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RESEARCH GAP ANALYSIS

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My understanding of the research gap is the gap which exists between our present level of research and that of other advanced nations. I would like therefore to start my talk by reading to you a page or two from the book on Mohammad written by sir John Glubb in 1970. Glubb Pacha you will recall lived in Amman a good part of his life. He is not a moslem. He is a Christian. He writes on page 372 on the Arab civilization from the times of Muhammed to the end of the Omaids and the Abbasids.

He writes further. This period of enthusiastic conquest may be said to end with the death of Mouawiya in 680. Then he goes on to say' After 732, a hundred years after the Apostles death, conquests virtually ceased, but by this time, the empire was so vast that it had no foreign rival. It remained the world's greatest power until it fell apart from internal degeneration.

Internal degeneration is the reason why research as everything in life have deteriorated in our part of the world. The reason for such degeneration may be due to:

1- Religous enthusiasm has faded out.

2- Indulgence in materialism and wealth.

Let us now talk specifically on research and the gap existing between our Nation and other advanced Nations.

Advancement of research depends on many factors,important among which are:

1- Trained research scientists.

2- Research facilities.

Training Research Scientists.

The majority of research in Egypt is undertaken for the sake of promotion of scientific staff and for obtaining the degrees of M.Sc. and Ph.D. Very little research is done to promote scientific ideas. The

majority of the published papers are repititions of already known results. They lack accuracy which is fundamental for drawing up valid conclusions. There is very little usefule discussion. The authors in the majority of publications entertain discussions which only show the results to be in agreement with or do not agree with other authors without explaining even the reasons of agreement or disagreement. This in itself shows that the work has been done before and mostly dose not need to be repeated. because many of the research is repitition of work done before, the references given at the end of the publication are usually old and rarely could we find a recent reference on the subject. It is unfortunate also that we have allowed the release of so many journals in Egypt. Almost in every Faculty of Agriculture there is a scientific journal in general agricultural sciences and branches. In many of these scientific journals the quality of editing is rather low.

The life and times of Muhammad

Arab civilisation was, of course, built on the ancient cultures of Greece, Rome and Parsia. The works of the Greek philosophers and physicians were translated into Arabic and incorporated into Arab culture. But, in every field of learning, the Muslims added to and improved culture which they inherited.

Medical schools were extremely active in Baghdad in the ninth century under the Abbasid Khalifs. Medical students underwent four years of training, at the end of which they were obliged to pass their final examinations before they were allowed to practise. Arabic textbooks on medicine and ophthalmology were standard works in European universities until the sixteenth century.

Arab astronomers measured the circumference of the earth with surprising accuracy, eight hundred years before Europe recognised that the world was not flat.

Their most outstanding contribution to human knowledge, however,was in the field of mathematics. It was they who introduced to the Western world the use of zero and with it our modern system of writing numbers in tens, hundreds, thousands and so on. All modern mathematics is founded on this discovery. The clumsy Roman system of writing numerals had, until then, been a bar to progress in mathematics.

The Arabs also invented algebra, trigonometry, logarithms and trigonometrical ratios, sine and cosine, tangent and cotangent.

"This brings us far beyond the point reached by the Greeks and really opens up the era of modern science." All this learning was widely diffused

among the people in the Muslim countries. For example, in Baghdad in the ninth century there were hundreds of bookshops. This general diffusion of learning was made possible by the fact that the Arabs introduced the manufacture of paper, which reached Europe ultimately from the Arabs in Spain and Sicily. At a time when even peasants and farmers could read and write in Muslim Spain, kings, princes and dukes in Christian Europe were mostly illiterate.

The Arab Empire enjoyed naval command of the Mediterranean and of the Indian Ocean. Their commercial vessels plied to Indonesia and the Far East. In Canton, China, Arab business men had a reservation, just as Europeans had in the nineteenth century in Shanghai. At a time when European rulers kept their financial reserves in the form of sacks of coins, the Arabs had a well developed banking system. Their business men could cash cheques in Canton on their bank accounts in Baghdad.

From the seventh to the eleventh, the Arab Empire enjoyed a virtual monopoly of industry. Northern and Westren Europe was a purely agricultural area without overseas trade. It produced its own food and rough clothing and little else. In the Muslim world, textiles were probably the most prosperous and efficient branch of industry. The Arab Empire was the world's greatest producer of silk fabrics. Cotton goods, embroideries, carpets, satin, velvet, muslin (from Mosul), damask (from Damascus) were produced on a great scale. Carpets were used in profusion, though this luxury did not reach Europe until several centuries later.

Other industries were weapons, inlaid gold and silver work, glazed coloured tiles, pottery, lustre and glass. Architecture was a field of artistic activity in which the Arabs, combining the styles of East and West with many original features, produced some of the most beautiful buildings the world has ever seen.

Arabic culture continued the old bedouin tradition by treating was introduced to Europe. The classical Greek and Latin poets never discovered the art and beauty of rhyme.

It would be wearisome to prolong the catalogue. Suffice it to say that for five centuries after Muhammad, the Muslims dominated the world both culturally and militarilyas completely as Europe and America have done for the last two hundred and fifty years.

"But how," we may well ask, "was this rich and brilliant culture produced by the illiterate Prophet of Arabia and his primitive tribesmen?" Limitation of space will allow only a brief analysis of the process.

The tribes of Central Arabia, in the seventh century, were principally dedicated to war. The Messenger of God did not share this predilection. As we have seen, he was basically a religious enthusiast with a mangnetic personality which won over to his side great numbers of men amd women, if he had the opportunity to talk to them. Althought he found himself from time to time involved in fighting he owed his greatest successes to speech and persuasion. Militarily,his followers were for more successful after his

death than when he was alive and command.

Carra de Vaux in the Legacy of Islam.

Almost all the published research is not original in nature. It is devoid of new ideas in methodology or in planning of the experiment or in the originality of discussion.

Most of the research is of applied nature and never basic. In order to start research you should have a problem and you ask your self a question. Research has an element of experimentation. In every experiment there should be a control group for comparison.

Scientists in Egypt are promoted to a higher level automatically evrey five years. All they have to do is to submit a number of papers of mediocre standerd. Only under very rare conditions that their submitted research is rejected by the scientific committee.

Research Facilities

One cannot blame the research scientist for not being able to cross the gap because a lot of the failure is due to surrounding conditions. As Egyptian research worker in a foreign advanced country, having the correct scientific environment has always identified himself among the good research workers. Hence it is majorly the scientific environment in Egypt that detains our scientists from achieving the same level as they do in foreign institutes.

The present conditions can be described as follows:

1- Lack of research funds: The amounts of funds directed for research are very limited (e.g. 14000 LE/year for 20 departments, Faculty of Agriculture. University of Alexandria). Except for the few projects which are submitted by few research workers. it would have been impossible to carry out research. With the present available funds one cannot expect anything but mediccre research.

2- Lack of insentive: For reasons very well known to all research workers, there is very little insentive for research.

3- Poor laboratory facilities: with the high expence of laboratory equipments and chemicals and poor funding it has become almost impossible to carry out significant research.

4- Poor library facilities: Libraries have only a small collection of international journals. Any search in the literature cannot cover all the previous publications in the subject in question.

How to overcome these constraints:

Traning Reserch Scientists:

1- Scientists should be allowed to attend conferences especially international ones.

2- They should be allowed to travel on sabatical leaves once every four years to carry out research in advanced laboratories. Funds must be made available to cover travel expences and perdiem in either case.

3- The system of promotion must be changed so that staff members should receive increases in their salaries periodically but must never be promoted to professors unless they have made significant contreibution to science and/or technology recognised internationally.

4- A yearly conference on animal production must convene to discuss the recent publications.

Research facilities

1- Research funds must be made available through:

a- University budget: more money must be allocated through the government to allow for better research facilities. A certain percentage of the national income e.g. 2.5% should be allocated for research according to priorities set by higher authorities.

b- Raised by the different universities and research institutes through investment projects (an investment bank belonging to the university) undertaken by the different faculties. This requires that each university would be completely independant of other universities and of the Supreme Council of the universities. This is to enable each university to raise its own funds and secure its own activities,similar to the American University, Cairo.

c- Accept gifts to be directed towards scientific research.

d- Carry out research for the private and puplic sector industry.

e- Research projects to be financed by a financing body, e.g. Academy of science and technology, a private box within the Ministry of Education and possibly other concerned Ministeries such as the Ministry of

Agriculture for agricultural research in the Faculties of Agriculture and engineering, Ministry of health for Faculties of Medicine and so on.

f- Other means as suggested by members of boards of trusties may be suggested.

2-Laboratory facilities must be made available to research workers. All modern research equipment be subblied to research scientists. Means of maintaining and repairing equipment must be realized. It is suggested that an industry for building sofisticated scientific equipment in a joint investment venture with large industrial companies should be arranged. This would provide a good local and export market in arab and african nations.

3- Development of local libraries to comliment one another so as to cover most of the international literature required for the promotion of research, and to employ modern systems of dissipating knowlege to Egyptian scientists through films computors. video cassettes and tickers. Employing rigid systems of borrowing and returning them in a limited period and of producing photocopies of the articles.

Animal Production Research

This part will include a summary of a book on Animal Agriculture Research To Meat Human Needs in The 21st Century.

Scince"3/4th of the protein, one third of the energy, most of the Ca and P and substantial amounts of essential vitamins and other minerals in the American diet are from animal products."it was thought imperative to have a meeting with over 210 scientists, economists, engineers, political scientists and other in ten working groups to address the critical challenges facing animal "Their goal was to identify priorities for future research to enable animal agriculture to efficiently and effectively serve human needs in the 21st centure."

In the conference imperatives the following keynote was given:

"Every great advance in science has issued from a new audacity immagination."

The participants of the conference set forth six categories of high priority research:

1- Resourse conservation.

2- Human health

3- Systems research.
4- Communications.
5- Biological engineering.
6- Analytical methods.

Rsource Conservation.

It has been agreed by all groups to reduce fat in animal products and to increase efficiency of protein synthesis. It was recommended "to reduce erosion and pollution."

- "to harvest nutrients in animal waste."
- "promote use of noncompetitve feed stuffs such as lignocellulosic material".
- "to exploit legumes "(and non legumes, I add)" to fix nitrogen."

Human Health

"Transfer of resistence factors between pathogenic species.

"Preserve environmental quality and natural resourses for future generations."

Systems Research

"Qualitative modelling to evaluate strategies for resource allocation and utilization.

"To deal with the sensitive relationships and linkages among animal agriculture."

Communications

Research results "to be expressed in ways to improve communication and level of understanding between the body politic and policy makers."

Biological Engineering

Recommended easearch included:

-Research "intended to regulate body protein and fat deposition.
-Improve gut microbial population.
-Understand factors controlling apetite.
-Improve disease resistence and immunity.
-Provide basic knowledge on gene splicing,sexed semen and embryo transfer.

Manipulating animal and plant resources including unlocking cellulose for use by animals.

Analytical Methods.

"Develop more precise and efficient analytical tools." Animal Nutrition and Digestive Physiology.

A Holstein cow producing 25000 kg milk in a single lactation season consumes 64 kg dry matter/day."The proportion of her nutrient intake used for milk compared to that used for maintenance was markedly greater than that of the average cow."

How is the efficiency of such a cow regulated?

What governs the huge amounts of feed intake?

How to achieve results with more limited resources?

The following research imperatives were suggested:

1-"Cellular processes associated with protein synthesis and animal growth. Basic factores that limit the rate and extent of muscle growth and protein synthesis into animal products as well as those concerned with the development of adipocytes and fat deposition have not been defined. An understanding of these mechanisms will permit manipulation by nutritional,endocrinologicl selective breeding and maximize product output."

2- "Interelationships between alimentary microbial ecosystems,digestive processes and host animal. There is an urgent need for knowldge on the nutritional requirements of the microbes in all sections of the alimentary tract and how they may be manipulated to improve animal performance."

3- Nutrient requirements for different physiological functions.

4- "Controlling feed inake to maximize animal efficiency."

5- "Integrated nutrient management to enhance production efficiency. Availability and costs of conventional and non conventional feedstuffs and other nutrient resoutces must be integrated for cost effective animal production."

6- "Nutritional characterization of feedstuffs. There is an urgent need for rapid and economical techniques which accurately characterize all nutrients as well as thier bioavailability to animals.