To Go or Not to Go after the 'ET'

by Mohd Anisur Rahman

ET or extraterrestrial, a term used to describe intelligent lives elsewhere in the universe, has been on the list of man's quest for unknown since many years. With the invention of radio-telescope 'ET hunt' has become a lot more easier than before. Although accumulated evidences are in the negative so far, search for extraterrestrial intelligence (SETI) continues.

One could not possibly disregard the existence of ETs specially if radio-astronomer Frank Drakes's equations are to be hold correct. Drakes equation shows that there could be 40 billion stars out of the total 400 billions in our own galaxy, the Milky Way, in terms of size and composition, that resemble the sun. Of these, four billion stars may have planets conductive to the evolution of life. Now, if the chance of existence of intelligent beings is one in one billion of these 'earths' we will have four probable neighbours in our own galaxy! What is more, the Milky Way is just one of 100 billion galaxies in the universe.

That sounds good! But many physicists are rather skeptic about such a possibility. They come up with what is known as the anthropic principle for support. Anthropic principle is something that addresses some important questions like, "Is there something special about our particular location in the universe either in space or time? Are the laws of physics specially designed in order to allow the existence of conscious life?" etc.

The anthropic principle has many forms of which two versions — the weak and the strong, address merely the 'spatio-temporal' location of intelligent life in the universe.

The weak version states that in a universe that is large or infinite in space and/or time, the conditions necessary for the development of intelligent life will be met only in certain regions that are limited in space and time. This argument can be used to explain why the conditions happen to be just right for the existence of intelligent life like us on the earth at present. For, if they were not right, we should not have found ourselves here; then I wouldn't be scrawling over pages and you would not be reading it now!

This version was used very effectively to resolve a puzzling issue concerning various striking relations that are observed to hold between physical laws like the gravitational constant, the mass of proton, the age of the universe etc. It seems these numbers are so finely adjusted to make the universe a place where it is possible for intelligent beings like us to exist. For example, had the electric charge been different, stars either would have been unable to burn hydrogen and helium or else they would not have exploded in supernovas to fling back into space the raw materials for new stars like our sun or planets like earth. If gravity were less powerful than it is, matter could not have congealed into stars and galaxies, nor could they have formed, had gravity not been the weakest of the four basic forces.

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The answer to why big bang occurred some 10 billion years ago is that it takes that long for intelligent beings to evolve. The fact that we exist in this time on earth is a mere coincidence, somewhat analogous to the situation that one knows it takes six hours to reach Dhaka from Rajshahi by a particular route without knowing which one to take. Arbitrarily he chooses one and reaches Dhaka by that time.

The strong anthropic principle goes still further. In this case we are not just concerned about our location in this universe, but within an infinite number of possible universes. It goes as follows: there are either many different universes or many regions of a single universe, each with its own configuration and set of laws of science. Of all, only a few would be conductive to the development of intelligent being like us.

This version is most suitable to duck question like why is the universe the way we see it? The simple answer is, if it had been different we would not be here.

Few would argue about the validity of the weak version while the strong version may be fraught with plenty of doubts. Many physicists see it as an attempt to escapism by the theorists whenever they do not have good enough theory to explain the observed facts.

Even though there are rooms for doubts, these versions of anthropic principle explain a good deal about what is known as a 'fine tuning' that had to occur to make the universe a place for living for intelligent being like us. Noticing the pattern in the universe, Stephen Hawking, one of the most eminent scientists of the day, said, "If one considers the possible constants and laws that could have emerged, the odds against a universe that has produced lift like us are immense."

So, in the light of the anthropic principle, fructification of the ET hunting projects currently underway, some at the cost of a large fortune, may seem like chasing a mirage. But one should, definitely, be happy to realize that this is far better a way to spend money than draining cash into building weaponry.

