Barriers to Adoption of some Agricultural Innovations in a Village in the New Valley Governorate

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Abstract: This research aims to determine rates of adoption and continuation of some selected innovations (Wheat Seds1, El-Gorma Watermelon, Sprinkler Irrigation System, and Sugar Beet) and to determine perceived barriers to adoption and diffusion of these selected innovations from farmers' point of view. In order to achieve these objectives, an empirical study targeted all farmers of The Third Village in Darb El-Arbaeen area, Paris District, The New Valley Governorate. Data were collected during January 2008 through personal interviews with farmers using a questionnaire form constructed and pre-tested to fulfill the study objectives. Frequencies and percentages were used for data processing and presentation. Results showed that high price of fertilizers, its unavailability and high shelling of grains were the most important barriers to the adoption and diffusion of Wheat Seds1. Lack of farmers experience and lack of extension activities were the most important barriers to the adoption and diffusion of El-Gorma Watermelon. Barrier to the adoption and diffusion of Sprinkler Irrigation System were: (1) it requires more labor, (2) it requires more effort, time, and money, (3) losses in yields caused by transferring pipes, (4) damage of pipes, (5) type of soil is not suitable, and (6) prefer surface irrigation system. Barriers to the adoption and diffusion Sugar Beet were: sugar factory did not implement its promises, lack and late arrival of transportation means, prefer wheat cultivation and have no experience about it.

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1. Introduction

Agriculture is the mainstay of many low-income or developing nations' economies and exports, and provides for the livelihoods of billions of smallholders (Maru, 2005). The national economy of Egypt suffers from several problems. The food problem comes on the top of all these problems. This situation arose from the deficiency of the local food production to cover the ever increasing consumption needs. Therefore, a food gap arose and continued to increase year after year. So, there were many gaps between production and local consumption needs of a number of agricultural products in 2005 such as Wheat, Maize and Bean. These gaps were estimated to be 4.434, 0.438 and 0.227 million tons, respectively (CAPMAS, 2007).

Therefore, the Egyptian government imports these products, which cost a lot of money. (CAPMAS, 2006) reported that the imports of wheat, wheat flour and maize in 2005 were 5300, 60 and 3961 million L.E., respectively.

The most important way to overcome these gaps is the agricultural development, which consists of two types: (1) Horizontal agricultural development which can be achieved by reclaiming new lands to increase the area of cultivated lands, (2) Vertical agricultural development which occurs by improving the productivity of the existing agricultural resources (Abdel-Maksoud, 1988).

For the purpose of achieving horizontal agricultural development, the Egyptian government adopted Mubarak national project for developing and serving young graduates and beneficiaries' lands since 1985. This project was applied on a number of areas including The New Valley governorate. The project created an organization in January 1986 as a supervisor for the project progress, this organization called General Supervisory for Development and Cooperatives (Mubarak National Project for Developing and Serving Young Graduates and Beneficiaries' Lands, 2000).

The Egyptian Government also put a great deal of effort to the diffusion of modern agricultural practices in both old and new lands to increase their productivity to achieve vertical agricultural development. This vertical agricultural development requires diffusion of information concerning innovations, their adoption, and social structures and conditions necessary for their implementation (Manig, 1985).

These processes consumed a lot of money, time, and effort. Therefore, the success of these activities will lead to overcoming the food gap, while their failure will lead to losses of our money, time, and effort, increasing the external debt, and increasing the

imports due to the increased number of population (the external debt equals to 28948.8 million U.S. $ till 2005 (CAPMAS, 2006).

The Problem Statement

The New Valley Governorate is one of the most important horizontal agricultural development governorates in Egypt. Mubarak national project reclaimed 24951 Feddan in the New Valley Governorate distributed among five areas and thirteen villages (General Observatory for Development and Cooperatives, 2007a).

Many innovations have been introduced to farmers in the new reclaimed areas in the New Valley governorate (General Observatory for Development and Cooperatives, 2007b & Directorate of Agriculture, 2007). Some of these innovations adopted; some others were not. This research aims at investigating barriers to adoption of some of these innovations (Wheat Seds1, El-Gorma Watermelon, Sprinkler Irrigation System, and Sugar Beet).

Objective

This research aims to:

Determine rates of adoption and continuation of the selected innovations.

Determine perceived barriers to the adoption and diffusion of the selected innovations according to farmers' point of view.

