved the utility of music in routine types of jobs.
5. **Employee counselling:** Employee counselling is also an important method of overcoming monotony in work. The opportunity of counselling makes the worker interested in work, keeps him/her involved in it and changes his/her attitude towards the work.

## Chapter Review

1. Workforce of an organisation is likely to feel contented to a great extent if technological changes are handled properly, safety measures are undertaken appropriately, industrial health and hygiene are maintained adequately and working environment is made conducive. And it is a well-known fact that a contented workforce is always instrumental in ensuring production at the optimum level.
2. Technological changes may be automation, rationalisation, time and motion studies, scientific management, changes in plant and machinery, and so on. Technological changes are beneficial because they add to physical and mental comfort to workers and also lead to increased output, reduced cost of production, improved quality, higher profits and so on. However, technological changes are resisted because they have their adverse impact also. It is, therefore, desirable to first switch over from indigenous technology to appropriate/intermediate technology and then to the state-of-the-art technology in stages, that is, step by step.

## 732 HUMAN RESOURCE MANAGEMENT

3. Since the technology is changing fast, therefore, it is causing industrial accidents also. Hence, adequate preventive measures and safety controls are called for. Although there are several classifications of the causes of work-related accidents, the one that divides these causes into two categories, namely machine factors and non-machine factors, appears to be more appealing. Most accidents are preventable if both statutory and non-statutory preventive steps are undertaken in the right spirit.
4. Good industrial health is in the interest of all the stakeholders of an organisation. Appropriate medical check-up and good health services are the main factor affecting health of the workers favourably. It is primarily the Factories Act, 1948, which has provisions (Sections 11–20) relating to health. An organisation should take due care of mental health of its workforce. Industrial hygiene which involves improving material environment, personal hygiene, proper cleanliness, and healthy habits and practices should also be ensured.
5. In the absence of a conducive working environment, it is virtually impossible for an organisation to accomplish its objectives. There are two types of working environment, namely the physical working environment and the psychological working environment, and both of good quality are necessary to achieve the goals of an organisation.
6. Physical environment usually refers to working conditions such as illumination at the worksite, ventilation, temperature, noise, rest pauses, hours of work, music and so on. Psychological working environment refers to intangible aspects such as behaviour, mutual relations, need satisfaction, security of job and incentives.
7. Fatigue, which is a sort of negative appetite for activity, arises due to continuous or prolonged work. Interest in work and quantity of output both decline as fatigue increases. Of course, fatigue may be due to excessive physical or mental demands on employees or due to the nature of work assignments. There are two types of fatigue, namely mental and physical. Long hours of work, abnormal temperature, inadequate rest intervals, lack of illumination and ventilation, improper seating arrangement, defective design of tools and machinery, low morale, lack of sleep and the like are the main causes of fatigue.
8. Monotony is a mental condition due to an unfavourable impact of work, causing lack of interest and daydreaming. Monotony can be overcome through job enlargement, job rotation, counselling, providing music and so on.



### Key Terms

Anthrax	Industrial hygiene	Muscular conditions
Appropriate/intermediate technology	Industrial mental health	Phosphorous poisoning
Automation	Job enlargement	Physical exhaustion
Bagassosis	Job enrichment	Physical fatigue
Double-edged weapon	Job rotation	Physical working environment
Employee counselling	Labour turnover	Proneness to accidents
Fatal injuries	Lead poisoning	Psychological working environment
Fatigue	Manganese poisoning	Rationalisation
Health hazards	Mental fatigue	Rest pauses
Horseplay	Mercury poisoning	Serious injuries
Incentives	Minor accidents	Silicosis
Industrial accidents	Monotony	
Industrial health	Morale	

### • Discussion Questions •

1. Discuss how the concept of technological change came into existence. Also discuss the benefits as well as adverse impacts of technological changes.
2. Discuss how technological changes should be transferred into a developing country. Is it a good idea for such a country to first go for appropriate technology or intermediate technology and adopt the state-of-the-art technology over a period of time depending on circumstances?
3. Discuss the causes of industrial accidents and also the problems that arise in the measurement of accidents.
4. Discuss the ways and means to prevent industrial accidents and also the steps taken by the Government of India in the direction.
5. Discuss that the voluntary steps in the direction of prevention of accidents are as important as statutory steps.
6. Discuss how industrial health is important for both workers and employers. Also discuss the factors affecting health in industries.
7. Discuss the concepts of mental health and wellness approach. Also discuss the problem of stress management in industries.
8. Discuss the meaning of occupational hazards and occupational diseases. Also discuss the importance of occupational health services.
9. Discuss the symptoms and causes responsible for fatigue and how fatigue can be overcome.
10. Discuss the symptoms of monotony and how monotony can be overcome.