Technological Options

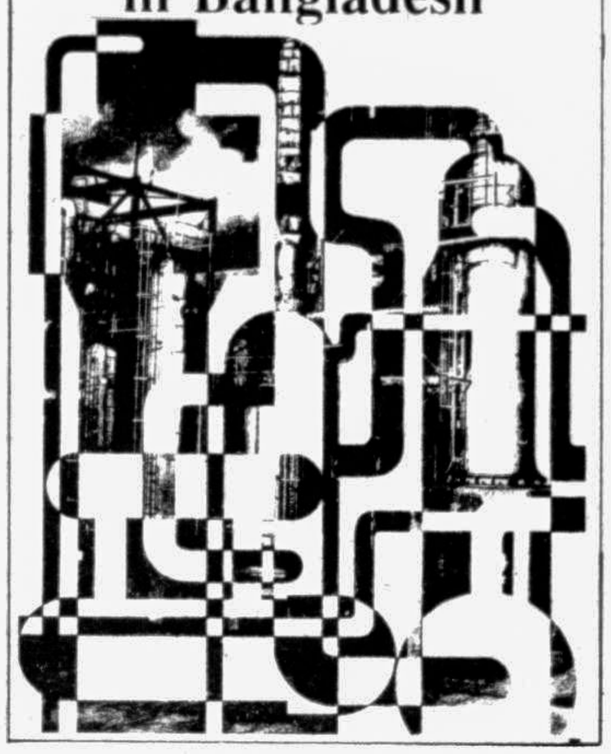
Book Review

Choice of Technology
Fertilizer Manufacture in Bangladesh

by M M Huq and K M Nabiul Islam
University Press Ltd, Dhaka, PP 108+xii, Price Tk 225.00

(Reviewed by Mizaffer Ahmed)

IN Bangladesh development literature of technological economics is generally absent. Alinur Rahman and Quazi Hesanuddin Ahmed had addressed such issues in the context of textiles industry in early 80s; later Quazi Hesanuddin Ahmed also addressed similar concerns about fertilizer units. It is heartening to see new additions to this much needed area of enquiry. Bangladesh suffers from donor conditions, and supplier indentor-dominated choice of technology. This has led to lack of awareness about the choices available, preparedness for absorption and adaptation of technology and comparative analysis of productive efficiency.



In the case of 'Fertilizer Manufacturing', the authors addressed the issues of scope of technology choice, extent of search for appropriate technology and achievement of indegenous technological capability.

In doing so they begin with the description of structure of industry in Bangladesh and of fertilizer industry in some detail. They have discussed investment, sources of technology, the production process, capacity utilization, employment, local participation in design and supervision, production cost structure and return on investment. After these factual but descriptive presentation they have proceeded to look into comparison of alternative technologies on the basis of factor intensity, profitability, social rates of return scale economies etc.

The conclusion that emerges is that despite phenomenal growth of this sophisticated industry through donor accommodation, the technology is controlled by few suppliers from developed countries and the indigenous technological capacity is lacking. The authors found higher capacity utilisation in smaller plants and rate of return on net assets were found to be low due high capitalisation. The authors suggest that improved technological variant with large scale operation has better possibility to become economically viable particularly with full capacity utilization.

Such studies are welcome particularly for planners and policy-makers.

Almost a similar analysis has been carried out for leather manufacturing sector which is not so organised and not dependent on donor dictates.

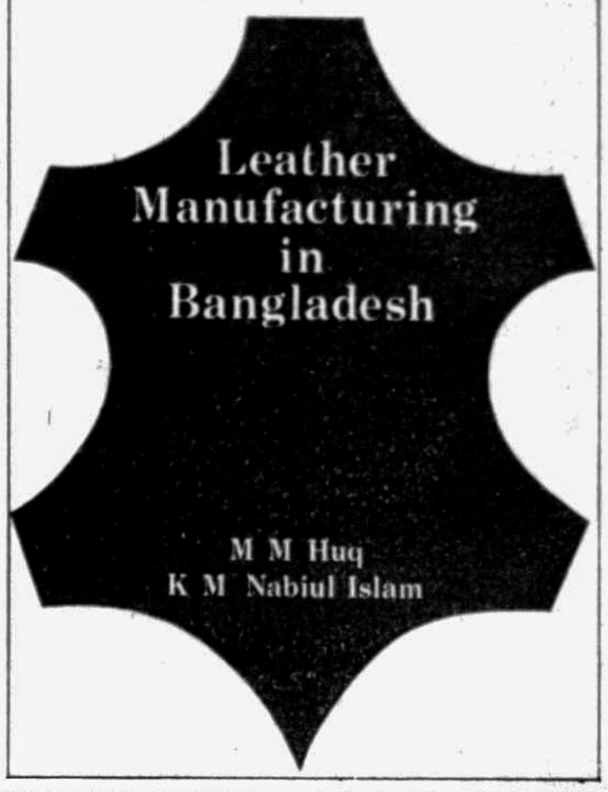
Here the findings confirm limited local manufacturing ability of even simple equipment. The choice seems to be for European machines where precision is important and for Indian ones for sub-processes.

Such combination of low cost simple sub-process with high cost high precision machinery has given this export industries substantial rate of return even when there exists significant underutilised capacity.

The researchers have found that availability of credit for imported machinery and non-protection of indigenous producers of simple machinery have restricted the growth of technological sector related to leather manufacturing. The researchers have also underscored the need for a research and development organisation.

