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IAASTD CWANA REPORT

CHAPTER 4 - SECOND ORDER DRAFT

LOOKING FORWARD: POLICIES, INSTITUTIONAL AND ORGANIZATIONAL ARRANGEMENTS FOR AKST DEVELOPMENT AND APPLICATION

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Key Messages

1. Trade globalization and market liberalization favor AKST as a key factor to improving CWANA agricultural products compositeness in domestic and international markets as well.

2. While adjusting to the new context, CWANA agricultural research portfolio has to cover newer issues in addition to conventional still pending agenda.

3. Agricultural productivity improvements will depend on substantial and deliberate investments in agricultural research and development in order to contribute to poverty alleviation, food security and economic progress.

4. Rising private ownership securing intellectual propriety rights will be likely to raise dissuasive barriers in accessing international research spillovers by developing countries. Self-reliant research policy is required to building domestic AKST capacity.

5. Compliance with food safety and quality assurance has been relatively slow and is mostly in response to importing countries' provisions to secure traditional export markets. In order to provide the required conditions for food safety and the adoption and implementation of standards, legislation needs to be enacted and strictly enforced.

6. Promoting participatory and cultural sensitive and multidisciplinary approaches, involving all stakeholders is a key element in fostering AKST systems at local, national and regional levels.

7. AKST effectiveness will require better interaction between agricultural education, extension and research institutions.

8. In order to ensure that generation and application of AKST is truly geared towards poverty and sustainability goals, the countries of CWANA region will have to provide transparent and participatory mechanisms to developing relevant policies and implementation mechanisms.

9. National agricultural research systems in CWANA region should be structurally empowered and their activities should be supported by national, regional, and international funds, in order to effectively meet national persistent agricultural technology needs.

10. CWANA countries present level differentials in AKST capacity building and capabilities. But, all are required to engage in radical changes to depart from doing business as usual.

11. If no public deliberate agricultural people centered policies are initiated, it is likely that AKST will fail in meeting IAASTD development and sustainability goals.

Introduction and scope

Throughout preceding chapters, AKST has emerged as a key driver of agricultural development and economic growth to achieving desired medium to long term development and sustainability goals (DSG) in the CWANA region. However, such an important role is unlikely to be effective unless concerns induced by continuing changes in the AKST context are appropriately addressed. In fact, rising issues and challenges are such important in magnitude and scope that they are expected to deeply affect AKST generation and application in the future. In addition to market structure and prices changes, these concerns cover expansion and diversification of agricultural research and innovation portfolio, reduction of investments in agriculture and in agricultural research, diminishing opportunities to benefit from international research spillovers, weakening of agricultural extension services and growing roles of private sector, NGOs and community based organizations (CBOs) in AKST system. Therefore, continuing to deal with AKST business as usual is not a viable strategy, because it will ultimately result in AKST vanishing contributions to attaining DSG.

Given that improvements in AKST are driven both by factors that help develop new AKST as well as factors that enhance its adoption and use, the purpose of this chapter is to explore ways by which future policies and institutional and organizational arrangements can influence AKST generation and application in the CWANA region. To this end, the chapter (i) addresses the potential implications of policies, institutional and organizational arrangements for AKST generation and application in order to identify corresponding relevant options to improving AKST development and application and (ii) suggest a set of elements to orienting future policies, institutional and organizational arrangements to ensure adequate AKST future effectiveness.

The chapter builds on relevant information provided by previous chapters and relies, in particular, on findings from chapter three. These information and findings are related to rising issues and future major challenges that are of great importance to assessing future AKST system viability. The chapter helps identifying key policy and institutional elements to be used as a foundation by chapter three in assessing future options for the role of AKST in meeting the DSG. In doing so, the chapter also takes advantage of methodological guidelines and concepts provided by IAASTD Global assessment contributions.

4.1 Implications of Future Challenges for AKST Related Policies

4.1.1 Market and trade issues

Markets and trade are considered as a cross-cutting theme in the CWANA-IAASTD for their relevance in determining the access to and adoption of AKST. Rising demand for agricultural products and more competitive markets are likely to result in higher demand for AKST. For example, protectionist policies would not encourage the adoption of certified seeds, while liberalization and appropriate marketing policies may be accompanied by the adoption of more productive technologies and improves efficiency and economic growth.

4.1.1.1 Trade arrangements

Although trade liberalization globally represents the goal of multilateral trade negotiation under the auspice of WTO all WTO members have entered into regional or bilateral agreements. This somehow shift from WTO objectives is due to the failure of WTO to achieve global consensus about trade agreements but also is due to the relative ease of regional blocs' formation. The CWANA region is not an exception. It has seen the emergence of many regional and bilateral trade agreements among neighboring countries. For instance Egypt has concluded about forty agreements (ESCWA. 1998) The gulf countries have established in 1981 the Gulf Cooperation Council to enhance intra-regional trade and cooperation. And in February 1989 the Arab Maghreb Union has been established in Marrakech. By joining WTO the central issue for these countries and regional blocs is the compatibility with the requirements of multilateral trading principles. According to article 24 of GATT the purpose of regional blocs is to facilitate trade between the members of the bloc without restricting trade with other WTO members. The main concerns of these countries with respect to their provision with WTO are i) the compatibility of the common tariff rates with the bound rates committed by joining WTO, ii) the revision of specific binding restrictions in the area of market access, domestic supports and exports subsidies, iii) the establishment of common market in accordance with GATT provision for regional blocks to foster their position in current and future multilateral trade negotiations, and iv) the revision of tariff structure under the most favored nation status in previous bilateral or regional trade agreements.

Intra industry trade is also growing among regional trading groups. Such a trend is an indication of economic integration and economic diversification and development. Intra industry trade within the regional trading blocs occurs mostly between countries of proximity and with similar demand structure. Transportation and transaction costs are among the constraints that hamper the development of intra industry trade within the region. Policy and institutional changes are required to follow these developments and overcome some current constraints.

Since the 1990s many countries of the Mediterranean region (namely North African and Middle Eastern countries) have signed partnership agreements with the European Union (EU). These countries are liberalizing their economies under the Euro partnership conditions, a process which is strongly influenced by the EU-common agricultural policy (CAP). By examining concerns before and after CAP reforms as well as the current WTO negotiations we can anticipate that the above concerns may be further exacerbated. Since negotiations have a great deal of programs has been undertaken by the different trade partners and a lot of changes have taken place at the international level. These changes will be accompanied with new concerns about negotiations and may require adjustment of production and trade policies. In what follows we present trade and non-trade concerns with the consequent old and new concerns. We present subsequently (i) the multilateral trade negotiations and benefits, (ii) the recurrent and newer issues, and (iii) the EU and CAP reforms. Then, we discuss the most relevant issues to draw on the concerns to the region in the future.

4.1.1.2 Trade negotiations and expected benefits

Since the inception of the WTO in 1994 efforts have focused on the launching of a new comprehensive multilateral trade negotiations round. From the Seattle ministerial meeting up to the Doha declaration there has been advances on a number of trade and non trade issues. The Ministerial Conference at Cancún, Mexico sets a milestone towards achieving the Doha Development Agenda (DDA) round of trade negotiations as mandated by ministers at the 2001 Doha conference. However, giving the achievements of past negotiations, observers remain skeptical that a new comprehensive round can be completed as planned (Miner, 2001). The big players are expected to make additional policy reforms (e.g. trade legislation in the USA and CAP reforms in the EU) before undertaking strong concessions and commitments in the upcoming negotiations.

It is somehow disappointing that benefits from agricultural trade liberalization have not materialized as it was predicted. There are at least two reasons for the partial achievements of trade benefits. First, negotiations on agriculture alone do not consider the comparative advantage principle. As a result, the Doha declaration made provisions for broad based negotiations extending trade negotiations to further trade liberalization for industrial products and services in which nations may take advantage (Merlinda, 2002). Second, national policies and legislations are creating additional cross national boundaries transaction costs and limiting the liberalization efforts. (Gerber, 2000) pointed out that trade relations remain far denser within nations than between nations and that there is a lot of missing trade relative to the predictions of the neoclassical model. Accordingly, in the case where trade barriers are reduced, the absence of trade in goods as predicted by trade theory is an indication of significant transaction costs across national boundaries. “Deep” economic integration requires not only the removal of border barriers but the removal of domestic policy barriers as well.

