

Barriers to Networking the Agricultural Innovation System in Sinai Peninsula, Egypt

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ABSTRACT

This research aimed at determining barriers that face development of linkages within the Agricultural Innovation System in Sinai Peninsula (AISSP) and suggestions to networking that system. In order to achieve the above objectives, an empirical study targeted 220 respondents were conducted on the 10 main actors of the system in Sinai Peninsula, these actors are Policy making units, Research stations, Secondary Agric. Education, Higher Agricultural Education, Agricultural Extension organization, Private Consultants, Farmers & Producers, Agricultural Credit banks, Agricultural Private Sector, and NGOs. Samples of 16, 16, 23, 21, 33, 6, 35, 16, 29, and 25 respondents were selected to represent these actors respectively. Data were collected during the period from November-2011 to February-2012 through personal interviews with respondents using a questionnaire form. Frequencies, percentages, means, modes, standard deviations, and relative weights were used for data processing and presentation. Results of the study could be summarized as follows: There are several barriers faced sub-systems of AISSP, barriers related to policy such as Lack of appropriate sources of finance, excessive organizational fragmentation; barriers faced research system includes Multiplicity of type and dependency of research institutions; barriers faced agricultural education includes lack of finance limited physical resources unclear agricultural education policy; barriers faces Agric. Extension Organization includes organizational rigidities and long administrative procedures, weak cooperation with private & international organizations; more risky of agriculture, poor access to knowledge about new varieties, fragmentation of farm size were barriers faces farmers; complexity & long administrative procedures and highly interest ratio of agricultural loans are barriers that face agric. Credit.; barriers faces agric. private sector are poor communication with decision makers, long quality-control procedures; lack of financial capacities of FOs, decline of agricultural cooperatives' role are barriers faced NGOs.in addition to barriers such as poor of transportation infrastructure, lack of knowledge

and information about agricultural innovations, and misunderstanding aims of linkages between actors. Suggestions to Networking AISSP: involve all stakeholders in all agriculture-related activities, formulate a national AIS policy, use activities for coordination including co-publishing, co-trainings & co-seminars, establish coordination unit in extension organization, establish AIS unit, and appointment an agent for every organization in other organizations are the highest frequent suggestion for networking AISSP.

Key Words: Agricultural Innovation System, Extension, Barriers, Networking, Sinai Peninsula, Egypt

1.

2. Introduction

Agriculture is acknowledged as a key component of the economy in both industrialized and developing countries, it contributes to economic development as an economic activity and leading sector for economic growth; a source of livelihood; a provider of environmental services; and a contributing factor to peace and stability by providing food to the growing population at an affordable price.

Six major changes in the context for agricultural development heighten the need to reexamine how innovation occurs in the agricultural sector (**World Bank, 2007: pp 1-4 & Rajalahti *et al.*, 2008: pp 4-5**) these changes are: markets, not production, are increasingly drive agricultural development; the production, trade, and consumption environment for agriculture and agricultural products are growing more dynamic and evolving in unpredictable ways; knowledge, information, and technology increasingly are generated, diffused, and applied through the private sector; exponential growth in information and communication technology (ICT) has transformed the ability to take advantage of knowledge developed in other places or for other purposes; the knowledge structure of the agricultural sector in many countries is changing markedly; and agricultural development increasingly takes place in a globalized setting.

In the last decade, economic and technology strategies have shifted from National Agricultural Research System (NARS) to Agricultural Knowledge and Information System (AKIS) and more recently to Agricultural Innovation System (AIS) (**World Bank, 2007: XIV**). A NARS comprises all of the entities within a country that are responsible for organizing, coordinating, or executing research that

contributes explicitly to development of its agriculture and the maintenance of its natural resource base (ISNAR, 1992). The AKIS links people and institutions to promote mutual learning and generate, share and utilize agriculture-related technology, knowledge and information (FAO & World Bank, 2000). The AIS is a set of agents that contribute, jointly and/or individually, to the development, diffusion, and use of new agricultural technologies, and that influence, directly and/or indirectly, the process of technological change in agriculture (Temel, *et al.*, 2002: p 6).

