

ATTITUDE OF OWNERS, MANAGERS AND WORKERS  
TOWARDS TECHNOLOGY TRANSFER : A CASE STUDY  
IN BANGLADESH

M.Phil.

MD. ABU TAHER

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**ATTITUDE OF OWNERS, MANAGERS AND WORKERS  
TOWARDS TECHNOLOGY TRANSFER : A CASE STUDY  
IN BANGLADESH**

**Thesis Submitted to the Department of  
Psychology, University of Dhaka,  
For the Award of the Degree of Master of  
Philosophy in Psychology**

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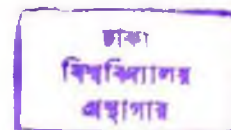


By

**MD. ABU TAHER**

Exam. Roll No. 1

Session : 1994-95



Under the Guidance of  
Dr. Azizur Rahman  
Professor of Psychology, D. U.

Department of Psychology, Faculty of Biological Sciences  
University of Dhaka, Bangladesh.

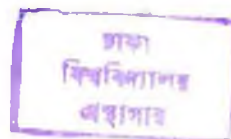
1998

## DECLARATION

The research work embodied in the thesis entitled "Attitude of owners, managers and workers towards Technology Transfer : A case study in Bangladesh" has been carried out by me under the guidance of **Dr. Azizur Rahman**, Professor of Psychology, University of Dhaka, Bangladesh. I do hereby declare that the work is original and no part of it has been submitted for any degree of this or any other University.

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Date ..... 27. 9. 97 .....



MD. ABU TAHER

## CERTIFICATE

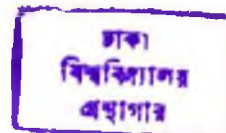
Certified that the thesis entitled "Attitude of owners, managers and workers towards Technology Transfer : A case study in Bangladesh" is a bonafide work of **MD. ABU TAHER** done under my guidance for the award of the degree of M. Phil. in Psychology.

Dated : 27-9-98.....



**Dr. AZIZUR RAHAMAN**  
Professor of Psychology  
University of Dhaka.

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## SUMMARY

The present study was conducted to investigate: whether attitude towards technology transfer differed by respondent categories (owners, managers and workers) and levels of technology (auto, semi-auto and manual); whether there was any interaction between respondent categories and levels of technology in respect of attitude towards technology transfer ; whether attitude of the respondents towards technology transfer correlated with their age and education ; and to identify the problems / barriers in transfer and use of new technology in Bangladesh.

Data were collected from a sample of 216 respondents comprising 17 owners, 64 managers and 135 workers taken from 17 private textile industries situated in Dhaka, Narayangoj, Narshingdi, Khulna and Satkhira Districts of Bangladesh. Of the organizations, 5 were running under auto and semi-auto systems while 7 were running manually. Though the organizations were purposively selected, the respondents within the organizations were actually selected by stratified random sampling technique. To collect the relevant data, two Interview Schedules were used : (1) the Interview Schedule for assessing attitude towards technology transfer which consisted of 20 items, each having 5 alternative response categories. To develop the items, help was taken from relevant literature and experts in the field ; (2) the Interview Schedule for identifying problems / barriers in transfer and use of new technology. This Schedule consisted of 17 items, each having 5 alternative response categories. The developmental procedure of this Interview Schedule was the same as the first one. To analyze the data, Two-way ANOVA, Pearson's 'r' and some descriptive statistics were used.

The results revealed that attitude towards technology transfer differed significantly and independently by respondent categories and levels of technology but the two-way interaction effect was not significant. The result further showed that attitude towards technology transfer was most favourable in case of the owners and least favourable in case of the workers. Similarly, attitude towards technology transfer was

most favourable in case of organizations running under semi-automation system and least favourable in case of the organizations running under manual system. The result also indicated that scores on attitude towards technology transfer were significantly and positively correlated with age and education of the respondents. Considering the opinions of owners, managers and workers, the most common problems / barriers in use and transfer of technology in Bangladesh, among others, appeared to be (a) financial insolvency in importing new technology, (b) bureaucratic complexities and (c) shortage of raw materials.

These results have been analyzed rationally and suggestions have been offered for future studies in this direction.

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**MD. ABU TAHER**

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# **CHAPTER - 1**

## 1. INTRODUCTION

### 1.1 Definition and Concept of Technology

*The Oxford English Dictionary* defines technology as “a discourse or treatise on an art or arts; it is also a coherent set of knowledge and practices based on scientific principles in a specific domain”. Strunk (1985) defined technology as “the application of science to industrial use by use of methodological and systematic studies and treatment”. In the broadest sense, ‘technology’ is defined as the knowledge that humans possess which, in turn, enables them to perform particular tasks (Smith, 1981).

The history of struggling life of humanbeings is as old as the history of the world. From the very beginning of civilization, humanbeings are trying their best to uplift the condition of life standard. And the effect of their effort is technology. All the time men tried their best to have control over the nature and natural environment and, as a result, various technologies have developed. For example, stones and pieces of rocks were only available raw materials to the ancient people, and for this reason, their technologies were initially stone-based (Rashid, 1982). The recent emphasis on technology is inevitable as a tool to develop socio-economic conditions. The importance of technology is unlimited and it is also one of the most important elements of modern-age development. Output specially depends on technology whereby natural assets are transformed to finished goods through the use of technology. During the course of this century, and especially after the Second World War, technological development has contributed enormously to economic growth and social progress in the industrialized countries. The wealth in today's world is mainly of applied technological origin and is primarily the product of applied sciences and technological knowledge. This concept underlines the importance of adapting technology to its users and the operating environment (Shahnavaz, 1985).

## **1.2 Science and Technology**

The methods of realizing the process of collecting and inventing information about the animate and inanimate world is called science. The Knowledge acquired by the help of science is called technology when it is used to produce something. The combined aim of science and technology is to collect and invent information about the animate and inanimate world and these things should be used for the welfare of the human beings. Science is universal and it is open for all. But technology is not universal, it belongs to the persons or countries who achieve it. However, this technology can be handed over to others through different conditions.

The general population in most of the developing countries ordinarily think of technology as a tool for the production of economic goods such as a machine, a vehicle or a factory. Very few perceive that Technology refers collectively to the tool and also the know-how for making and using that tool. We all know that tools increase human capability and productivity through enhancement of muscle and brain powers. Physically, tools are available in two basic forms: object embodied, such as materials, machines, products etc. and document-embodied, such as charts, relations, processes etc. But tools are man-made and by themselves, tools are not enough for development. Tools have to be made, applied and maintained. For making and using tools know-how is most essential. Know-how can be classified broadly into two groups—human-embodied such as knowledge, skills, creativity etc. and institution-embodied such as organizations, linkages, management etc. Technology, in the sense of practical application of invention or discovery, is as old as mankind itself. From the dawn of history, the power of human group, be it family, tribe or nation has depended on the strength of its technology: military, industrial, agricultural or organizational (Qurashi, 1985).

Technologies are of two types: (a) Hardware technology and b) Software technology. Hardware technology, again, is of two types: (i) End-use production type such as Motorcar, Computer, Television, etc., and (ii) Production tools type-such as Machine, Equipment, etc. Software Technology is also of two types: (i) Know-how type

such as process, technique, method etc., and (ii) Know-why type such as knowledge, skill, experience etc.