4.1.1.3 Recurrent and newer issues

The main issues already identified in the GATT agreement on agriculture (AoA) embodied market access, export competition and domestic support. However, a body of new trade and non trade concerns are emerging and attracting grower public interest. The AoA already included issues of food security, food safety and quality, environment concerns, resource conservation and rural development (Miner). Additional issues raised in the last negotiation meetings included animal welfare, biotechnology, species preservation, safeguarding the landscape, poverty reduction and preservation of rural culture (Miner).

Newer border-trade topics embodied items such as the rules of origin, standards and technical barriers, intellectual property rights, SPS standards, dispute settlement and the role of small countries (Gerber). Among the non-trade domestic policy issues are: foreign investment, competition policies, and labor and environmental standards.

4.1.1.4 Regional linkages: the EU and CAP

Traditional regional linkages are shaping export markets and observed trade flows. According to (Diao et al., 2002), export markets for many developing countries are concentrated in a few countries in the North due to geographic proximity and historical linkages. As a result trade negotiations will be shaped by regional blocs. As such, North African and Middle Eastern countries are more interested in the EU agricultural markets and consequently in the EU agricultural reforms under the CAP agenda 2002.

Indeed, the work programme annexed to the Barcelona Declaration cites the following objectives with regard to the countries that have signed the declaration (Enzo Chioccioli, 2002):

- Integrated rural development
- Support for policies implemented by the Med countries to diversify production
- Reduction of food dependency and
- Promotion of environment friendly agriculture.

4.1.1.5 Challenges and relevance to AKS

i- The effects of the EU enlargement

The enlargement of the EU to the Central and Eastern European countries (CEEC) is an integral part of the EU Agenda 2000. The process has started following the decisions of the European council in 1993 in Copenhagen and 1994 in Essen to be achieved by 2004. The enlargement of EU could have positive impacts as it opens new frontiers to our exports. It may however divert foreign investment to the eastern EU countries and therefore preventing the region from access to new technologies.

ii- Food safety & environmental quality Standards

With the decline in the use of traditional trade barriers such as tariffs and quotas, there is evidence that technical and regulatory barriers are increasingly used instead. In developed countries many firms are moving toward the adoption of environmental standards. This move is relatively slow in our countries and might therefore represent an obstacle to international trade.

iii- Environment friendly agricultural practices

Current trends to protect the environment with the EU provision of direct payment to farmers complying with environmental regulations and support of agricultural methods which protect the environment, all these would mean also the spread of these agricultural techniques along the region. Among these techniques the low tillage or no tillage will be sought to replace current practices.

4.1.1. Pricing policies

Pricing policies for agricultural products ought to follow the rules of a free market. Further, there is a need for strategic planning to shift towards market oriented agriculture policy closely integrated with national development objectives, without compromising food security/food sovereignty would be required. This however depends on the prevailing market structure locally

and the engagement in multilateral/regional economic cooperation and negotiation towards the establishment of free markets. If the conditions of a free competitive market are prevailing, this will lead to efficient price formations which in turn influence positively the development and adoption of AKST.

In most CWANA countries however, agricultural markets are not competitive. Small farmers in particular are facing scale problems with market power in favour of middlemen agents. Marketing conditions and marketing margins are changing as a result of the evolving retailing supermarket requirements and are mostly affecting small farmers. Under these conditions pricing policies will be developed in parallel to the development of coordination strategies. Vertical coordination will guarantee stable prices and markets. Farmers' associations are also an effective way to create market power to small and medium farmers. Vertical coordination and farmers association are more likely to favour the adoption of AKST in response to new requirements of the supermarket phenomenon which characterizes the new marketing scene. For instance supermarkets are imposing the adoption of private quality schemes. Farm enterprises ought to adopt these private standards if they desire to stay in business.

The pricing policy, when coordinated by bureaucratic mechanisms through administered prices, does not reflect marginal production costs. Under this scenario, for administrative convenience, monopolies are created which lead to distorted prices compared to product quality. It should be noted that in this scenario there is no market-based price-formation and no possibility to compensate for seasonal deficiencies and overstocks. Prices set by the government are rarely revised and do not reflect the opportunity cost on the international market, which brings negative added value for some producers if evaluated on the basis of international market prices. Due to government interventions, entrepreneurs will find it more profitable to trade on the basis of barters or mutual agreements, as the transaction costs will be too high. In this case, producers see no necessity to seek alternative resources or adopting newer techniques, because they have no incentive to improve their work processes.

Most CWANA countries have made significant progress to establish free market conditions. Negotiations are underway with major trading partners to enter into trade relations based on WTO rules. At the national level, agricultural production is no longer centrally planned and is now in the hands of private sector farmers who are free to choose what crops to grow. Agricultural incomes have risen significantly as a result. Government policy towards trading of inputs and outputs, including processed goods, is steered towards creating a liberal market, though some interventions remain in some countries which cause distortions and inefficiencies. In these countries, governments are undergoing reform programs to completely liberalize the sector and redefine the relationship between government agencies and the private sector. This will create a more favorable environment to freer markets and prices. Liberalization is expected to be accompanied by better access to AKST firstly to meet international markets' requirements, secondly to be competitive in the market place and thirdly as a result of access to these AKST in the international markets.

The private sector must be prepared to assume the role market regulation and to serve as an engine of growth for the whole agricultural sector. Working directly with farm associations, private enterprise will improve marketing conditions by changing traditional concepts of how to do marketing and by creating useful information systems and fostering business linkages. Useful information will be needed about prices, but also about quantities and the quality of products as required by the supply chain actors. This will improve price formation mechanisms. While helping the industry to process high quality products efficiently and create better conditions to foster the processing capacities through transferring technologies this will also work to lay the foundation for sustainable growth in the industry, and provide the agricultural sector with the means to respond to the ever-changing market conditions. The private sector may also be involved in AKST development through involvement in joint ventures with research institutions to make AKST available as a public good to smaller farms.

Changes in price-formation policies will occur mainly as a result of shifts in the demand curve and as a consequence product prices will be affected differently. What factors will cause this shift?

- Demographic – growth in population normally brings to equal growth in demand for all types of goods. However, concomitant changes in the age structure may affect the demand and consequently the price for certain goods. For instance, an increase of children's percentage in CWANA countries' population may cause higher demand for milk.
- Economic – changes in per capita income levels may affect the demand for most goods, although to different degrees. Increase in income will change the food patterns, with expensive meat and sea products dominating. Less tasty foods containing starch will decline in quantity as the income grows. If the income level falls, less expensive necessity foods, such as bakery products, will prevail.
- Socio- and psychological – these are the factors that have recently emerged due to the development of human health concerns. Thus, recently there was a decline in the demand for beef, especially in Western Europe, resulting from fears that mad cow disease could cause mortal disorder in human brain. Avian flu caused drastic decline in the demand for poultry. On the other hand, the demand for olive oil grew in view of the belief that it reduces the risk of cardiovascular diseases as compared to adipose or other vegetable oils.

While the above factors will influence directly the demand for final agricultural products they also influence indirectly the (derived) demand for AKST. Demand (market) oriented production will focus more on the adoption of AKST.

Price disparities were most visible at the producer level, where prices for agricultural products showed much less increase than prices for means of production. Calculations indicate that rise in prices for means of agricultural production is 40% faster than for agricultural products. Purchasing prices set by monopolistic processing industries are below world market prices, and farmers have no option than to accept them.

Notwithstanding the government support to producers in the form of subsidies, most means of production, such as agricultural machinery, fertilizers, pesticides, veterinary services, are inaccessible for producers. Also, food pricing policies based on an extensive system of food subsidies has negative impacts on macro economic variables such as the rate of inflation, the balance of payments and the exchange rate. Moreover, the subsidy system has destabilized industrial output and investment. Restricting the benefits of subsidies to those most deserving would lower the inflation rate, reduce the volume of imported food, thus the government deficit, and increase industrial output and investment. Subsidies to producers will come through public services such as research and extension and may be more effective to the diffusion and adoption of AKST.