These two books will be highly useful for policy-makers particularly those associated with industry, technology, commerce and finance.

Researcher in this area would also benefit from this.



Electric Vehicles : Gearing for the Future

by TV Padma

FRANCE is gearing itself to run environment-friendly electric vehicles that produce neither noise nor smoke, in the hope of solving in one stroke the twin problems of catering to the ever-increasing demand for vehicles and reducing pollution on roads.

The French group PSA (Peugeot) recently introduced two new electrical vehicles — a little car and a scooter.

The car, called Citela, (City Electrical Automobile) is a prototype under the Citroen car make. It can go upto 210 kms per hour at a speed of 40 kms per hour, reports the French newsletter CEDUST.

Its maximum speed is 100 kms per hour which means that the driver can travel on a big city ring road at a sustained speed of about 80 kms per hour without consuming too much energy.

The compact car — 2.96m length and 1.55m breadth — takes six hours to be recharged.

PSA hopes to commercialise such electrical cars fairly soon, and expects its electric models to be priced at the same value as their petrol engine counterparts, excluding the battery pack.

The second PSA vehicles is a Peugeot motorcycle which can travel at 40 kms per hour and is easily reachargeable.

Electric vehicles run mostly on sealed leadacid or alkaline nickel-cadmium batteries. The sealed lead-acid battery is an advanced water-tight version of the traditional lead-acid type, with electrolyte in the form of a gel and no need for periodic maintenance.

Although much costlier than lead-acid batteries, nickel-cadmium cells offer three attractions : more energy-to-weight ratio, nearly double power-to-wight ratio and more than treble the lifespan.

Currently battery recharging takes upto 10 hours, though nickel-cadmium batteries can be recharged more quickly. Scientists are working on improved nickel-cadmium cells that need only annual servicing, which they hope will be ready by 1994.

CEDUST says an electrical motor will be able to cover a million kms without any problems on a nickel-cadmium battery which lasts around 10 years.

Although several types of advanced highpower batteries are available to run these vehicels the road to commercial manufacture of electric vehicles had been strewn with obstacles.

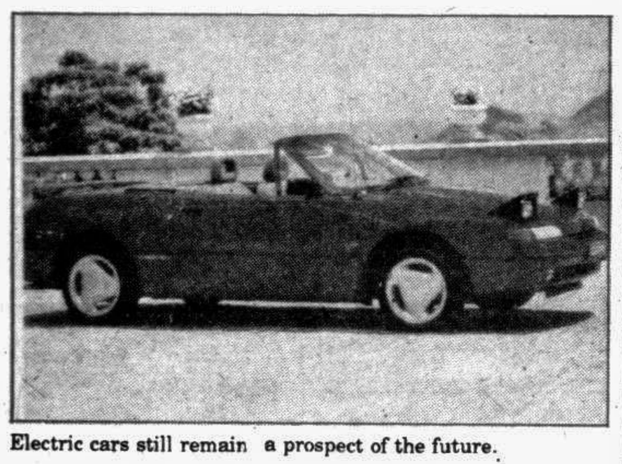
The most daunting of these is the enormous wight of the batteries needed : about 225 kg or a quarter ton of lead-acid batteries are needed to substitute for one litre of petrol.

And ,unlike the petrol or diesel tank that can be refilled in a few minutes, it takes several hours to recharge the batteries. That is, provided a battery-recharging infrastrueture is available on the lines of petrol filling stations that can be erected on most roads.

But some European countries have now launched major projects to run battery-powered vehicles on roads, involving not merely the research laboratories but also automobile manufactures.

For them the benefits of reduced smoke emissions and noise pollution, and lesser dependence on fossil fuels, seem worth the trouble involved in overcoming these hurdles.

Besides PSA, Renault is offering van models somewhat resembling delivery vans, with speeds upto 90 kms per hour,



Electric cars still remain a prospect of the future.

to administrative services and local authorities.

German electric cars are being tested on the Baltic Island of Rugen where 39 passenger cars, 20 vans and trucks and three small buses are being tried over a three-year period.

French experts estimate that an electric vehicle in France would cost only 6-10 Francs (approximately Rs 30-50) per 100 kms to run, compared to an average of 50 Francs (Rs 240 approximately) per km for a petrol-driven car. Improvements in battery and electric motor technology are expected to cut costs even further.

With French public opinion getting increasingly inclined towards electric vehicles. France's state-owned electricity supplier Electricite de France (EdF) is taking the initiative by placing an order for 250 sealed lead-acid battery driven Peugeot J5 electric vans which PSA started to commercialise in 1990 on a small scale.