### Individual and Group Activities

1. As an individual or in a group of two members, visit some large manufacturing organisation and discuss with the HR officials how they introduce a technical change in their organisation and also how they manage resistance from employees to such a change.
2. As an individual, discuss with the safety director/manager of some large manufacturing organisation the status of accidents happening in his/her organisation. Find out from him/her what steps his/her organisation takes to prevent industrial accidents.
3. In a group of two members, discuss with union officials of a large organisation the status of industrial health in their organisation, especially the medical check-up facilities available in their organisation, and prepare a brief report.
4. As an individual, visit some large textile organisation employing around 1,500–2,000 employees. Discuss with the HR officials the present status of occupational health services in their organisation. Also find out what occupational diseases are more common in their organisation.
5. In a group of two members, visit some big manufacturing organisation and discuss with the HR officials the steps taken by their organisation to eliminate or, at least, reduce physical and psychological fatigue of their employees.

## APPLICATION CASE 20.1

**Executing Technological Change Without Applying Mind Property**

James has been serving as a manager in a general insurance company employing about 100 employees. The company has been in existence for the last about 20 years and had been doing well until 4 years back. It had been following traditional methods of doing the clerical and administrative work. Its 90 per cent employees were in the age bracket of 45–55 years. Except the use of a few typewriters, two landline telephones and some manual calculators, everything in the office of the company was being done manually. Consequently, the operations in the company had become time-consuming, more costly and less customised, resulting in the downfall of the business of the company. Its competitors, especially the ones which had come up into existence during the last four–five years, were getting more popular.

Since the company James is serving at was finding it difficult to sustain itself, its top management also thought of modernising the company with latest electronic automated items, including sophisticated computer systems, latest mobile phones and so on. The top management placed the purchase order for these as per its estimated requirement and within a fortnight, the purchase order was executed and necessary fittings and the like were made and equipment installed.

The top management was highly excited about the whole exercise, though it did not last long.

Since everything was done very hastily and without taking the employees into confidence, the entire initiative taken by the top management boomeranged. The equipment were there, but there were no people who could operate and maintain them. The employees who had no exposure to handle the modern and highly sophisticated equipment found themselves unable to master the techniques of operating the new equipment. Most of them were too old to learn the new technology. There was little hope that training programmes for the purpose would yield any results.

The top management was in a great dilemma. Now it was left with the option that it should recruit new, young, well-trained employees to go ahead with its modernisation plan. But the problem was how to get rid of the redundant employees who were neither well qualified nor had the potential to learn any new technical things. The top management had the challenge how to rehabilitate the old employees or how to get them outplaced, as all of them got united and had the full backing and support of their union.

**• Questions •**

1. Who is responsible for all the mess created in the company and where did the things go wrong?
2. Were you the CEO of this company, how would you solve this problem?

## Glossary

### **Appropriate/intermediate**

**technology:** It is a halfway stage between the simple, traditional or even non-existent technology and the advanced technology.

**Automation:** In it, operations are controlled by the technology itself; that is, operations are self-regulated with the help of technology.

**Direct costs of accidents:** These are usually measurable because these are normally expressed in terms of money.

**Double-edged weapon:** Having both positive effects if handled appropriately and negative effects if handled carelessly.

**Indirect/hidden costs of accidents:** It is a little bit difficult job to measure hidden costs of accidents because these are usually in terms of work time wasted by different

employees because of happening of an accident.

**Industrial accident:** As per the Factories Act, 1948, an industrial accident is an occurrence in an industrial establishment considering bodily injury to a person which makes him/her unfit to resume his/her duties in the next 48 hours.

**Physical environment:** It usually refers to working conditions such as illumination at the worksite, ventilation, temperature, noise, rest pauses, hours of work and music.

**Productivity:** It is the rate of output to input.

**Proneness to accidents:** Accident proneness is a condition in which a human being is mentally inclined, strongly disposed, attitudinally addicted or personally destined to become continually

involved in an ongoing and never-ending series of accidents or injuries.

**Psychological working environment:** It refers to intangible aspects such as behaviour, mutual relations, need satisfaction, security of job and incentives.

**Rationalisation:** It is one of the forms of technological changes. It involves basic changes in the structure and control of industrial activities.

**Rehabilitation:** It involves resettling the workers in other jobs, employments, and the like.

**Wellness approach:** This approach focuses on avoiding things which are harmful to health such as smoking, drinking and using drugs, and in calculating good habits and practices such as regular exercise and optimistic and positive attitude.