Many developing countries tend to treat technology as a 'black box'. Technologies are often categorized in other ways: high and low technologies, modern and traditional technologies, capital-intensive and labour-intensive technologies, advanced and intermediate technologies, etc. These categories, while useful, often require careful interpretation. However, all these categorizations imply that technology is a combination of hardware and software with the relative proportions of each varying from one extreme to another. There are four basic components of technology which appear in different forms. The components are:

- 1) **Technoware**: which includes equipment, machineries, tools, structures etc. These may be referred to as the object-embodied technology.
- 2) **Humanware** : which includes creativity, expertise, proficiency, skill etc. This is the human-embodied form of technology.
- 3) **Inforware**: which includes theories, relations, designs, specifications, blue prints, manuals etc. This is the document-embodied accumulated knowledge or information.
- 4) **Orgaware**: which refers to management practices, linkages, organizational arrangement etc. to facilities the effective integration of facilities, abilities and facts.

All four components of technology are complementary and interdependent (Islam and Hoque, 1987). When all the four components of technology are present in at least minimum level, then only resource transformation can take place.

### 1.3 *Appropriate Technology*

An appropriate technology is a technology which is suited to its user population and the environment in which it is used; technology which is appropriate to the needs and means of population. Technology should, therefore, not to be regarded as the objective of development but rather the principal means for its attainments (Shahnavaz, 1985). There are no universal and permanently applicable 'appropriate technologies' in the world and there are varying views as to what should be considered as appropriate technology. The criteria of what is considered to be appropriate technology differs according to the place and stage of development. Concepts, ideas and policies of appropriate technology are also dependent on local conditions. Therefore, there exists no uniform prescription that one can regard as the relevant or appropriate technology for all developing countries at all times. Each country should define and develop its own technology fully appropriate to its special needs and resources.

The crucial issue which needs to be fully considered before any decision on transferring new technology, is an examination of the existing technology and consideration of what can be done to improve it. In this context, the Fifth Five Year Plan of Bangladesh states, "self-reliance can not be achieved without proper contribution of science and technology. In the present world, all developing countries have given priority to development of science and technology because it bridges resource gap to a great extent through application of appropriate technology" (GOB, 1997).

Any technology transfer project may adopt three important stages viz., initial study, subsequent selection and final utilization. During all three stages, collaboration and communication of transferers and acquirers as well as ergonomists and economists are essential. According to the ergonomists, technology will be appropriate, useful, safe and successful depending on the following factors :

- a) *Technological factors*: Perception and control philosophy, type of technology, systems safety, market maintaining ability, national traditions and resources, etc.

- b) *Anthropological factors*: Environmental and physiological characteristics, body size, level of skill, education and knowledge, attitudes and preferences, etc.
- c) *Socio-economic factors*: Culture, social and political values, infrastructure of finance, communication and energy supplies, availability and distribution of labour, etc. (Abeysekera and Shahnava, 1987).

At last, we can say that the appropriate technology does not offer an absolute prescription but rather a process of choosing from among a broad range of options. The appropriate technology approach seeks optimal solution to the problem.

#### **1.4. Technology Transfer**

Technology transfer simply means movement of technology from laboratory to users, producers to users, and sellers in one country to buyers in another country. In the context of developing countries, the term technology transfer gives the impression of the existence of a donor and a recipient instead of a seller and buyer. Technology transfer constitutes one of the major tools in achieving the goal of economic development for developing countries. However, technology transfer without incorporating proper and needed ergonomic considerations is likely to be a failure (Meshkati and Robertson, 1986). Technology transfer may be defined as 'the process of introducing an existing technological knowledge where it has not previously been conceived or implemented'.

Technology transfer is a complex phenomenon. It has proved to be a double-edged weapon in certain situations. While it has brought benefits to the common men in their life styles and social behaviour, it has destroyed indigenous culture and value system in many traditional societies. The indiscriminate import of technology has brought along with it the cultural accretions of modern societies which are totally alien to the spirit and core values of indigenous societies. Infact, it has proved to be highly disruptive of the social fabric and cultural identity of many developing and emerging nations (Masihuddin, et al. 1985). In a sense, technology transfer and developments are world

wide problems. In most cases developing countries have to buy technology from industrialized countries, who in turn, sell their technology with little or no modification to meet the socio-cultural and biological requirements of the receiving countries. Thus, industrialization strategy has failed because incompatibility exists between technology and human characteristics of the countries concerned. Little or no research has so far been done about the success of this industrialization strategy but experience indicates that the lack in fitting the new technology to the operators' level of skill, anthropometric, environmental and socio-cultural conditions has, in many cases, frustrated the industrial development and created new problems (Khaleque, 1991). It is also a problem for the industrialized countries, where there are sometimes enormous differences the level of technical development. Within industrialized countries, there are continuously new discoveries and new techniques so that it is extremely difficult to keep abreast of them (Verhaegen, 1995).

The transfer of technology is actual transplantation of a whole network of institutions, values, work method, hardware, software and infrastructure which usually takes place from a developed country to a less developed country (Shahnavaz, 1985). It simply means importation of technology based on mutuality of interests. It is also known that useful technology is not given away free it has to be paid for in one way or the other. Therefore, in this context it may be better to note that technology is not transferred, it is imported by developing countries from developed countries.

Transfer of technology from one society to another is a complex process which involves proper grafting of imported technology on to indigenous base. Technology transfer can mean many things. In the first place it concerns the introduction of machines. We use the term machine in its most extensive meaning. A motor car, a bicycle, a chair, a table, a dish washer, production machines in industry are all machines. Man and woman operate machines and constitute man-machine systems. But that does not mean that technology transfer is limited to man-machine systems. There are also other fields: for example, administrative and financial techniques. Public administration and office work in general should be organized in an efficient way with the

necessary checks but without excessive bureaucracy. It is clear that industrialization of countries depends to a large extent on economic factors, on international agreements on trade and tariffs, etc. Psychology and education are added contents of Technology transfer (Verhaegen, 1996).

Technologies from developed to developing countries are transferred in two ways:

- (a) **Formal method** – In this method, technology is transferred through an agreement viz., Technical Cooperation Agreement. There are three factors in technical cooperation agreement : (i) counseling, (ii) machinery and (iii) training.
- (b) **Informal method** - In this method, technology is transferred through exchange of opinion through meeting, conference, seminar, etc. (Karim, 1996).

**Technology transfer and domestic technological capabilities.** It is through the process of technology transfer that societies were and are able to benefit from evolutionary development i.e. the growth resulting from technological innovation. Effective transfer of technology depends on domestic technological capacity which, in turn, requires development and promotion of indigenous innovations. We find several steps between the transfer of a technology (in the sense of providing the equipment, instruction and blue prints) and its effective mastery (absorption, deployment and subsequent upgrading). Because of differing levels of technological capabilities in the host developing countries, the same technology is often found to be used at widely differing levels of efficiency in different developing countries.

Necessary skills and technological and managerial know-how are very much important in case of technology transfer, without which the initial transfer of technology cannot lead to efficient operation and it needs a long period of learning. Even simple activities like plant layout, quality assurance, maintenance and process optimization may call for substantial capability building when new technologies are introduced. The attainment of technological capabilities may often entail, apart from in house efforts by firms, broader social investment in education, training and the provision of information. In

addition, capability building by firms does not usually happen in isolation. In most activities, there is a need for a great deal of interaction between firms and technology services, research centres, quality control centres and similar support institutions (Lal, 1993).

