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Factors Affecting the Partnership between Public and Private Sectors in Developing Agricultural Biotechnology

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ABSTRACT

Agricultural experts in the field of biotechnology in Iran were surveyed in order to explore their perception about factors affecting the partnership between public and private sector in developing agricultural biotechnology. The research population included Agricultural biotechnology experts in the public and private sectors (N=66). A series of in-depth interviews were conducted with some biotechnology experts in the Ministry of Agriculture and Agricultural Biotechnology Research Institute to examine the validity of questionnaire. A questionnaire was developed based on these interviews and relevant literature. The data collected by interviewing the respondents and analyzed by using factor analysis technique. To determine the appropriateness of data and measure the homogeneity of variables, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test measures were applied. KMO amount and meaningful level of Bartlett test for policy making and economic factors shows that they are very suitable for factorial analysis. Based on the results of study, intellectual property rights and allocating low interest rate financial facilities to private companies affected the partnership between public and private sector.

Keywords: Biotechnology; Agriculture; Iran; Private sector; public sector.

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INTRODUCTION

Agriculture biotechnology can play an important role in increasing production and improving the quality of food produced by farmers. Many believe that biotechnology will secure growing world food needs as well as deliver a huge range of environmental, health and economic advantages (Wheeler, 2005).

In some of the developing countries, there is not a clear understanding about the role of biotechnology in agriculture sector and policy makers have difficulty in prioritizing the policies and strategies and this pose a great challenge to these countries.

Successful adoption of biotechnologies in developing countries will depend on the availability of technologies appropriate for local agricultural conditions, and policies that enhance the ability of poor farmers to obtain these technologies (Ameden *et al*., 2005).

Public/private partnership is more an effective mechanism for converting the potential of biotechnology in producing products that improve productivity and economic conditions of agriculture sectors (Lewis, 1999).

These partnerships and the shared experiences of the private and public sectors, while largely in more industrialized countries so far, have been repeated to a lesser extent in some developing countries, and support the probability that equally productive interactions will continue in these newer areas (Barry & Horsch, 1999)

Ozor (2008) pointed out that there is need for greater public-private sector collaboration in relation to agricultural biotechnology and its application to problems in developing countries.

A major issue that will affect successful applications of biotechnology to agriculture is the regulatory climatic governing the release of new products. Developing societies will need to develop and implement regulatory measures to manage any environmental, economic, health and social risks associated with genetic engineering (Ozor, 2008).

The results of the study by Spielman *et al*., (2006) suggest that the regulatory environment governing the introduction of new technologies is slowing the forward movement of research into later stages of product development. The absent, incomplete, or nascent character of many regulatory regimes means that very few GM crops have moved onwards to efficacy and performance trials, testing for human and environmental safety, commercialization, marketing, or distribution. Regulatory processes are holding up testing and commercialization, while institutional and attitudinal barriers to partnerships are preventing the use of private-sector knowledge and assets to provide valuable learning and data exchange opportunities relating to regulatory processes.

Poor funding in the research and development of biotechnology in the developing countries is considered another major challenge and financial helps from developed countries and donor agencies can not fulfill their needs. Public sector in the developing countries allocates a major portion of funding and investment in the R and D in the area of biotechnology. Many developing countries tend to spread their limited financial and human resources thinly across divers agricultural biotechnology activities and research agencies (Kasonta, 1999).

Regulatory processes have become clearer in many countries, and the private and public sectors have shown commitments to training and other support, and support for local regulatory system development (Barry & Horsch, 1999).

There is therefore a need for greater public-private sector collaboration in relation to agricultural biotechnology and its application to problems in the developing world. This will require: continued public sector investments from domestic and external resources, public-private sector partnership, innovative funding mechanisms on the part of international development agencies, and involvement of both local private sector companies and transnational companies (Ozor, 2008).

Shoemaker *et al*., (2001) reported that appropriate regulations would increase partnership between public and private sector. In the United States, public research centers are permitted to issue licenses for their inventions. Stevenson-Wydler law provides this opportunity for public research institutions to develop mechanisms for distributing innovations.

In MENA region, Iran has earned a unique position in developing biotechnology in agriculture sector. However, research activities in the field of biotechnology have been largely depended upon the funds from public sector.

In Iran, a radical approach to spread and to promote the adoption of biotechnology by farmers is underway. For instance, the establishment of the National Council for Scientific Research improves the status of biotechnology in the agriculture sector. The promising development was to include both agriculture and biotechnology among the top priorities for funding at the national level (Mugabe, 2002).

MATERIAL AND METHODS

A series of in-depth interviews were conducted with some biotechnology experts in the Ministry of Agriculture and Agricultural Biotechnology Research Institute to examine the validity of questionnaire. A questionnaire was developed based on these interviews and relevant literature.

