"WHAT IS WRONG WITH THE POLYTECHNIC EDUCATION" - SOME SUGGESTIONS.

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The ideas expressed in this paper are in response to a question raised in the ISTE news bulletin Vol. XIX No. 4 of April, 1989.

1.0 Analysis of the Current Situation

The present technical education structure comprises about 600 Polytechnics conducting predominantly 3 years diploma courses in Civil, Mechanical, Electrical and Electronics Engineering, few polytechnics conducting 4 years diploma courses with sandwich pattern on specialised courses in area like tool-making, refrigeration and air-conditioning etc. Some polytechnics conduct one year post-diploma courses in specialised areas like Public Health Engineering, Ground Water Engineering, Building Technology etc.

3 year diploma courses are the only courses which come within the national framework and for which some norms and standards have been laid down. Other types of courses like sandwich pattern courses, specialised courses, post-diploma courses have no national framework and not even state level framework for starting such courses.

Neither at the national nor at the state level exists any organized thinking on the technician education structure linking it with (a) technician manpower needs of the large, medium and small industries (b) educability and the learnability needs of the student population entering the stream as well and (c) continuing education structure which takes care of their career development needs.

Establishment of courses for post-diploma, specialized diploma, sandwich courses without any national and state level technician education structure which takes care of the three criteria mentioned above will not succeed, as innumerable case-studies have established. For example, three year diploma courses are still considered as diluted version of the degree courses, since the existing curriculum gives less emphasis on practical knowledge; specialised courses in refrigeration and air-conditioning; automobile engineering have been abolished in many states, as these courses do not attract students, and those who passed out did not find employment; most of the post-diploma courses also had to be abandoned.

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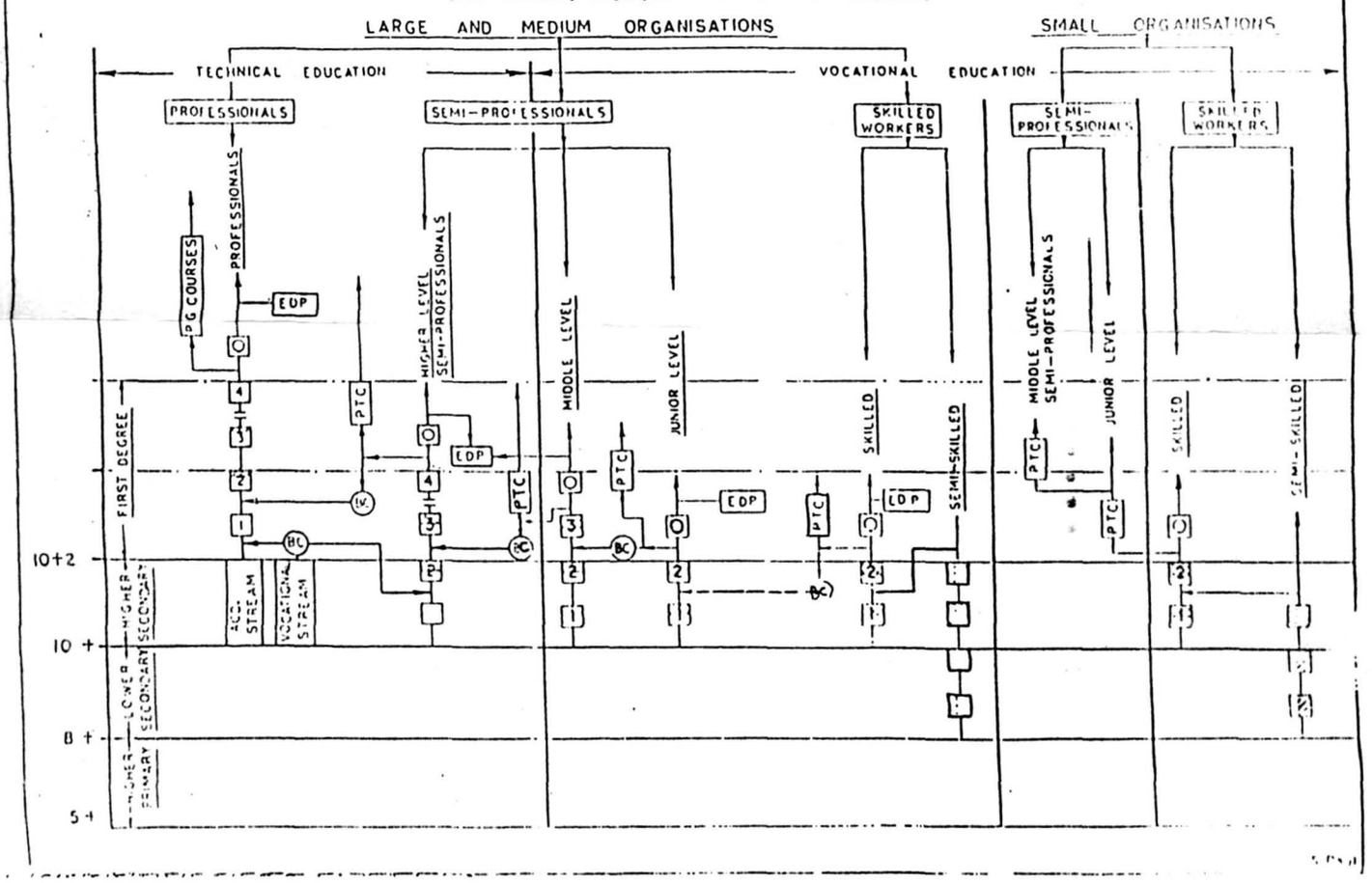
SECTOR OF URBAN DEVELOPMENT
TECHNICAL AND VOCATIONAL MANPOWER REQUIREMENT