3. The Problem Statement

In the 1970-2000 period, the Egyptian government reformed the highly centralized economy, and in recent years Egypt has enjoyed moderate but constant growth; in parallel, the Egyptian government took various measures to set up the main elements of relatively comprehensive national innovation system to stimulate industrial modernization.

Agricultural extension service is a key actor in the AIS. With its strong and wide grassroots presence, it remains the major source of knowledge for farmers in developing countries. An effective agriculture extension system will need to provide a broad range of services (advisory, technology transfer, training and information) on a wide variety of actions (agriculture, marketing and social organization) needed by rural people so that they can better manage their agricultural systems and livelihoods. In strengthening extension's role and contributions to AIS, it is important to assess the current strengths of different institutional linkages and the ability of extension providers to serve in more inclusive manner which will enhance the role and contributions that overall AIS can make in achieving national goals.

As a result of increased attention to innovation matters by the Egyptian government over the past years, the innovation system approach should take a place to improve the agricultural development, so, the present study is a trial to explore barriers that face AIS in Sinai Peninsula.

4. Objectives

This research aimed to determine barriers that face components of the AIS in Sinai Peninsula and their suggestions to network that system

5. Methodology

a. Research Area

The Sinai Peninsula or Sinai is a triangular peninsula in Egypt about 60,000 km² in area. It is situated between the Mediterranean Sea to the

north, and the Red Sea to the south, and is the only part of Egyptian territory located in Asia as opposed to Africa, effectively serving as a land bridge between two continents. Based largely on its strategic geopolitical location it was selected to conduct this research. The bulk of Sinai Peninsula is divided administratively into two of Egypt's 28 governorates (with three more straddling the Suez Canal area), the two governorates are North Sinai Governorate (NSG) & South Sinai Governorate (SSG).

b. Operational Definition

AIS in Sinai Peninsula: is a set of agents that contribute, jointly and/or individually, to the development, diffusion, and use of new agricultural technologies, it includes Policy making units, Research stations, Secondary Agric. Education, Higher Agricultural Education, Agricultural Extension organization, Private Consultants, Farmers & Producers, Agricultural Credit banks, Agricultural Private Sector, and NGOs.

c. Types and Sources of Data

The study depends on several types of data obtained from different sources including: Secondary information related to the research subject were obtained from books, references, scientific journals, magazines, websites, directorates of Agriculture in NSG & SSG, and Central Agency for Public Mobilization and Statistics (CAPMAS). Primary data were obtained from respondents through questionnaire forms.

d. Sampling

A number of field visits were conducted to NSG and SSG, where meetings were made with stakeholders in agricultural sector including: agricultural researchers, agricultural extension personnel, key informants, and expert consultancy to develop the knowledge about the AIS of Sinai Peninsula and determine its main sub-systems. These field visits resulted in determining 10 main sub-systems of the AIS in Sinai Peninsula, which are Policy making units, Research stations, Secondary Agric. Education, Higher Agricultural Education, Agricultural Extension organization, Private Consultants, Farmers & Producers, Agricultural Credit banks, Agricultural Private Sector, and NGOs.

In order to achieve the study objective, the empirical study targeted samples of 220 respondents represent all of these 10 actors. Number of respondents regarding every sub-system could be summarized in table 1.

Table 1. Distribution of study's samples form AISSP sub-systems.

No	Sub-systems of AISSP	Sample size
1	Policy making	16
2	Research	16
3	Secondary Education	23
4	Higher Education	21
5	Agricultural Extension Services	33
6	Private Consultants	6
7	Farmers & Producers	35
8	Agricultural Credit Banks	16
9	Agric. Private Sector	29
10	NGOs	25
	Total	220

e. Data Collection

Data were collected during the period from November-2011 to February-2012 through personal interviews with respondents using a questionnaire form constructed to fulfill the study objective. The questionnaire was pre-tested on 20 respondents represent the majority of AIS actors and the invalid questions were modified.

