

TECHNICIANS IN INDUSTRY - A RESEARCH STUDY

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Introduction :

In the coming decade, the industry is likely to accelerate the pace of modernization in order to increase productivity and to compete in the international market on the basis of dual criteria of cost and quality. In addition, many emerging technologies will find place in the industrial map of the country. Therefore, a time has come that polytechnics need to look into these advancements. Suitable technician curricula can only be designed if the skill profile of technicians is known. This research study was, therefore, undertaken to identify the present and future activities of technicians in the context of changing technology.

In this research study 'Technician is considered to be a technical personnel who occupies middle level position between the engineers and craftsmen'. Technician require proficiency in skills higher than that of engineers but lower than that of craftsmen. Technician is engaged in production planning; shop- floor supervision; shop-floor production; inspection and quality control; fault finding, repairs and maintenance; safety and labour management.

For the purpose of this study, a sample of 300 industrial undertakings/organisations comprising of 100 large units, 150 medium units and 50 small units was selected. 20% of

the total sample was identified for organising personal visits for collecting data.

Objectives of the Study :-

The main objectives of the study were:-

- i) to determine the employment distribution of technicians in industry,
- ii) to determine the type of technicians needed by large, medium and small scale industry,
- iii) to identify the present activities of technicians employed in these industries, and
- iv) to predict the likely changes in the role and functions of technicians in the next decade due to technological changes and advancements.

Data Collection And Analysis :

a) Through Questionnaire:

Data collection was effected through specially designed questionnaire requiring detailed information regarding present employment distribution; types of technicians required; present activities of technicians and likely changes in their job profile; likely changes in technology in the next decade and reactions of industry on the existing technician curricula.

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The questionnaire was mailed to 300 industries/organisations in the northern region.

b) Personal visits :

Personal visits were organised in 20% of the total sample covering large, medium and small industry and interviews were held with the executives in these industries. In addition, a large number of technicians employed in these industries were also interviewed.

c) Data Analysis :

The data was received for 93 industries comprising of 32 large scale, 40 medium scale and 21 small scale. The data thus received was analysed and responses from industry were plotted in the form of histograms for presenting the total analysis in a graphical form.

RESEARCH FINDINGS :

Employment Distributions :

a) Large Scale Industry :

In a large scale industry, the area of operations, level of automation, manpower requirement, level of production and level of investment are much higher as compared to small and medium industry. Generally, the investment in plant and equipment is above Rs. 5 crores and the power consumption is very high. A large scale industry has independent departments namely R & D, Planning, Design and Drawing, Production, Quality Control, Repair and Maintenance, Purchase and Stores, Administration, Personnel, Finance & Accounts and public relations etc and each of the department is managed by professionals with specialised education and training.

The study indicates that there is considerable scope of employment of technicians in large scale industry. The employment distribution of technicians (diploma holders) is as shown in fig. 1 on (page No. 15)

b) Medium Scale Industry :

In a medium scale industry, the area of operations, level of automation, manpower requirement, level of production are of medium size i.e. in between those of large and small scale industries. In a typical medium scale industry, activities are departmentalised in :

- i) Engineering department covering activities like : Production Planning and Control, Production, Quality Control, repair and maintenance.
- ii) Purchase, Stores and Inventory management.
- iii) Marketing sales and after sales service, and
- iv) Administration, Finance and Accounts

Each of the above cluster of activities is managed by a functional managers.

Medium scale industry also needs technicians in considerable number. The employment Distribution of technician (diploma holders) in medium industry is shown in Fig 2 on page No. 14

c) Small Scale Industry :

In a small scale industry the investment in plant and machinery is restricted to Rs. 35 lakhs. The area of operations, level of automation, manpower requirement and level of production are very small.

The study reveals that small industry has very meagre potential for providing employment to diploma holding technicians. The main reasons attributing for this are :

- i) Small Scale Industry is unable to pay salaries to technicians commensurate with those paid by medium and large industry.

- ii) Lack of vertical and horizontal mobility, discourage diploma holding technicians to seek employment in small industry.
- iii) Small Scale Industry prefer to promote master craftsmen to the technicians positions rather than engaging fresh diploma holding technicians.

Types of Technicians Needed by Industry :

a) Technicians needed by large scale industry :

The study reveals that large scale industry predominantly require technicians who have broad based knowledge and skills so that these technicians with little reorientation and training can easily be made to work in any of the section of large scale industry. Generalised diploma courses in Civil, Electrical and Mechanical engineering are more suitable for large scale industrial undertakings.

b) Technicians needed by medium scale industry :

These industries also require technicians having broad based knowledge and skills but only in the specialised field of activity like technicians in electronics, refrigeration and airconditioning, plastic technology, chemical engineering etc.

c) Technicians needed by Small Scale Industry :

These technicians are predominently master craftsmen who work close to the worker on the shop floor. Generally small scale industry prefer to promote experienced master craftsmen to the technicians positions

rather than engaging fresh diploma holders. This is advantageous because these master craftsmen possess multiple skills and are able to themselves work on the machines, able to supervise the workers, perform quality control function and are able to look after repair and maintenance of machines.