FIG. 1

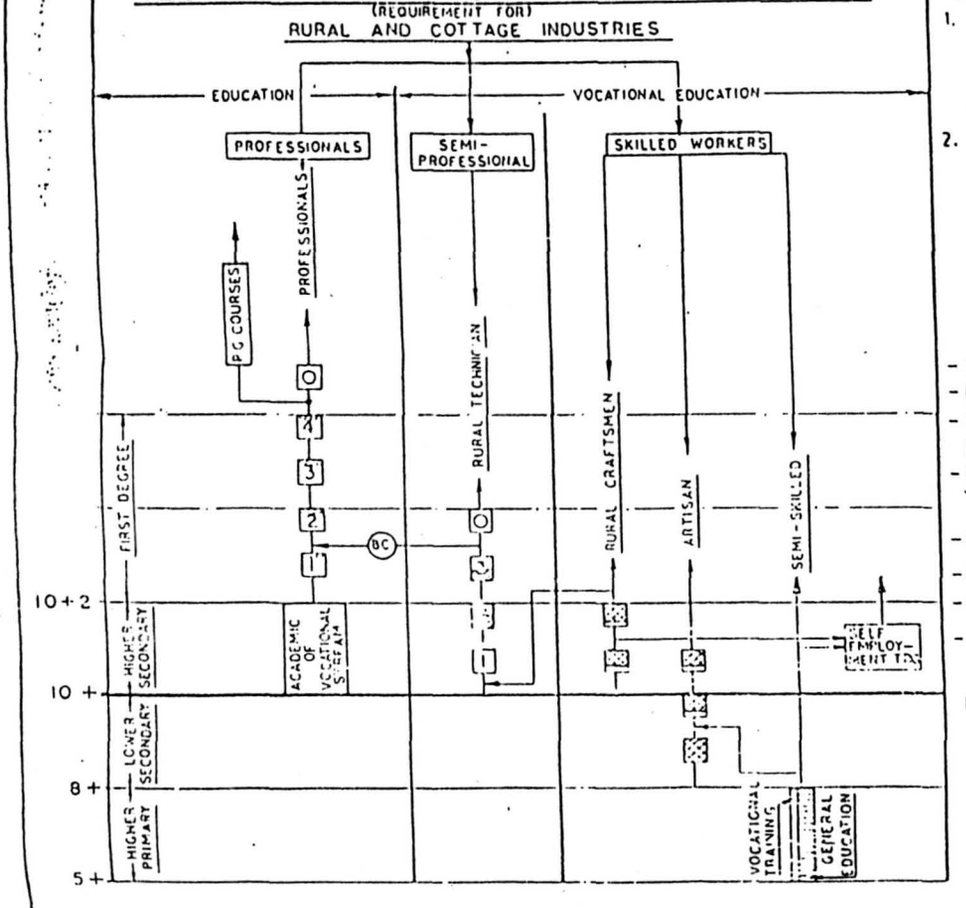
(FOR PRIMARY, SECONDARY AND TERTIARY SECTORS)



