

Engineering Resources of Pakistan

By

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Introduction

1.1. In a developing country, the development of human resources is fundamentally more important than the creation of any other form of wealth. Possessing a mammoth dam is perhaps not so vital to a society as possessing the ability to build it. For, unlike the dam, a nation's reservoir of human resources is not susceptible to depletion due to accretion.

1.2. A country's potential for sustained development can well be assessed from the prevailing status of its engineering profession and construction industry. A planned effort to foster the growth and effectiveness of the engineering profession would thus appear to be a necessary precursor to the launching of national development plans. For historical reasons, however, the events in Pakistan did not generate the climate required for the optimum utilization of its available engineering resources nor promote a vigorous growth of the profession so as to adequately cope with the future requirements of national development.

1.3. The sudden outburst of unprecedented engineering activity generated by the concurrent execution of the Indus Basin Projects and other development and reclamation schemes necessitated the employment of a multitude of foreign engineering consultants which are said to supplant rather than supplement the indigenous engineering resources.

1.4. The object of this paper is to examine some of the reasons for the aforesaid disparity between the supply and demand of engineering services in the country and suggest some means of increasing the effective utilization of the existing professional talent and promote a balanced growth of the engineering resources in the public and private sectors.

Engineering in the Government Departments

2.1. The genesis of the method of execution of engineering project wholly through formally constituted government departments must be sought in the history of development of the Indo-Pakistan sub-continent under colonial rule. By the very nature of colonial policy, the administration of the country

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had to be kept in a highly centralized form in which dispensation of crown rule could emanate from a chosen few representatives of the crown. The policy of the government was directed towards minimum development of the country consistent with the objective of securing maximum benefit for the crown. Towards this end, an elaborate and complex framework of rules, regulations and procedures had been evolved which was admirably suited to using the native functionaries for implementation of the crown policies without effectively participating in the administrative process of the government.

2.2. A well established system of administration was thus inherited at the time of independence alongwith a group of highly experienced administrators adept at operating that system. This left no choice but to continue the administrative status quo regardless of its suitability or otherwise for continued application to a new policy directed towards maximum development of the country for the maximum benefit of its people.

2.3. The classical agencies for undertaking the large public work projects in Pakistan are the formally constituted Public Works Departments of the Central and Provincial Governments. These departments carry out the planning, construction, maintenance and operation of large projects such as the public buildings and roads, the irrigation and power facilities and public health works. Each of these departments maintain a large body of permanently employed engineers who work under the administrative control of a Secretary to the Government. In performing the combined role of the Owner, the Engineer and the Builder of great public utilities the departments have a vast variety of functions ranging from assisting the government in policy making to the collection of public revenues. The role of a government department has been lucidly described by Mr. Ghulam Ishaq, Chairman WAPDA, as quoted below:—

“The Government Department partakes the character of the government as a whole and is, therefore, largely impersonal. Impersonal administration means low motivation of employees which, coupled with the large measure of inbuilt service security, makes it ideally suited for routine, repetitive operations in which there is precedent for every situation and a rule for every action, but hardly for anything more. A government department must also aim at perfection, there must be uniformity of treatment of problems and of individuals, the exercise of discretion in individual judgment to be kept at its minimum: risks are out of the question and nothing is to be left to chance. In short nothing should be done which would upset the established system or order. This preoccupation with order and system, conformity and

perfection, as also with playing it safe, succeeds in loading a government department with such a mass of rules and regulations, codes and practices and manuals and charts that inevitably keeps it, by and large, effectively in check and balanced, but at the same time its movement is so rigid, so ponderous as practically to incapacitate it for undertaking a large, business type venture."

