Importance Of Safety For Optimising Productivity

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"No job is so important
And no service is so sought
That we can not take time
To perform our work safely
This time, time to do things safely
Can be the most important time in our lives"

The above motto of Bell Telephone Company, U. S. A., is the essence of Safety. Whatever man does, it is to live and live cheerfully. Therefore, if a man is to remain "KARMAYOGI" it is necessary that he feels safe to work and lives to enjoy the benefits of his work. More lives were lost in industry than in war during the war period 1939–45. Around 1,00,000 workers are killed in industrial accidents throughout the world every year and around 5% of the National totals of working days are lost through occupational accidents and related diseases.

Safety aspect of industrial life was ignored from the beginning of industrialisation of this country and is borne out from the facts that the rate of Accidents jumped from 28.84 in 1948 to 74.74 in 1971, and the rate of fatalities from 0.13 to 0.24 per thousand workers during the same period. The rate of Accidents in U K. and U S A. stood at 33.40 and 26.69 per thousand workers respectively for the year 1971 in spite of their far more rapid industrialisation. Thus it is seen that safety is required for men and equipment. Men may meet with an accident or suffer from health hazard. It is necessary to initiate, implement and enforce measures which would result in safe working conditions.

The importance of total safety i.e. of the plant, machinery, people (within and neighbourhood) and money would be further clear from the disaster that took place at Bhopal and shook the very safety of the organisation itself-a multi national giant, what would happen to lesser ones as represented at this forum. Bhopal tragedy, though century's biggest is not alone, Swiss owned chemical plant in Italy exploded in year 1976 with resulting damages of about 28 million dollars, one of the largest absestos manufacturer, M/s. John-Manville Corporation went bankrupt in 1982 while dealing with claims estimated at 2 billion dollars related to job related discases such as lung cancer; Pemex, a state owned oil company had to pay huge compensation to victims of a gas explosion in which 500 people died and thousands injured and many many more companies are facing problems due to occupational diseases. Thus safety is not accident reduction alone, it covers health of employees and pllution control as well. The health aspect of employees has not received the attention it deserves by the industry in India in general and needs to be attended on priority basis by it to ensure its own survival and its productivity levels.

Productivity is the key to national prosperity without which the dream of equality and social justice as enshrined in our constitution will remain a distant dream. It is a measure of the economy of means and refers to the efficient use of men, machines, materials and money. Better productivity apart from other factors is also dependant upon state of technology, management's commitment, skilled and motivated manpower, continuing education, house keeping and machine maintenance, plant and work layouts, safety of workers, workers participation in management, absenteeism, environment etc. and industrial relations. It is heartening to notes the Governments commitment to productivity as clear from the institution of National Productivity awards to provide recognition to concer-

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ned organisations and various other steps it has taken in recent years.

Productivity in manufacturing sector is very low in India and in fact is going down with the passage of time. According to Prof. V. K. R. V. Rao output–input ratio in the registered manufacturing sector has gone down to 1.285:1 in 1979–80 from 1.3928:1 in 1960–61. As per Asian Productivity Organisation growth rates (percentage increase per annum) in labour productivity and capital productivity were 0.89 and –0.30 for period 1960–61 to 1975–76 for India as compared to 10.52 and 9.51 for period 1967–1977 for Taiwan. As per T.V. Mansukhani, Labour productivity growth rate is 2.0 in India (1970–1980) as compared to 5.8 for Japan (1970–1978) for manufacturing sector. Productivity in steel industry has gone down in India from 68 Tonnes of steel ingots per man year in 70's to 56 in 1981 as compared to 331 Tonnes in Japan (1981). This emphasises the scope of raising productivity.

