ENGINEERING CONSULTANCY IN WATER SECTOR

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Abstract

With a 1345 million population, India is the largest democracy in the world. India possesses a large pool of technical manpower with an annual intake of about 15,76,500 of graduates and post graduates from 10,949 technical institutions (as in 2013) spread all over the country(CEAI-2017). Consultancy services offer a unique opportunity for the engineers in solving innumerable problems being faced by the society to ensure proper utilization of available manpower by .providing specialist services. The paper discusses about the scope of consultancy in the various disciplines in water sector mostly under Government control at present.

Keywords: consultancy, irrigation, hydro-power, river training, water transport, water transfer, water supply, coastal protection

1.0 INTRODUCTION

Engineering Consultancy can play a very significant role in the water sector in bridging the gap between private initiative and public responsibility and in allaying the fears of both the government and the private bodies (Nadeem Khalil,2004). Development of consultancy profession in India has been quite significant during the last few decades. Consultancy Development Center (CDC) under the Department of Scientific and Industrial Research (DSIR) of the Ministry of Science & Technology, Government of India, Engineering Council of India (ECI), Consulting Engineers Association of India (CEAI), etc. have prepared a data base of consultants/,consultancy firms - both public sector undertakings and private organizations - covering areas like agriculture and rural development, banking and finance, engineering, construction and construction management, health, education, etc. Consultants face stiff competition amongst themselves for wining projects by projecting bio-data of their experts who act as key persons in the various disciplines to prove their capability and worthiness. They train their engineers to efficiently perform the various jobs assigned to them by the team leaders and specialists to complete the project in a time bound, cost effective and efficient manner to the satisfaction of their clients. The project reports prepared by the consultants are also subject to scrutiny by other consultants in the area. Consultancy help in value addition, quality control, timely completion of projects in a cost effective and time bound manner. To establish their credibility, they help in identification and cross fertilization of best practices, development of best strategy, analytical techniques and software, technology up-gradation, innovative ideas, application of latest R&D and best management practices. Many a times, a consultant associates with other consultants of repute from India and abroad or outsource a part of the job where they lack in necessary expertise and experience. Consultants are very effective in the allocation and best utilization of available resources by providing specialist services for a limited period without obligation for permanent appointment. Knowledge transfer and training form an important aspect of consultancy. They also offer independent and impartial advice to clients on most suitable and cost effective methodology and solution to satisfy cliental need and interest. Collaboration strategies of consultancy organizations in India have been discussed in depth by Diwan (1999). Although consultancy has taken deep root in our country, still there are some shortcomings which have to be overcome. In this paper, the author has outlined several areas in water sector where consultants can play major role for Nation building (IWRS,2007).

2.0 CURRENT STATUS OF ENGINEERING CONSULTANCY IN INDIA

Scope of engineering consultancy services are steadily increasing in our country because of the government policy of outsourcing jobs. The number of consulting companies in different disciplines in engineering and technology are steadily increasing day by day due to gigantic developmental projects being undertaken by the government for improving urban and rural infrastructures e.g. roadways, railways, waterways, smart cities, etc. Consultancy organisations in India, in both public and private sectors, are rendering very valuable services to the nation by doing most of the jobs (which government departments used to do earlier) in a much more efficient, economic and time bound manner.

It is, however, unfortunate that majority of the consultants in India are reluctant to upgrade and modernize through collaborations with educational and research institutions in India for more effective use of their manpower, time and money. Currently, research and development in our country is generally confined to a narrow circle of academicians and end in conference or seminar and journal papers or reports with very little industrial application. The main challenge of transfer of such R&D from laboratories to field lies in organizing, implementing and directing the research efforts in a well coordinated manner through appropriate collaboration (Chakraborty,1999). Research and development must have strong linkages with industry for meeting socio-economic goals (Mazumder, 2014). University professors and the young research scholars working under the professors comprise an enormous pool of expertise and resources which must be tapped to solve many a challenging problems faced by the society in the fast changing world with global competition.