In order to overcome negative consequences of the transition to free market conditions it is necessary to take several measures on improvement of the agricultural policy*:*

- Liberalization of prices and agricultural trade. Unless prices for agricultural products are harmonized with world market levels, and payments are made directly to producers, one cannot expect a significant growth in the agricultural sector, and the productivity will remain low.
- The primary task is to improve price-formation policies through increased competition at the level of farms. Anti-monopsony legislation should be developed. Creation of a more competitive environment in the sphere of purchases will increase farms' incomes and encourage them to improve productivity, marketing and trade, and quality of agricultural processing.
- It is necessary to abolish the system where production requirements are based on government order and production scheduling is done by state. For products that in government's opinion represent national interests, a price policy should be introduced that would stimulate their voluntary production based on profitability.
- Public purchases should be based on market prices. The productivity could be improved using a contract-based system. In future, the state and farmers will buy and sell futures contracts in response to changes in market conditions, and generate income before harvest.
- It is necessary to undertake thoroughgoing reforms in the agricultural and trade policies. Trade barriers should be removed and a system of customs duties established. Export and import licensing should be abolished, private companies should be allowed and encouraged to take part in international trade on the condition that only above-mentioned customs duties are collected from them.

4.1.3. Research policy

One of the most challenging issues is the emerging expansion and diversification of the research portfolio. In addition to conventional topics, AKST is called upon to cover a variety of new research and innovation domains. The following list highlights the major concerns that have been identified in previous chapters and which need to be included in AKST future agenda (Pardey et al., 2006)

Natural resources management

- NRM

- Pasture management;
- Soil and water Management
- Using alternative crops;
- Reduced tillage research.
- Livestock

Crop management

- Improve wheat, barley, maize resistance to major pathogens;
- Drought tolerance;
- Earliness & shorter maturity for many crops;
- Seed certification.

Income increase and diversifications

- High value crops;
- Post harvest methods;
- Value added technologies.
- Improving access to rural roads, water supply, electricity & information tech.;
- Exchanging & sharing knowledge.

Value chains

- Analysing constraints of access to market information;
- Develop better methodologies for communication price and quality information
- New technology to reduce post-harvest losses
- Role of production for different markets
- Availability of inter and domestic markets for poor
- Improved access to financial capital and markets
- Input markets and services; marketing capacity building
- Promotion of carbon and technology markets
- Gender and high value chain

Biotechnology

- Gene search
- Target genes description along with markers to assist breeding
- Vaccine development for animals
- Bio-information to assist molecular work.

Given exiting research capacities and capabilities in the CWANA region it is unlikely that such an overwhelming agenda be met under business as usual scenario.

4.1.4. Investment and funding policy

During the 20th century, highly accelerating improvements in agricultural productivity have significantly contributed to poverty alleviation, food security and economic progress. These

productivity improvements have been achieved as a result of substantial and deliberate investments in agricultural research and development. Because of associated high returns, it is recognized worldwide that a minimum target of spending on investment in agricultural research and development be set by developing countries, in addition of ensuring larger share gains from international public spillovers.

Historical trends of investments in agricultural research and development show, however, that government spending slowed in the Middle East, North Africa and in Central Asia and Caucasus. Meanwhile, international technology spillovers and corresponding knowledge have also decreased. Taking account of low density and poor to medium performance of National Agricultural Research systems (NARS), these trends are currently posing critical challenges to AKST development and application. Business as usual prospect show that higher investment will be of great interest in order to ensure a critical level of AKST self-reliance (Alston et al., 2006). This is even vital in light of persistent signals that developing countries are not likely to benefit, as they were used to, from international spillovers from the North and from the CGIAR centers.

It is suggested that under globalization, countries would have opportunities to still benefit from investment spillovers by interacting with nations and communities who are well equipped in terms of agricultural science and technology and information. However, likely risks are to be faced regarding the availability, the price and the quality of needed new technologies. Research agendas and investment structures are changing in the direction of diverging research objectives between developed countries and developing ones, and of the emergence of private corporates providing AKST.

As a result, only substantial self-reliance in agricultural research and development will ensure developing efficient agriculture production systems that are able to successfully compete in terms of terms of price and quality in domestic and international markets as well. This is of a particular importance for the future of small farmers who cannot generate, or do not have access to the AKST needed to improve their livelihoods.

Therefore, it seems that business as usual will not, under all circumstances, ensure a continuous flow of affordable AKST. Therefore, an increase in the national spending of CWANA countries will be still needed to counter increasing monopoly building in AKST system that may be detrimental for agricultural development and sustainability objectives by excluding developing and less developed countries from AKST benefits.

4.1.5. Intellectual propriety rights policy

Growing intellectual propriety right (IPR) protection, as the one endorsed by WTO members, is intended to promote innovation and technology transfer and dissemination to the mutual benefit of both technology producer and technology user. This is why all countries are called upon to establish and enforce appropriate IPR related regulations to help innovation take place in sectors

which are vital for the socio-economic and technological development. As a result if required regulations are adopted, technology transfer towards less developed countries can occur. Such cooperation comprises assistance to prepare law texts related to the enforcement and promotion of IPR protections, prevention of their abuse, implementation of institutions and agencies serving this aim, and last but not least, personnel and technical training (Abott , 2003).

However, in developing countries, IPR protection regulations can be perceived as a means serving rich countries in a first place since these countries are technology generators. Being the IPR holders, AKST producers will invest only in developed countries with established and functional laws that comply with international standards. It is true the developing countries are more and more present, but the technology generated in these countries comes either from multinational companies which relocate their production plants of from small national companies.

In addition, perfect compliance with trade related intellectual propriety rights (TRIPS) does not guaranty access to new top technologies by poor countries. This happens often because of lack of absorption capacity due to insufficient infrastructures and professional qualification of human resources. Furthermore, technology patenting is not always followed by consequent use in a production process; which results in retention practices preventing consumers to take advantage of technological progress.

Trade barriers abolition and global IPR protection may be antagonistic, if effective control of IPR holding and use is not rightly assured. According to the WTO report on the interactions between trade exchanges and competition policy, IPR protection and competition policy are seen as two complementary notions aiming to promote competition and consumer's welfare. But, in some cases, IPR protection might threat competition (Drexl, 2003). To avoid such a negative outcome, one may suggest inclusion of IPR protection under the control of a global competition law. But, should the competition laws harmonization include a sensitive concept like the IPR protection? If yes, what would the effect of that extended law on high technologies?

For the time being, very few CWANA countries have established IPR protection laws, and, hence, are not likely to take advantage of accessible new technologies to strengthen their own innovation capacity. While working towards establishing domestic legal environment (market competition and IPR protection laws), developing countries can consider:

- Barrier abolition for a better access to innovation
- Supplying adequate engineering and managing skills
- Promoting an adequate national marketing environment
- Reducing technology gap
- Implementing IPR standards for dynamic competition.

These suggestions are acceptable if the imported technology is relevant and if the importing country has adequate capacity, policy, regulation and institutions to optimally exploit IPR provision.

In a fair-competition environment, with protected IPRs, innovation, consumer's welfare and development are evident consequences. In other words, competition enhances dynamic efficiency which through protection can give access to an exclusive right to innovation through appropriation, in respect to patent law while diverting free-riders and misappropriations. This allows the consumer a better access to innovation and encourages information dissemination. Monopoly ownership, resulting from IPR protection, may not be harmful to innovation in given applications (scientific research, computer licenses… etc.).

However, very often, An optimal mix of competition policy and patenting laws is required to effectively induce a productive equilibrium between innovation and IPRs, as mentioned above, creating stronger markets.

4.2 Implications of Future Challenges for AKST related Institutions and organizations

In such a rapidly growing world with tremendous challenges, CWANA has a lot to worry about while striving for a better and sustainable future. The CWANA countries share complex situations, beginning with their harsh climate and scarce resources. These factors are compounded by high population growth rates, passing through wars and natural disasters and ending with the newly emerging issues of globalization and trade liberalization. All of these factors have significant implications on the ability of CWANA countries to achieve development and sustainability goals, and more specifically to reduce hunger and poverty, and improve livelihoods. Institutional arrangements and partnerships are major actors in the development and application of AKST. Their impact varies reflecting different levels of involvement and maturity across the region.

4.2.1 Cooperation

Institutional and organizational arrangements of interest comprise regional and international conventions (Framework Convention on Climate Change, biodiversity, etc.), regional organizations (e.g. ACSAD, etc.), national institutions, local and community based arrangements to enhance technology generation, transfer and adoption, access to new technology and better technology management.

These arrangements affect directly (as direct drivers) the generation, access, dissemination, and use of AKST in achieving the development and sustainability goals. If development goals are to be attained by the CWANA region, member countries need to cooperate and coordinate their efforts.

CWANA countries need to coordinate and collaborate within and across the region to deliver the development objectives, especially with reference to poverty alleviation, amelioration of hunger, socio-economic and sustainable development. Also they need to establish networks for preservation and development of natural resource, human capital and mitigation of natural disasters such as droughts & floods, and resolution of conflict over natural resource management.

4.2.1.1 Global cooperation

There is a need for institutional arrangements within the Developing Countries system in conformity with, and providing input into, the restructuring of the government of these countries in the economic, social and related fields, and the overall reform of the government. Cooperation principles should be based on an action- and result-oriented approach and consistent with the principles of universality, democracy, transparency, cost-effectiveness and accountability.

These institutional arrangements should elaborate strategies and measures to increase national and international efforts to promote sustainable and environmentally sound development in the CWANA countries and the promotion of economic growth. In fulfilling the mandate of these strategies, there is a need for institutional arrangements within the developing countries in conformity with, and providing input into, the restructuring and revitalization of the developing countries in the economic, social and related fields, and the overall reform.

To be effective, these efforts need to be coordinated and implemented by private or public organizations in relation to international organizations in the form of networks to support and facilitate the transfer and adoption of technology. The involved organizations include

- National Research Centers
- NGOs
- Trade associations (chambers, associations of enterprises);
- Statal and parastatal institutions for the conversion of the economic politic approaches;
- Private service providers, active NGOs

These institutions and international networks contribute to the development and diffusion/adoption of AKST. These institutions/networks should be enabled by financial funds, strong networking capabilities, continuous learning and assessment, explicit incorporation/voice of producers in the AKST process; business management and planning approaches, clear and transparent priority setting mechanisms to achieve significant success in realizing the development and sustainability goals.

4.2.1.2 Regional cooperation

Regional and sub-regional cooperation include the regional development banks, non-governmental organizations and regional economic and technical cooperation organizations. Within their respective agreed mandates, these organizations can contribute to the process of AKST development and adoption by:

(a) Promoting regional and sub-regional capacity building;

(b) Promoting the integration of economical, social and environmental concerns in regional and sub-regional development policies;

(c) Promoting regional and sub-regional cooperation, where appropriate, regarding issues related to sustainable development.

In particular regional organizations for technology generation, evaluation, diffusion and study will need to be developed. It is likely that new AKST will flow towards the region from all around the globe promoting research and development in this field. This will be further enhanced by the

increased pressure on natural resources associated with increased population. Countries of the region may be encouraged to share resources (water, energy, and gas) which would help stabilize the prices of such goods. Nevertheless, a basic assumption for stronger regional cooperation is the high level of commitment for institutional development and reform from various countries especially from the industrialized countries and donors.

Such cooperation is more effective if outward liberalization policy is adopted. If inward looking and protective approach in dealing with development issues is adopted, this will not likely to enhance the development and application of AKST to achieve development goals and reduce poverty in CWANA.

In the latter case, increased prices and the monopoly of some associations will prevent poorer – or non-oil producing - countries from development and application of AKST. Under this scenario, countries will continue to have inward-looking policies which will hinder any potential cooperation across borders. In addition, linkage with research and development institutions will be weak and thus access to new technology and innovation will be very limited. This will likely have long term implications on reducing poverty and achieving development goals.

Given these expected negative results, CWANA countries will more likely to take a more proactive role going through an adjustment (transitional) phase to enter global markets. This will be enhanced through the development of regional trading blocs that are already emerging. This will provide a better space for AKST development and application on the national, regional and international levels. Regional cooperation will be enhanced in the fields of research and AKST targeting mainly processing, storage and marketing of products and ultimately food security, human health and environment protection resulting in stronger contribution to poverty alleviation, improvements towards quality of life in the region. As a result, investment in science and technology in general and in agricultural research and development in particular will be enhanced on national and regional levels - thus contributing to achieving the development goals.

In addition, countries will be encouraged to produce and sell products tailored to diversified market niches. This is applicable to both regional and global markets. Problems of agriculture in CWANA will be addressed holistically and efforts would be made to align agriculture with WTO negotiations aiming at global reduction of subsidies and removal of barriers to agriculture trade. Markets for ecosystems services and relevant technologies will be created and developed as a result of agricultural multi-functionality and diversification. New companies and cooperatives (institutions) will evolve to provide these services. These companies, however, requiring large amount of capital and knowledge will develop in rich countries and operate as multinationals in poor countries imposing their own fees, operation system and less control from local governments or institutions. Poor countries will be at a disadvantage and may not approve such institutions.

4.2.1.3 National cooperation

Of equal importance to CWANA countries are the impacts of national institutional arrangements and efforts on AKST development and application and thus on achieving the development goals.

It is assumed that the CWANA will adopt a knowledge-driven economic development in which AKST is the key factor. CWANA countries will enjoy need-based decision making integrated within countries of the region and across regions, leading towards achieving the development goals and improving livelihoods.

While the CWANA countries struggle for integration within global market through regional trade areas, they need to face major challenges including the development of AKST infrastructure at different levels such as: academia, research as well as the development and planning for supporting transformation and change management under globalization. Among all, the process of change should be feeding into the enhancement of well-being of nations and improving health, education, use of natural resources and infrastructure.

Policy and institutional reforms in various sectors will be a major feature of this storyline. National policies, plans and legislation will be improved to support the integration into global market and meeting all the required criteria and conditions for promoting investment and facilitating trade. In parallel, public institutions will need to be developed to accommodate the changes. Local producers will strive to meet the conditions for entering the global market. The role of private sector and other national stakeholders will be enhanced through better cooperation and strengthened public private partnership will be witnessed with more emphasis on gender equality and empowerment of local community. CWANA countries will live a flourishing era for development institutions especially those working on AKST and other relevant issues including natural resources and property rights. Farmers' organizations will emerge as a major player to support research and technology transfer and application and protection of farmers' rights. Civil Society Organizations promoting the conservation of natural resources will advocate for land conservation and rehabilitation. Education and capacity building for various players will be integrated into various activities. Sustainability will become a culture and way of living for the people of CWANA leading the countries and the region towards more accomplishments on the development goals scale.

As stated earlier, inward policies will contribute to increased prices. Also, the monopoly of some associations will prevent poorer – or non-oil producing - countries from development and application of AKST. CWANA countries will suffer from focusing on food security from local perspectives, and not in the global context. Research and development will focus on adaptive research, but investment in basic and applied research may not get priority. As a result, innovation capacity would be limited. The media shall continue to be under central control sifting the information, and thus agricultural informatics and flow of scientific information would be blocked to a greater extent. Consumers will have to rely on the limited information and because of limited role of civil society; consumer activism would not get roots. The human resource quality

shall remain at low ebb and agriculture shall continue to be complacent with skill less or low skilled labor, with hardly any capacity to transform the agriculture and thus increase its productivity. Over-controlled governance will prevent agriculture and its relevant institutional arrangements from responding to the change out of and across borders.

As governments embark more people caring and outward looking policies, they become more proactive to provide equitable access to education, health and information and thus AKST development will be enhanced focusing mainly on processing, storage and marketing rather than agricultural production.

Local organizations will receive more support from local and national governments. Governments will become more proactive to provide equitable access to education health, and information. The aim will be to improve knowledge about the environment and to ensure an optimal national NRM system. In addition, new actors will engage in agricultural production. The goal of better quality of life as opposed to income generation will get prominence. Higher awareness and responsibility levels will help fight problems like environmental pollution and public health hazards on national and regional levels, and thus achieving sustainability goals.

Affected by the WTO negotiations, environmental problems will be solved through technology and market-oriented institutional reform. People will pay for the pollution they create under these policies with expansion of property rights. People providing ecosystem services will be paid. Eco-technologies for managing ecosystem services will be demanded as interest in increasing economic values of property rights grows, benefits of ecosystem services increases.

Agricultural problems will be addressed holistically and markets for ecosystems services and relevant technologies will be created and developed as a result of agricultural multi-functionality and diversification. New companies and cooperatives (institutions) will evolve to provide these services. These companies, however, requiring large amount of capital and knowledge, will develop in rich countries and operate as multinationals in poor countries imposing their own fees, operation system and less control from local governments or institutions. Poor countries will be at a disadvantage and may not approve of such institutions.

4.2.2 Innovation capacity building

4.2.2.1 Public research organizations

CWANA countries do not possess the institutional, managerial and financial capacity to absorb current levels of project aid and to sustain the project activities after foreign aid is phased out. The challenge for donors is to continue moving beyond the resource transfer model of financing the construction of buildings and purchasing equipment and vehicles for NARS and pursue a human capability-institutional building model that is geared to the specific needs of the CWANA countries at this stage of their development. The following constraints face most NARS of developing countries in the process of their institutional development include: weak research management, institutional instability (donor-driven), human resources instability, funding instability, research program instability, limited relevance of research and deficiency in priority setting, defective linkage with the world knowledge system, insufficient linkages within the NARS themselves (Universities, private sector, non-governmental organizations) and with outside partners, such as IARCs, regional institutions, advanced research institutions in developed countries, etc., and weak monitoring and evaluation of research. Generally speaking, the role of foreign assistance has been prominent in the development of NARS in the region. Building agricultural research capacity means developing the capacity to design rules for organizational forms that will facilitate activities of people in organizing, supporting, conducting and monitoring agricultural research. Research management capacity development measures may involve:

- setting medium- and long-term research plans and strategies to serve as a frame for priority research programs and projects, in light of integrated sustainable development priorities and policies;
- identifying appropriate research instruments for achieving research objectives;
- transforming human, physical and financial resources of research institutions into research outputs and practical technologies;
- upgrading and execute research agenda in consistence with minimum environmental degradation; and
- Monitoring, evaluating and revising the agricultural research system.

The agricultural research agenda must respond to the challenges of the world food supply. It will be influenced by the choices of research investments and strategies made by governments and institutions both in developed and developing countries.

It is now recognized that a rigid borderline between public and private sector roles can not be established, and there are many gray areas where public-private partnerships, often in conjunction with civil society and producer and community organizations, are needed. In some least-developed countries, the withdrawal of the public sector from markets has left a vacuum that has not been adequately filled by the private sector, due to high transactions costs and risks. This means that there is a need for a more active public sector role in coordination activities, joint financing, and building needed capacity to allow the private sector to fill its role, in addition to financing core public goods (especially infrastructure). Many responsibilities are also being devolved to local or state governments for decentralized program implementation, and this

provides additional challenges and opportunities. Strategies such as contracting-out to the private sector, providing targeted matching grants to support activities within the public interest, and expanding collaborative action in the context of market supply chain development and trade associations, and various types of consultations and coordination forums with the private sector are all important. CWANA countries while signing free trade agreements and proceeding with trade liberalization are facing tremendous direct and indirect challenges that will need to be addressed carefully among which is the capacity of local public and private entities as well as the regulatory and institutional maturity.

Farmers need to enhance their recognition of the role of agriculture as the key to sustainable development, food security, biodiversity conservation and central to international action in trade and investment. It was the main user of freshwater resources and was central to producing bio-energy. Thus, farmers had begun - but not sufficiently – to form partnerships, covering such areas as management of water, land, genetic resources and energy. Farmers were also strengthening partnerships in the area of research and technology. Those partnerships were good, but must be supported by capacity-building and good governance. Successful development of agriculture required democratic, consultative processes that involved farmers' organizations. On the other hand, indigenous communities would continue to seek partnerships and associations with governments and transnational bodies to maintain access to traditional lands, based on principles of good faith and equity.

4.2.2.2 Public Private Partnership

When discussing partnerships, one should note that sustainable development requires partnerships among all stakeholders and among all levels. In particular, the regional aspect had been stressed as crucial, if implementation was to achieve the stated goals. Despite the fact that many encouraging partnerships towards implementing the declarations and conventions had emerged following Rio, real implementation had been less satisfactory due to the lack of resources and political will. Implementation had also been hindered by structural and institutional failings, such as questionable government policies and incentives associated to trade and agriculture. The International Community has a responsibility to consolidate the multi-stakeholder dialogue by establishing an institutional structure to facilitate the building of partnerships.

Recent approaches - adopted by some international entities such as the World Bank rural strategy - in investment to promote agricultural growth and poverty reduction are founded on the fact that public sector, private sector, and civil society can employ to enhance productivity and competitiveness of the agricultural sector in ways that reduce rural poverty and sustain the natural resource base. These actions involve a rich mixture of science, technology, people, communication, management, learning, research, capacity building, institutional development, and grassroots participation.

4.2.3 Governance and Information

It is essential in striving for sustainable development to seek and maintain transparent democratic institutions capable of protecting the environment and natural resources while providing basic needs and economic opportunities. In communities where people were able to come together to protect their ecosystems, they also had better schools, health care and economies. Hence, developing institutional capacity was the core of the recent national and global attempts to achieve the Millennium Development Goals. Moreover, and with continuous globalization, sustainable urbanization that covers environmental, social, economic and institutional sustainability should be based on the proposition that transformation from rural to urban life required a change in the institutional framework.

4.2.3.1 Governance principles

While rapid technological advances may in many cases help achieve economic growth without harming the environment through what is known as "green economics", real cases had showed the opposite raising the question: how could the international community guarantee that it would not continue to fail? The answer lies in emphasizing that greater overall sustainability went hand-in-hand with less institutional constraints on decision-making powers, greater openness of political competition and more widespread civil and political rights. Inevitably, national efforts to achieve sustainable development must focus on productive capacity and its key determinants, namely institutions, as well as human and natural resources. Moreover, capacity must be strengthened to be able to monitor performance where the results would feed into the process of influencing policy at the highest level.

When speaking of institutions, it is essential to stress all types of institutional set-ups that could play a role in achieving the IAASTD sustainability goals. On political level, the democratic deficit in decision-making, both nationally and internationally, had to be overcome. Far too many governments and institutions in the position to act were focused only on narrow interests without special focus on the will of the people. Parliaments had been working, at national and international levels, to provide a parliamentary dimension to the work of intergovernmental organizations working on sustainable development issues.

Local governments, on the other hand, could show leadership through increasing the coherence and integration of their own policies, including integrating sustainable development concerns across ministries and ensuring that existing policies did not work against each other.
Trade liberalization was a means to an end, not an end in itself. Each of the international regimes and institutions should be judged on its contribution to poverty eradication and maintaining a viable natural resource base. The new perspective must build the bridges between trade and environment, between investment and development, and between finance and sustainable development.

4.2.3.2 Transparency and accountability

The poor state of governance and weak protection of rights of vulnerable communities, including smallholders, is attributed to lack of transparency and accountability in government as well as corporate activity, which restricts the ability of citizens, civil society groups and public representatives to effectively monitor the performance of various public and private institutions. Access to information is the first step towards promoting and institutionalizing public accountability at various levels; while its absence or lack of it often results in arbitrary and non-participatory decision-making , weak monitoring, inefficient project execution, human rights violations and rampant financial corruption in public bodies (Transparency International in 2006) Lack of access to information also contributes to sustaining excessive bureaucratic controls, eliminating stakeholder participation and weakening of democratic institutions.

Currently, almost all government activity in CWANA takes place in a pervasive culture of official secrecy, which is manifested in both official attitudes and various pieces of legislation (e.g. Official Secrets Act 1923 in Pakistan). Any disclosure or sharing of information, if and when it takes place, is on 'need to know' basis, as determined by official authorities, and not in recognition of 'right to know' as one of the fundamental human rights. As a result, what information is made accessible or not and at what time or in what manner it is disclosed is determined by the government. Citizens and communities have hardly any say or control on it, even though the information and records held by various government departments may have direct implications for their environment, health, safety and well-being as well as their ability to make political or economic choices. It particularly affects the weaker sections, as the powerful people find it easier to access the required information by using their contacts and influence.

The culture of secrecy is so predominant that it has failed or seriously undermined almost all mechanisms created for providing access to government information. Official statements and press releases often provide one-sided information and lack credibility. Annual reports are either not published or lack details and appropriate analyses, which could help in determining the credibility of data presented and assessing the year-wise performance of related departments. Parliaments either do not exist or parliamentary proceedings do not provide adequate mechanisms for disclosure of maximum information about public policies and plans, participation of farming communities, transparency and accountability. Information could also be made accessible through websites but most government websites provide very little useful information. All of this is, partly or wholly, because of the absence of comprehensive policies that recognize the right to information as a fundamental human right and provides an efficient legislative and institutional framework for its implementation.

There are very few countries in CWANA, which have enacted and implemented right to information laws. These include Pakistan, Turkey, Tajikistan and Uzbekistan. Even where such laws exist, they do not conform to the international best practices and, hence, offer little opportunity to promote a culture of transparency and accountability. This situation has adverse implications across the board but especially in relation to the AKST, which is the mainstay of

economy of many countries in CWANA. For instance, this lack of transparency and access information explains, at least partially, the grave nature of the problem of corruption. On the Corruption Perception Index (CPI) of Transparency International in 2005, not even one country from CWANA is among the top 20 better performing countries. Among the first 50 best performers, only 7 are from CWANA. Almost all the major countries in CWANA are among the very poor performers on CPI. For instance, in 2005, Turkey ranked at 65, Egypt, Saudi Arabia and Syria at 70, Morocco at 78, Iran at 88, Algeria at 97, Uzbekistan at 137 and Pakistan at 144.

4.2.3.3 Information technology

New information and communication technology (ICT) will be having profound impacts on information and knowledge transmission in agriculture and natural resource management. New systems will be emerging to provide up-to-date market information, weather, and extension information to rural producers, processors, and shippers. Geographic Information Systems (GIS) will be increasingly used in linking geographic information to agriculture and NRM to help decision makers. GIS will allow a more efficient use of inputs which will not only save money in materials, but also make labor available for other activities. Innovations in biological and information sciences have resulted in several emerging fields that hold promise for the development of future agricultural technologies. The new fields of bioremediation, nanotechnology, genomics, and bioinformatics will increase knowledge that can be shared and used to improve sustainable agricultural production and protect ecosystem functions in developed and developing countries alike.

There will be a need to facilitate the exchange of scientific information and knowledge among all stakeholders in the CWANA region, and between them and the outside world. And the IAASTD goal of facilitating sustainable development and the MDG goal of developing a global partnership for development can only be realized in cooperation with the private sector to make available the benefits of new technologies, especially information and communications. (10) To meet the need for the exchange of information and knowledge, is its highly essential to improve and enhance ICT in the region. ICT will contribute to brining together the scientific strengths and talents available in the region to collectively tackle the formidable challenges and tasks ahead.

There is a great potential in improving access to information necessary for boosting production using traditional communications technologies (such as radio) to disseminate information and ideas on agricultural technologies, markets, and investors. For information without proprietary constraints, national and international agencies are increasingly using modern communication technologies, such as the internet, to disseminate information. While such communication technologies are important mechanisms for sharing information and experiences, and their use is likely to grow in the future, excessive reliance on them in the future could prevent those CWANA countries with the least capacity and the greatest need for information (such as biosafety and other risk-related information) from having timely access to the latest knowledge they need. Measures should be taken to complement information dissemination through the internet. Such measures include the establishment of information clearinghouses to act as bridges for sharing

information and experience and disseminating the lessons learned between various sections of society and across countries. In order to deliver solutions for the poor in CWANA, biotechnology and information technology should be actively linked together so that new scientific discoveries worldwide can be accessed and applied to the problems of food security and poverty in a timely manner. In addition to the growing challenge of facilitating and regulating access to information and information technologies, CWANA countries will need to harness modern science and skills for pro-poor growth, in a world in which agriculture is becoming more knowledge and information intensive. The challenges here require global efforts to reach agreements on access to proprietary information and technologies for the poor. In addition, a modernizing agricultural sector requires harnessing new skills and capacities to utilize modern science and technology, a formidable task ahead for CWANA countries.

To summarize, considerable advances in internet and electronic commerce and their application to the needs of CWANA countries present great opportunities to provide new cost-effective knowledge systems, and offer much potential to make agricultural growth more pro-poor, but at the same time are often controversial. The challenge will be how to use these new advances together with developments in biotechnology and other agricultural technologies to make the complex agricultural systems of CWANA more productive and sustainable.

4.2.4 Social factors

4.2.4.1 Small farmers concerns

Farming to the detriment of small-scale economies, of diversity in agricultural products and farming systems. Small scale farmers, semi, low-skilled or informal laborers are likely to suffer most from a purely market-oriented agricultural production. Women who constitute the majority of these categories are likely to suffer more from liberalization policies in agriculture (Baden 1998).

Since ‘markets are not abstract, neutral entities but are real processes of exchange embedded in social institutions, including gender relations’ (ibid: 36) a number of policies can be adopted to balance their negative effects. These include provision of credit to initiate new business, of information on new market possibilities and requirements, and of training on compliance with new production standards, to mention a few, might be adopted. Also, the construction of infrastructures to facilitate the movement between rural areas and the markets, the storing, transporting and preservation of agricultural produce could be an effective way of integrating farmers from the most remote areas and enhancing female participation to the markets. This would enhance the control by farmers over the returns of their agricultural work and eventually contribute to their empowerment, particularly in the case of female farmers. This might also positively affect the general economy of many rural households.

Agricultural market liberalization has generally reduced state intervention. A different approach might assign a new positive role to the state to support a fair globalization of the market. The

creation of alternative systems of agricultural production that favors quality, locally produced and organic products, can support small economies, help preserve local systems of agronomic management, and benefit the environment. It can also help diminish the marginalization of the most vulnerable rural sectors.

A sustainable approach to development of agricultural technology will not aim at agricultural production per se but will integrate a number of concerns such as environmental, socio-cultural and economic ones. It will also include the needs of all stakeholders in establishing priority areas, research performance and technology adoption. On the contrary, technology developed under a purely market-driven system is likely to focus on profitable topics marginalizing the needs and interests of those who lack the financial means to support research or influence its development.

Furthermore, land holding systems in CWANA have hardly improved in many years. The remaining of older systems of community land management persists but largely influenced by modernization in agriculture, which has encouraged individualization of land holdings and the breakdown of their linkages. Currently these systems are fragmented, have low productivity and suffer from lack of investment. They also suffer from a steady decline in labor as young men and women migrate to urban areas. These systems suffer from a lack of dynamism and innovative drive, due to several factors including: uncertain land tenure arrangements, lack of effective local institutions and unchanged soil and water management practices. In addition, little synergy still exists between livestock and arable agriculture.

This problem has been recognized for many years, but has been resolved only in places where smaller farms have been bought out by wealthier groups or individuals. There remain hundreds of thousands of smaller farmers who are unable to resolve the problem though holdings are being consolidated through land reform but in a slow and difficult manner. Key policy and institutional reforms in this process may include:

- Consolidation and rationalization of land holdings with a focus on the common, long-term interest and survival of the community, or communities, who occupy a water catchment area.
- Development of more collective forms of land management that will allow the introduction of more efficient soil cultivation and management technologies.
- Legislation that will control the grazing pressure on dry lands and uplands. This action has to be linked to policies and regulations on the importation of cheap grains used for intensive livestock systems.
- The establishment of livestock producer marketing groups with a wide membership, i.e. not only pastoralists but also urban-based entrepreneurs who are involved in financing the industry.
- The establishment of action research groups responding to the different management needs of different types of livestock owners and managers.
- Special support for the owners of small numbers of livestock who constitute the majority of livestock owners.
- Regulation of water use, particularly related to the use of non-renewable groundwater.

- In addition to this, democratic local institutions need to be established, including various forms of water users groups that control, regulate and manage water efficiently and equitably
- Decentralization of power structures relating to rural development and livelihoods.
- Creation of new forms of integrated agricultural and natural resource research and extension systems.
- Policies and interventions to encourage better partnerships between public and private sector stakeholders in management of scarce resources.
- Policies that will allow greater access to information on markets, new soil and crop technologies, integrated pest and soil management techniques, the removal of trading and price distortions (for example, on grains) that affect the poor more than the well off, access to credit for production, processing and marketing needs.

4.2.4.2 Gender issue

Including all stakeholders in all phases of AKST development has positive effects also at ground level. Since men's work is considered productive, as opposed to women's unproductive domestic work, it is generally considered more worthy of investments. As a result, research and social spending are directed to irrigation infrastructures more than safe drinking water, with women and children being always in charge of fetching water. Cash crops, mainly cultivated by men, often receive more attention than subsistence crops, generally grown by women (Chambers, 1983). Agricultural machinery is mainly designed for male users and their needs. As a consequence, male farmers only enjoy the improvements to their work due to technology introduction. Engagement with mechanized agriculture, furthermore, often corresponds to more powerful positions in intra-household or community dynamics (Boserup, 1970).

On the contrary, a truly participatory approach to agricultural technology will include both men and women as beneficiaries and work on technical characteristics of machinery that facilitate the use also by smaller and weaker persons. This could contribute to limit the gender division of labor that in the CWANA region has for long assigned the use of machines to the men, leaving manual and time-consuming jobs to women and children (Rassam and Tully, 1988). A gender-sensitive AKST will also expand the range of crops to focus on by including cash, subsistence crops and local varieties. It will take into consideration all phases of agronomic management also post-harvest duties and related domestic activities that are often neglected. By integrating local and gender-differentiated understanding of seeds and the cultural values connected to food preservation, preparation and storage AKST could enhance the success of technological adoption and eventually be more effective in enhancing rural livelihoods. Such a gender-sensitive approach to agriculture development is particularly important in areas characterized by a feminization of agriculture. In countries like Syria male farmers often migrate to urban areas in search of work and women are in charge of the agricultural work (Abdelali-Martini et al,. 2003). Nonetheless, they are not considered as farmers, and their needs and preferences are overlooked with negative impacts on the agricultural work. Furthermore, laws and policies do not adapt to the changing situation. In the case of the personal law entitlement and access to land, water and seeds still rest with absent husbands or fathers whose support women need to access the basic means for their

daily work. The labor law does neither protect the rights of women farmers, nor those of the growing number of informal workers.

On the other hand, technologies can be developed and applied to meet the need of women in particular. For example, biofortification and foods enriched to supply nutrients which women in CWANA tend to have deficiency of, such as calcium, iron, and zinc should be considered. There is currently a lack of supply of or access to technology suitable for women farmers in several CWANA countries, and particularly to labor- and energy-saving farm and household technologies. This lack of suitable technology impairs women's productivity. Agricultural technology developed with close attention to alleviating some of the labor constraints experienced by rural women has the potential to improve not only the well-being of the woman farmer, but also of others in her household who are dependent upon her care. Alleviating the labor burdens on rural women is an important dimension in their empowerment. Whereas technology implementation which is targeted at men and implemented with men's goals and situation in mind will put the women at a disadvantage by leading to an increase in the amount of labor required to be expended by women to attain the same level of production.

There are no easy answers to the question of what kind of technology will promote the autonomy of women in rural societies of CWANA. Women in CWANA may indirectly, but drastically, be affected by technological innovations. Technologies, as was seen in many instances during the Green Revolution, may displace women and cause a decrease in their income levels. Modern technologies such biotechnologies carry the risk of increasing the burden on women as providers for their families. Increasing competition and lower world market prices as a consequence of the application of modern technologies could lead to the migration of men from rural areas; an increase in the heavy burden that women must carry alone; and the impoverishment of women.

If the present global power structure and the current male bias in agricultural research, extension and development policies persist, modern agricultural technologies will most likely further widen the gap between men and women, and rich and poor people. Public research also generally bypasses women and their needs, or, approaches women for efficiency reasons to diffuse technical innovations more rapidly. In this way, women are instrumentalized to stimulate acceptance of modern biotechnology. If women's situations, concerns, technological skills, use of technologies, and knowledge will continue to be overlooked, women will be displaced and marginalized by technology development, with many of their activities becoming sidelined or taken over by men. This will have resulting implications for the health and well-being of women and children, environmental sustainability, and income levels in developing countries.

There is an urgent need for research and priority setting to ensure that women will be in a position to benefit from modern agricultural technologies, rather than being disadvantaged by their implementation of technologies as has often occurred in the past. Women's participation both before and during the introduction of new technology is of central importance. Their participation should go beyond consultation aiming to implement outside innovation more easily, and include

shared responsibility, trust and cooperation. The exchange among women of technology and knowledge developed by women would be a more sensitive step in the improvement of women's autonomy than expensive and advanced technology. And if women are involved in the whole technology innovation process, they could set their own priorities and collectively appropriate capital intensive technology. Only if conditions are changed in such a way that women are able to set their own priorities, which implies the need to change national and international research and agricultural policy in favor of women's possibilities and capacities, could new technologies probably benefit, instead of harm women. There is also a need to increase the participation of women in the biotechnological sciences and other modern sciences especially at the senior levels, as well as their representation in biotechnology regulation and policy making.

To conclude, technologies developed and implemented to meet the needs of women and women farmers have the potential to contribute to the IAASTD development goals, mainly through alleviating labor burdens. Measures should be taken to ensure that modern agricultural technology will not undermine women's autonomy, but will rather help women to gain more autonomy. Acknowledgement of women's autonomy leads to the logical conclusion that women must play a key role as decision makers in designing the direction of research and in agricultural policy-making processes and governance in the CWANA region.

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4.2.4.3 Education

There are a great number of problems facing Central Asian countries attempting to achieve the new millennium goals. For example NAIS (national agricultural innovation systems) are important in providing key directions for future growth in the economy and in the improvement of rural livelihoods. They need to be effective in their use of natural resources and in their use of science, innovation and technologies in order to achieve national development goals. However, they face difficulties in creating their own national AIS (agricultural innovation system). Developing and reforming education – re-orientating it to the new approaches needed – is the most innovative way of dealing with the challenge. We need to commence by analyzing the quality of the education situation in each country. We need to consider whether they have reached world standards in education. Do appropriate curricula and all necessary disciplines exist? Does one block in a curricula link fully with all the other blocks? How many institutions react to change in science, to the new needs of the market? Are they producing market-based knowledge? Are their enough well-educated trainers working? Is education linked to research and being continually updated? How can national agricultural education systems adopt new knowledge like biotechnology, genetic engineering and modern information technologies?

Many problems are financial. Others lie in the way students are selected for university. Tests and exams need to be based on new approaches. Currently there is a gap in selection procedures, meaning that abilities for the future are lost. It is important to conduct in-depth needs analysis focusing on the concrete situation in CWANA, bearing in mind the impact of the plausible futures outlined in this document. The best examples provided by famous scientific schools indicate that consistency and succession is important. The question is how to ensure that this tradition can

grow to ensure that the millennium development goals are met. For example cotton is a very specific agricultural technology and very important in every day life, as well as in industry as a raw material. Some highly developed scientific schools in CWANA have been able to significantly improve cotton production, but may not be able to meet the challenges of the future. Central Asian universities were founded on strong farmer soviet education systems, based on inter-disciplinary approaches, with positive and negative elements. It would be good if the Central Asian and CWANA education systems could collaborate and build on their strengths.