Absenteeism results in poor productivity. In India absentee reserve is of the order of 13–15%, which alone results in 10% fall of productivity. Further, productivity is lost due to skills of reserves. Accidents result in Mandays lost and so contribute to absenteeism and poor productivity. High absenteeism results in employment of more casual labour who has not received that amount of detailed training which would otherwise be the case and as such are more susceptible to accidents. This problem is specially acute for Paper Industry as absenteeism in Paper and allied industries is higher than other industries due to its location, type of materials used and peculiarities of process and products made. Thus accidents are caused due to absenteeism and in turn increase absenteeism resulting in poor productivity.

The principle reasons for high rate of accidents is the resistance and absence of concerted drive for preventive measures which are simply considered obstacles to production or deserving only low priority. There is complete lack of realisation that accidents are expensive and affect productivity considerably. It is found that as number of accidents decreased the productivity went up considerably. A study by a committee on safety and productivity of the American Engineering Council has found that—

i) Reduction in accident rates can be obtained simultaneously with an increase in production rates.

ii) Efforts to improve safety performance do not interfere with production.

iii) The incidental or accompanying cost of industrial accidents is a loss in industrial operation which should not be neglected.

iv) Maximum productivity is ordinarily secured only when the accident performance tends towards the irreducible minimum.

Thus it could be safely concluded that safety and productivity are the two sides of the same coin and would be achieved only simultaneously.

An accident results in heavy costs. Accident costs do not provide any return and therefore, unproductive in nature and so should be minimised. Injured pays in the form of physical sufferings, loss of earnings, mental worries and incapacity for activities. Medical Insurance companies suffers from compensation payment and medical and care expenses. Management pays by way of worries, loss of prestige and morale of employees, loss of man hours and skills, machine downtime and other associated costs all resulting in loss of productivity. Society suffers by way of financial help or assistance to victims. Government suffers heavy loss of revenue due to interruption in production. The environment of work place changes for worse following an accident and ceases to be conducive to high productivity in varying degrees. There are indirect costs such as time lost by other employees by way of curiosity, sympathy, assistance, complying with formalities, investigation etc. It results in poor productivity due to poorer skills of the replacement personnel either for short durations or on permanent basis. There are further costs by way of loss of materials, equipments and tools. Some time these costs are very heavy and could bring down the production to a grinding halt for considerable period for example if a critical machinery has been damaged, critical raw material has been lost. Thus an accident has adverse effect on productivity and some time its effect could be disastrous.

Occupational accidents are never simple and most common causes are not most dangerous machines nor

the most dangerous substances but rather quite ordinary actions like stumbling, falling, faulty handling of goods or use of hand tools, or being struck by falling objects. Similarly those who meet with accidents generally are not the disabled but the young workers who are best equipped physically and from psycho-sonsorial point of view.

In many countries, commuting accidents have also been brought under occupational accidents. An accident is normally the result of multiple causes viz., technical, physiological, psychological such as machines, environment, posture and work induced fatigue, commuting circumstances, illtemper, youthful exuberance, physical or mental state, malnutrition, endemic diseases, changes in life style forced by technological development etc.

An accident is an unforeseen and unintended event resulting in injury or loss or both. Accidents do not happen, they are always caused, either due to unsafe acts i.e. deviation or violation of safe procedures or rules set for carrying out a task or unsafe situations i.e. defective condition of the environment or the machines and tools. Unsafe acts could be due to ignorance of the job, over confidence, improper attitude, fatigue etc. Unsafe situations such as poor layout, improper design, inadequate lighting, defective equipment, poor house keeping, loose clothing etc. are the result of human failures like poor planning, co-ordination, communication, execution etc. and these are the factors which effect Productivity for worse. Education, training, incentives, enforcement of rules and Procedures, etc., help in eradicating unsafe acts Proper design, correct layout, good housekeeping and maintenance practices will develop safe situations and help in boosting productivity.

Four basic methods of accident prevention in decreasing order of effectiveness are removal of Hazard removal of individual from exposure, isolation of Hazard and protection of individual. Improved work methods, upgraded technology, fire prevention measures, well designed work premises, sufficient lighting, good accoustics, comfortable climatic conditions, proper ventilation, application of ergonomics, turnover, education and training and harmonious industrial relations are measures which affect safety as well as productivity.