A major problem being faced by our educational, research, consultancy and industrial institutions today is how to attract and retain qualified and meritorious persons (CEAI, 2017). A large number of such persons leave the country for higher education abroad for better pay and perks, congenial environment for research, freedom of work and above all due recognition of their achievements. Post graduate study for teaching and research is the last priority in India today. If this situation continues, our educational, research and consultancy institutions have no future and we are going to be dependent on foreign institutions for higher education, research and consultancy forever.

3.0 CONSULTANCY IN WATER SECTOR

Water resources engineering is a branch of civil engineering where there is a lot of scope for research and consultancy (FICCI,2004). For any development project, a large number of consultants are needed in various disciplines of Civil Engineering viz. (i)Structural Engineering (ii) Geo-technical & Foundation Engineering (iii) Highways & Transportation engineering (iv) Hydraulic & Water Resources Engineering and (v) Environmental Engineering, et al. Although there are good numbers of private consultants in the first three disciplines, there are very few qualified and competent consultancy organisations under the next two which are at present solely dealt with by the government departments. The author wishes to focus on the fourth discipline i.e. Hydraulic and Water Resources Engineering where there is a vast scope for research and consultancy in both private and public sector (Mazumder,2009).

3.1 Hydraulics and Water Resources Engineering

The areas which are covered under this discipline can be broadly sub-divided in to:

- Irrigation and Drainage
- Hydro-Power Development
- River Training and Flood Control
- Water Transport and Navigation
- Water Supply and Sanitation
- Water and Soil Conservation

- River Linking for Drought protection
- Coastal Area Protection

3.1.1 Irrigation and Drainage

Fig.1 shows the Growth of Population, Food Production and Irrigated Area in India during 1951-2050. Presently,78% of our precious water resources are used for food production and food security (INCID,1998).

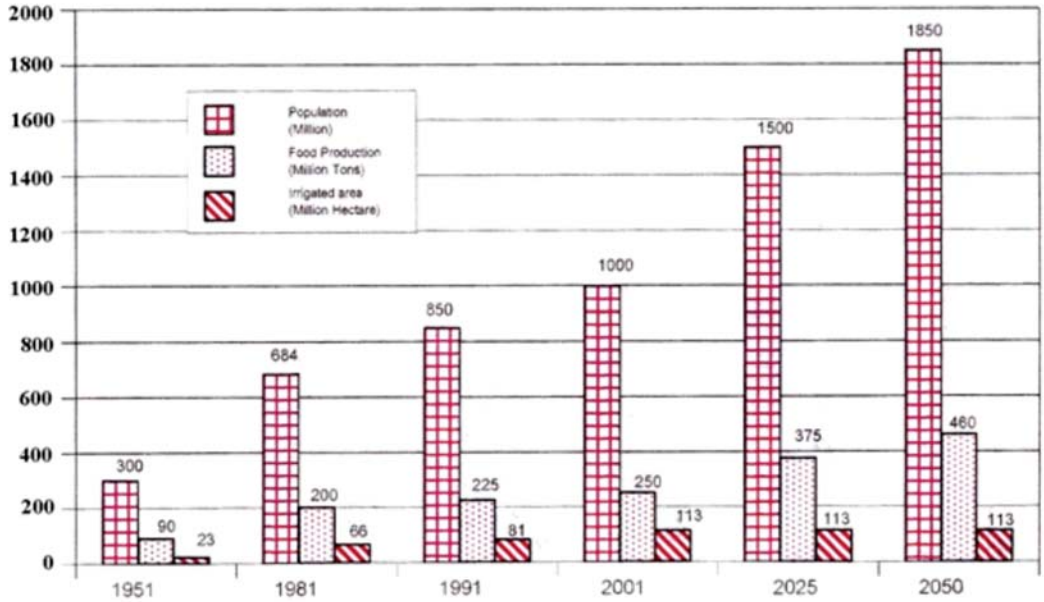

Fig. 1 Growth of Population, Food Production and Irrigated Area in India (1951-2050)