Activities of Technicians :

a) Activities of Technicians in Large Industry :

The analysis of data received from industries reveals that technicians undertake the following activities in large scale industry :

1) R & D

- Data collection/surveys
- Testing materials/machines/equipment
- Interpretation of drawings and test results
- Supervision, fabrication and testing of prototypes
- Preparation of technical reports

2) Design & Drawing :

- Assistance in designing components/circuits structural elements
- Preparation of drawings/detailed sketches
- Maintaining record of drawings and blue prints
- Assistance in preparing specifications

3) Production Planning & Control :

- Interpretation of drawing
- Preparation of bills of raw materials

- Determination of unit costs
- Operations' layout for various jobs
- Preparation of labour and material schedules
- Assistance in planning activities

4) Production/Construction :

- Explaining working drawings to craftsmen
- Preparation of bills of materials
- Allocation of work to craftsmen
- Assistance in selection of appropriate equipment and processes
- Supervision of production/construction/erection activities
- preparation of progress reports
- Testing of products/materials
- Determination of machine utilization time
- Handling labour problems in the concerned section
- Supervising Installation of new machinery
- Ensuring waste reduction
- Ensuring safety measures
- Training new workers

5) Quality Control :

- Preparation of check lists for quality control
- Inspection of raw materials
- Undertaking quality control measures at various stages
- Preparation of inspection/test reports.

6) Maintenance and Repair :

- Study of drawings/manuals for fault detection
- Preparation of material and cost estimates for repair and maintenance works
- Undertaking routine and preventive repair and maintenance measures
- Supervision of maintenance and repair of equipment and machinery
- Testing of repaired equipment and machinery
- Keeping inventory control
- Ensuring safety during repair/maintenance operations.

7) Purchase/Store :

- Preparation of purchase documents
- Processing tenders/quotations and preparation of comparative statements
- Inspection of materials/machines/equipment
- Classification and storage of materials/tools
- Conducting demand surveys

b) Activities of Technicians in Medium Industry :

The study reveals that technicians perform followings activities in medium scale industries :

1) Production :

- Interpretation of drawings
- Testing materials/machines/equipment
- Preparation of bills of materials
- Management of men, materials and machines



- Assistance in selection of suitable machines and processes
- Supervision of production/fabrication processes
- Undertaking quality control measures
- Preparation of inspection/test reports
- Preparation of progress reports
- Preparation of machine utilization statements
- Handling labour problems
- Installing new machinery
- Ensuring safety measures
- Training new workers
- Assisting manager/engineer in planning functions

2) Quality Control :

- Preparation of check-lists for quality control operations
- Inspection of raw materials
- Undertaking quality control measures at various stages
- Preparation of inspection/test reports.

3) Maintenance and Repair :

- Study of drawings/manuals for fault detection

- Preparation of material/cost estimates for repair and maintenance works
- Undertaking routine and preventive maintenance measures
- Supervision of maintenance and repair of equipment and machinery
- Testing of repaired equipment and machinery
- Keeping inventory control
- Ensuring safety during repair/maintenance operations

c) Activities of Technicians in Small Industry :

As indicated earlier, small scale industry prefer to promote master craftsmen to the position of technicians. Their activities in small scale industry include the following :

- Supervision of draftsmen and workers
- Handling precision machines
- Quality Control
- Repair and maintenance

To summarise, a comparative statement of the *main activities* of technicians in Large, Medium and Small industry is given below :

Activities of Technicians in :

Large Scale Industry	Medium Scale Industry	Small Scale Industry
Works close to Engineer for :	Works on the shop floor for :	Works close to the craftsmen for :
<ul style="list-style-type: none"> • Data collection / surveys 	<ul style="list-style-type: none"> • Shop floor Planning and Management 	<ul style="list-style-type: none"> • Handling precision machines
<ul style="list-style-type: none"> • Testing of materials 	<ul style="list-style-type: none"> • Supervision of production processes 	<ul style="list-style-type: none"> • Supervising / guiding craftsmen & workers

Activities of Technicians in :

Large Scale Industry	Medium Scale Industry	Small Scale Industry
<ul style="list-style-type: none"> • Design of simple components 	<ul style="list-style-type: none"> • Quality control operations 	<ul style="list-style-type: none"> • Repair and Maintenance
<ul style="list-style-type: none"> • Assistance in planning 	<ul style="list-style-type: none"> • Installation of new machinery 	
<ul style="list-style-type: none"> • Assistance in selection of appropriate equipment & Processes 	<ul style="list-style-type: none"> • Handling repair and maintenance of precision machines 	
<ul style="list-style-type: none"> • Production supervision and Control 	<ul style="list-style-type: none"> • Ensuring safety 	
<ul style="list-style-type: none"> • Labour management 		
<ul style="list-style-type: none"> • Quality Control 		
<ul style="list-style-type: none"> • Ensuring safety 		

Reaction of Industry on The Performance of Technicians :

The study indicates that a large percentage of diploma holders are generally considered inadequately trained. It is true that the best among the diploma holders are amongst the best anywhere but their number is extremely small. On the other hand the lowest among the technicians trained in the polytechnics in this country are extremely poor and their number is large.