A large number of accidents occur in material handling, and work study can contribute in reducing the incidence by simply reducing the number of handling operations and the distance that goods have to be transported. Dangerous operations could be further eliminated by prior work study, process analysis and critical examination of work organisation. These steps would simultancously result in reduced time lost in non basic work and thereby increase productivity.

Rapid advancement in technology are being made to improve productivity. These advancements have also created new and totally unrecognised hazards. Yet the same technological strides have also peovided means for the early detection of signs or symptoms of occupationally induced diseases. Thus productivity and safety are intertwined. Updating plant and technology by way of modernisation and renovation not only improves productivity but also safety.

High productivity requires total elimination of losses due to fires. Fires also cause injuries. A planned fire prevention system manned by well trained fire fighting squad is an essential requirement both for productivity as well as safety. Specifically it is very important in paper industry as the average fire load per square meter in this industry is about 200 times greater than in the general industry. Periodic fires, small or big, all result in loss of materials and equipments apart from loss of machine hours, man hours and constitute a very real danger to workers specially when occurring during working hours.

Certain basic principles such as floor area, noise levels, traffic aisles need to be appreciated and incorporated at the plant design stage for improved productivity and safety. Window area of not less than 17 percent of floor area, $10M^3$ of air per worker, not less than $2M^2$ of floor area per person, non slip floors, traffic aisles wide enough for simultaneous movement of materials, vehicles and people, reduced noise transmission are all essential for providing environment for high productivity and greater safety. Equally essential is good house keeping i.e. tidiness and state of repairs which contributes to accident prevention but also is a factor in productivity. Aisles cluttered with stacks of materials result in time loss in clearing the way and in locating the materials. Such materials tieup considerable capital and built up space. All

these will result in low productivity and presents hazards for accidents.

Good visibility of equipment, product and data are essential to reduce defects, reduce wastage, prevent visual fatigue and headaches, and accelerate production. Inadequate visibility and glare both are frequently a cause of accident. Natural light is best but its availability is limited and good lighting system could be designed using fleorescent tubes. It must be remembered while designing lighting system that lighting intensity rapidly falls by 10 to 25 per cent and then more slowly until it is only 50 per cent or less due to accumulation of dust and the wear of lighting element. A good colour scheme makes a valuable contribution to good lighting apart from having a psychological impact and enlivens the environment,

Deafness caused by exposure to excessive sound has been made a notifiable disease vide Act 94 of 1976, an amendment to the Factories Act, 1948. Noise is the cause of various problems such as impeded sound communication, sensori motor, neuro–vegetative and metabolic disorders, industrial fatigue, irritation, reduced productivity and occupational accidents. It interferes with attention, concentration and performance of the employee. Prolonged exposure may cause permanent loss of hearing and result in occupational deafness. So employees must not be exposed to noise level above 85 decibles in general. Therefore, monitoring and control of sound vibrations and noise is essential for improved safety. This will also contribute to better productivity because of reduced equipment breakdowns and better communication.

Climatic conditions should not place extra burden on the worker if high productivity is to be maintained. This is also a factor in safeguarding the health and comfort of a worker. If attention is not paid to climatic conditions, worker had to go into the open air to recover from unbearable working conditions, as found by first ILO produetivity mission to India, resulting in a great deal of time loss. Productivity has generally been found to be low in hot climatic conditions. Climatic conditions are to be specifically controlled in hot work, cold work and wet work areas. The more burdensome the climatic conditions, the longer the work breaks should be for example with rate of work being of the order of 200 K. Cal./hr. and wet bulb globe temperature (WBGT) of 32°C, the rest period may be as high as 75% of total work as per American conference of Governmental Industrial Hygienists (ACGIH) and lowering of WBGT by 2°C may eliminate the total rest period. Adverse climatic conditions have deleterious health effects and prevention involves various measures i.e. technical and work organisation.