For development research the main priorities are:

- Harmonic interactions with education and extension
- All the components of agricultural innovation system at this key time for CWANA counties need to be re-orientated. They need to include the best research approaches in the most innovative ways.

- The policies for re-orientation have to focus on supporting the development of modern technologies for research, with appropriate use of methodologies
- The main factors which provide for accelerating research progress are well-educated scientists and scientific schools.
- The quality of research depends on financing existing modern technologies and analysis.
- The main issue with respect to the progress in AKST development is the linking between education from all the levels include primary schools up to university levels (for example Uzbekistan has own strategy in reforming the educating system, with the national programme taking a lead in preparing specialists)

4.3 Elements to Strengthening AKST Future Effectiveness

This sub-chapter is a synthesis attempt of with reference to three plausible futures that may take place because of differentials in resource endowments and capacity building. Considered plausible futures are: business as usual AKST, sunset agriculture related AKST, sunrise agriculture related AKST and people centered agricultural development.

4.3.1 Business as usual related AKST

As defined in chapter 3, this is an inward-looking situation with policies and national government's capacity that are unable to deal and achieve the development goals – at least not in the short to medium term. As such, this scenario itself does not provide an enabling environment in general for AKST to play its effective role towards attainment of the cherished objectives of development goals. However, within the global context, national policies are likely to be influenced by the changing geo-economics and geo-politics allowing for more space for AKST as a driver of innovation & growth.

Under inward-looking economies, a lot shall depend on the capacity of the governments to adjust under the changing environment and deal with the complex issues arising in the global arena, and

AKST certainly has a central role in developing the required capacity, and in making agriculture efficient & sustainable.

The capacity and capability of both national governments and communities will be relatively limited but will grow slowly. Democratic institutions will gradually evolve and national policies will get more focused in the long term. As such, the economic growth and development in the CWANA will help attain development goals a bit slower. Local partnerships will be enhanced gradually with more involvement of private sector and civil society organizations. Capacity development for various institutions and human resources will be major factors to determine level of partnership and development. Policy integration - especially for economic and research policies - will play a significant role in speeding the pace for achieving the development goals, however, this is likely to take longer time to be in place.
The legal frameworks especially those related to marketing and trade are weak. Some countries have already started legal upgrading processes to comply with multilateral trade regime under WTO and with other bilateral agreements involving free trade obligations.

Regional political and trading blocs will emerge – slowly - resulting in institutional arrangements that promote regional trading, economic development and poverty alleviation. Regional capacity development in the field of trade liberalization will be needed. Partnerships across borders between CWANA countries will be enhanced gradually targeting trading at most but may develop further to include other aspects.

International partnership and foreign support will continue to play a major role in this scenario. However, national institutional and policy reforms and capacity development will be important to decrease donor-driven approach in funding research and projects. Under the business as usual scenario, it is the global context that pushes the CWANA countries towards achieving the sustainability goals despite the current lack of enabling environment.

4.3.2 Sunset agriculture related AKST

This prospect consists of agriculture interfacing authoritative governance and weaker AKST.
It is not likely to enhance the development and application of AKST to achieve development goals and reduce poverty in CWANA. Over-controlled governance will prevent agriculture and its relevant institutional arrangements from responding to the change out of and across borders. Research and development will focus on adaptive research, but investment in basic and applied research may not get priority. As a result, innovation capacity would be limited. The media shall continue to be under central control sifting the information, and thus agricultural informatics and flow of scientific information would be blocked to a greater extent. Consumers will have to rely on the limited information and because of limited role of civil society; consumer activism would not get roots. The human resource quality shall remain at low ebb and agriculture shall continue to be complacent with skill less or low skilled labor, with hardly any capacity to transform the agriculture and thus increase its productivity.

Increased prices and the monopoly of some associations under this scenario will prevent poorer – or non-oil producing - countries from development and application of AKST. Under this scenario, countries will continue to have inward-looking policies which will hinder any potential cooperation across borders. In addition, linkage with research and development institutions will be weak and thus access to new technology and innovation will be very limited. This will likely have long term implications on reducing poverty and achieving development goals.

Countries of CWANA will remain under the prevailing authoritarian system of governance which will prevent sustainable development concepts form being fully absorbed and implemented. The closed environment will not follow people-driven policies and will prevent access to new technologies and tools that could assist in achieving development goals and improving the lives of people living in the region. Decision-making will remain alienated from sustainability with potential risks on human health and the natural resources.

CWANA countries will remain far from entering the global markets after achieving a lot of institutional and legislative reforms or even effective capacity development which could be rather difficult under the inward looking policies envisaged under sunset scenario. However, there is a potential that this might lead to more focus on regional markets and trade rather than global.

4.3.3 Sunrise agriculture related AKST

This prospect consists of agriculture interfacing democratic governance and strong AKST institutions. CWANA countries will embark upon an innovation-trade-growth paradigm. As a result, investment in science and technology in general and in agricultural research and development in particular will be enhanced on national and regional levels - thus contributing to achieving the development goals.

When technology is the driver to economic growth under this story line, countries will be encouraged to produce and sell products tailored to diversified market niches. This is applicable to both regional and global markets. Problems of agriculture in CWANA will be addressed holistically and efforts would be made to align agriculture with WTO negotiations aiming at global reduction of subsidies and removal of barriers to agriculture trade. Markets for ecosystems services and relevant technologies will be created and developed as a result of agricultural multi-functionality and diversification. New companies and cooperatives (institutions) will evolve to provide these services. These companies, however, requiring large amount of capital and knowledge will develop in rich countries and operate as multinationals in poor countries imposing their own fees, operation system and less control from local governments or institutions. Poor countries will be at a disadvantage and may not approve such institutions and capacity development attempts.

In this scenario, AKST institutions (academia and research) will be strengthened within and across the countries of the region. Key elements for success include human and institutional

capacity, IPR, access to knowledge and investment. Thus, differences among countries could be expected depending on those elements.

4.3.4 People-centered and outward looking development

This prospect consists of people centred and development-oriented agriculture interfacing globalization. As governments embark more people caring and outward looking policies, they become more proactive to provide equitable access to education, health and information and thus AKST development will be enhanced focusing mainly on processing, storage and marketing rather than agricultural production. Regional cooperation and integration is expected to grow especially to address common problems such as water, climate change and natural resources as a collective responsibility.

Under this scenario, local organizations will receive more support from local and national governments. Governments will become more proactive to provide equitable access to education health, and information. The aim will be to improve knowledge about the environment and to ensure an optimal national NRM system. In addition, this story line will bring new actors in agricultural production. The goal of better quality of life as opposed to income generation will get prominence. Large agricultural corporations will be encouraged by governments, consumers, and researchers. Such a future is very advantageous as a provider of services, regulating services, cultural services and human well-being - although it contributes to a decrease in recreation and ecotourism. People and governments are the enabling factors. Higher awareness and responsibility levels will help fight problems like environmental pollution and public health hazards on national and regional levels, and thus achieving sustainability goals.

CWANA countries will take a more proactive role going through an adjustment (transitional) phase to enter global markets. This will be enhanced through the development of regional trading blocs that are already emerging.

Regional cooperation will be enhanced in the fields of research and AKST targeting mainly processing, storage and marketing of products and ultimately food security, human health and environment protection resulting in stronger contribution to poverty alleviation, improvements towards quality of life in the region and thus achieving development goals.

Democratic thinking and decision-making will be enhanced resulting in better tackling of cross-border environmental issues. People and governments are the enabling factors under this scenario. Higher awareness and responsibility levels will help fight problems like environmental pollution and public health hazards on national and regional levels, and thus achieving sustainability goals.

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