f. Measurements

- **Barriers that face the AIS in Sinai Peninsula:** respondents were asked to indicate their opinion regarding barriers that face the AIS components. Responses were ranged from yes, sometimes and No. Scores were assigned to the responses as 2, 1 and 0 respectively.
- **Relative Weight (RW) of the barrier:** depends on scores that given to respondents' response RW is estimated using the following formula, when weights of 2, 1 and 0 are referred categories of always, may be and no respectively:

$$RW = \frac{\sum (\text{No. of Individuals of each Category} * \text{the Category Weight})}{\text{Total Number of respondents} * \text{the Biggest Weight}} * 100$$

- **Suggested methods to networking the AISSP:** respondents were asked to indicate their opinion regarding methods for networking the AISSP. Responses were ranged from appropriate, maybe and not appropriate. Scores were assigned to the responses as 2, 1 and 0 respectively.

- **RW of the Suggested method to networking the AISSP:** depends on scores that given to respondents' response RW is estimated by the same formula of RW.

g. Data Processing and Analysis

Frequencies, percentages, means, modes, standard deviations, and relative weights were used for data processing and presentation.

6. Results

a. Barriers to networking sub-systems of the AISSP.

This section includes results related to respondents' opinions about barriers to networking AISSP. These barriers were classified according to actors of the system.

- **Policy-related barriers to networking AISSP:** Table 2, summarizes barriers indicated by respondents explaining barriers faced the policy making actor, some of these barriers could be ranked as: lack of appropriate sources of finance, excessive organizational fragmentation, limited physical resources, absence of policy for Agricultural Innovation (AI) priorities, unclear national agricultural policy, absence of stakeholders in planning for agricultural sector, overlapping of supervision dependency, and late prioritize of agricultural sector.
- **Research-related barriers to networking AISSP:** Data in table 2 shown that multiplicity of type and dependency of research institutions, lack of appropriate sources of finance, absence of agricultural research priorities, inefficient use of existing resources, and excessive fragmentation of the research system were at top barriers faced the research component.
- **Secondary Agric. Education-related barriers to networking AISSP:** As shown in table 2, barriers, indicated by respondents, faced secondary agricultural education are lack of finance limited physical resources, unclear agricultural education policy, limited qualified human resources, and inadequate access to information
- **Higher Agric. Education-related barriers to networking AISSP:** Result in table 2 also shown barriers related to higher agric. education that prevent networking among AISSP, these barriers includes unclear agricultural education policy, limited physical resources, and lack of finance.

- **Agric. Extension Services-related barriers to networking AISSP:** According to barriers related to agric. extension services, results in table 2 shown barriers indicated by respondents, some of these barriers could be ranked as organizational rigidities and long administrative procedures, Limited qualified human resources, lack of initiatives to utilize the existing agricultural knowledge and information stock, lack of appropriate sources of finance, and farmers' lack of interest in extension services.
- **Agric. Private Consultancy Services-related barriers to networking AISSP:** Weak client linkages and inadequate access to market information were barriers that prevent private consultancy to networking with AISSP actors as shown in table 2.
- **Farmers & Producers-relate barriers to networking AISSP:** Results reported in table 2 shows that, more risky of agriculture, poor access to knowledge about new varieties, fragmentation of farm size, poor access to information, limited farm management skills, and farmers' weak response to market-oriented farming were barriers indicated by respondents explaining why farmers could not be able to network with other actors in the system
- **Agricultural Credit-related barriers to networking AISSP:** Data in table 2 shows that: complexity & long administrative procedures and highly interest ratio of agricultural loans are only two barriers that prevent agric. credit to develop linkages with AISSP actors.
- **Agric. Private Sector-related barriers to networking AISSP:** Data in table 2 showed that; poor communication with decision makers, long quality-control procedures, high customs duties and cross-border difficulties, weak legal framework, and limited physical resources (e.g., computer-based information sources and storage facilities) are at top of barriers to networking the agric. private sector with other actors in the system.
- **NGOs-related barriers to networking AISSP:** according to barriers related to NGOs actor, data in table 2 shown barriers indicated by respondents as lack of financial capacities of FOs, decline of agricultural cooperatives' role, lack of farmers' interest in establishment of FOs, lack of farmers organizations, complexity and long administrative procedures for FOs establishment, and fragmentation of farm size.