**Technology transfer and ergonomics.** Ergonomics is the technology of work design and, technology is a key factor in ergonomic development. There is no developing country which can afford to reinvent the wheel when much of the needed advanced technology is already available in more highly developed countries. As formulated by the Denver Research Institute (1983), the crucial questions faced by developing countries are which technology to acquire, how to master it, how to adapt and adjust it to specific sources and the environment of a given country, how to maintain it, and how to build upon it. Ergonomics studies the relationship man has with his work, machine and the environment, with the view to achieve an equilibrium between the interacting systems, such as, man-work, man-machine, and man-environment for optimum performance of the system. The technology of ergonomics takes cognizance of human capacities and limitations in body size, physical and mental faculties in order to achieve comfort, safety and efficiency at work. If Technology is transplanted without consideration of dynamic complex systems of man in his working environment, it is bound to end up in failure. To avoid the negative effects of technology transfer, a thorough evaluation of ergonomic principles in the transfer process and a knowledge of human requirements of the acquirer of technology are necessary. It seems that many problems experienced by developing countries in acquiring the technology of industrialized countries can be solved by the proper application of ergonomics (Abeysekera and Shahnava, 1987).

The first International conference on "Ergonomics in Developing Countries" was held in 1983 in Sweden. To achieve the goals of Ergonomics in developing countries, the following steps were suggested (Shahnava and Babri, 1983) :

- (1) To determine appropriate technology according to the demand of the developing countries.

- (2) To import appropriate technology for the workers and employees of the developing countries considering their physical and mental ability, educational qualification and social and natural environment.
- (3) At first, higher technology should not be adopted instead of intermediate technology so that the engineers and technicians of the developing countries can change, enrich or repair the machines-tools in need.
- (4) Arrangement should be made for working environment, worker selection and training programme according to the imported modern technology.
- (5) The influence of imported technology on the work performance of the workers and employees' job satisfaction, health and welfare should be determined and by this the bad effect of above should be removed.
- (6) Co-ordination between imported modern technology and indigenous technology should be made.
- (7) To conduct research about technological problems of the developing countries and supply the research-based information to the Ergonomists of developed countries so that they can prepare appropriate technology for the developing countries.

***Economic factors in technology transfer.*** In the technology transfer process, emphasis is usually laid on economic progress. It is of course necessary that the economic situation and the general standard of living should improve but the method by which this is achieved is also important (Shahnavaz, 1985). Economic growth, corporate profits and individual remunerations are seen as indicators of such achievement. Technology draws upon workers' initiative and drive, 'go-ahead' sprits, and the striving for efficiency (Ferguson, 1979).

Innovation and development of technology is closely oriented to the demands and needs of the user, i.e. the humanbeing. However, the needs of human's are changeable. At different social and economic levels, the needs will not be exactly the same. Human needs also change with time. For example, for many Asian families, it would have been a wishful thinking 15 years back to own a colour television set, a refrigerator or a washing machine. Today, it is quite usual to possess such goods. The

priority of development of technology should be to provide the majority of people a basic standard of living, good working conditions and offer possibilities for improvement over time (Shahnavaz, 1985).

Differences in the standard of living affect attitude towards work and life which create problems in technology transfer. Heavy domestic responsibilities, deficient transport systems and poor wages prevailing in the developing countries make employees view work with disgust and scorn. They work only as a means to survive. Job satisfaction is more the exception than the rule. Low wages drive them to seek other income sources, perhaps a second job at night, part time job, overtime work, private business, etc. As a result, the interest towards their regular employment is low. They may be prepared to sacrifice anything e.g. health, leisure time, security of employment, seniority etc., for higher wages (Abeysekera and Shahnavaz, 1987).

The issues of unemployment and under-employment have been the object of much concern when considering the question of appropriate technology. In industrialized countries, the advancement of new technology is acknowledged as an important step towards maximal economic output where intensive automation replaces human labour. Technology from industrialized countries have on the whole been designed to reduce labour costs and are usually large scale, complex and capital-intensive.

## **CHAPTER - 2**

## **2. TECHNOLOGY TRANSFER IN BANGLADESH**

The importance of science and technology has been well captured in the Fifth Five Year Plan document of Bangladesh which states, "for attaining socio-economic prosperity of a country, science and technology is a crucial area where development is essential. The need for a faster technological development is being increasingly felt in Bangladesh. Hence, high emphasis will be placed on the advancement of science and technological research and innovations by adopting imported improved technology as well as through development of indigenous technology" (GOB, 1987). The strategy adopted in the first plan of Bangladesh was to concentrate energy and efforts in those fields of research whose results would lead to produce quick return in products and services.

The problem identified at the end of the fourth plan as the major constraint in this sector was that the research organizations had no linkages with the industries. As a result, most of the research findings or developed technologies could not see the light of the day beyond the premises of the research organizations. Another problem which was identified, was the absence of any satisfactory linkage between the industries and the Universities. Local industries remained satisfied with the know-how of imported technology and had not taken any serious initiative to gear up research and development (R & D) activity in their organizations (GOB, 1997).

The major objectives for the Fifth Five Year Plan are as follows:

- (a) Development of technologies specially required for the capital goods sector and large industrial enterprises, improvement of appropriate traditional and indigenous technologies for small enterprises in both rural and urban areas will be undertaken.
- (b) Upgradation of Research organizations involved in the field of science and technology will be upgraded. Through the use of indigenous technology and innovations, attempts will be made to make Bangladesh a modern state. Attention will be given to bring the fruits of scientific and technological innovation to the door steps of common people.

(c) Strengthening of the institutional and human development activities in the country through the development of improved science and technological knowledge.

(d) Strengthening the R&D programmes of existing organizations of the Ministry of Science and Technology through dissemination of modern scientific and technological know-how.

(e) Building up Centres of Excellence in required field on science and technology.

As a developing country, Bangladesh is passionately devoted to the development of its resources and the advancement and welfare of its citizens. Its goals for national development require large inputs on science and technology. Since the basic infrastructure required for development of science and technology is not available in our country, our Science and Technology infrastructure must be integrated with the production system of the country as it would help us to develop technological competence and innovation according to our needs.

## **CHAPTER - 3**

### 3. REVIEW OF LITERATURE ON TECHNOLOGY TRANSFER

#### 3.1 *Human Factors in Technology Transfer*

**Size of worker and work posture.** Significant differences in the size of human beings living in different parts of the world have been shown in anthropometric studies (Roberts, 1975). People living in tropical environments who are usually from developing countries are smaller in stature, physique and body proportions as compared with the people living in industrialized countries (Abeysekera, 1985). Considerable inconvenience and problems are experienced when machines and articles designed in industrialized countries for larger people are thrust on smaller people in developing countries. For example a design range for 90% of the British for a standing operation would also accommodate 90% of the Germans but only 80% of the French, 65% Italians, 50% Iranians, 45% Japanese, 35% Sri Lankans, 25% Thais and 10% Vietnamese (Shahnavaz, 1976; Abeysekera, 1985).

Working postures adopted by people in different countries must be studied and integrated into designs of technology, e.g. in machine operation. Many operations are performed seated on the floor or adopting a crouching posture in India whereas the western-designed machines are mostly operated at standing levels (Baranson, 1969).

**Physiology and strength.** Physiological differences, viz., rate of oxygen consumption, working capacity etc., among people in different countries have to be considered in determining performance successes in transferred technologies. Significant differences in work capacities have been reported by Whydham et. al (1983) Shahnavaz (1976) and others between people of different ethnic groups and between people in developing countries and industrialized countries. Adjustment of work standards, working hours and work rates is necessary under these circumstances. Forces to be exerted on foot or hand controls, muscle strength and torque requirements vary widely between people of different nations. On grip strength measurements, Asians were found to be considerably weaker than Americans (Guthrie et al., 1970).