There are only a few storage reservoirs like Bhakra which can hold flood waters in high rainfall years to fight consecutive droughts due to scanty rainfall. It is not advisable to build dams like Bhakra today, because of their environmental impact. The only way left is to properly manage the available water resources in a judicious and efficient manner (CWC,2010). There is a huge loss of water in surface irrigation schemes primarily due to heavily subsidized water supply policy and poor on-farm development (Ministry of Agriculture, 1979). Even a marginal increase in irrigation efficiency will generate enough water to meet the requirements for our future need of food and other requirements, provided of course our population can be stabilized at 1850 million by the year 2050 (Fig.1).The overall efficiency of irrigation projects (also called project efficiency) in India is too low at an average of 35% in the case of major and medium irrigation projects (INCID,1998) as compared to 55% in China and 70% in Japan (CWC,2010). Most of the irrigation water is found to be lost in conveyance and field application and extremely poor management of water at the farm level (Mazumder, 2017). While emphasizing the present day need of intensive irrigation for maximizing yield per unit of area and unit of time, Bharat Singh (1991) identified the following major short comings of our present irrigation schemes:

- Gap between the creation of irrigation potential and its utilization
- Unreliable and inadequate water supply
- Inequitable distribution of water between head and tail enders.
- Non-responsive and authoritarian administration
- Lack of control, poor administration and increasing malpractices
- Low efficiency of canal systems and poor on farm management of water.

Planning Commission(1992), renamed as Niti Aayog, recognized the three major shortcomings responsible for poor performance of irrigation schemes in India, namely,

- Unlined channels
- Lack of land consolidation, improper leveling and sizing of irrigated land
- Poor on- farm management of irrigation water beyond outlets.

Several steps for improving irrigation efficiency by reducing avoidable losses have been outlined by Mazumder and Kumar (2015). Since there is a lot of risk involved in water availability, depending on natural rainfall, private consultants, except a few, are reluctant to invest in water sector. However, there is great scope for consultancy in the area of irrigation and irrigation management in India (Mazumder, 2010).

3.1.2 Hydro-power Development

India has a hydro–power potential of 90,000 MW at 60% load factor corresponding to a potential installed capacity of 1,50,000 MW. Currently hydro-power share is about 17 % against an ideal share 40% in hydro-thermal mix of power supply. Out of 1,45,320 MW of major hydro-potential of India, 94,900 MW i.e. 65.3% is yet to be developed in the country. The State of Arunachal Pradesh with a major potential of about 50,000 MW has developed only 5-6% of its hydro-power potential so far. A large numbers of projects are in the pipeline in Arunachal, Himachal and Uttarakh and states (Mazumder,2017). There is a great scope for private participation and consultancy services in the area which needs high quantum of expertise and experience.

3.1.3 River Training and Flood Control

River and river water is in the concurrent list of Indian Constitution. On an average, there is a annual flood damage of about Rs. 40,000 million (based on 2003 prices) due to recurring floods in all parts of the country, apart from loss in communication and unimaginable sufferings of people (CEAI, 2018). River training and flood control is at present under the exclusive domain of the State and Central Governments. There is a great deal of mismanagement, corruption and inefficiency in this sector. Consultants with proper knowledge and experience in the subject can play a major role in the area in improving performance of the projects in a time bound and economic manner.

3.1.4 Water Transport and Navigation

Water transport is the cheapest mode of transport (especially for bulk goods), compared to other modes of transport like airways, roadways and railways. Government of India is going to develop 106 National Waterways (e.g. NW-1: Allahabad – Haldia stretch of Ganga, NW-2: Sadiya-Dhubri stretch of Brahmaputra, NW-3:Kollam-Kozhikode Stretch of West Coast, etc.) for navigational purposes. Similar to Highway Authority of India, Government of India has entrusted the job to Inland Waterways Authority of India for proper planning, design, execution and maintenance of these projects at huge capital costs. It needs qualified and experienced engineers and consultancy services to expedite the timely completion of these projects.