- Finally, respondents indicated some general barriers that prevent networking among AISSP actors, including poor of transportation infrastructure, lack of knowledge and information about AI, misunderstanding aims of linkages between actors, some actors think that they do a great effort more the others, some actors have highly social status more than others, and poor of communication infrastructure as shown in table 2.

b. Suggested method for networking AISSP.

Results in table 3 shows that involve all stakeholders in all agriculture-related activities, formulate a national AIS policy, use activities for coordination including co-publishing, co-trainings & co-seminars, establish coordination unit in extension organization, establish AIS unit, and appointment an agent for every organization in other organizations are the highest frequent suggestions for networking AISSP with averages of 1.83, 1.78, 1.75, 1.73, and 1.72 respectively The relative weights of these five suggestions are 91.59 %, 88.86 %, 87.5 %, 86.36 %, and 86.14% respectively

It could be noted that all of suggestions have relative weights more than 66.66%; which mean the highly priorities of these suggestions.

Table 2. Barriers faced development of linkages among components of Agricultural Innovation System in Sinai Peninsula

No	Barriers facing the AISSP's sub-systems	Yes		Sometimes		No		\bar{x}	SD	RW (%)	Rank
		N	%	N	%	N	%				
Policy Making Units											
1	Lack of appropriate sources of finance	143	65.0	73	33.2	4	1.8	1.63	0.52	81.59	1
2	Excessive organizational fragmentation	137	62.3	83	37.7	0	0	1.62	0.49	81.14	2
3	Limited physical resources	150	68.2	51	23.2	19	8.6	1.6	0.64	79.77	3
4	Unclear national agricultural policy	118	53.6	90	40.9	12	5.5	1.5	0.6	74.09	4
5	Absence of policy for agricultural innovation priorities	137	62.3	49	35.9	4	1.8	1.6	0.53	73.41	5
6	Absence of stakeholders in planning for agricultural sector	127	57.7	64	29.1	29	13.2	1.44	0.72	72.27	6
7	Overlapping of observatory dependency	108	49.1	93	42.3	19	8.6	1.4	0.64	70.23	7
8	Late prioritize of agricultural sector	93	42.3	117	53.2	10	4.5	1.38	0.57	68.86	8
9	Absence of legal & regulatory framework that organize linkages among actors involved in agricultural sector	85	38.6	116	52.7	19	8.6	1.3	0.62	65.00	9
10	Heavy reorganization	72	32.7	119	54.1	29	13.2	1.2	0.95	59.77	10.5
11	Limited qualified human resources	79	35.9	105	47.7	36	16.4	1.2	0.7	59.77	10.5
Research Institutions											
1	Multiplicity of type and dependency of research institutions	142	64.5	72	34.7	6	2.7	1.62	0.54	80.91	1
2	Lack of appropriate sources of finance	121	55.0	92	41.8	7	3.2	1.52	0.56	75.91	2
3	Absence of agricultural research priorities	94	42.7	114	51.8	12	5.5	1.37	0.59	68.64	3
4	Inefficient use of existing resources	95	43.2	106	48.2	19	8.2	1.34	0.63	67.27	4
5	Excessive fragmentation of the research system	95	43.2	103	46.8	22	10	1.33	0.65	66.59	5
6	Limited qualified human resources	84	38.2	124	56.4	12	5.5	1.33	0.58	66.36	6
7	Heavy reorganization	75	34.1	125	56.8	20	9.1	1.25	0.61	62.50	7
8	Over employment	75	34.1	119	52.7	29	13.2	1.2	0.66	61.14	8
9	Poor access to knowledge about and information on new technology	72	32.7	108	49.1	40	18.2	1.14	0.7	57.27	9