2.4. It did not take long to appreciate that the complex bureaucratic web was spun around a deep-seated nucleus of mistrust in the loyalty and reliability of the greater part of the administrative machinery, which needed a major overhaul to fall into harmony with the urgent needs of a dynamic state of growth and development. The array of reports from expert consultants in the art of public administration and the re-organization committees is a testimony of the government's effort in this direction. The element of anachronism inherent in any form of bureaucracy lends an inertia to all attempts at bringing about quick changes in the established order and system. Under normal conditions, these anachronistic forces exert a certain stabilizing influence against erratic and rudderless tendencies and help in adhering to a well considered and planned course of action. These forces rendered the efforts at bringing about radical changes largely ineffectual and the results were too slow to show any visible signs of rejuvenation in the prevailing order of administration.

2.5. As the pace of development activities gained momentum, a number of unsatisfactory features began to emerge as being persistently common to the implementation of many projects. The Projects Wing of the President's Secretariat summarized the following features to be persisting in the execution of development projects in Pakistan:

- (i) A large number of schemes are taken up for execution without carrying out sufficiently detailed surveys and investigations which not only result in delayed implementation but also in significant increase in wasteful expenditure during construction.
- (ii) Implementation of schemes according to schedule has been the exception rather than the rule. Completion of projects often took twice as long as originally estimated.
- (iii) Increase in the cost of projects during implementation is frequent due to unrealistic estimation of project cost. An increase in cost by 200% to 300% is not uncommon and as much as a tenfold increase in estimated cost has occurred in certain cases.
- (iv) Lack of coordination and synchronization has at times been observed between various components of the same project or between related projects.

2.6. Various reasons can be advanced to explain the causes of the above-mentioned shortcomings but, in the writer's opinion, the main cause arises out of the fundamental incongruity between the basic framework of a government department and the commercial nature of undertakings entrusted to it. Acting within the framework of the various prescribed rules, codes and procedures, the engineer with executive responsibility works under the influence of two opposite forces. The rules require a series of administrative, technical and other sanctions from a long and often remote chain of command before a plan can begin to be translated into action. Although a broad range of responsibility is entrusted to the departmental engineer, the authority delegated to him is often not commensurate with the responsibility. Where the rules have been suitably amended to delegate adequate authority, an array of procedural checks often frustrate the effective exercise of the delegation. The departmental engineer has little control in the choice of assistance allocated to the project who are frequently transferred to other assignments. He has no material means at his command to reward those who serve well and is often helpless in replacing those who don't. He is required to prepare estimates of cost strictly in conformity with the rates prescribed in the sanctioned schedule of rates, which are often out of date and out of phase with the prevailing market rates. He is often obliged to undertake works through direct employment of labour force when he has to contend with the use of artificers of poor skill who alone could be hired for the low scales prescribed in the schedule of wages. If the work is to be carried out on contract basis, he often finds it difficult to satisfy simultaneously all the multifarious formalities prescribed by the rules so that the running payments authorized by him are repeatedly dis-honoured by the audit. This soon renders the Contractor unable to keep going with the job in the absence of regular compensation for the work already performed. Regardless of its importance or significance, every step that the engineer may propose to take must be considered if, among other things, it would meet the requirements of the various rules non-compliance of which could result in objections and disallowance of payment by the audit.

2.7. The foregoing discussion does not purport to underestimate the most important role that a government department must play in promoting the developments of the country. The supreme functions of providing administrative continuity, assisting government in formulating development policies, setting broad objectives, allocating priorities, coordinating and allotting funds can only be performed by an engineering department in the government. But the sole occupation of the departments to these supreme functions could greatly expedite the fulfilment of government's aims and objectives.

2.8. The departments are the largest employers of engineering talent

in the country, but a substantial proportion of technical personnel is engaged in performing office routine and complying with the large volume of procedural requirements, thus employing some engineers in wholly non-professional work and great many others in professional work for only a small part of their working hours. A substantial part of the energies of a government employee is spent in the pursuit of solution to such personal problems as arranging the timely payment of his monthly salary, safeguarding his service rights—such as seniority and promotions, watching against untimely or unsuitable transfers and pursuing the issue of periodically revised pay authorizations from the Central Accounting Offices. These conditions result in partial utilization of the available resources and bring about an apparent shortage of technical manpower.