SECTOR OF RURAL DEVELOPMENT
TECHNICAL AND VOCATIONAL MANPOWER

(REQUIREMENT FOR)
RURAL AND COTTAGE INDUSTRIES

FIG. 2



LEGEND

URBAN DEVELOPMENT

1. ECONOMIC DEVELOPMENT
   - Primary (Agriculture & Allied Industries)
   - Secondary (Manufacturing)
   - Tertiary (Service)
2. SOCIAL DEVELOPMENT
   - Education
   - Health
   - Tourism
   - Recreation
   - Communication
   - Defence
   - Legal

- To World of Work
- Internship — O
- Teaching of concepts, principles, Procedures & related skills
- Entrepreneurship Development Programme — EDP
- Part-time courses — PTC
- Bridge Courses — BC
- Practical training in industry
- Skill training in the institute

Note – The word industry in a broader sense means any organisation entrusted to given output to the society in all the three sectors of development.

The terminal nature of the courses without making provision for continuing education, without linking it to employment potential, and without ensuring availability of educational resources available in the polytechnics to industries for improving their productivity will neither attract student community nor the industries whose co-operation is imperative.

MHRD/AICTE while assuming the responsibility of maintaining standards of the technical and vocational education have no overall long range national plan whatsoever for the design of the total technician education structure which should be the starting point for any educational reform in the technical education.

I, therefore, give below certain suggestions for ISTE to take action :

2.0 Initiating Exploratory Research for Technical Education :

First of all, MHRD as well as the State Ministries of Technical Education should establish a cell for survey research in some of their Resource Institutions like ISTE, TTTIs and IITs or TMIS to explore the number, size, structure and technology of the industries responsible for various sectors of economic and social development.

All levels of the technical and vocational system are essentially designed for preparing students to practice vocation. Its curriculum structure can never be the same as that of the general education structure which is more or less totally schoolbased with very little interaction with the world of work.

Before deciding what sort of interaction the Technical and vocational education system should have with the industrial structure of the country, it is necessary to be conversant with the above mentioned aspect of the industry and know its man-power structure (the present and future) of all types of Industries-large medium and small.

Such exploration will reveal that not one type of technician but three types of technicians are necessary in the urban development context and different steps of technicians are needed for rural development. Thus a separate educational structure will have to be planned for urban and rural development .

3.0 Policy-Planning for Technician Education :

The next step is to develop a national and state level policy on Technician Education which should take into consideration following important aspects of design of curriculum :

1. Technician Education is primarily to serve the technician manpower needs of the industry and hence most of the courses will be terminal in nature with the focus on practical knowledge.

2. But the very terminal nature of the courses is a disincentive to the more intelligent and ambitions students, when they find those courses have no origanized linkage with the well planned continuing education plan which will provide them for career development i.e. (a) provide educational opportunities to improve their qualification (b) to provide continuing education facilities to update and upgrade their knowledge to enable them to move vertically as well as horizontally in the industry they have chosen to work, (c) entrepreneurship development courses to start their own

business, if they are not satisfied with being a wage-earner.

Neither MHRD nor the State Government have thought of such a plan, even though many publications of the IIEP, Paris (International Institute for Educational Planners) have long back highlighted the importance of this issue (Coombs 1971).

3. On-the-job training of students in the industry should be an integral part of the curriculum of any technician course and the award of the certificates, dimplomas and degree should ensure that such a training is given.

4. For this, MHRD and the State Governments should make an elaborate plan for developing Industry Institute Interaction. This should be the major thrust in the future five year plans.

A proposed comprehensive Technical and Vocational Educational structure for producing professionals, sub-professional and the skilled level workers for urban development and the rural development. is given in Fig. 1. It also shows, how industrial training should be incorporated in the curriculum and its linkage to continuing education. These Technicians courses could be 4 years, 3-1/2 years and 2-1/2 years, full time, part-time and distance education courses depending upon the levels of the technicians required and leading to higher diploma, diploma or certificate courses.