Continued

Table 2 Continued

No	Barriers facing the AISSP's sub-systems	Yes		Sometimes		No		\bar{x}	SD	RW (%)	Rank
		N	%	N	%	N	%				
Secondary Agriculture Education											
1	Lack of finance	151	68.6	65	29.5	4	1.8	1.67	0.51	83.41	1
2	Limited physical resources	141	64.1	75	34.1	4	1.8	1.62	0.52	81.14	2
3	Unclear agricultural education policy	138	62.7	79	35.9	3	1.4	1.61	0.52	80.68	3
4	Limited qualified human resources	65	29.5	123	55.9	32	14.5	1.15	0.65	57.50	4
5	Inadequate access to information	64	29.1	119	54.1	37	16.8	1.12	0.67	56.14	5
Higher Agriculture Education											
1	Unclear agricultural education policy	111	50.5	107	48.6	2	0.9	1.5	0.52	74.77	1
2	Limited physical resources	71	32.3	124	56.4	25	11.4	1.21	0.63	60.45	2
3	Lack of finance	73	33.2	104	47.3	43	19.5	1.14	0.71	56.82	3
4	Limited qualified human resources	42	19.1	93	42.3	85	38.6	0.80	0.74	40.23	4
5	Inadequate access to information	10	4.50	97	44.1	113	51.4	0.53	0.58	26.59	5
Agricultural Extension System											
1	Organizational rigidities and long administrative procedures	134	60.1	86	39.1	0	0	1.61	0.49	80.45	1
2	Limited qualified human resources	128	58.2	78	35.5	14	6.4	1.52	0.62	75.91	2
3	Lack of initiatives to utilize the existing agricultural knowledge and information stock	98	44.5	114	51.8	8	3.6	1.41	0.56	70.45	3
4	Lack of appropriate sources of finance	93	42.3	120	54.5	7	3.2	1.39	0.55	69.55	4
5	Farmers' lack of interest in extension services	110	50.0	79	35.9	31	14.1	1.36	0.72	67.95	5
6	Inadequate access to market information	85	42.3	122	55.5	13	5.9	1.33	0.58	66.36	6
7	Weak cooperation with private & international organizations	84	38.2	116	52.7	20	9.1	1.29	0.62	64.55	7

Continued

Table 2 Continued

No	Barriers facing the AISSP's sub-systems	Yes		Sometimes		No		\bar{x}	SD	RW (%)	Rank
		N	%	N	%	N	%				
Private Consultants											
1	Weak client linkages	20	9.1	36	16.4	164	74.5	0.35	0.64	17.27	1
2	Inadequate access to market information	3	1.4	18	8.2	199	90.4	0.11	0.35	5.45	2
Farmers & Producers											
1	Poor access to knowledge about agricultural innovations	115	52.3	105	47.7	0	0	1.52	0.5	76.14	1
3	Fragmentation of farm size	107	48.6	71	32.3	42	19.1	1.3	0.77	64.77	2
4	Farmers' weak response to market-oriented farming	68	30.9	132	60.0	20	9.1	1.22	0.59	60.91	3
5	Limited farm management skills	65	29.5	128	58.2	27	12.3	1.17	0.62	58.64	4
6	More risky of agriculture	63	28.6	114	51.8	43	19.5	1.1	0.69	54.55	5
Agricultural Credit Bank											
1	Complexity and long administrative procedures	168	76.4	52	23.6	0	0	1.76	0.43	88.18	1
2	Highly interest ratio of agricultural loans	150	68.2	59	26.8	11	5.0	1.63	0.58	81.59	2
Agricultural Private Sector											
1	Poor communications with decision makers	114	51.8	99	45	7	3.2	1.49	0.56	74.32	1
2	Long quality-control procedures	109	49.5	107	48.6	4	1.8	1.48	0.54	73.86	2
3	High customs duties and cross-border difficulties	100	45.5	110	50.0	10	4.5	1.41	0.58	70.45	3
4	Weak legal framework	92	41.8	121	55	7	3.2	1.39	0.55	69.32	4
5	Limited physical resources (e.g., computer-based information sources and storage facilities)	111	50.5	79	35.9	30	13.6	1.37	0.71	68.41	5
6	Limited qualified employers	82	37.3	115	52.3	23	10.5	1.29	0.64	63.41	6
7	Poor information on markets	76	34.5	120	54.5	24	10.9	1.24	0.63	61.82	7
8	Lack of mechanisms (e.g., workshops and seminars) to obtain information on international markets	63	28.6	139	63.2	18	8.2	1.20	0.57	60.23	8
9	Limited managerial skills	63	28.6	137	62.3	20	9.1	1.2	0.58	59.77	9