3.1.5 Water Supply and Sanitation

Apart from agriculture, water supply is needed in other sectors like industries, power plants, municipal supplies, etc. for building smart cities and providing improved infrastructures including ‘Swatch Bharat’. Assured water supply and sanitation in a sustainable manner is an important task for improving quality of life for our urban and rural poor. Function of ministry of water resources has been extended to rejuvenation of river Ganga and river development to face the immense challenges of river pollution and river development for water transport and water transfer from surplus to deficit basins.

Treatment of waste water and re-use of treated water is highly effective not only in reducing fresh water requirement but also in combating increasing pollution of surface and sub-surface water (CEAI, 2018). Consultants of high caliber, knowledge and appropriate training are essentially needed for implementing the ideals of the Government for planning, design, construction, operation and maintenance of water supply and sanitation projects.

3.1.6 Water and Soil conservation

Utilizable water resources of India are estimated as 1120 billion cubic meter (BCM) which comprise 690 BCM of surface water and 430 BCM of replenish able ground water (Iyer, 1989). 748 BCM is lost to the atmosphere through evapo-transpiration from rain fed agriculture, barren lands, forests, natural vegetation, natural ponds and lakes, etc. Water conservation through rain water harvesting is a must to meet the ever increasing demand of water by our growing population. We have poor storage capacity of about 305 BCM only and many of the storage reservoirs built in 50s and 60s are fast depleting their capacities due to siltation of the reservoirs (CWC, 1991). Soil conservation is badly needed not only for extending the life of the reservoirs but also for control of landslides, floods and associated calamities, especially in hilly areas. The area is at present fully under government control. Considering its severe implications, private participation and consultancy are essentially needed in this area.

3.1.7 River Linking for Drought protection

Average per capita water availability in India is estimated as 1545cubic meter (Iyer, 1989) in the year 2025. Areas having per capita availability of less than 1000 cubic meter and less are considered to be water stressed. Considering the regional variation in precipitation, many parts of the country are already facing acute shortage of water and droughts as indicated in Table-1. Many more states are going to be water stressed soon due to increasing demand of water. Considering rapid growth of our population and increasing river pollution, Government of India has proposed 30 river link projects for water transfer from surplus to deficit basins of India (Fig.2). Implementation of these projects is a herculean task and faces many difficulties (IWRS,1996). Obviously, execution of such projects needs host of consultancy services in multiple disciplines of civil engineering from both public and private sectors.