2.9. If, on the other hand, the government departments were to limit their activities to the performance of the supreme administrative functions outlined above, they could do so with the help of much fewer professional engineers. Under the circumstances, the bulk of the technical personnel could be released for utilization on directly productive technical work in other organizations endowed with greater flexibility, freedom of action and effectiveness. The consolidation of the now diluted professional talent in the above manner could go a long way to remove the widely publicized shortage of technical manpower in the country.

Engineering in the Public Corporations

3.1. With the accelerated pace of development work, it became necessary to create semi-autonomous public corporations which "could be clothed with the powers of the government, yet retain the flexibility and initiative of a private enterprise". The dramatic results achieved by the Pakistan Industrial Development Corporation within the first few years of its existence led to creation of many more semi-autonomous bodies such as the Water and Power Development Authorities, the Agriculture Development Corporations, Karachi Development Authority and Capital Development Authority etc. The Public Corporations thus came to play a very important role in the development of the country. Out of the total estimated development expenditure of Rs. 4,600 crores allocated in the third Five Year Plan, approximately half the amount will be spent through public corporations. This does not include the Indus Basin Projects being administered by West Pakistan WAPDA at a total cost of Rs. 900 crores.

3.2. These public corporations were brought into existence so as to endow them with a relatively large degree of freedom of action consistent with the broad development policies of the government. But the invincible forces

of bureaucracy soon began to exercise a very profound influence on the day to day functions of these organizations. Widespread criticism began to be aroused of the alleged uneconomic practices and wasteful manner in which public funds were being spent by the corporations, and a strong opinion appeared to prevail in government circles that suitable checks and controls must be imposed to prevent the said practices. For example, the first important check imposed on WAPDA was the establishment of an outpost of statutory pre-audit at the headquarters of each project estimated to cost more than Rs. 2 crores. This is meant to subject every voucher for payment to scrutiny and approval by audit before payment can actually be made. If the above control was to be exercised without judicious discretion and breadth of vision, it could precipitate the virtual collapse of all construction activities. The smallest digression from any one of the numerous formalities could provide sufficient cause for disallowance of any expenditure by the audit. Apart from the lack of trust that would arise out of such a situation from those who do not receive prompt payment for supplies made or services rendered, it could well result in depriving the executive of initiative and effectiveness.

3.3. Some far reaching financial and procedural controls on the functioning of public corporations were prescribed by the Government of West Pakistan in the Notification dated February 27, 1963 (Appended). Although compliance of some of the procedures prescribed in the Notification have not yet fully taken effect, the step is indicative of an important change taking place in the government policy towards the degree of freedom which may be enjoyed by public corporations in conducting their business. Needless to say that imposition of too severe restrictions on the activities of the corporations may impart such a degree of similarity in their character to regular Government Departments as to make their separate existence of doubtful value.

3.4. With the sudden launching of large scale construction and reclamation programmes in West Pakistan, the Water and Power Development Authority was faced with the gigantic task of marshalling the engineering resources of the country. The available resources, however, were oriented to the classical mode of operations through government departments and were not readily adaptable to the manner and tempo required for achieving the scheduled progress of the multitude of projects. For obtaining the essential manpower, WAPDA had to turn to the Government departments who could spare barely enough personnel to fill some of the key positions in the fast expanding organization. The vacuum that existed in the field of private engineering consultants could not conceivably be filled within a short period.

3.5. The international water treaty of 1960 required the construction of a large number of major engineering works, costing more than Rs. 900

crores, for providing replacement of irrigation supplies which were to cease in the year 1970. The network of Link Canals Barrages and storage reservoirs was an undertaking of unprecedented magnitude required to be completed and brought into operation under provisions of heavy penalties for late completion. The accomplishment of this task could hardly be conceived without some assistance from imported technical manpower. The consortium of friendly countries, providing financial aid for the Indus Basin Project, made it a pre-condition to the aid that consultants of international repute be engaged as Engineers and the works be let out on competitive contract by international bidding. The employment of foreign consultants and contractors thus became an expedient need to meet the target provided under the treaty.

3.6. Under the arrangements, the foreign consultants were to act as the 'Engineer' with full responsibility for planning, designing and administering the projects and WAPDA assumed the role of the owner or 'Employer' who has the right to review and appraise the Engineers' plans and exercise surveillance of the construction without carrying any direct responsibility in regard to the engineering and execution of the works.

In order to provide training by working with foreign engineers of international repute and learn their techniques and skills by sharing a part of their work, WAPDA made arrangements to depute a number of Pakistani engineers to the various consultants' organizations. Due to various reasons, however, this purpose appears to have been achieved only to a limited extent. Primarily, the foreign consultants found it administratively as well as commercially advantageous to employ the maximum number of expatriates in their organizations. Their reluctance to accept local nominees in important positions seems to have been further accentuated by an apprehension that the Employer's nominee may, in certain cases, possess a greater sense of loyalty to the 'Employer' rather than to the firm with which he was temporarily attached. If true, this could lead to embarrassing situations for the firm. A large proportion of deputationists who were accustomed to the methods of work in the Government departments could not readily attune themselves to the modus operandi of the foreign firms, which led to their being placed in routine or semi-professional positions in the consultants organizations. Furthermore, the unfamiliarity with the terminology and codes of practice used by the foreign consultants often created a difficulty in communication, with the result that the foreign consultants often considered the local trainees as an unnecessary appendage to their organizations. In spite of the above difficulties, some Pakistani engineers gained valuable experience from their association with foreign consultants, although the larger proportion of engineers deputed to consultants complain of being unable to

participate in the more important engineering functions in which they wish to acquire experience.

3.7. Of late, the recognition of this problem has resulted in efforts to bring about a more effective participation of the indigenous talent in engineering of these projects. The preliminary works, which should preferably be ready before the arrival of the main contractor of a large project, were entrusted to local engineers and contractors with considerable economy in cost. These works included the construction of residential colonies, railway sidings, roads and other facilities, prior availability of which enabled substantial savings in the completion time of the main project. Similarly the remodelling of existing irrigation works affected by the replacement programme was undertaken by an organization consisting of Pakistani Engineers. As more experience was gained, it was decided to entrust the engineering of at least one of the Indus Basin Projects, *viz.*, Taunsa-Panjnad Link, to Pakistani Engineers. The present outlook is, therefore, indicative of a better recognition of the need to patronize the indigenous talent for shouldering greater responsibility in carrying out the major projects. The wealth of modern scientific knowledge is undoubtedly an international trust which even the most advanced countries must share with each other. But in sharing this knowledge, unless we endeavour to acquire the ability to produce instead of merely acquiring the finished products we can hardly hope to reach the 'take-off' stage of sustained development through our own resources.

Engineering in the Private Sector

4.1. The benefits to be obtained from an experienced group of engineering consultants thriving as a competitive business enterprise have only lately been appreciated and realized. To be successful in business, a consulting outfit must save more to the client than it costs to be hired. A consultant assumes undivided responsibility for the safety and successful operation of the scheme he produces, as his continued success in a competitive market depends solely on his reputation for competence, integrity and dependability. Towards achieving and maintaining his reputation, he must engage the top-ranking professional talent available in a particular field and keep himself abreast of the latest development in techniques and methods. By offering compensation commensurate with the productive capability of his employees he can attract men with aptitude and inclination for specialized professional work and motivate them to acquire advanced skills. By concentrating his efforts in a particular branch of engineering, a consultant can become highly specialized in his field and provide expert services economically to several agencies who cannot afford to engage their own specialists in the various branches of engineering.

4.2. The virtual non-existence of such consulting organizations in the past is by itself largely responsible for their retarded growth and insufficient development at present. A start having already been made, what remains to be done is to devise ways and means of providing a fillip to the engineering enterprise in the private sector so that the wide gap between the supply and demand of engineering services can be narrowed down as quickly as possible. But tendencies at mushroom growth without maintaining a high standard of engineering must be curbed by evolving a system of self regulation through a chartered national association. A high standard of prequalification for membership in the association and enforcement of strict ethical practices by the association will go a long way to generate public confidence in the consulting organizations.

4.3. At present there are only a few firms of repute of Pakistani engineering consultants, and even those firms do not possess very large resources or wide experience. But these assets can be created only through a planned effort at entrusting more and more responsibility to the existing organizations and encouraging the growth of new organizations. It must be agreed that the services of foreign experts would continue to be required for tackling complex projects calling for experience in advanced technology. This could be arranged in appropriate cases by stipulating that the local consultants who are made to carry the direct responsibility as the Engineers in-charge should employ foreign experts on their rolls or associate with renowned firms of foreign consultants who possess experience in the required field. The past attempts at achieving the same results by the converse methods of directly entering into agreement with foreign consultants and requiring them to associate with Pakistani consultants has not proved successful. It has been observed that the foreign firms are often inclined to associate a local firm 'in name only' so as to meet the requirements of the employer. By such an arrangement, the local consultant may well derive a small financial benefit but may fail to gain substantial experience; this being a situation analogous to the doubtful benefits secured by deputing Pakistani Engineers from the departments to the foreign consultants' organizations. In the procedure suggested above, the Pakistani consultants would act as the senior partner in the joint venture and will thus be in a position to effectively absorb the know-how and secure the experience in the process of working side by side with the foreign counterparts while retaining the direct responsibility for the end product.

APPENDIX

GOVERNMENT OF WEST PAKISTAN
FINANCE DEPARTMENT

NOTIFICATIONS

The 27th February, 1963

No. SOFR. II-14/63 (Vol. I).—In exercise of the powers conferred under section 3 of the Public Investment (Financial Safeguards) Ordinance, 1960 (Ordinance No. XLVI of 1960). The Governor of West Pakistan is pleased to prescribe the following financial procedures for the corporations, institutions or undertakings established with the aid of the revenues of the West Pakistan Province, listed in Schedule I appended to this notification :—

(The Government may amend this Schedule from time to time)

- (i) Public statutory bodies or corporations shall submit their annual statements of anticipated receipts and expenditure in the prescribed proforma to be framed in consultation with the Auditor-General of Pakistan/Accountant General, West Pakistan to Government for prior approval in accordance with the time schedule laid down by Government from time to time.
- (ii) Revised estimates shall be sent to Government on the same lines as the budget estimates indicating the deviations from the original budgeted amounts and the reasons therefore in accordance with the time schedule laid down by Government from time to time.
- (iii) No scheme or project or commercial activity or promotional activity shall be undertaken without the prior approval of Government.
- (iv) The expenditure on a particular scheme or a project shall not exceed the amount approved by Government for that year without the prior approval of Government. Anticipated increase in the expenditure of a particular project or scheme exceeding 10 per cent shall be intimated to Government in good time before the close of the financial year.
- (v) Where the cost of a scheme or project exceeds the approved cost by more than 10 per cent; it shall be submitted to Government for revised approval.
- (vi) No expenditure shall be reimbursed which is incurred without the prior approval of Government in excess of the amount budgeted by Government in their budget estimates of that year, unless covered by clause (v) above.

- (vii) The monthly accounts of the activities, which are being financed out of loans or grants given by Government out of the Provincial Consolidated funds, shall be submitted to Government quarterly within two months of the expiry of the quarter in the Proforma to be prescribed by Government.
- (viii) An accounting procedure for various activities shall be laid down in consultation with the Auditor-General of Pakistan/Accountant General, West Pakistan, and Government. This shall also include the system of internal financial control.
- (ix) No overdrafts shall be obtained from the commercial banks in excess of the amount guaranteed by Government.
- (x) A quarterly statement of the amounts overdrawn and outstanding on the last working day of the quarter shall be submitted to Government before the end of the following month. The circumstances under which the amount was overdrawn and the manner in which the said amount is proposed to be repaid shall be indicated.
- (xi) A detailed procedure shall be laid down in consultation with the Auditor General Accountant General regarding the manner in which audit shall be carried out. The procedure shall include a specific provision that at any time, for good and sufficient reasons to be recorded in writing should the Government so direct, a special audit may be carried out of any particular activity of the corporation, be considered necessary, and such corporation, institution or under-taking shall provide all reasonable facilities to the Audit.
- (xii) No employee or pensioner of Government, on appointment to any public statutory body or corporation, shall be paid in excess of the amount which he was receiving before deputation or which he was receiving before retirement without prior approval of Government.
- (xiii) Pay scales shall be laid down for all categories of employees with the prior approval of Government.
- (xiv) Rules regarding terms and conditions of service and recruitment of employees other than deputationists shall be framed with the prior approval of government.
- (xv) Rules regarding conduct of the meetings of the Board to consider all important matters shall be framed with the prior approval of Government.

- (xvi) Rules regarding delegation of financial powers to the Managing Directors or paid Chairman and Officers subordinate to them, or Members of any Committee set up by the Board shall be laid down with the prior approval of Government.
- (xvii) A standard form shall be prepared in consultation with Government regarding the terms and conditions on which consultants are to be employed.
- (xviii) Purchases shall be made in accordance with the normal Government procedure regarding issuing of tender enquiries and with due regard to the policy of government regarding conservation of Foreign Exchange.
- (xix) One of the Members of the Board of Management shall be designated as Financial Adviser/Finance Member/Finance Director and he shall be a nominee of the Provincial Finance Minister, subject to the approval of the Governor. Where a whole time Financial Adviser/Finance Member/Finance Director is not considered necessary a representative of the Finance Department shall be nominated to the Board by the Provincial Finance Minister as ex-officio part-time Financial Adviser/Finance Member/Finance Director. The Financial Adviser/Finance Member/Finance Director shall, in all matters having financial implications, consulted in writing and a quarterly report shall be finished to Government of cases in which his advice has not been accepted within one month of the expiry of the quarter in question.

SCHEDULE I

1. The Water and Power Development Authority, Lahore.
2. The West Pakistan Industrial Development Corporation, Karachi.
3. The West Pakistan Agricultural Development Corporation, Lahore.
4. The Karachi Development Authority, Karachi.

The 2nd March, 1963

No. SOFR-II-14/63-(Vol. I)-222/63.—In exercise of the powers conferred under section 3 of the Public Investment (Financial Safeguards) Ordinance, 1960 (Ordinance No. XLVI of 1960) the Governor of West Pakistan is pleased to make the following amendment in Schedule I, appended to Government of West Pakistan, Finance Department's Notification No. SORF-II-14/63-(Vol. I), dated the 27th February 1963, namely—

AMENDMENT

The following Corporations, Institutions or Undertakings established with the aid of the revenues of the West Pakistan Province shall be added after Serial No. 4 of Schedule I, namely :

- (5) The West Pakistan Road Transport Board, Lahore.
- (6) The West Pakistan Cooperative Development Board, Lahore.
- (7) The West Pakistan Text Book Board, Lahore.
- (8) The Rawalpindi and Hazara (Hill Tract) Improvement Trust, Murree.
- (9) The Social Welfare Council, West Pakistan, Lahore.
- (10) The Provincial Anti-Malaria Board, Lahore.

By Order of the Governor of West Pakistan

L. C. SHORE,

Deputy-Secretary (Development)

Government of West Pakistan

Finance Department.