Ventilation is important factor in maintaining the worker' health and productivity. It is an important means of making tolerable the extremely arduous working conditions. Ventilation replaces the contaminated air by fresh air and thus dilutes atmospheric contamination and disperses the heat generated by machines and men at work–it may be noted that generally only 20 percent energy is converted into useful work, rest 80 percent is released as heat. A minimum air flow of $50M^3$ per hour per worker is essential. It is reported that complete control of dust in industry could extend the life span of many workers by 10 years.

Long continued work under extremely low stress conditions produces a lack of alertness ; work under high stress conditions produces fatigue. Both factors are known to play a leading role in causing accidents. Ergonomics also known as Human Factor Engineering aims at ensuring the wellbeing of the person through the attainment of optimal working eonditions and by the most suitable use of physical characteristics and physiological and psychological capabilities. Productivity is, therefore, not the primary objective of ergonomics but is usually one of the end products. Ergonomics measures are not to be reserved for latest technology or design stage of the plant, appliance or machine, it could fruitfully be used in manual handling also for example for work requiring frequent lifting, correct technique is to bend knees, hold the back straight and use powerful thigh muscles than weaker back muscles. In such jobs instructions in kinetic techniques and systematic training is essential for prevention of low–back pain and injuries to the lumbar spine which are among the most frequent causes of absenteeism especially amongest older workers. Effect of absenteeism on productivity and safety is well known.

Almost all hand tools are manufactured safe. But use of right tool is not enough it must be used in the

right way. No tool is the right tool unless it is in good condition. Use of right tool in right way and in right condition not only prevent accidents but is essential for optimising productivity.

It is well known that new men are injured far more than experienced men. Turnoever and accidents have, therefore, twin relation and each makes the other worse. Turnover brings in new men who are more likely to be hurt than trained men. Accidents lay off men and new men have to be engaged. New men mean accidents. Accidents mean new men. So the vicious circle goes on resulting in poor productivity and poor safety.

Accidents caused either due to unsafe acts or unsafe situations, are the result of human error and therefore, preventable by proper training and education. Poor skills result in wastage of man hours, machine hours and material and poor quality to job, thus lowering not only productivity but creating safety hazards Therefore, continuing training and education are essential for safety as well as productivity. No safety movement will succeed unless every employee puts his heart and soul into it. Better safety required involvement of employees in departmental and works level Safety Committees, Safety inspection, accident investigation, proper plant maintenance, use of personal protective equipments and other safety promotional efforts. So harmonious industrial relations are essential for safety. Better labour–management relations will encourage employees to participate in management, provide them a feeling of involvement with the organisation and motivate them to excell in their work and thus promote productivity. Education and involvement will ensure that employees exercise caution, avoid unsafe acts, follow safety rules and procedures laid and avoid dangerous or risky work habits. Large number of accidents occur to contract labour due to lack of skill and training and these could be minimised through education and training which would enhance their productivity also. Thus safety has a direct bearing on productivity.

Thus accidents must be prevented for total safety and improved productivity. This requires total commitment to the safety cause by the management as well as other employees — apart from a safety system designed to identify hazards through regular inspections, to investigate accidents for underlying causes, to remove the hazards by Engineering, to eliminate unsafe acts through education and training; and to promote safety consciousness. Accident causes could be unearthed by using various modern hazard identification techniques such as Incident Recall Technique (IRT), Technique of Operotions Review (TOR), Hazard Hunt (HH) etc.

A system to promote industrial safety was designed and executed at M/s. Straw Products Ltd. (J.K. Paper Mill Unit) in steps, details given in Annexure - I, resulting in substantially improved safety standards. This could be done because of management's total commitment to safety and earned the organisation national recognition. The steps indicated helped in promotion of employees participation in managing safety and resulted in improved morale and motivation of employees. The productivity levels remained high. Some important statistics pertaining to safety, production and recognition at J. K. Paper Mills are indicated in Annexure – II.