4.0 National and State Level and Institute Level Administration :

Planning and organising technician education system for implementation is also a very difficult task when one takes into consideration the industry-institute interaction.

At the State level, the DTE's office will have to establish a state level Advisory Body for the Industry-Institute Interaction for technician education. At the Institute level, local level advisory bodies for industry Institute interaction to develop policies and strategies for designing curriculum, developing and implementing it are required.

An additional academic structure will have to be established both of the state level as well as the institute level to (i) establish liaison with the Industry-Chambers of Commerce. (ii) finding training places for students. (iii) supervising training and evaluation (iv) developing reciprocal relationship, so that the polytechnic resources are also available to the industry for consultancy and development. (v) linkage with the Regional Boards of Apprenticeship Training.

This requires strengthening of the state Directorate of Technical Education as well as at least one polytechnic in each Divison of the state to give impetus to the activities focussed on Industry-Institution Interaction.

5.0 Curriculum Planning :

Based on the overall planning of the Technical and Vocational Educational structure, the respective State Boards of Technical Education will have to design curriculum in consultation with the Industry. This exercise in curriculum design which combines both institution-based instruction and on-the-job industrial training is not an easy task and requires the services of the specifically trained curriculum planners who know how to integrate theoretical knowledge with the practical knowledge to educate and train technician at various levels - higher, middle and junior level. Curriculum guides for plan-

ning and supervising industrial training for the guidance of both the industry - trainer and the polytechnic teacher will have to be prepared for each course and for each level of technician.

This necessitates induction into the State Board of Technical Education professionally trained curriculum planners.

Another important feature of the curriculum planning is that the Principals and the Heads of the Departments in each polytechnic must be well versed in the principles of curriculum planning, so that they could intelligently implement the curriculum decisions embodied in the curriculums designed by the State Boards of Technical Education.

One of the important features of the curriculum planning for technician education will be its flexibility. Since the new educational structure will admit students from secondary schools, ITI pass outs, employed persons with no formal technical qualification, but experienced persons, the curriculum programmes will be credit-based with multiple entry system. The curriculum may be implemented formally in the polytechnic or on part-time basis or distance education. Such system needs to be designed with great care.

6.0 Instructional Material :

Even the present technician courses suffer from the lack of good instructional material which should include both print and non-print material to make instruction effective. There are no plans both at central and state Government level to initiate this activity through well planned projects. It is left to the individual states and institutions/polytechnics to prescribe books to students. Non-print instructional material which is so vital to the teaching process is non-existent and none even cares for its development.

With the introduction of the courses of various types and its flexibility, the instructional material on the modular basis using multimedia will be necessary., There is a need for the services of the Educational Technologists for developing instructional material. This activity should never be left to chance or individual institution's or individual teacher's whims. The Instructional Material Development projects should be taken at the state level in co-operation with industries. There should be full time course teams working over a period of five years specifically assigned to this project.

7. Staff Training :

This is the crux of the problem. The Technical Education is generally dominated by the bureaucrats in the MHRD and State Directorates and academic staff of the IITs and Engineering Colleges. The people who are directly associated with the policy-making, administration and teaching, technicians have less dominant status.

Thus the opinions and beliefs of this former group is dominant affects technician education.

Many of these opinion builders have till now assumed that the State level educational planning, curriculum planning and its management and instructional design are the fields one can learn through experience alone. This was also the philosophy of ISTE in the past. Only TTTIs used to speak about these areas as fields of study. But there voice has been feeble and they very rarely asserted themselves in the national and state level forums.

My personal study and experience in these fields of study and the analysis of the current status of the working of MHRD, Directorates, Engineering Colleges and Polytechnics has all the more convinced me that unless the policy-makers, administrators curriculum designers, instructional designers (teachers) undergo a well planned initial, induction and in service programmes as educational planners, administrators, curriculum planners and educational technologists, the technical and Vocational Education system will never function effectively.

The comprehensive planning of staff development should be done by the national and regional level resource systems like ISTE, TTTI's and IIT's.