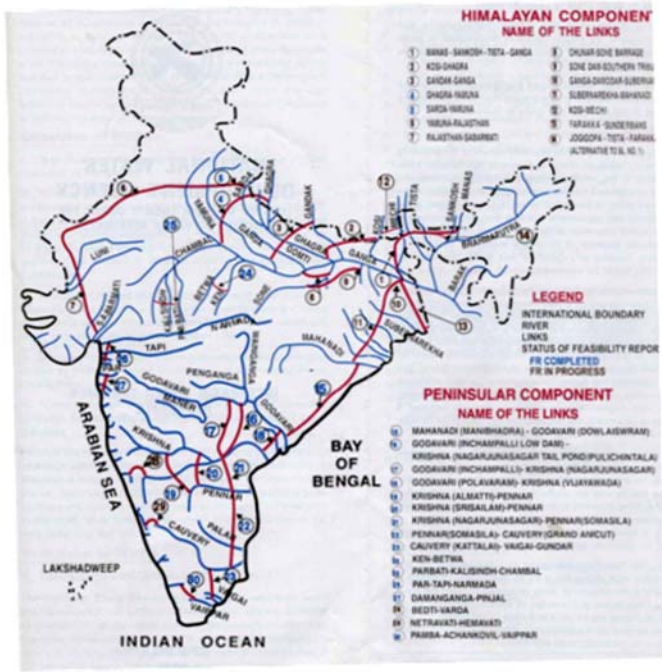

Fig.2 Interlinking Indian Rivers

Table-1: Surplus and Scarce Basins in India

Surplus Basins		Scarce Basins	
Basins	**Per Capita Availability (cum/ year)**	**Basins**	**Per Capita Availability (cum/ year)**
Brahmaputra Basin	18,417	East flowing Rivers between Mahanadi and Pennar	919
Barak Basin	7,646	Cauvery	666
Eastflowing Rivers between Tadriand Kanyakumari	3,538	Pennar	648
Eastflowing Rivers between Tapiand Tadri	3,194	Westflowing River Basin of Kutch and Saurashtra including Luni	631
Narmada	2,855	East flowing River Basins between Pennar and Kanyakurnari	383
Brahmani-Baitarni	2,696		
Mahanadi	2,546		
Godavari	2,026		
Indus	1,757		
Ganga	1,473		

3.1.8 Coastal area Protection (http://cwc.gov.in/CPDAC)

India has a coastline of 7500 km of which 2700 km is on the east coast, 3000 km on the west coast and the remaining in Lakshadeep and Andaman groups of islands. The continental shelf extending up to 50 km in the east and 150 km in the west beyond the shoreline also belong to India. Several storms occur both on east and west coasts due to disturbances in the ocean. The frequency of such storms is low (about 2 in a year) on the west coast as compared to those on the east coast (about 5 in a year). The coastal processes in sediment transport and coastal erosion due to oblique attack of sea waves and tidal currents are responsible for coastal erosion affecting coastal population, shipping, fishing, transport, harbors, ports and docks, etc. Sea defense works consisting of sea walls, artificial nourishing of sea beach, dykes, bulkheads, groins, gabions, stone pitching, etc. are necessary for protection of the vast coasts of the country. These are very costly measures and need high expertise in their implementation. There is a lot of scope of consultancy services in this discipline.

4.0 CONCLUSIONS

India produces a large numbers of graduates and post graduates every year from both public and private institutions. Through proper industrial training and updating of knowledge, consultancy services-through public, private and PPP schemes- offer great opportunity for the Engineers in execution and maintenance of all development projects envisaged by the governments in an economic and time bound manner. There is a great scope of consultancy services in water sector e.g. Irrigation, hydro-power, water supply, water treatment, river training, river linking, coastal protection etc. which are by and large performed by the Government at present.

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INDIGENOUS TRAIN 18 NOW FASTEST IN INDIA

NEW DELHI: Train 18, an indigenously developed semi-high speed train, has officially become the first train in India to cruise at a sustained speed of 180 km per hour making it the fastest train in the country, railway minister Piyush Goyal announced through a Tweet on Wednesday.

The Chief Commissioner of Railway Safety (CCRS) has given the go-ahead for the train to run at a maximum speed of 160 kmph with certain conditions paving the way for its commercial operation. The conditions include providing "sturdy fencing" all along the track to avoid any mishap. The CCRS in its communication to the Railway Board has said, "Railway shall ensure provision of sturdy fencing at vulnerable location on need basis for operation up to 130 kmph. For speed beyond 130 kph and upto 160 kmph, provision of sturdy fencing all along the track shall be ensured." It has laid down 21 conditions that the railways must comply with to run at maximum speed of up to 160 kmph.

The clearance from CCRS is a pre-requisite for any train with new technology to start service.

Railway Ministry sources said the train speed can also go up where the track condition is superior. Tweeting a video clip of the train, Goyal Tweeted, "Need for Speed: Train 18 seen cruising at a sustained 180Km/h, officially becoming the fastest train in India."

The first such train manufactured in India at a cost of approximately Rs 100 crore is scheduled to ply between Delhi and Varanasi via Allahabad. Prime Minister Narendra Modi will flag off the train and the date of starting the service has not yet been decided.

The CCRS has put the conditions while giving go ahead for the train operation after it recently carried out inspection of the new 16-coach train during speed trial between Safdarjung railway station and Agra. The train is fully air-conditioned and has modern amenities to make the travel comfortable and safe. The train can accommodate 1,128 passengers.

Source: http://timesofindia.indiatimes.com/articleshow/67264642.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst