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THE IMPORTANCE OF ACCOUNTABILITY IN AGRICULTURAL EDUCATION

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1 INTRODUCTION

A number of global factors have a definite influence on how the world deals with the need for food and the related agricultural requirements affecting such food supply. Agriculture is continuously in a cycle of improvements in order to produce more against any adversity relating thereto. One may argue that one can do little in one's little corner to resolve the global agricultural problems. The solutions are, however, in the hands of everyone involved in whatever aspect of agriculture.

Some examples of factors that affect the need for more and better agriculture are quoted below. Such factors impact directly on agricultural education and training. It therefore requires little argument that mechanisms must be devised to ensure accountable agricultural education and training of adequatee quality. Improved agriculture requires improvements in the knowledge base of agriculturalists and therefore improvements in agricultural education, training and research.

2 TRENDS AFFECTING AGRICULTURE

(Encyclopedia Britannica 2001)

The need for adequate education and training in agriculture may be demonstrated by reference to a number of factors affected thereby. Such factors may have an impact on the global scale rather than on the local situation, but must nevertheless be taken cognizance of. It illustrates the fact that we cannot neglect education and training in agriculture.

2.1 Population growth

There have been two major population explosions in the course of human social evolution. By the end of the Paleolithic period the world's human population is estimated to have been between five and six million 0,04 persons per square kilometer of the Earth's land area). Following the Neolithic or agricultural revolution, the population made its first major leap, reaching over the short span of 8,000 years around 150 million by the year 1000 BC (0,8 persons per square

kilometer). For the next two and a half thousand years there was relatively little change. World population had reached about 500 million by the middle of the 17th century. From about 1700 there was a second and far more rapid population explosion. Since the late 1600s the world's population has increased more than eightfold, reaching 4.8 billion by the mid-1980s.

The world population, which did not reach its first 1 billion until about 1800, added another 1 billion persons by 1930. The third billion was added by 1960, the fourth by 1974, and the fifth before 1990. Mortality declined during the 19th century in Europe and North America while mortality and fertility remained high in Asia, Africa and Latin America. Mortality decreased in the last-mentioned countries from the 1930s. The rapidity of the resulting growth, which some described as the "population explosion," was due to the sharpness in the falls in mortality that in turn were the result of improvements in public health, sanitation, and nutrition that were mostly imported from the developed countries. In Asia and Latin America persons marry early and almost without exeption. In Europe marriages take place late and many persons never marry.

Since the 1960s both mortality and fertility rates have decreased, and the annual growth rate has fallen moderately, to about 1.7 percent. Even at this lower rate, because it applies to a larger population base, the number of people added each year has risen from about 68,000,000 to 80,000,000.

By 1960 many developing countries had rates of increase as high as 3 percent a year, exceeding by two- or threefold the highest rates ever experienced by European populations. Since a population increasing at this rate will double in only 23 years, the populations of such countries expanded dramatically. In the 25 years between 1950 and 1975, the population of Mexico increased from 27,000,000 to 60,000,000; Iran from 14,000,000 to 33,000,000; Brazil from 53,000,000 to 108,000,000; and China from 554,000,000 to 933,000,000.

In Africa population growth has accelerated from 2.6 percent to more than 3 percent over the same period, following belated significant declines in mortality not accompanied by similar reductions in fertility.

If the time taken to double the world's population over the past 350 years is taken as a measure, then the doubling time is seen to have been shrinking fast. It took 200 years, to 1825, to double the world's population from 500 million to one billion. It took only 100 years to achieve the next doubling, bringing the total to two billion by 1930; and only 45 years to achieve yet another doubling, to four billion by 1975. There were signs of slowing in the last part of the 20th century, and clearly this accelerating pace could not last indefinitely. Even so, many experts predicted eight billion by early in the 21st century, a reduction in the doubling time to about 40 years.

2.2 Industrialisation

It was in Western Europe, with the Industrial Revolution, that the second population revolution began. Europe's population doubled during the 18th century, from roughly 100 million to almost 200 million, and doubled again during the 19th century, to about 400 million. It was in Europe, too, that the pattern first emerged that has come to be known as the "demographic transition". The populations of non-industrial countries are normally stable (and low) because high birth rates are matched by high death rates. With industrialisation, improvements in medical knowledge and public health, together with a more regular food supply, bring about a drastic reduction in the death rate but no corresponding decline in the birth rate. The result is a population explosion, as experienced in 19th-century Europe. In time, however, as European societies showed in the early 20th century, the urbanised populations of industrial societies voluntarily lower their birth rates and population growth flattens out. A new population plateau is reached. Japan, industrialising some 50 years later than the West, provided an almost textbook demonstration of the pattern of the demographic transition. Its population grew rapidly after 1870, during its

industrialising phase, and leveled off equally rapidly after World War II. In an even more speeded-up form, the Soviet Union in its century of industrialisation that began in the 1880s illustrated the link between industrialisation and population.

Does the demographic transition hold good for the developing societies known as the Third World? Nearly all of these countries experienced rapid population growth after World War II, at rates greater than had ever occurred anywhere in the West. Western aid and medical science spectacularly reduced the high death rates, often by more than 50 percent. But, unlike those in the West, the high birth rates showed little tendency to fall. Determined efforts in a few countries, such as Singapore, Sri Lanka, and China, were beginning to yield some results by the 1980s. But on the whole the attempts by national governments and international agencies to persuade non-Westerners to have smaller families had failed. One result was the persistence of predominantly youthful populations in societies that could least afford the burden of feeding and educating their nonproductive young. People under 15 made up more than 40 percent of the populations of the Third World, as compared with between 20 and 30 percent in the industrialised world.

It was argued that the birth rate remained stubbornly high in these societies partly because industrialisation was so slow and fragmentary in the Third World. In addition, where any significant development had taken place, as in Brazil or Malaysia, it had only really affected a small elite; the mass of the people were untouched. Thus, the reasons people in the industrialised West chose to have fewer children lacked cogency in underdeveloped countries. It remained rational for the bulk of the population to continue to have large families both to share in manual labour and to provide security for parents in their old age. Lower fertility would come, it was argued, when wealth was more evenly distributed and social security systems well established.

2.3 Land scarcity and redistribution

Population growth necessarily has had to result in higher demands for agricultural land in order that populations may be fed. Recent developments in Africa and particularly in neighbouring Zimbabwe illustrate the urge for the redistribution of land among populations. Less available land must produce more food.

2.4 Agricultural developments

Agriculture is the science or art of cultivating the soil, growing and harvesting crops, and raising livestock. The art of making land more productive is practiced throughout the world--in some areas by methods not far removed from the conditions of several thousands of years ago and in other areas, with the aid of science and mechanization, as a highly commercial type of endeavour. Agriculture still drafts into its service more of the world's aggregate manpower than all other occupations combined.

Agriculture has no single, simple origin. At different times and in numerous places, many plants and animals have been domesticated. How many species passed into or out of domestication in prehistory is not known. Cultivation of foxtail millet in America and domestication of the elk in Scandinavia and the gazelle in the Middle East were abandoned long ago. In the 20th century, cultivation of bottle gourds, finger millet, and Galla potatoes is on the decline, while efforts proceed to tame the eland, musk ox, and fox. Cultivation of rice, wheat, barley, potatoes, and corn (maize) met with great success in the favourable climate that followed the last Ice Age, while reindeer husbandry, by contrast, found these climatic changes unfavourable and lost importance.

Agriculture was long believed to have begun in a single centre in the Middle East, about 4000 BC. Modern dating techniques have since disproved this hypothesis; they indicate agriculture already in progress about 7000 BC, and archaeologists have uncovered evidence of animal domestication thousands of

years earlier. It has also been shown that some plants were probably cultivated in the New World, which suggests that agricultural development took place simultaneously in many areas and thus did not spread from a single originating centre.

Nineteenth-century scholars hypothesized four stages in human development: (1) a savage stage in which all people were hunter-gatherers, (2) a herdsman or nomad stage during which man domesticated some animals, (3) a farming stage, and (4) civilization. Researchers have since attempted to determine when and where man first changed from hunter-gatherer to pastoralist or agriculturist.

Scientists of the 18th century had established the principles that governed plant life. About 1837 the English agriculturist Sir John Bennet Lawes began to experiment with the effects of manures on plants and crops. In 1842 he patented a process for treating phosphate rock to produce superphosphate and thus initiated the synthetic fertilizer industry. In the following year Lawes enlisted the services of the English scientist J.H. (later Sir Henry) Gilbert, with whom he worked for more than half a century, performing experiments on crop and animal nutrition. The work of Rothamsted Experimental Station, which Lawes founded and endowed, became world renowned. At the same time, similar work was carried out in France, Germany, and the United States.

Though a considerable number of books on agricultural subjects appeared during the 19th century, their effect was perhaps less than that of the measures taken to promote agricultural education in most European countries. Though schools for farmers had been established in some German states in the 18th century, the first professorships of rural agriculture and economy were established at Oxford (1790) and Edinburgh (1797). Though similar events took place in France and Germany in the 19th century, a key date in the history of agricultural research and education is 1862, when the U.S. Congress set up the Department of Agriculture and provided for colleges of agricultural and mechanical arts in each state.

Agricultural technology has developed more rapidly in the 20th century than in all previous history. Though the most important developments during the first half of this century took place in the industrial countries, especially the United States, the picture has changed somewhat since the 1950s. With the coming of independence, former colonies in Africa and Asia have initiated large-scale efforts to improve their agriculture. In many cases they have used considerable ingenuity in adapting Western methods to their own climates, soils, and crops.

2.5 Mechanisation

The internal-combustion engine brought major changes to agriculture in most of the world. In advanced regions it soon became the chief power source for the farm.

The first applications to agriculture of the four-stroke-cycle gasoline engine were as stationary engines, at first in Germany, later elsewhere. By the 1890s stationary engines were mounted on wheels to make them portable, and soon a drive was added to make them self-propelled. The first successful gasoline tractor was built in the United States in 1892. Within a few years several companies were manufacturing tractors in Germany, the United Kingdom, and the United States. The number of tractors in the more developed countries increased dramatically during the 20th century, especially in the United States: in 1907 some 600 tractors were in use, but the figure had grown to almost 3,400,000 by 1950.

Major changes in tractor design throughout the century have produced a much more efficient and useful machine. Principal among these were the power takeoff, introduced in 1918, in which power from the tractor's engine could be transmitted directly to an implement through the use of a special shaft; the all-purpose, or tricycle-type, tractor (1924), which enabled farmers to cultivate planted crops mechanically; rubber tires (1932), which facilitated faster operating speeds; and the switch to four-wheel drives and diesel power in the

1950s and 1960s, which greatly increased the tractor's pulling power. The last innovations have led to the development of enormous tractors--usually having double tires on each wheel and enclosed, air-conditioned cabs--that can pull several gangs of plows.

2.6 Irrigation and drainage throughout the world

The FAO (Food and Agriculture Organisation) is the oldest permanent specialised agency of the United Nations, established at the end of World War II with the objective of eliminating hunger and improving nutrition. The FAO seeks to coordinate the efforts of governments and technical agencies in programs for developing agriculture, forestry, and fisheries.

The FAO carries on research; provides technical assistance on a project basis to individual countries; operates an educational program through seminars and training centres; maintains statistics on world production, trade, and consumption of agricultural commodities; and publishes a number of periodicals, yearbooks, and research bulletins.

An Indicative World Plan for Agricultural Development was issued in 1969, analysing the main problems in world agriculture and suggesting strategies for their solution. From the 1960s on, the FAO concentrated on programmes for the development of high-yield strains of grain, the elimination of protein deficiencies, the provision of rural employment, and the promotion of agricultural exports.

The Food and Agriculture Organization of the United Nations (FAO) keeps the most complete statistics on irrigated lands; it estimates that in the entire world some 520,000,000 acres (211,700,000 hectares) are irrigated. FAO data, supplied by each country, indicate that the largest areas under irrigation are located in such countries as the People's Republic of China, India, Pakistan, and the United States. More than 130 countries report some acreage under irrigation. The largest area reported was estimated as 113,700,000 acres (46,000,000 hectares) in the People's Republic of China. Asia, excluding the former Soviet

republics, irrigates close to 65 percent of the total area of the world that is irrigated; most of this is the large surface-irrigated, rice-producing areas of the People's Republic of China, India, Pakistan, and Southeast Asia. The United States has approximately 10 percent of the world's irrigated areas. Europe has roughly 7 percent, South America and Africa each about 4 percent, and Central America about 3 percent. Australia and New Zealand together have 1 percent or less. Sprinkler irrigation is employed throughout the world, but the largest acreage to make use of the sprinkler method is the approximately 9,900,000 acres (4,006,500 hectares) in the United States.

Statistics on drainage improvements are sparser than statistics on irrigation. It may safely be said that drainage in one form or another is practiced in almost every country of the world. It is now universally accepted that drainage is needed as much on irrigated as on non-irrigated land. Countries such as India that have large-scale river-basin developments planned with irrigation also have companion drainage systems planned so that the land will not be damaged by salt accumulation.

It is almost certain that the land area of the world improved by irrigation and drainage will continue to increase because these practices are two of the most elemental means of reclaiming and improving agricultural lands.

2.7 Food scarcity

At the end of the 1995-96 crop year, grain stocks were only 14% of world grain consumption--the lowest in decades. Nine years earlier, stocks had been 28% of consumption. In addition, considerable quantities of stocks were located in countries such as China, where they were not available to world markets. As a result, there was virtually no grain safety net to protect the world's consumers from a poor grain harvest in 1996-97. Because of the rapidly increasing livestock numbers in the less-developed countries, the world demand for grain was rapidly expanding. Fortunately, a record world grain harvest in 1996-97 and in 1997-98

were able to satisfy demand and provide a small recovery in world stock levels. Even so, grain stock levels at the end of the 1997-98 crop year were expected to be slightly below the minimum recommended by the FAO to provide protection against the possibility of a poor harvest in 1998.

A study by the U.S. Department of Agriculture's (USDA's) Economic Research Service showed that 9 million-11 million tons of food aid in the form of cereals were estimated to be needed during the 1996-97 crop year to raise food consumption in hard-hit less-developed countries to target levels. The target was the average of their food consumption in the previous five years--a figure that was still far short of their minimal nutritional needs. Food needs in those countries were less than in previous years because of their improved harvests and increased commercial food purchases. The FAO reported that aid shipments of cereals by donors, principally the U.S. and the EU, during the 1996-97 reporting year totaled slightly under five million tons--which was far short of food-aid needs.

In general, food production in 1997 continued to improve in countries defined by the FAO as "low-income food-deficit," increasing 2% over 1996. Food emergencies continued to exist, however. The FAO identified food emergencies in 31 countries in 1997, up from 25 the previous year. Most were in Africa.

Even so, the African situation eased somewhat in 1997. The FAO estimated that food production in the continent declined slightly in 1997 from the record-high level of the previous year, and overall there was somewhat less civil strife. Emergencies did, however, exist. The FAO reported that Ethiopia and Uganda suffered crop failures and food shortages as a result of adverse weather and civil disorder. Food production was also seriously reduced in Somalia, Tanzania, Burkina Faso, The Gambia, Senegal, Cape Verde, and Malawi. The ravages of war continued to cut food production in The Sudan, Rwanda, and Burundi, but some recovery was evident in 1997 in the latter two countries. Food emergencies

also continued in Sierra Leone and Liberia. Civil strife in the Republic of Congo seriously disrupted food production and distribution in 1997.

The food crisis continued in North Korea during the year. A typhoon and severe drought in 1997 followed two years of destructive flooding of farmland in the nation. The disruptions of the Persian Gulf War and the resulting trade embargo continued to greatly restrict food supplies to Iraq. As a consequence, malnutrition was widespread. The UN-brokered food-for-oil trade agreement eased the food situation somewhat in 1997, but malnutrition persisted. The FAO reported that Mongolia continued to have food shortages. Papua New Guinea and Haiti suffered from very poor harvests due to prolonged droughts. In addition, four of the former Soviet republics--Armenia, Azerbaijan, Georgia, and Tajikistan--suffered food shortages as a result of poor weather and the disruptions of the transition to new civil and economic conditions.

3 AGRICULTURAL EDUCATION

A UNESCO report on higher education disclosed that annual attendance in postsecondary institutions throughout the world grew from 28 million students in 1970 to 65 million in 1991 and would continue to increase, reaching 97 million by 2015. In less developed countries enrollments over the 1970-91 period rose from 7 million to 30 million. The proportion of students at private universities increased, particularly in less developed regions, with the numbers of non-degree and part-time students also rising. According to the report, the financial burden of rapid growth tempted officials to limit spending on higher education. UNESCO's then director general, Federico Mayor, warned that yielding to that temptation would simply widen the gap between industrialised and non-industrialized societies. Sub-Saharan Africa had the fewest educational resources and opportunities of any region. Students in Africa were four times less likely to pursue postsecondary education than those in other less developed areas and 17 times less likely than those in the industrialized countries.

Public and private postsecondary enrollments in the U.S. were projected to increase slightly, to 15.4 million students. More than half of the students--nine million--were expected to attend four-year institutions. Two-year colleges were set to enroll an estimated six million. Proprietary schools and postsecondary programs were expecting one million enrollees, and degrees earned were projected to reach record levels. Federal officials expected seven million students to receive some type of financial aid by 1996.

Spending in the U.S. for public elementary, secondary, and collegiate education was projected to reach $433 billion in 1995. The cost of private education was predicted to reach $104 billion, and the head of the U.S. College Board said that most college students faced a heavily mortgaged future. His assessment was made in response to rising tuition and a decline in available federal grants and loans. Tuition increased at a 6% rate for the third year in a row, an increase greater than the pace of inflation. The annual cost of tuition, room and board, books, and personal expenses averaged $19,762 per student at four-year private colleges and $9,285 at state colleges. To make matters worse, Congress had been hammering out an agreement to trim billions of dollars from student loan programs as part of its move toward balancing the federal budget by 2002.

Agricultural education and training are major role players in the further upliftment of the quality of agriculture and food production. The parameters described below must be considered in determining the need for such education and training.

3.1 The levels of education

The need for education and training in agriculture at all levels can neverbe satisfied. The quality of such education and training at all levels becomes the more important, considering the discussion on world trends in agriculture above. In countries such as South Africa training at basic levels and in adult basic education and training (ABET) probably has to deliver the greatest numbers of

persons to the industry. Such persons form the major work force in agriculture and the better their training the better is the productivity attainable in the industry.

Agriculture orientation should be commenced with at primary school levels and should be continued at secondary school levels. The quality of such schooling will be critical in attracting persons toward careers in agriculture. It is gratifying that the government has introduced legislation for the establishment of a national quality assurance body to guard over the quality of education and training at further education levels.

The core of leaders in agriculture will be persons with higher education qualifications in agriculture and agriculture related fields. Susch persons will be the employment creators in the industry. The quality of their education is therefore crucial to the success of the industry. Higher education as all other levels of education, is a capital and human resource intensive activity, which is offered at high cost to the individual and the state. The South African government has also introduced legislation to provide for quality assurance in higher education. The Higher Education Quality Committee, a sub-committee of the Council on Higher Education is tasked with the remit of quality assurance in higher education.

3.2 The cost of education

Government subsidy to public higher education in South Africa is of the order of 60 to 70% of the total cost of higher education. The balance is payable from student fees and other contributions to higher education. The government contribution to higher euction is of the order of R7bn. It is to be expected that the government will want good control over the effective spending of that amount.

In traditional terms the Principal of the Grootfontein College of Agriculture recently expressed the cost of education at the college in 2001 to be of the order of the price of 6 head of cattle in the first year, 7 in the second year and eight in the third year. Any member of the public making such contributions to the

education of his/her child will obviously wish to be assured of the quality, the effectiveness and the efficiency of the effort that goes into the education.

3.3 The need for education and training

The autor has been involved in a high level study into the need for persons in South Africa with higher education level qualifications to the year 2010. The main conclusion could be that such projections are of utmost complexity and seldom very accurate. Too many factors influence the projections in midstream. It can nevertheless be stated that it is better to educate too many persons in certain fields such as agriculture than too few. Due to the transferability of knowledge at that level, persons will either find other employment or create employment through entrepreneurship for other persons.

Training in agriculture at higher education level needs to be of the best possible quality. The future demands on persons trained in agriculture is likely to become more sohisticated and complex than ever in the past. Mechanisms are therefore introduced for the validation of the quality of such training.

4 ACCOUNTABILITY

"What is this new interference in our autonomy and academic freedom?" and *"Surely we are the experts, how dare a bunch of outsiders come and tell us what is good and what is bad about our institution or programme?"*, were some of the questions often posed at the commmencement of external quality assurance in South Africa. One very senior Head of a University Department very aggressively expressed the view that he would rather retire before being subjected to such arrogance. He did retire.

Robert Pirsig (1974) stated:

> *"And what is good Phaedrus,*
> *And what is not good--*
> *Need we ask anyone to tell us these things?"*

Izadi, M., Kashef, A.E., & Stadt, R.W. (1996. p. 10) quote David Kemp, the then Australian Shadow Minister of Education as stating:

> *"Education has to be about excellence. If it is not about quality, then all our effort, all our expenditure will have been for nothing because we will not only have blighted the lives of our students, but damaged our ability to compete and survive in a world which does not owe us a living. We cannot have a world-class economy and a world-class living standard without a world-class workforce. And we cannot have a world-class workforce, without world-class education."*

Altbach (1991, p. 48) describes accountability as :

"Accountability means the justification of activities; it means the responsibility to demonstrate the achievement of certain gains by employing the most efficient means. In other words, accountability has to do with efficiency and effectiveness, with performance assessment, with truthfulness concerning information about activities designed to reach specific targets."

Altbach (1991, p. 49) distinguishes between the level-specific accountability and function-specific accountability. In level specific accountability the system level may be distinguished from the institutional level. In function-specific accountability Altbach distinguishes five sets of functions:

Teaching accountability;
Research accountability;
Consulting ("public service") accountability;
Learning accountability; and
Administrative, including fiscal, accountability.

The first three functions are related to the academic staff; the fourth function is related to the student body; and the fifth function is related to the administrative staff.

Improvement is only achievable with the full co-operation of all concerned within the institution. Improvement can hardly be enforced from outside. External quality assurance for this purpose must therefore aim at promoting improvement and getting the support of the staff within the institution. It is often argued that in external quality assurance for improvement, the staff are more inclined to reveal the existing shortcomings. In the external quality assurance with the view to satisfying the accountability requirement, it is argued that staff are more inclined to hide any shortcomings that may exist.

Donaldson, (1994, p. 107) lists a detailed quality framework as applied in Scotland. The following broad categories of aspects of quality assurance are used:

- *Aims and curricula*
- *Curriculum design and review*
- *The teaching and learning environment*
- *Staff resources*
- *Learning resources*
- *Course organisation*
- *Teaching and learning practice*
- *Student support*
- *Assessment and monitoring*
- *Students' work*
- *Output, outcomes and quality control.*

5 THE IMPORTANCE OF ACCOUNTABILITY

There can be no argument about the accountability of agricultural education and training. In direct or indirect ways the state, the public and private individuals all contribute financially to the provision of agricultural education and training. An

agricultural college principal recently expressed the cost of studying at his college to the student as 6 head of cattle in the first year. The question arises whether one can afford to have such capital invested into an education and training system that is not up to standard.

Considering that the individual who studies at a higher education institution is not only preparing for first employment, but for a life-long career, and that his or her success in functioning somewhere in the chain of agricultural activity will provide to a lesser or larger extent food for the masses, then it is beyond argument that accountable agricultural education and training must be provided.

Accountability is best measured by the practice of external quality assurance basd on the institutional mission and its internal quality assurance. The more transparent the process, the better is accountability satisfied. Transparency requires the presence of peers in the external quality assurance. Not only should academic peers be involved, but representatives of all role-players, i.e. employers, interested organisations and present and past students.

6 CLOSURE

It was hopefully demonstrated that higher education in agriculture must be:

- Of good quality;
- Seen to be of good quality;
- Satisfy the requirements of accountability;
- Transparent in the satisfying of the accountability requirements; and
- In line with what is generally acceptable good quality hgher education.

Agriculture is a critical industry that requires the involvement of practitioners of the best quality in order to feed the ever increasing population of the globe.

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FOR FURTHER READING

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