Continued

Table 2 Continued

No	Barriers facing the AISSP's sub-systems	Yes		Sometimes		No		\bar{x}	SD	RW (%)	Rank
		N	%	N	%	N	%				
NGOs											
1	Lack of financial capacities of FOs	146	66.4	64	29.1	10	4.5	1.62	0.57	80.91	1
2	Decline of agricultural cooperatives' role	139	63.2	77	35	4	1.8	1.61	0.52	80.68	2
3	Lack of farmers' interest in establishment of FOs	111	50.5	96	43.6	13	5.9	1.45	0.61	72.27	3
4	Lack of farmers organizations	113	51.4	85	38.6	22	10	1.41	0.67	70.68	4
5	Complexity and long administrative procedures for FOs establishment	100	45.5	101	45.9	19	8.6	1.39	0.64	68.41	5
6	Fragmentation of farm size	110	50	82	37.3	28	17.2	1.37	0.70	68.64	6
General Barriers											
1	Poor of transportation infrastructure	130	59.1	86	39.1	4	1.8	1.57	0.53	78.64	1
2	Lack of knowledge and information about agricultural innovations	128	58.2	86	39.1	6	2.7	1.55	0.55	77.73	2
3	Lack of awareness about benefits of the linkages between sub-systems	122	55.5	86	39.1	12	5.5	1.50	0.60	75.00	3
4	some actors think that they do a great effort more the others	108	49.1	112	50.9	0	0	1.49	0.50	74.55	4
5	Some actors have highly social status more than others	99	45	120	54.5	1	0.5	1.45	0.51	72.27	5
6	Poor of communication infrastructure	119	54.1	78	35.5	23	10.5	1.44	0.67	71.82	6

Source: the Study's Results

Table 3. Suggested methods for networking AISSP actors

No	Suggested methods for linking the AISSP sub-systems	Appropriate		May be		Not appropriate		\bar{x}	SD	RW (%)	Rank
		N	%	N	%	N	%				
1	Involve all stakeholders in all agriculture-related activities	187	85.0	29	13.2	4	1.8	1.83	0.42	91.59	1
2	Formulate a national AIS policy	171	77.7	49	22.3	0	0	1.78	0.42	88.86	2
3	Use activities for coordination including co-publishing, co-trainings and co-seminars	169	76.8	47	21.4	4	1.8	1.75	0.47	87.50	3
4	Establish coordination unit in extension organization	169	76.8	42	19.1	9	4.1	1.73	0.53	86.36	4
5	Establish AIS unit	159	72.3	61	27.7	0	0	1.72	0.45	86.14	5
6	Appointment an agent for every organization in other organizations	154	70.0	66	30.0	0	0	1.7	0.46	85.00	6
7	Appointment central coordinating council	158	71.8	57	25.9	5	2.3	1.7	0.51	84.77	7
8	Decentralize decision-making to lower levels of government and relevant local organizations	169	76.8	26	11.8	25	11.4	1.65	0.67	82.73	8
9	Coordination through periodic exchange of information	159	72.3	44	20.0	17	7.7	1.64	0.62	82.27	9
10	Coordination by periodic meetings	154	70.0	49	22.3	17	7.7	1.62	0.63	81.14	10
11	Appointment of coordinating committee	153	69.5	40	18.2	27	12.3	1.57	0.7	78.64	11
12	Establish agricultural information unit for coordination	131	59.5	33	15.0	56	25.5	1.34	0.86	67.05	12
13	Formulate legal framework and regulations to stimulate coordination	99	45.0	96	43.6	25	11.4	1.34	0.67	66.82	13

Sources: The Study's Data

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معوقات تشبيك نظام الابتكار الزراعي في شبه جزيرة سيناء، مصر

