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The Perception of Researchers about Factors Affecting the Partnership between Public and Private Sectors in Developing Agricultural Biotechnology

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Abstract: The major purpose of this study was to identify strategies in marketing, infrastructural and educational areas to improve the partnership between public and private sector. The total population for this study was 66 biotechnology experts in Iran. The results show that variables establishment of biotechnology hubs were the most important variable in the infrastructural factor, organizing conferences and symposia on biotechnology with participation of public and private sectors to make them familiar with partnerships and exchange of experiences the most important in the educational factor and establishment of sale branches and standing up or participate in technology market fairs as the most important in marketing factor.

Key words: Biotechnology, Iran, Marketing, Educational, Infrastructural, Partnership, Public Sector, Private Sector

INTRODUCTION

Human population growth and increasing urbanization are putting a massive pressure in demand for food production in developing countries. Biotechnology could significantly contribute to increased global food security while supporting ecologically sound agricultural production (Qaim, 1999).

Developing countries confront with many problems such as overpopulation, reduce natural resources, poverty and food insecurity, and they have to utilize the new technologies such as biotechnology to overcome above mentioned problems (Kefayati, 2001;Ozor, 2008)

Public sector by itself can not play the important role in accelerating the development of biotechnology in agriculture sector. Private and public sector partnership in R&D of biotechnology has become a cornerstone of policies developed and to a lesser extent in developing countries.

The private sector is likely to focus on those areas opportunity that will repay their investment in innovation. The public sector must maintain the freedom to operate in an era of increasing proprietary technology (Persley, 2002).

These partnerships will be beneficial to both as their strengths are complementing each other and will reduce the time between the development of the technology and its reaching the end user _ farmer. So, they should be encouraged for harvesting the synergies between the vast infrastructure and expertise of public sector and product delivery network of private sector (APCoAB, 2005)

Kameri_Mbote *et al*. (2001) refereed to factors that increase the partnership between public and private sector. They pointed out to providing exchange programs involving staff from private industries working in laboratories owned by public institutions like universities, establishment of science and technology council/commissions to providing institutional framework for stimulating and fostering public_ private partnership initiatives and setting up joint public_ private coordination bodies.

Asia-Pacific Consortium on Agricultural Biotechnology in the brainstorming session on public_ private partnership in agricultural biotechnology(APCoAB, 2005) concluded: Set-up incubation centers in few selected laboratories/institutions in specialized areas for nurturing start-up companies and encouraging early stage innovations through appropriate partnership mechanisms, market assurance and technology back up, organizingneutral forums to act as facilitator to bring key partners together to get engaged in research, development, commercialization and public awareness of agricultural biotechnology for the benefit of society,existence of properplan of actionin which the role of each partner is clearly defined, strengths andweaknesses realized and the share of benefits of each of the partners is clearly mentioned,before getting into Public-Private partnership, insert a macro-level policy change to make Public-Private partnership more effective, Existence of a declared national strategy for promoting PPP in agri_ sector are some attractive strategies to promote public_ private partnership.

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Department of Biotechnology Ministry of Science & Technology Government of India (n.d) in the National Biotechnology Development Strategy pointed out to encouragement of Public_ private partnerships by doctoral programs through creation of the 'Bio-edu-Grid', establishing biotechnology parks, establishing network of universities and industries facilitating pooling of resources, partnership between publicly funded organizations and industry, inserting masters degree level professionals in industry to undertake Ph.D. programs while retaining their jobs through industry university tie-ups.

Purshafie (2004) suggested establishment of biotechnology and bioinformatic networks are one of the best scientific collaboration in the exchange views between researchers, policy makers and people to optimum use of biotechnology products. These networks can be work as a strong information network, linked withdatabases and networks around the world for easy access by large number of scientists.

The research question for this study is: what is the role of infrastructural, educational and marketing strategies in improving partnership between public and private sector in developing agricultural biotechnology in Iran?

The following objectives were formulated to guide the study: identify the personal characteristics of respondents and identify strategies in marketing, infrastructural and educational areas to improve the partnership between public and private sector.

MATERIALS AND METHODS

A series of in-depth interviews with some senior experts in the field of agricultural biotechnology to examine the validity of our questionnaire were conducted. A questionnaire was developed based on these interviews and previous literature.

A pilot study was conducted with 15 experts that were not included in the sample population to determine the reliability of the questionnaire for the study. Computed Cronbach's Alpha was 89.0% which indicated high reliability of the questionnaire.

The research population included Agricultural biotechnology experts in the public and private sectors (N=66) included private companies, universities, Agricultural Biotechnology Research Institute, National Institute For Genetic Engineering & Biotechnology. The data collected by interviewing the respondents and analyzed by SPSS-Win software by using confirmatory factor analysis technique.

The goal of confirmatory factor analysis is confirmation of special factor structure. In this method, hypothesizes are propounded about number of factors and then suitability of considered factor structure are tested with covariance of measured variables in the hypothesis.

KMO and Bartlett 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.

Results:

The mean age of respondents was 36.8 years. The results show that 78% of experts and more than 90 percent had at least a master degree. Lessthan half of them had a degree in biotechnology (45.5%) and slightly more than 50 percent were involved in public institutions.