So the causes of production troubles are the same as those of accidents. Time is lost because material is not piled properly. Time is lost because aisles are blocked with boxes or materials those should not be there. Time is lost because wrong type of tool is used. And every time such situation arises, operating efficiency suffers and there is an interference with the job of getting the production. As such accidents whether they cause personal injury or only property damage destroy efficiency. Further more, those are symptoms that something is wrong. These stem from lack of control over men, materials and processes, which spells inefficient operation and lower productivity. maximum productivity is ordinarily secured only when the accident performance tends towards minimum.

Thus it can be safely concluded that safety and productivity are intertwined. Action or reaction of an object, substance, person or radiation results in accidents and these are the conditions that create excess production cost, low volume, delay, spillage etc. and hence improved safety is essential for optimising productivity. Therefore, safety movement must be built up from departments, factories, regions into a

powerful national movement if we were to live up to the clarian call of high productivity given by our beloved late Prime Minister Mrs. Indira Gandhi in her declaration of the year 1982 as the 'Productivity year', and realise high productivity levels so essential for the safety of the people, safety of the industries, and safety of our nation. Let 'Safety for Productivity' be our motto.

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ANNEXURE-I

SAFETY SYSTEMS AT J.K. PAPER MILLS

(a) **Policy**	:	—Safety Policy —General Safety Rules —Safely Code for contractors.
(b) **Co-ordination & Execution**	:	—Contral Safety Co-ordination Committee (1 No.) —Departmental Safety Committee (10 Nos) —Safety Stewards.
(c) **Reporting & Investigation**	:	—Accident reporting —Accident investigation —Accident Analysis

(d) **Inspection**	:	—Weekly Safety visit to plants —Monthly Inspection by Deptl. Heads.
(e) **Information & Control**	:	—Safety notices —Testing of pressure vessels —Testing of lifting tackles —Job intimation system —Work permits system
(f) **Training**	:	—Quarterly 6 days training for staff and Workmen. —Yearly 4-day, 3-Tier Safety Training for Officers/Staff/ Workmen. —Local Safety Courses to employees. —Local Training to Contractor Workmen. —Safety Induction for new employees. —Participation in Safety Seminars. —Participation in Safety Training Course. —Training in First-Aid & Fire fighting.
(g) **Instruction**	:	—Shop floor lectures. —Site safety instructions.
(h) **Promotion**		—National Safety Day celebration. —Safety Exhibition. —Promotional Poster making.
(i) **Visual Aids**	:	—Centralised display of accident statistics. —Safety Bulletins. —Safety Slogans. —Safety Posters. —Display of Safety Slogans. —Display of Safety Stickers.
(j) **Competitions**	:	—Essay competitions. —Poster competitions. —Quiz competitions. —Slogan competitions. —Safety suggestion competitions. —Hazard Spotting competitions.

ANNEXURE—II

STRAW PRODUCTS LIMITED
(J. K. PAPER MILLS)
SOME IMPORTANT STATISTICS REGARDING SAFETY. PRODUCTION & RECOGNITION

(a) SAFETY :

YEAR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
No. of reportable Accidents	156	129	112	72	58	48	77	43	64	45
No. of personnel trained in Safety	—	—	—	—	—	336	389	521	796	947

(b) PRODUCTION :

YEAR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Finished Production (M.T.)	33927	35421	37993	39987	40861	41311	44486	43792	45668	49060

(c) RECOGNITION (National Safety Awards) :

Performance year	1977	1978	1979	1980	1981	1982	1983
Award year	1978	1979	1980	1981	1982	1983	1984
Lowest Average Frequency Award	—	—	Winner	Winner	Runner	Runner	Runner
Longest Accident free period	Winner	Winner	Winner	Winner	Winner	Winner	Winner