An effort was made by the MHRD to modify the rolls of TTTI in 1982 from that of the mere teacher training institute to the one of the Resource System assisting simultaneously MHRD, State Directorates, Principals and teachers of the Polytechnics through their R/D, Educational and Training and extension services and help the user system to identity their problems, search for solutions, train staff appropriately through integration of off-the-job and on-the-job training courses. The modifications were incorporated in the National Guide Document of MHRD. Most of the TTTI's have continued to implement old plans with fragmented efforts at research, education, extension services, instructional material, development etc.. Their planning and programmes are not specifically oriented towards DTE's, heads of the departments and teachers. There is no integrated use of research and development education and training and extension services towards improving the performance of the above mentioned target groups. Their annual reports are content with the statistical reporting in terms of number of courses, number of teachers trained. After 20 years of its existance, the polytechnic education is being criticised in the same tone and for issues raised 20 years back.

None of the TTTI's have even developed a comprehensive policy on In-service Training for technician education development. Worst of all, there is nobody to co-ordinate the efforts of four TTTIs and evolve a national policy on resource system. The Co-ordicating Council of TTTIs has not met for the last five years.

We must now be more explicit in our assumptions when we talk about educational development. MHRD should now clearly make a ploicy-statement that all those who are entrusted with the task of educational planning at the Centre and States must be educated and trained as professional educational planners; those who are working in the State Boards of Technical Education and as Principals of the Polytechnics, must be educated and trained as professional curriculum planners and developers, and all Heads of Departments and teachers should be professionally trained as educational technologists. Further, all the above mentioed staff must be well acquainted with "The Management of Innovation". Such explicit policy-statements by the National and State Government will give appropriate long term directions to the in-service-training programmes of IIT's, ISTEs and TTTIs.

Tremendous advances have been made in the fields of educational planning and Management, Curriculum Processes, Educational Technoloy, Organisational Development, Systems Thinking etc. the understanding of which is very essential for systematic development of the Technical Education. We

have had enough of conferences and seminars and expert committees. Conferences and seminars, are supposed to bring scientific personnel and professionals who are systematically working in these fields as scientists and professionals. There is very little scientific and professional activity in the above metioned fields as applied to Technical/Vocational Education System, but plenty of seminars and conferences using so called common sense of the experienced persons. The result is the poor quality of recommendations which cannot be implemented or even if they are implementable, the present system does not have project planning skills to translate recommendations into successive action plans at the National, State and Institute and Class-room level.

The situation is worst in the degree education. There is no resource system similar to TTTI specifically geared to qualitative improvement. Consequently, the awareness of the importance of the fields from behavioural and social sciences does not exist at all. This has indirectly an adverse effect on the technical education. Most of the policy-making bodies and boards of studies of technician education have representatives from these higher education institutions who are primarily subject matter experts and have little awareness of fields like educational technology curriculum studies etc.. Owing to the prestige attached to their views, the policy-making is influenced by them. Since there is very little contribution from them in giving proper thrust in these new fields of education, the policy-making for the qualitative improvement for the technician education is not very effective. Consequently, the qualitative improvement in Technical Vocational Education has suffered in the past and will also continue to suffer in the future on account of the sheer ignorance of the personnel manning the system in the fields of educational technology, curriculum development, educational planning and management, organisational development, systems thinking in education.

8. Evaluation of Technician Education System :

Systems performance improves only when a control system is properly designed and operated at various levels. Every educational institution files quarterly financial returns, but never 'performance returns'. Annual Reports invariably report numbers of students passed out, programmes conducted etc.. Every controlling authority should install performance evaluation cell skilled in qualitative performance evaluation. All types of survey technics should be used to periodically analyses the situation and locate gaps. This is the only way to keep the technician education in trim conditions. But such a control system needs to be designed. Evaluation should focus on actual instructional system, curriculum implementation proc[illegible], financial management in polytechnics; it should focus on the capacity of the Directors and MHRD to prepare their perspective plans, their financial managements, their capacity to supervise and evaluate the sub-systems they are expected to control, their capacity to evolve adequate information system to maintain linkages with other supporting organisations and industry and also with the educational institutions, certification, and accreditation agencies.