EdF has also placed an order for 250 Renault vans for use at nuclear power plant sites, says French Science and Technology.

The major drawbacks with the Renault vehicles are their life and the load of the batteries. Their life is limited to 100 kms after which the engine has to be recharged for six hours and the batteries are bulky.

Renault is launching a pilot project operating in the French town Chatellerault, involving ten electric van, minibus and flat-truck versions. The vehicles, operating on nickel cadmium batteries, can run for 120 kms at a speed of 80 km per hour.

PSA's future plans include 50,000 small electric passenger cars (electric versions of some existing Peugeot and Citroen models) in 1994 for the European second car market which they estimate at 400,000 vehicles per year in 1995.

A number of minor French manufactures too are trying small-scale commercialisation of electric vehicles with chassis made from composite materials, specifically designed for electric propulsion.

And one French manufacture has been producing for the past few years relatively cheap electric minicars, which not only may be legally parked on footpaths, but even driven without a license.

The second-generation German electric vehicles with speeds upto 120 kms per hour are being tested on Rugen as part of the largest ever German project on electric automobiles, involving the German Automobile Association, the Federal Ministry of Research and several German companies.

They are driven by newly developed high-power batteries which have relatively longer life, can be recharged upto a thousand times and need replacing after about 150,000 kms. It takes less than 30 minutes to charge the battery.

French scientists have also initiated as part of their clean vehicle programme a project to develop and run a gas-turbine series-hybrid vehicle approaching 500 kms, close to that of the best thermal-powered vehicles.

On the road, the gas turbine which is more efficient and compact and less polluting than an internal combustion engine, produces electricity via an alternator.

Once in the city, the driver would cut the turbine and switch to an all-electric system.

Once the batteries are exhausted, a press on the accelerator would be enough to recharge them.

The gas turbine would be able to run on methane, diesel, heavy fuel oils and even hydrogen as well as on petrol, and its life span is expected to be form 20-30 thousand hours, compared to 4-5 thousand hours of an internal combustion.

Its main drawback is the complex reducers needed to couple it directly to the wheels.

British scientists tested a hybrid system in which an internal combustion engine, smaller than in a conventional car, runs to charge a battery pack which drives the vehicle.

Such systems can travel well beyond the 60 miles range of a lead-acid battery driven vehicle.

Demand-Driven Research and Extension for the Rural Poor

FUNDAMENTALLY the Grameen Bank approach is adopted by IFAD in developing sustainable research and extension systems oriented to the poor. In the National Agricultural Extension and Research Project in Zimbabwe, IFAD strengthened the national research system and helped it change its focus from large-scale estate farmers to small-scale African farmers. Part of this reorientation involved support for farming systems research of particular relevance to small farmers, especially when linked with local technology testing. Particularly strong linkages between small farmers and extension were developed in the Minya Agricultural Development project in Egypt and the National Extension Project in Kenya. The Minya project encouraged research scientists and extension specialists to visit resource-poor farmers for two to three days each month. Regular field days were also organized for farmers to visit research stations. Contact with poor farmers was sought through a ratio of one village extension worker per 200 farmers, out of which 20 were chosen in consultation with village members as "contact farmers" to be visited once every two weeks. The function of these contact farmers is to pass on messages, whether from lab-to-land or from land-to-lab, and strengthen the links between the two. A measure of this system's effectiveness is shown by a rapid increase in the practice of intercropping maize and soya beans — a new technique which has swept through the project area with excellent results. Lessons learnt at Minya have been used to adapt subsequent projects.

The National Extension Project in Kenya, supported by IFAD, was designed to strengthen the links between extension and adaptive research by the Ministry of Agriculture, to facilitate a flow of technology to the poorest farmers. Feedback from these farmers was to travel via the same links back to the research establishment. Monthly workshops have brought research centres closer to the extension service in each district. These workshops review technical recommendations for the coming four-week period and discuss feedback by front-line extension staff. Researchers and extension staff jointly undertake monthly field visits prior to the workshops so that researchers have an opportunity to interact with extension staff on the farmers' fields. Crop, soil and water management methods were developed during research on farms. District farm management officers and farming system economists based on research stations were made jointly responsible for ensuring that trials took note of labour and cash constraints, that both technical and non-technical factors influencing farmers' decisions were taken into account, and that patterns of inputs use were recorded and yields measured. A status report on this project indicates that it has led to an increase in maize production of 85 percent, and to significant increases in bean, coffee and milk production. This is a direct result of regular training and logistic support for extension officers and, most significantly, of improved two-way links between research and extension.