Measuring respondent's attitudes towards the policy making and economic factors influencing the partnership between private and public sectors has been achieved largely through structured questionnaire surveys. The usual questionnaire approach to measure attitude is include a range of semantic-differential (with good/bad options for example) and Likert items (ranging from 1 as strongly disagree to 5 as strongly agree) to operationalize the attitude construct.

The final questionnaire was divided into several sections. The first section was designed to gather information about personal characteristics of respondents. The second section was designed to measure the attitudes of respondents about the economic and policy making factors. The respondents were asked to indicate their agreements with statements by marking their response on a five point Likert-type scale.

Content and face validity were established by a panel of experts consisting of faculty members at Science and Research Branch, Islamic Azad University, and some specialists in the Ministry of Agriculture. Minor wording and structuring of the instrument were made based on the recommendation of the panel of experts.

A pilot study was conducted with some biotechnology experts to determine the reliability of the questionnaire for the study. Computed Cronbach's Alpha score was 94%, which indicated that the questionnaire was highly reliable.

The research population included Agricultural biotechnology experts in the public and private sectors (N=66). The data collected by interviewing the respondents and analyzed by using factor analysis technique.

To determine the appropriateness of data and measure the homogeneity of variables about factors influencing the participation of private sectors in developing agricultural biotechnology from the viewpoints of biotechnology experts in Iran, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test measures were applied. These statistics show the extent to which the indicators of a construct belong to each other. KMO and Bartlett's test obtained for these variables show that the data are appropriate for factor analysis. The Kaiser criterion also was utilized to arrive at a specific number of factors to extract. Based on this criterion, only factors with Eigen-values greater than one were retained.

RESULTS AND DISCUSSION

KMO and Bartlet test were used to show the extent variables have correlation and dependence to each other. In factorial analysis when KMO is less than 0.5, data are not suitable for factorial analysis and when KMO is between 0.5-0.7, data are suitable for factorial analysis. KMO amount and meaningful level of Bartlett test for policy making and economic factors indicated in Table 1, that shows are very suitable for factorial analysis.

Table 1: Number of variables, eigen-values and variance explained by each variable in policy making factors

Factor	KMO	Sig.
Policy making	0.748	0.00
Economic	0.848	0.00

Table 2: Number of variables, eigen-values and variance explained by each variable in policy making factors

Variables	Eigen-value	% of variance
Changes in policies	0.746	0.556
Participatory strategies in R and D programs	0.686	0.470
Political Support	0.671	0.450
Intellectual property rights	0.805	0.648
No tariff for exporting biotech products	0.646	0.418
Licenses to establish private companies	0.700	0.490

The Varimax rotated factor analysis is shown in tables 2 and variables loadings greater than 0.50 were considered as to be significant. Eigen-value of intellectual property right is 0.805, which is placed at the first variable among the policy making factors that affect the partnership between public and private sectors in developing agricultural biotechnology.

Table 3: Number of variables, eigen-values and variance explained by each variable in economic factors

Variables	Eigen-value	% of variance
Allocating financial facilities with low interest rate	0.929	0.862
Incentives for researchers in public and private sector	0.765	0.585
Tax incentives	0.757	0.570
Providing subsidies to investors	0.742	0.550
Establishing financial supportive system	0.707	0.500
Establishing Common investment funds	0.619	0.384

The economic factor contains 6 variables and the eigen-value for allocating financial facilities with low interest rate is 0.929 which puts this variable as the most important factor influencing partnership between public and private sector.

CONCLUSION

The perception of biotechnology experts about the role of policymaking and economic factors affecting the partnership between public and private sector was discussed in this article and the results demonstrated that opinions and attitudes towards these two factors to a great extent depend upon the intellectual property rights and allocating low interest financial facilities to private sector.

Results of the study indicated that one of the most important factors that affect the partnership between public and private sector is the intellectual property rights. Private sector is not willing to invest in the biotechnology, unless there is certain rules and regulation which would protect them. Intellectual property right would encourage researchers especially in the private sector to be more involved in the process of developing biotechnology products.

Another issue related with the economic factor is financial constraints in developing countries. Poor funding in the research and development of biotechnology in the developing countries is considered another major challenge and financial helps from developed countries and donor agencies can not fulfill their needs. Public sector in the developing countries allocates a major portion of funding and investment in the R and D in the area of biotechnology. Many developing countries tend to spread their limited financial and human resources thinly across divers agricultural biotechnology activities and research agencies (Kasonta, 1999).

It is important to point out that strengthening the linkage between private and public sector and supporting private sector through regulatory and financial mechanisms would accelerate the development of biotechnology in agriculture sector.

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