The perception of respondents about variance of infrastructural factor in attracting partnership between public and private sector in developing agricultural biotechnology was reported in table 1. This factor contains 8 variables and based on the results, the Eigen-value for infrastructural factor is 3.791 which show 47.362 percent of the total variance of has been explained by these eight variables.

Table 1: Eigen-values and variance of infrastructural factor explained by variables

Factor	Eigen-value	% of variance
Infrastructural	3.791	47.362

As shown at the table 2, establishment of biotechnology hubs with factor loading of 0.82 was the most important and about 68% of its variance is explained by the factor. Also, amount of communality show 68.2 percent of variance of this variable is common with variance of rest variables.

Table 2: Variables loaded in the infrastructural factor using maximum likelihood method

Variable	Eigen -value	communality	Factor Loadings	% of variance
Establishment of biotechnology Hubs	0.631	0.682	0.826	0.682
Set-up incubation centers, in few selected laboratories/ institutions	0.572	0.576	0.759	0.576
Creation of comprehensive infrastructural facilities for biosafety and transgene testing in the public sector	0.513	0.561	0.749	0.561
Establishment of centers for joint use of equipment	0.586	0.531	0.729	0.531

Existence of complete infrastructure	0.479	0.443	0.666	0.443
Establishment of science and technology park or biotechnology park	0.404	0.346	0.588	0.346
Establishment of export processing zones	0.409	0.330	0.574	0.330
Setting up biotechnology and bioinformatics networks	0.443	0.321	0.567	0. 321

(Sig= 0.030)

Table 3 shows the results of factor analysis about educational factor. This factor is consisted of four variables. The result of Eigen-value for educational factor is 2.294 which show 57.353 percent of the total variance of educational factor has been explained by these four variables.

Table 3: Eigen-values and variance of educational factor explained by variables

Factor	Eigen-value	% of variance
Educational	2.294	57.353

It was reported that organizing conferences and symposia on biotechnology with participation of public and private sectors to make them familiar with partnerships and exchange of experiences with factor loading of 0.865 was determined as the first priority and about 74% of its variance is explained by the factor. Also, amount of communality show 74.8 percent of variance of R34 variable is common with variance of rest variables.

Table 4: Variables loaded in the educational factor using maximum likelihood method

Variable	Eigen -value	Communality	Factor Loadings	% of Variance
Organizing conferences and symposia on biotechnology with participation of public and private sectors	0.588	0.748	0.865	0.748
Inserting high educational level in agricultural biotechnology in the universities and research institutions	0.518	0.610	0.761	0.610
Making awareness and informing public and private sector authorities with kind of partnerships and their benefits	0.456	0.496	0.704	0.496
Facilitating the presence of researchers in the educational workshops	0.410	0.440	0.664	0.440

(Sig= 0.095)

In order to finding the respondent's view about variance of marketing factor in attracting partnership between public and private sector in developing biotechnology, respondents were asked to express their views (table5). As can be seen, among four variables in this factor, establishment of sale branches and standing up or participate in technology market fairs with factor loading of 0.838 put in first priority, and about 70% of it's variance is explained by the marketing factor. Also, amount of communality show 70.2 percent of variance of this variable is common with variance of other variables.

Table 5: Variables loaded in the marketing factor using maximum likelihood method

variable	Eigen -value	Communality	Factor Loadings	% of Variance
Establishment of sale branches and standing up or participate in technology market fairs	0.581	0.702	0.838	0.702
Adopting arrangement for national and international marketing for biotechnology	0.570	0.685	0.828	0.685
Contracting to sale based on guaranteed biotechnology market	0.513	0.603	0.777	0.603
Contact with plant distributors in and out of country and use of their resources in form of joint agreement	0.447	0.520	0.721	0.520

(Sig= 0.967)

Table 6 shows the results of Eigen-value for marketing factor which was determined to be 2.511 and 62.772 percent of the total variance of marketing factor has been explained by these four variables.

Table 6: Eigen-values and variance of marketing factor explained by variables

Factor	Eigen-value	% of variance
Marketing	2.511	62.772

Discussion and Conclusion:

Biotechnology has tremendous potential to improve production and quality of agricultural products. However, public sector can not fulfill the function of developing this technology. In this regard, it is important to identify the perception of researchers about factors that influence the partnership between public and private sector in developing agricultural biotechnology.

Based on the findings, establishment of biotechnology hubs were the most important variable in the infrastructural. It echoes that of AkhavanSepahi (2006); Abdi *et al* (2005); Purshafie (2004) and Chaturvedi (2002).Respondents indicated that variable setting up biotechnology and bioinformatics networks were determined as the least important variable. This finding is inconsistence with findings of Department of Biotechnology, India (n.d); Chaturvedi (2002) and APCoAB (2005).

The finding about educational factor show that variable organizing conferences and symposia on biotechnology with participation of public and private sectors were mentioned as the most important educational variable. This is in accordance with those of Cohen *et al* (2001); Kefayati (2001) and Mugabe (2002).

The results also show that variable of facilitating the presence of researchers was the least important variable among educational factor. The importance of this variable pointed out by several authors such as Kefayati (2001) and Ozor (2008).

Based on the perception of respondents, establishment of sale branches and standing up or participate in technology market fairs was found to be the most important variable in the marketing factor. The findings are in accordance with the study by Reza Abdi (2002).

The government of Iran should find ways to overcome the challenges facing the partnership between public and private sector in developing agricultural biotechnology and transform the challenges to opportunities.

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