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الملخص

استهدف هذا البحث تحديد المعوقات التي تواجه اقامة العلاقات بين الانظمة الفرعية لنظام الابتكار الزراعي في شبه جزيرة سيناء والأساليب المناسبة للتنسيق وتشبيك النظام. ولتحقيق هدف البحث تم إجراء دراسة ميدانية استهدفت 220 مبحوث تمثل العشرة عناصر الرئيسية لنظام الابتكار الزراعي في شبه جزيرة سيناء (محافظة شمال وجنوب سيناء)، وتلك العناصر هي: صانعي السياسات الزراعية، البحث العلمي الزراعي، التعليم الثانوي الزراعي، التعليم العالي الزراعي، الارشاد الزراعي، الاستشارات الزراعية الخاصة، الزراع والمنتجون، بنوك الائتمان الزراعي، القطاع الخاص الزراعي، والمنظمات غير الحكومية. تم سحب عينات تبلغ 16، 16، 23، 21، 33، 6، 35، 16، 29، و25 مبحوث تمثل العشر مكونات الرئيسية المدروسة على الترتيب. تم جمع البيانات في الفترة من نوفمبر 2011 الى فبراير 2012 من خلال المقابلة الشخصية باستخدام استمارة استبيان صممت خصيصاً لتحقيق أهداف الدراسة. واستخدمت التكرارات والنسب المئوية والمتوسطات والمنوال والوزن النسبي والانحراف المعياري بالإضافة الي اسلوب الرسم النظري في معالجة وعرض البيانات.

يمكن تلخيص نتائج الدراسة على النحو التالي:

أ. **معوقات التشبيك:** تعددت وتنوعت المعوقات التي تواجه مكونات نظام الابتكار الزراعي وتضمنت معوقات متعلقة بصانعي السياسات منها غياب السياسات الخاصة بأولويات الابتكارات الزراعية وعدم وضوح السياسة الزراعية، ومعوقات خاصة بالبحث العلمي الزراعي ومنها تعدد الجهات البحثية وتبعيتها لأكثر من جهة و ضعف الموارد المالية و غياب أولويات البحث الزراعي، ومعوقات خاصة بالتعليم الزراعي (الثانوي والجامعي) ومنها نقص الموارد المالية، و ضعف الموارد المادية، وعدم وضوح سياسة التعليم الزراعي، ومعوقات خاصة بالارشاد الزراعي ومنها التعقيدات التنظيمية وطول الإجراءات الادارية و ضعف التعاون مع المنظمات الأخرى الخاصة والدولية، ومعوقات خاصة بالزراع ومنها ضعف القدرة على الوصول الي المعلومات، تفتت حجم الحيازات المزرعية، ضعف المهارات الادارية، ومعوقات خاصة ببنوك التنمية والائتمان الزراعي تضم تعقد وطول الإجراءات الإدارية وارتفاع سعر الفائدة على القروض الزراعية، ومعوقات خاصة بالقطاع الخاص منها ضعف التواصل مع صانعي السياسات و متخذي القرارات، طول الإجراءات الرقابية، ومعوقات خاصة بالمنظمات غير الحكومية ومنها ضعف القدرات المالية لمنظمات الزراع، وتراجع دور التعاونيات الزراعية، وعدم اهتمام الزراع بتكوين منظماتهم بالإضافة الي معوقات كضعف البنية التحتية للمواصلات، وقلّة المعلومات عن الابتكارات الزراعية، وسوء فهم الهدف من الترابط بين الانظمة الفرعية.

ب. **الأساليب المقترحة للتشبيك:** اوضحت النتائج الاساليب المقترحة لتشبيك النظام على النحو التالي: تضمين ومشاركة جميع الأطراف في كافة الأنشطة المرتبطة بالقطاع الزراعي، وضع سياسة قومية لنظام الابتكار الزراعي، الربط والتشبيك من خلال النشر المشترك والتدريب والمؤتمرات، وانشاء وحدة أو ادارة خاصة بنظام الابتكار الزراعي، وتعيين وكيل لكل نظام فرعي في باقي الأنظمة الفرعية للقيام بالمهام التنسيقية.

الكلمات المفتاحية: نظام الابتكار الزراعي، التشبيك، المعوقات، الارشاد الزراعي، سيناء، مصر