An essential element of improvement in research and extension is closer consultation with farmers, and nowhere is this more critical than in the area of soil and water conservation. An interesting example of this, involving strong farmer identification of issues and means, is provided by IFAD's Special Country Programme in The Niger. The Special Country Programme aimed to reduce the vulnerability of the country's agriculture to drought and desertification by means of three sub-programmes, including one dealing with soil and water conservation. Under this sub-programme conservation techniques were emphasized as a means of increasing yields; it was designed to improve water harvesting and soil moisture retention by using micro-catchment techniques, which are simple, efficient, and replicable. In consultation with the farmers the space between contour ridges was enlarged to save both land and labour in the construction of stone bunds.

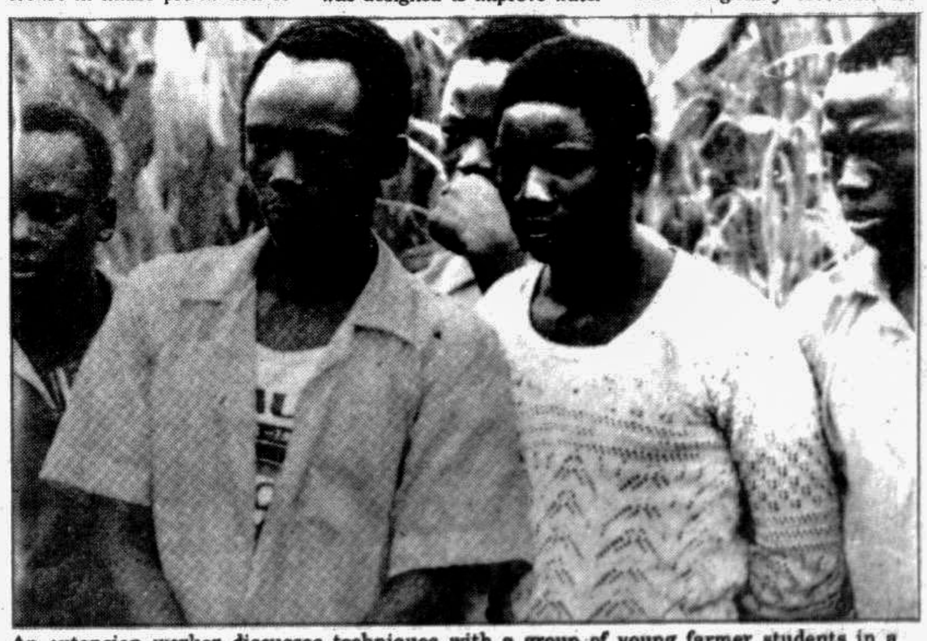
A process of discussion and exchange between programme managers and intended beneficiaries was initiated with, the dual objective of clarifying the technical innovation to be carried out and understanding the perceptions and apprehensions of farmers regarding them. The farmers eventually agreed that the conservation techniques could be tested and demonstrated. The increase in yields of sorghum and millet during the first year of the programme were well beyond farmers' expectations and, during the second year, they willingly adopted the recommended soil and water conservation techniques on 1,000 ha of cropland — an area large than originally foreseen for that year. However, another round of consultations was necessary to come to an understanding with the beneficiaries on the incentive system which would compensate for farmers' labour used to adopt conservation measures. Initially, the farmers expressed their preference for a food-for-work programme while the project management suggested tools-for-work, community infrastructure-for-work (village wells, grinding mills, etc) and credit through cereal banks. Following an exchange of views, the options suggested by the project management were accepted although it was agreed that the food-for-work will be considered under exceptional circumstances such as drought.

Such participative approach to the selection of techniques and compensation measures gained the confidence of the farmers and persuaded them to adopt longer-term conservation measures as their short-term survival concerns were addressed to their satisfaction.

IFAD's demand-led approach to extension has evolved to its fullest point in the Promotion of Technology Transfer to Peasant Communities in the Highlands Project in Peru.

Following an extension market approach, farmers are being supported with financial assistance to contract extension support from the suppliers (Government, NGOs, individuals and universities) which the farmers themselves consider to be the most effective.

To strengthen supply, the project will train extension workers in subjects identified by communities as being of prime concern, while making demand more sophisticated through the training of high school students returning to their communities. The project establishes ceilings for project financial support, beyond which farmers themselves must finance services. Farmer groups contracting services will graduate from direct project financial support after three years. — (IFAD)



An extension worker discusses techniques with a group of young farmer students in a country school in Kenya