**Manual dexterity.** The higher degree of manual dexterity among Japanese developed from early training on writing and art of calligraphy (Baranson 1963), has been cited as contributing factors of success of the Japanese electrical industry. Eskimos are proficient in watch making and radio engineering (Calder, 1961). They are said to possess a high degree of mechanical aptitudes, viz. acute eyesight, photographic memory, nimbleness of hands and special abilities to improvise. Therefore, the characteristic of manual dexterity can affect the degree of technology utilization in different countries.

**Climatic problems in technology transfer.** Many developing countries have extremely hot and humid climate compared with the cold and dry climate of industrialized countries. Working places designed for the cold environment have good insulation properties whereas in the tropics, the buildings should have more ventilatory openings for heat dissipation. Glaring mistakes have been made when designing buildings in developing countries during technology transfer.

A team of experts from WHO and ILO has found several climatic problems in a North European design of a sulphur extraction plant installed in the hot and humid city of Mosul, Iraq. There were no provisions to reduce the radiant heat and air movement which caused the sulphur gas to be blown back into the work area (Najmedin, 1986).

**Psychology as human factor.** Population stereotypes of different nationalities is a major consideration in technology transfer. Clockwise direction of a control may be interpreted as increasing the water flow in tap or increasing the temperature of an electric hot plate in developing countries, but in some industrialized countries the feedback expected can be vice versa. Similarly a red signal which indicates 'danger' in UK, may be interpreted as 'safe' for operation in the Peoples Republic of China. Perceptual differences prevalent among people affect their responses towards the display-control relationship. Special precautions have to be observed in the design of visual display units for different population (Abeysekera and Shahnavaz, 1987).

Kaminaka (1985) observed differences in the Characteristics of the labour force in different parts of the world which were limited to acquired skills. Wisner (1985) has shown that there is no difference in basic cognitive capacity between men belonging to different societies and cultures. The differences observed in performance levels of human operation in various tests, were attributable to cognitive capabilities of individuals resulting from factors such as cognitive complexity, information processing, behaviour and psychomotor skills (Meshkati, 1983).

### **3.2 *Coping With New Technology***

Wisner (1985) studied the negative aspects of technology transfer and its effects on health and safety. His study revealed that there was a higher rate of work injuries and a greater frequency and variety of occupational illnesses as compared to the originating country of the technology. The most appropriate way to achieve rapid development is to acquire technology from existing sources and not try to re-invent the wheel. So we want to consider which technologies to acquire, how they can be mastered, how they can be adapted and further developed (Denver Research Institute, 1983). It is generally too late and too expensive to redesign or modify at a later stage of technology transfer (Sen, 1982, 1984).

Shahnavaz (1985) has labelled non-ergonomically adjusted technology as 'transplanted technology' and due to its negative impact, characterized it as doomed to failure. Technological adjustment includes activities at different levels of design, implementation, and utilization, covering both hardware and software technology. Investigation on the disasters of Iraq's sulphur extraction plant and India's chemical plant at Bhopal revealed that without adjustment or modification on the basis of anthropometric, climatic, socio-economic and workplace variables, the use of technology can lead to serious catastrophes (Meshkati, 1986).

Technological adjustment and modification have to be based on sound ergonomic principles, focusing on the ability and limitations of the infrastructure,

environment and anthropological factors of the industrially developing countries. This is a challenge to both provider and user (Meshkati and Robertson, 1986).

**Adaptation problems with new technology.** Transplanted technology without considering the local human operator within the man-machine-environment system can result in problems. The designer selecting his design parameters and characteristics is influenced by physical, cultural and sociological environment as well as technological and anthropological factors of the users. The designer from an industrialized countries, hence, designs products and systems suitable for a population he knows. With the wide variation in these factors between industrialized countries and developing countries, the articles, machines and processes, etc., need adaptation, modification or redesign to the changing situation in developing countries (Abeysekera and Shahnava, 1987). It is believed that much design incompatibility in machines and work aids causes problems to the users in developing countries.

**Matching technology with users.** While it is well recognized that most of the equipment and machines are designed for users in industrialized countries, anthropometric information on users in industrialized countries must be altered in order to suit the local population (Ong, 1991).

According to Chapanis (1974), the problem of fitting equipment to anthropometrically different users is more complex than it appears to be. The difficulty is that body proportions are different among people. For example, Germans are known to have much longer legs, whereas Japanese have much shorter legs in proportion to their heights. The application of French anthropometric design standards to the developing world will provide equipment that fits only 20% of Thais, and only 15% of Vietnamese (Kennedy, 1972).

The differences in the amount of oxygen consumption of pilots from different ethnic backgrounds have been extensively studied by Pierce (1963). It has been a requirement for pilots to use an oxygen supplement when flying in an unpressurized plane above 3000m. Peruvian pilots, as natives to highlands, do not need additional

oxygen due to the adaptation of their cardiovascular and respiratory systems. They can fly in comfort at 6000 meters without the use of oxygen. This study shows that physical differences among different ethnic groups play a significant role in determining, to a certain extent, the performance and success of technology (Ong, 1991).

It has been shown that something as simple as a European-designed adjustable safety helmet cannot be fitted properly to 40% of Sri Lankans (Abeysekera and Shahnavaz, 1988). It is extremely rare to find a mechanical product from the west that is designed specially for use in industrially developing countries, but it is slowly being recognized that technology transfer is not simply a matter of importing unmodified plant (Ong, 1991).

**Work environmental consideration.** The working environment of an industrially developing country is generally that of a tropical or sub-tropical climate and consequently, there are problems of heat and ventilation to be encountered. The introduction of manufacturing and its associated processes has served to exacerbate these difficulties. Furthermore, there is the additional heat produced by the hard physical work being performed. Subsequently, if the working environment is such that this excess heat is not removed and the workforce is unable to retain normal body temperatures, then it can be very uncomfortable and indeed dangerous both for the individual and for those working in the same environment (Shahnavaz, 1985).

Transfer of modern technology, without considering working environment, social, cultural and anthropological factors of the receiving country can lead to economic as well as social sufferings (Sudomo, 1985).

**Managerial and organizational factors.** Transferring any managerial and organizational methods from western societies to industrially developing country seems to face serious problems (Negandhi, 1975). Due to differences of culture, traditional habits, living levels and social, political and economic conditions, many successful managerial and organizational methods in industrialized countries could probably not be successfully applied or do not work satisfactorily (Shahnavaz, 1991). Kubr and Wallace

(1983) were concerned that some western managerial and organizational methods and practices could encounter serious operational problems in industrially developing countries and suggested that the management and promotion staff should be based on specific human, cultural, social and deeply rooted local behavioural patterns. The Denver Research Institute study (1983) concluded that 'without suitable and careful analysis of the management factors in any technology transaction, the prospect for success diminishes rapidly'.

Those responsible for technology transfer must have a through knowledge of ergonomics need, abilities and limitations of the acquirer in areas such as, infrastructure, environment and anthropometry. Technology not geared to the users, would certainly affect production, health and safety of people (Abeysekera and Shahnnavaz, 1987). The long hours that the operators tend to spend working in an uncomfortable environment and under a system that encroaches on their social relationships, create a stressful situation which, in turn, may adversely affect their health and emotional well being (Ong, 1991).

Differences in communication and transport systems, marketing, energy supplies and other services can also affect the acquisition of technology. For example, differences in voltage of the electricity mains supply viz. 110v in the United States and 220-230v in the U.K. and continental countries. Limitations in the power supply, voltage drops, unsuitable highways, problems in balance of payment, disregard for maintenance requirements, etc. are other areas of inadequacies in infrastructure in developing countries that can have negative effects on technology transfer. Large losses in time and money have been experienced due to overlooking infrastructure requirements in technology transfer (Abeysekera and Shahnnavaz, 1987).