Once again, it is stressed that this cannot be done by teachers, principals and directors who insist on learning by experience and trial and error. They have to learn the knowledge and skill through well planned in-service-training programmes, which is the responsi-

bility of the Resource System like ISTE, TTTI. These are the skills of educational technologists curriculum specialists, state level educational planner and administrator. Above all, they must know that the characteristics of the management of innovation is distinctly different from the management of the steady state institutions.

9.0 Organisational Structurte :

To begin with, key organisation units which *are responsible* for planning and management of Technician Vocational eduction need to be strengthened viz. MHRD/AICTE, State Directorates and Resource Systems like TTTIs, ISTE and their policy-making structures. Strengthening does not mean increasing the number of staff, but staffing them with people who are knowledgeable about their fields like Educational Technology, curriculum studies, Educational Planning and Management, Organisational Development and change, system thinking etc..

Firstly, MHRD/AICTE and all State Directorates must have at least one person who first of all knows what educational planning and management means and he must devote his entire time for techician education.

In at least one or few selected polytechnics (which may be called focal polytechnics), we must establish a cell of Educational Technology, whose job it will be to provide on-the-job guidance to principals, heads and teachers in planning and implementing curriculum more effectively, better instructional design and its management. These polytechnics will get continuous support from the TTTIs and its extension centres. These focal polytechnics will eventually spread the message of new fields of studies to other polytechnics. This is called net-work approach to educational development which TTTI Chandigarh had evolved in the past six years.

At present TTTIs are the rich source of information and expertise in these fields. But they need to be given a long term policy direction and their efforts need to be co-ordinated to ensure that all TTTIs together develop a coherent approach in these emerging areas. This coherence in TTTIs work will be a rich national resource. All TTTIs enjoy autonomy within a broad framework which has helped them to evolve new methods, ideas and approaches to solve the problems of the technician education. But this very autonomy has resulted in isolating TTTIs from each other. None of them has tried to learn from each other and develop a common understanding of new emerging fields of Educational Technology, Curriculum Studies etc..

This is an unprofessional and unscientific attitude. TTTIs should be asked to create opportunities for free exchange of ideas and develop common understanding at the national level. It is only then that the MHRD will be able to develop long range policies and action-plans for the development of the technician education.

MHRD should also take urgent steps to strengthen IIT Education Technology Centres and take similar steps to co-ordinate their activities.

There is already a provision in the Seventh Five Year Plan to establish the International Institute of Science and Technology Education. This Institute should be established without further delay. This Institute with the active collaboration of the TTTIs will be able to accelerate the generation and utilisation of the knowledge in the new fields of studies mentioned above.

Summary :

1. The present management of the Technician Education suffers from the fact either the MHRD nor the State Governments have any integrated technician education structure a starting point.

2. To link technician education structure to the man power needs of the industry, the resource systems like TTTI/ ISTE/IITs should have survey research cells for continuous and detailed survey of industries in all developmental sectors.

3. The results of such exploratory research should be translated into policies and action plans identifying technician educational structure which should make industry institute as an integral part of the technician curriculum.

   To ensure that these policies are translated into long-range action plans, professionally staffed technician education cells in MHRD and the State Directorates should be established which should be able to interact effectively with industry.

4. Similarly all State Boards of Technical Education should have professionally trained curriculum specialists capable of designing curriculum integrating effectively institute - based education and industrial training.

5. A well thought out scheme to prepare instructional material should be launched by MHRD in consultation with the State Govt,. This should be done by course-teams with the active collaboration of Educational Technologists.

6. TTTIs effort will have to be co-ordinated by the MHRD to plan and implement on the long range basis the staff development programmes aimed at improving the capability of the Directors, Principals, Heads and Teachers. A comprehensive philosophy for in-service training for educational development should be evolved by MHRD with the assistance of ISTE and TTTIs and IITs.

7. Above all, it should be accepted that the professionalization means teacher being trained as educational technologists, HOD and Principals as the curriculum specialists and the distrectors of the educational planners.

8. All funding agencies should establish control system to evaluate continuously the performance of the institutes and states and all central organisations dealing with the state's TECHNICIAN EDUCATION SYSTEM.

9. All these can be done on the national scale by the co-ordinated efforts of ISTE, TTTI and IITs under the aegis of MHRD.

   In absence of these actions the Technician Education has no future.

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