The following are some critical gaps in the performance of technicians which have come to light :

- a) Lack of competence in reading and interpreting drawings,
- b) Lack of understanding about the significance of accuracy in measurements, fits, tolerance etc.,
- c) Lack of basic laboratory and workshop skills needed for quality control and supervision of production processes, and

- d) Lack of proper attitudes towards time, team work economy, safety etc.

Advancement in Technology and Likely Changes in The Role of Technicians :

a) Advancement in Technology :

Visits to industry and interaction with executives have revealed that industrial development has made considerable progress during last three decades.

However, they are facing a host of problems arising out of obsolescence of existing technologies in terms of equipment, processes and materials, in adequate research and development efforts, low productivity, poor quality and high price ranges of products, absence of favourable work ethos, increasing international competition and environmental pollution.

Almost all industries foresee that in the coming decades, the industry is likely to accelerate the pace of modernisation in order to increase productivity. This will be

accomplished by a quantum leap in technology by way of introducing automation, computer aided design and manufacture (CAD-CAM), use of new materials and installing pollution preventive systems.

b) Likely changes in the role of Technicians :

the present role of the technicians is likely to undergo a variety of changes in order to meet the requirements arising out of the changes in technology and industry in the coming decades:

- i) Technicians will continue to play key roles in the industrial and other sectors of economy. A large number of them will continue to perform the well established functions in different technologies making provision for the improvements in materials, processes and quality control systems.
- ii) The analysis of the data indicates that increasing number of technicians will be required to possess specific knowledge/skills in specialised technologies such as : Energy and power ; transporation; instrumentation and control; modern machining methods; maintenance engineering and management; micro-electribucs; computer aided design and computer aided manufacture.
- iii) The knowledge skill mix of technicians is expected to undergo changes in view of the technical advancements. Further, the conventional job functions may coalesce into unified jobs, thus calling for a different range of competencies. The technician will be more a 'Knowledge worker' and will be required to possess higher order cognitive abilities, a fair amount

of managerial capabilities and less of conventional manipulative skills.

- iv) Technicians will have to possess learning to learn skills and must make effective use of information technology.

Conclusions :

In future, the polytechnics will be required to play a more pro-active role in the design and implementation of a variety of programmes to meet the needs of different target groups and the changes in technology and industry. The future role of polytechnics will be to :

- i) Conduct higher technician programmes in consultation with industry in identified technology areas on a selctive basis. The input to such courses should be flexible and be determined for each programme.
- ii) Conduct technician courses with greater involvement of the industry particularly with an intergral component of industrial training in conventional disciplines and emerging areas of technology and service sectors.
- iii) Conduct programmes for master craftsmen in small scale and tiny industry to upgrade their knowledge and skills.
- iv) Organise short duration continuing education programmes, modular in nature, to provide for advancements in technology and to combat obsolescence, to contribute to career development as well as horizontal and vertical mobility. These programmes should cater to the needs of a variety of target groups including working personnel in industry.

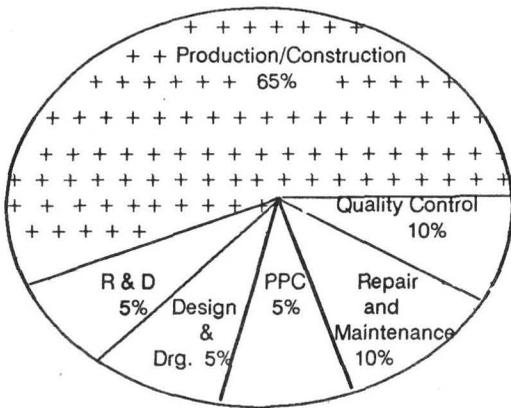
- v) Develop learning to learn skills so that technicians may be able to cope with the rapid technological and industrial advancements.
- vi) Promote interaction with industry in a variety of areas such as curriculum development, teacher updating and problem solving and innovations at the technician level.

- vii) Organise entrepreneurship development programmes to promote self-employment.

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Fig. - 1. Distribution of diploma holders in various sections of large scale industry (in terms of percentage)



PPC means : Production Planning & Control

Fig. - 2. Distribution of diploma holders section of medium scale industry (in terms of percentage)