### **3.3 *New Technology and Productivity***

A new technology is transferred from industrialized countries to industrially developing countries for increasing production and for developing its quality, but disappointing results are often noted with regard to the working conditions, production and financial returns (Wisner, 1984).

Poor working conditions also lead to poor workers' satisfaction, higher sickness, absenteeism and high labour turn over. In the area of production, low production rate and deterioration of production quality have been identified as negative aspects (Krishna, 1980). In terms of finance, low machine utilization and inability to provide adequate levels of salary, social benefits and general working conditions to workers, result in further losses of production (Abeysekera and Shahnavaaz, 1987).

### **3.4 *Importance of Local Culture in Technology Transfer***

The assimilation or integration of a new technique by a cultural group will be easier if it smoothly fits into the existing culture. The culture is the system of beliefs, attitudes, social rules, material objects, linguistic expressions, skills etc. of a group of people (Verhaegen, 1996). The way people think, feel and react is the result of their culture. Culture consists of traditional ideas and specially their attached values. People's attitude towards work, technology and organization, working habits, working group dynamics, religious beliefs and customs are reflected by their cultural background.

The transfer of technology has destroyed indigenous culture and value system in many traditional societies. It is, therefore, necessary that the transfer as well as import of science and technology developed in alien cultures should be carefully monitored. A positive integration with local culture with the methods, means and a tools of modern scientific knowledge and technology, which are a common heritage of mankind, must be adopted and promoted (Masihuddin et al., 1985).

Many studies highlight the cultural parameters of human performance (Kaplan, 1991). Generally, designers of technology in industrialized countries are unaware of the

complexities of the cultural context of the country to which their technology is going. Furthermore, the acquiring country usually has little opportunity to close or specially request the technology which is best adapted to their cultural environment (Shahnavaz, 1991).

### **3.5 Attitude Towards, and Barriers in, Technology Transfer**

The term 'developing world' is one of the many synonyms in current usage to describe groups of nations variously known as the 'newly industrializing countries'. Whilst a wide terminology exists to describe these nations, they are commonly financially poor and largely agricultural. There, life expectancy is short, infant mortality is high and the level of literacy is low. On the other hand, many of these countries are rich in term of culture, history and civilization (Gillis et al., 1983).

In some traditionally agriculture based countries like India, a job is generally regarded as a family responsibility to such an extent that its performance is considered to be collective and is shared by all the family members (Chapanis, 1975). Various ethnic groups in South East Asia are know to be hard working and energetic but there dislike for 'conveyor-belt' work is reflected on their negative attitude towards working on a fixed schedule clocking in at 8 AM and clocking out at 5 PM (Ong, 1991).

As reported by Pierce (1963), Somoans are skilled craftsmen and energetic workers but their dislike for factory-type jobs is based on their negative attitude toward having to put in time even when there is no immediate task to be performed. In Somoa, work is done and enjoyed to complete a job, after which relaxation during any time of the day is normal.

A study conducted in Dhaka University on attitude of managers and workers towards technology transfer showed that there was significant difference between the managers and workers of nationalized industries in their attitude towards technology transfer but there was no significant difference between the same employs of the private and the multinational industries (Khaleque and Taher, 1996).

The introduction of new technology requires both social and technical support and its successful implementation requires the active participation of the government,

industrial management and the workers (Ong et al., 1990). The introduction of new technology requires technical support but the inadequacy of basic infrastructures and frequent disruption of electricity supply has hampered the transfer of technology in many industrially developed countries.

A recent Seminar in Bangkok on working conditions in industrially developed countries revealed that in some places, workplaces were not constructed according to minimum building specifications (ILO, 1985).

In many 3rd world countries, individuals accustomed to a craft-oriented industry may have considerable difficulty in adjusting to the new techniques, management methods, disciplines and work organization associated with modern mechanized factories (Meshkati, 1988).

In another study of female visual display unit operators in Singapore, Jeyaratnam et al. (1989) found that three main ethnic groups in Singapore such as Chinese, Malay and Indian reported significantly different prevalence of musculoskeletal problems, with Malay and Indian operators reporting a higher prevalence of musculoskeletal disorders than the Chinese.

The above studies indicate the positive and negative attitudes of the operators of the concerned countries.

## **CHAPTER - 4**

## **4. RATIONALE AND OBJECTIVES OF THE PRESENT STUDY**

### **4.1. Rationale**

The acceptability of technologies depends on place, time and culture etc. of a person. So the attitude of the persons concerned to a technology should be known before setting up that technology. The probable barriers in setting up a technology and the adaptation problems that the users have to face, should also be identified. Besides, it should also be clearly understood whether the use of new technology affects the production. Recently, Bangladesh is heading towards rapid industrialization and for this modern technologies are-being installed in the industrial setting by importing the same from the industrially developed countries. But successful adaptation and implementation of foreign technologies depend to a great extent on the knowledge, attitude, habit and practice etc. of the users of the same. From a review of available literature, it appears that so far there have been no attempts to understand knowledge / attitudes of users or barriers in transfer and use of foreign technologies in Bangladesh. The present study was, therefore, designed to assess the attitude of owners, managers and workers towards technology transfer in Bangladesh and to ascertain the barriers perceived by them in the transfer and use of modern technologies.

### **4.2 Objectives**

The specific objectives of the present study were to :

- (1) assess whether attitude towards technology transfer differed by categories of respondents (owners, managers and worker) and levels of technology (auto, semi-auto, manual), and whether there was any interaction between respondent categories and levels of technology in respect of attitude towards technology transfer ;
- (2) investigate whether attitude of the respondents towards technology transfer correlated with their age and education ; and to
- (3) identify the problems / barriers in transfer and use of new technology in Bangladesh, and to ascertain the importance of each factor by respondent categories.

## **CHAPTER - 5**

## 5. METHODOLOGY

### **Variables Studied**

**Independent variables:** The major independent variables employed were levels of technology, respondent categories, age & education of the respondents.

**Dependent variables:** The dependent variables of the present study included attitude towards technology transfer and barriers in transfer and use of new technology.

### **Sample**

The study was conducted on a sample of 216 respondents comprising of 17 owners, 64 managers and 135 workers taken from 17 private textile industries. The organizations were situated in Dhaka, Narayngonj, Narshingdi, Khulna and Satkhira Districts of Bangladesh. Of the organizations, presently 5 are running under auto and semi-auto systems while 7 are running manually. Though the organizations were purposively selected, the respondents within the organizations were actually selected by stratified random sampling technique. The mean age of owners, managers and workers were 49.76, 36.94 and 32.97 years respectively and their mean job experience were 21.76, 12.42 and 11.62 years respectively. The average years of schooling of owners, managers and workers were 13.71, 13.45 and 8.68 years respectively. Except one, all the respondents were males.

### **Research Design**

The design employed for the study was a survey through interview.

### **Data Collection Instruments**

The following instruments were administered to collect data for the present study:

*The Interview Schedule for assessing attitude towards technology transfer:*  
The schedule consisted of 20 items, each having 5 alternative response categories ('strongly disagree', 'disagree', 'uncertain', 'agree', and 'strongly

agree'),). To develop the items, help was taken from relevant literature and experts in the field. Initially, a list of 30 items was prepared and submitted to the judges (professors of BUET, D. U. and scientists of BCSIR) with a request to indicate the appropriateness of the items for assessing attitude towards technology transfer in Bangladesh. Items on which all the eight judges agreed, were finally retained for use (see Appendix for a list of the items used).

*The Interview Schedule for identifying problems / barriers in transfer and use of new technology:* This schedule consisted of 17 items, each having 5 alternative response categories ('not at all important', 'little bit important', 'undecided', 'substantially important' and 'most important'). The developmental procedure of the 2nd Interview Schedule was the same as the first one. In this case, initially a list of 26 items was prepared and the final items were retained on the basis of agreement of the judges (see Appendix for a list of the items used).

In addition, the Interview Schedules accompanied a format for recording background information about the respondents and the organizations.

## **Procedure**

At first, the concerned authorities of the respective textile industries were contacted for their approval and cooperation in conducting research. After being permitted to conduct the research, separate lists of owners, manager and workers were prepared for each of the selected organizations. The selected respondents were, then, interviewed individually. Respondents were assured that it was purely an academic research and that their personal identity would be kept secret. After the completion of interviews with the respondents they were specially thanked for their co-operation. The data were collected during the months of October to December, 1997.

## **Statistical Analysis**

To analyze the data, Two-way ANOVA, Pearson's 'r', and some descriptive statistics were used.

## **CHAPTER - 6**

## 6. RESULTS

In order to investigate whether attitude towards technology transfer differed by respondent categories and levels of technology, and whether there was any interaction between the two independent variables in respect of attitude towards technology transfer, two-way ANOVA was applied (Table- 1).

**Table- 1 :** Summary of two-way ANOVA for attitude towards technology transfer by respondent categories and levels of technology.

| Sources of Variation | Sum of squares | df  | MS      | F        |
|----------------------|----------------|-----|---------|----------|
| Main effect of:      |                |     |         |          |
| Levels of Technology | 382.893        | 2   | 191.447 | 3.930*   |
| Respondent Category  | 422.295        | 2   | 211.147 | 4.335*   |
| 2-way interactions   | 339.051        | 4   | 84.763  | 1.740(a) |
| Residuals (errors)   | 10083.197      | 207 | 48.711  | -        |
| Total :              | 11227.436      | 215 |         |          |

\*  $P < 0.01$ ; a = Not significant.

*Note:* Mean attitude scores by category of respondents were 78.35, 74.36 and 73.74 for owners, managers and workers respectively. And, the mean attitude scores by present level of technology were 74.29, 75.65 and 72.34 for auto, semi-auto and manual respectively.

The above table reveals that the main effects for respondent categories and levels of technology were statistically significant ( $p < 0.01$ ) but the two-way interaction effect was not significant. That means, the attitude towards technology transfer differed independently by respondent categories and levels of technology but there was no joint effect of the two. A reference to the footnote of Table-1 further shows that attitude towards technology transfer was most favourable in case of the owners ( $\bar{X} = 78.35$ ) and least favourable in case of the workers ( $\bar{X} = 73.74$ ). Similarly, attitude towards technology transfer was most favourable in case of organizations running under semi-automation system ( $\bar{X} = 75.65$ ) and least favourable in case of the organizations running under manual system ( $\bar{X} = 72.34$ ).

**Table – 2 :** Correlation of attitude scores with age and education of the respondents.

| Variables                                                          | Number of sample (N) | Correlation co-efficient (r) |
|--------------------------------------------------------------------|----------------------|------------------------------|
| Attitude towards technology transfer and Age                       | 216                  | 0.23*                        |
| Attitude towards technology transfer and educational qualification | 216                  | 0.19**                       |

\*  $p < 0.001$ ; \*\*  $p < 0.01$

The figures in the above table indicate that scores on attitude towards technology transfer were significantly and positively correlated with age and education (years of schooling) of the respondents. However, the correlation coefficients were relatively low.

**Table-3 :** Mean scores and rank order of perceived barriers in technology transfer by respondent categories.

| Perceived barriers                                                                               | Owners (N=17) |            | Managers (N=64) |            | Workers (N=135) |            |
|--------------------------------------------------------------------------------------------------|---------------|------------|-----------------|------------|-----------------|------------|
|                                                                                                  | Mean scores   | Rank order | Mean scores     | Rank order | Mean scores     | Rank order |
| (a) Financial insolvency in importing new technology                                             | 4.59          | 1st        | 4.05            | 1st        | 4.39            | 1st        |
| (b) Shortage of raw materials                                                                    | 4.29          | 2nd        | 3.59            | 7th        | 4.17            | 2nd        |
| (c) Bureaucratic complexities                                                                    | 4.18          | 3rd        | 3.91            | 2nd        | 4.13            | 3rd        |
| (d) Physical work environmental problems (heat, humidity, temperature, dust etc.)                | 3.65          | 4th        | 3.41            | 8th        | 4.04            | 4th        |
| (e) Want of skilled trainer and trained man power                                                | 3.59          | 5th        | 3.88            | 3rd        | 3.86            | 6th        |
| (f) Lack of proper education and language ability                                                | 3.47          | 6th        | 3.70            | 5th        | 3.76            | 7th        |
| (g) Lack of expert technicians and spare-parts for maintenance and repair of advanced technology | 3.41          | 7th        | 3.70            | 5th        | 3.73            | 8th        |
| (h) Marketing and exporting problems                                                             | 3.41          | 7th        | 3.00            | 13th       | 3.59            | 10th       |
| (i) Problems related to basic infrastructure in our country                                      | 3.41          | 7th        | 3.34            | 9th        | 3.36            | 11th       |
| (j) Want of necessary organizational structure                                                   | 3.35          | 10th       | 3.77            | 4th        | 4.00            | 5th        |
| (k) Increasing trend in maintenance cost of new technology                                       | 3.00          | 11th       | 3.30            | 10th       | 3.65            | 9th        |
| (l) Cultural and anthropological variations between technology developer and user countries      | 3.00          | 11th       | 2.66            | 15th       | 3.20            | 14th       |
| (m) Workers' problem of adjustment with new technology                                           | 3.00          | 11th       | 3.19            | 11th       | 3.27            | 12th       |
| (n) Negative attitude of employees towards new technology.                                       | 2.88          | 14th       | 2.44            | 16th       | 2.52            | 17th       |
| (o) Lack of co-ordination between motor skill and operation ability of our workers.              | 2.76          | 15th       | 3.13            | 12th       | 3.24            | 13th       |
| (p) Religions / family customs and communal disharmony                                           | 2.65          | 16th       | 2.22            | 17th       | 3.04            | 16th       |
| (q) Accident and safety problems                                                                 | 2.53          | 17th       | 2.92            | 14th       | 3.19            | 15th       |

Figures in Table –3 show that with the exception of managers, the three most common barriers in technology transfer perceived by the owners and the workers were: (1) financial insolvency in importing new technology, (2) shortage of raw materials and (3) bureaucratic complexities. As perceived by the managers, the three most common barriers in technology transfer included: (1) financial insolvency in importing new technology, (2) bureaucratic complexities and (3) want of skilled trainer and trained manpower. The first two responses of the managers were also in agreement with those of the owners and the workers. Taking these into consideration, the three most commonly cited barriers in technology transfer in Bangladesh appeared to be financial insolvency, bureaucratic complexity (red tapism) and shortage of raw materials.

## **CHAPTER - 7**

## 7. DISCUSSION

The present study was conducted to investigate : whether attitude towards technology transfer differed by respondent categories (owners, managers and workers) and levels of technology (auto, semi-auto and manual) ; whether there was any interaction between respondent categories and levels of technology in respect of attitude towards technology transfer; whether attitude of the respondents towards technology transfer correlated with their age and education and to identify the problems / barriers in transfer and use of new technology in Bangladesh. The attitude towards technology transfer differed significantly and independently by respondent categories and levels of technology but the two-way interaction effect was not significant (Table- 1). The result further showed that attitude towards technology transfer was most favourable in case of the owners (  $\bar{x} = 78.35$ ) and least favourable in case of the workers (  $\bar{x}=73.74$ ). Similarly, attitude towards technology transfer was most favourable in case of organizations running under semi-automation system (  $\bar{x} = 75.65$ ) and least favourable in case of organizations running under manual system (  $\bar{x}=72.34$ ). That the owners had the most positive attitude towards technology transfer was quite expected as the owners themselves, being self-inspired, imported/installed the new technology. But this was not the situation with the workers. The workers in Bangladesh are mostly illiterates / poorly educated having backward ideas who are used to work with indigenous technology. These workers, because of lack of exposure to working with higher technology, might have thought the new technology as a problem imposed on them from the higher authority. Moreover, though the workers might have some readiness to work with semi-autonomous technology, they are yet not mentally ready or equipped to work with further higher, automated, technology. So, in the present socio-cultural context of Bangladesh, the workers' relatively negative attitude towards technology transfer (importing of higher technology from abroad) is not altogether unexpected.

The results also indicated that scores on attitude towards technology transfer were significantly and positively correlated with age and years of schooling of the respondents, though the correlation-coefficients were relatively low (Table-2). It is an established fact that age and experience go together, age increases as the job

experience accumulates. Because of experience in working with a particular type of technology, the job occupants develop more positive attitude towards that technology. Similarly, education (years of schooling) is the means of learning new / modern ideas. The higher the level of education, the more likely it is that the job occupants will be better informed / more knowledgeable about new system or technology. Under these considerations, it is quite likely that the higher aged and higher educated respondents will have more positive attitude towards technology transfer.

Taking the opinions of owners, managers and workers together, it appeared that, among others, financial insolvency in importing new technology, bureaucratic complexity and shortage of raw materials were the major barriers, in technology transfer (Table-3). These problems reflect the realities of Bangladesh. Since Bangladesh is a poor developing country, the entrepreneurs here are not financially solvent enough for importing new technology from abroad, especially when it needs foreign currency. Even if an entrepreneur manages to collect the required money for importing new technology, he / she has to undergo a long and tedious process of bureaucratic hurdles to complete the official formalities / protocols in importing something from abroad. It is said that in this country, bureaucracy exists not to help people but to create bottlenecks. In like manner, Bangladesh is not very rich in natural resources. Many of the raw materials needed for running industries are required to be imported from outside or far-off places. That is why, the above three have been regarded as the major barriers in technology transfer in Bangladesh.

To conclude, the findings of the present study imply that for creating a favourable climate for transfer and use of new technology in Bangladesh, attempts should be made to remove the barriers as perceived by the respondents of this study and to upgrade the level of knowledge of the employees through education or training on new technology.

However, the present study is not altogether free of limitations. First, the study had to be carried out in the absence of any standardized instrument. Second, the organizations under study were selected purposively. As a result, the findings of the study lack generalizability. So it would be appreciated if a future study is done in this direction by having a random sample of organizations with standardized instrument (s).

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## **APPENDIX**

প্রতিষ্ঠানের নাম : .....  
 উত্তরদাতার পদবী : ..... বয়স : .....  
 অভিজ্ঞতা : ..... শিক্ষাগতযোগ্যতা : ..... লিঙ্গ : .....

### নির্দিষ্ট প্রতিষ্ঠানের প্রযুক্তি সংক্রান্ত তথ্যাবলী

- ১। বর্তমান প্রযুক্তি কোন স্তরের ? .....
- ২। এই স্তরের প্রযুক্তি কখন থেকে চালু হয়েছে ? .....
- ৩। পূর্বের প্রযুক্তি কোন স্তরের ছিল ? .....

### ক. শিল্প প্রতিষ্ঠানে প্রযুক্তি হস্তান্তর সম্পর্কে মনোভাব

#### নির্দেশনা :

আমাদের দেশকে অর্থনৈতিকভাবে সমৃদ্ধশালী করার জন্য বিদেশ থেকে উন্নত ও নতুন প্রযুক্তি আমদানীর ব্যাপারে আপনার মনোভাব নিরূপনের জন্য নিম্নে কতকগুলি প্রশ্ন দেয়া হয়েছে। প্রতিটি প্রশ্নের জন্য পাঁচমাত্রা বিশিষ্ট উত্তর রয়েছে। কোন একটি প্রশ্নের উত্তর হিসেবে ঐ প্রশ্নের ডান পার্শ্বে প্রদত্ত পাঁচটি মাত্রার যে মাত্রাটি আপনার অনুভূতি সবচেয়ে ভালভাবে প্রকাশ করে, তাতে টিক (✓) চিহ্ন প্রদানের মাধ্যমে আপনার মনোভাব নির্দেশ করুন।

|                                                                                                          | মোটাই<br>একমত<br>নই      | একমত<br>নই               | বলাতে<br>পারি না         | একমত                     | সম্পূর্ণ<br>একমত         |
|----------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                                                                                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১। বিদেশী নতুন প্রযুক্তি (উন্নত যন্ত্রপাতি ও কলাকৌশল) আমাদের দেশে স্থাপন করলে শিল্প উন্নয়নে সহায়ক হবে। | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২। নতুন প্রযুক্তি স্থাপন করলে উৎপাদন বৃদ্ধি পাবে এবং উৎপাদিত দ্রব্যের গুণগত মানও ভাল হবে।                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৩। বিদেশ থেকে নতুন প্রযুক্তি আমদানী করলে আমাদের দেশজ প্রযুক্তির ক্ষতি হবে।                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৪। নতুন প্রযুক্তি নিয়ন্ত্রণে পূর্বের তুলনায় বেশী দক্ষতা প্রয়োজন।                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৫। নতুন প্রযুক্তি স্থাপনের ফলে কর্মপরিবেশের উপর বিরূপ প্রতিক্রিয়া সৃষ্টি হয়।                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৬। নতুন প্রযুক্তি আমাদের সামাজিক ও সাংস্কৃতিক ক্ষেত্রে বিরূপ প্রতিক্রিয়া সৃষ্টি করে।                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

|                                                                                                                                                           | মোটাই<br>একমত নই         | একমত<br>নই               | বলে<br>পারি না           | একমত                     | সম্পূর্ণ<br>একমত         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                                                                                                                                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৭। নতুন প্রযুক্তি আমদানী অপেক্ষা পুরাতন যন্ত্রপাতি সংস্কার করে ব্যবহার করলে বেশী ভাল হবে।                                                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৮। বিদেশে রপ্তানীযোগ্য পণ্য উৎপাদন করতে হলে নতুন প্রযুক্তি স্থাপন করার প্রয়োজন রয়েছে।                                                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৯। নতুন প্রযুক্তি আমদানীর ফলে দেশের অদক্ষ শ্রমিক-কর্মচারী বেকার হয়ে পড়বে।                                                                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১০। নতুন প্রযুক্তিতে উৎপাদিত পণ্য দেশজ প্রযুক্তিতে উৎপাদিত পণ্যের চেয়ে বেশী গ্রহণযোগ্য হবে।                                                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১১। নতুন প্রযুক্তির ব্যবহার পুরাতন প্রযুক্তির তুলনায় অধিকতর নিরাপদ।                                                                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১২। নতুন প্রযুক্তিতে কর্মীদের জীবনযাত্রার মান উন্নত হয়।                                                                                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৩। নতুন প্রযুক্তির যন্ত্রপাতি সহজেই পরিচালনা করা যায়।                                                                                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৪। নতুন প্রযুক্তির জন্য কর্মবিজ্ঞানের জ্ঞান ও আধুনিক ব্যবস্থাপনার উপর গুরুত্ব দেয়া দরকার।                                                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৫। আমাদের দেশে নতুন প্রযুক্তি আমদানী হলেও বিশেষজ্ঞ ও দক্ষ কর্মচারী আমদানী হয় না বলে আমরা কান্ডিত লক্ষ্যে পৌছাতে পারিনা।                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৬। বিদেশ থেকে স্বয়ংক্রিয় যন্ত্রপাতি আমদানী করে অল্প জায়গায়, অল্প শ্রমিক নিয়োগ করে শিল্প প্রতিষ্ঠান গড়ে তুলতে পারলে শিল্পায়নের গতি ত্বরান্বিত হবে। | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৭। উন্নত দেশ হতে প্রযুক্তি আমদানীর মাধ্যমে শিল্পায়নের নীতি গ্রহণ করলে প্রযুক্তিগত দিক থেকে স্থায়ীভাবে ঐ দেশ (দেশ সমূহের) অধীন হয়ে পড়তে হয়।          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৮। প্রযুক্তি হস্তান্তরের নামে শিল্পোন্নত দেশ, উন্নয়নশীল দেশে অপ্রচলিত ও নিম্নমানের প্রযুক্তি রপ্তানী করে থাকে।                                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৯। প্রযুক্তি হস্তান্তর সত্ত্বেও স্থায়ী শিল্পনীতির অভাব ও রাজনৈতিক অস্থিরতার কারণে সঠিকভাবে শিল্পোৎপাদন ও রপ্তানী প্রক্রিয়া সম্ভব হয় না।               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২০। নতুন প্রযুক্তিতে কাজের চাপ পূর্বের তুলনায় অনেকাংশে কম লাগে।                                                                                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## খ. শিল্প প্রতিষ্ঠানে নতুন প্রযুক্তি আমদানী, স্থাপন ও পরিচালনার ক্ষেত্রে প্রতিবন্ধকতা নির্দেশনা :

শিল্প প্রতিষ্ঠানে নতুন প্রযুক্তি আমদানী, স্থাপন ও পরিচালনার ক্ষেত্রে বেশ কিছু সমস্যা/ প্রতিবন্ধকতা আছে বলে মনে করা হয়। বর্তমান অনুধ্যানের উদ্দেশ্য হল প্রযুক্তি আমদানী, স্থাপন ও পরিচালনার ব্যাপারে নিম্নোক্ত উপাদানগুলোর আপেক্ষিক গুরুত্ব নির্ণয় করা। এতদসঙ্গে প্রদত্ত প্রত্যেকটি উপাদানের ডান পার্শ্বে পাঁচ-বিন্দু বিশিষ্ট একটি স্কেল দেওয়া আছে। আপনার কাজ হচ্ছে, প্রতিটি স্কেলের সঠিক বিন্দুতে টিক (✓) চিহ্ন দিয়ে সংশ্লিষ্ট উপাদানের আপেক্ষিক গুরুত্ব নির্দেশ করা।

|                                                                                                                                             | মোটাই<br>গুরুত্বপূর্ণ নয় | কিছুটা<br>গুরুত্বপূর্ণ | অনিশ্চিত             | যথেষ্ট<br>গুরুত্বপূর্ণ | সর্বাধিক<br>গুরুত্বপূর্ণ |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------|----------------------|------------------------|--------------------------|
|                                                                                                                                             | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১। নতুন প্রযুক্তি আমদানীর জন্য আর্থিক অভাব বিদ্যমান।                                                                                        | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ২। জাতিগত বিভেদ, পারিবারিক প্রথা ও ধর্মীয় বিধান নতুন প্রযুক্তি স্থাপনের জন্য বাঁধাস্বরূপ।                                                  | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৩। নতুন প্রযুক্তি স্থাপনের ক্ষেত্রে শ্রমিক-কর্মচারীদের মনোভাবই প্রথম বাঁধা।                                                                 | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৪। নতুন প্রযুক্তির সাথে খাপখাওয়াতে শ্রমিকদের বরাবরই সমস্যা হয়। (শারীরিক ও মানসিক সমস্যা)                                                  | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৫। নতুন প্রযুক্তির যন্ত্রপাতি পরিচালনার জন্য পর্যাপ্ত শিক্ষা ও ভাষাগত জ্ঞানের অভাব বিদ্যমান।                                                | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৬। উন্নত প্রযুক্তি পরিচালনার জন্য দক্ষ প্রশিক্ষক ও প্রশিক্ষণ প্রাপ্ত শ্রমিক-কর্মচারীর অভাব রয়েছে।                                          | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৭। আমাদের দেশে নতুন প্রযুক্তি স্থাপনের মৌলিক অবকাঠামোগত সমস্যা বিদ্যমান (যেমনঃ U.S.A electricity voltage 110v. Europe and others 220-230v.) | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৮। উন্নত প্রযুক্তি রক্ষণাবেক্ষণ ও মেরামতের জন্য বিশেষজ্ঞ এবং খুচরা যন্ত্রপাতির অভাব বিদ্যমান।                                               | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ৯। উন্নত প্রযুক্তি পরিচালনার ক্ষেত্রে দুর্ঘটনা ও নিরাপত্তাজনিত সমস্যা বিদ্যমান।                                                             | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |

|                                                                                                                                                                              | মোটাই<br>গুরুত্বপূর্ণ নয় | কিছুটা<br>গুরুত্বপূর্ণ | অনিশ্চিত             | যথেষ্ট<br>গুরুত্বপূর্ণ | সর্বাধিক<br>গুরুত্বপূর্ণ |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------|----------------------|------------------------|--------------------------|
|                                                                                                                                                                              | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১০। উন্নত প্রযুক্তি পরিচালনায় এদেশের শ্রমিকদের গতিশীলতা (motor skill) ও পরিচালনা ক্ষমতার মধ্যে সামঞ্জস্য বরাবরই কম থাকে।                                                    | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১১। তাপমাত্রা, আদ্রতা, ধূলাবালি, গোলমাল, কম্পন প্রভৃতি প্রযুক্তি ব্যবস্থাপনার ক্ষেত্রে বাঁধার সৃষ্টি করে থাকে।                                                               | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১২। নতুন প্রযুক্তিতে যন্ত্রপাতি পরিচালনার জন্য কাঁচামালের অভাব বিদ্যমান।                                                                                                     | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১৩। নতুন প্রযুক্তি আমদানীর ব্যাপারে আমলাতান্ত্রিক জটিলতা বিদ্যমান।                                                                                                           | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১৪। নতুন প্রযুক্তির দ্বারা উৎপাদিত পণ্যসামগ্রী বাজারজাতকরণ ও রপ্তানীজনিত সমস্যা আছে।                                                                                         | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১৫। প্রযুক্তি হস্তান্তরকারী বা উদ্ভাবনকারী দেশের সঙ্গে প্রযুক্তি গ্রহণকারী বা আমদানীকারী দেশের সাংস্কৃতিক ও নৃ-তাত্ত্বিক পার্থক্য প্রযুক্তি আমদানীর ক্ষেত্রে একটি বড় বাঁধা। | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১৬। নতুন প্রযুক্তির যন্ত্রপাতি রক্ষণাবেক্ষণ ব্যয়-বৃদ্ধিজনিত সমস্যা বিদ্যমান।                                                                                                | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |
| ১৭। উন্নত প্রযুক্তি পরিচালনা ও ব্যবস্থাপনার জন্য প্রয়োজনীয় সাংগঠনিক কাঠামোর অভাব বিদ্যমান।                                                                                 | <input type="text"/>      | <input type="text"/>   | <input type="text"/> | <input type="text"/>   | <input type="text"/>     |