2. Methodology

Selecting the Research Area

As the nature of The New Valley governorate which attributed by far away distances between the four districts, Darb Al-Arba'in area was selected to conduct this empirical research as a strategic area linking between West of The Valley (Toushka Project and East of El-Ewaynat Project) and Paris, Khargah, Dakhlah, & Farafrah oases, and the large area targeted in reclamation strategy in Darb El-Arbaeen area. As a case study we selected the Third Village which includes 144 farmers.

Types and Sources of Data

This research depends on various types of data obtained from various sources as bellow:

Secondary data related to the Mubarak Project were obtained from various documents of the project and its pamphlets. Secondary data related to the study's area were obtained from the General Supervision for Development and Cooperatives, The New Valley Governorate, Information and Decision Making Support Center, and Administration of Agriculture in The New Valley Governorate.

Primary data were obtained from farmers through general survey of all farmers of the study's village (The Third Village in Darb El-Arbaeen area in The New Valley Governorate).

Theoretical information related to the research subject were obtained from books, references, scientific journals, magazines, websites, and the agricultural national library.

The Respondents:

The empirical study targeted all farmers of The Third Village in Darb El-Arbaeen area, Paris District, The New Valley Governorate, the actual number of farmers who responded to the questionnaire is 140 farmers. Other four farmers were not at the Village during data collection.

Data Collection:

Data were collected during January 2008 through personal interviews with farmers using a questionnaire form constructed to fulfill the study objectives, after pre-testing it through 15 farmers in The First Village in Darb El-Arbaeen and modifying the invalid questions. The questionnaire includes questions related to hearing about the innovation, date of first hearing, date of first adoption, date of discontinuity, and barriers to diffusion and adoption of the innovation.

Measurements

Characteristics of farmers

Age: Measured by the number of years.

Education: respondents were asked about their educational levels. According to their responses, farmers were classified to 6 categories as follows: Illiterate, Read and write, Have primary education certificate, Have preparatory education certificate, Have secondary education certificate, and Have a university degree.

Home Governorate: respondents were asked about the governorate in which they lived before coming to the current village.

Number of children: respondents were asked about the number of children they had. Accordingly, farmers were classified to three categories: had less than 4, had from 4 to 6, and had more than 6 children.

Cosmpoliteness: to measure cosmopoliteness, respondents were asked questions related to visits to: surrounding villages, city of Khargah, and other governorates. According to their responses, scores were given to farmers and accordingly respondents were classified to three categories: low, medium, and high.

Satisfaction with services: respondents were asked to indicate their opinions about 10 sentences developed to measure their satisfaction with services.

Responses to these sentences ranged from agree, not indicate, and disagree. Scores were assigned to the responses as 2, 1, and 0 respectively. Accordingly, responses were classified to three levels of satisfaction with services: low or not Satisfied (less than 7 scores), medium (from 7 to 13 scores), and high satisfied (14 scores and more).

Tendency to change: respondents were asked to state their opinions about 6 sentences related to tendency to change. Responses ranged from implement immediately, wait for others, and does not implement. Scores were assigned as 2, 1, and 0 respectively. Accordingly, responses were classified to three levels of tendency to change: Low (less than 4 scores), medium (from 5 to 8 scores), and High (from 9 to 12 scores).

Attitude towards settlement: respondents were asked to indicate their opinions about 10 sentences developed to measure their attitudes towards settlement 7 positive, and 3 negative (Bali, 1998 and Anttar, & Abbassy, 1999). Responses to these sentences ranged from agreement to disagreement. Scores were assigned to the responses as follows:

Sentences	Agree	Not Indicated	Disagree
Positive	2	1	0
Negative	0	1	2

Accordingly, responses were classified to three levels of Attitude toward settlement: negative (less than 7 scores), medium (from 7 to 13 scores), and positive (14 scores and more).

Attitude towards Extension: respondents asked to indicate their opinion about 10 sentences developed to measure their attitudes towards extension. Responses to these sentences ranged from agreement to disagreement. Accordingly, responses were classified to three levels of Attitude toward extension: negative (less than 7 scores), medium (from 7 to 13 scores), and positive (14 scores and more).

Attitude towards agricultural innovations: respondents asked to indicate their opinion about 6 sentences developed to measure their attitudes towards agricultural innovations (see the questionnaire). Responses to these sentences ranged from agreement to disagreement. Accordingly, responses were classified to three levels of Attitude toward agricultural innovations: negative (less than 5 scores), medium (from 5 to 8 scores), and positive (9 scores and more).

Rate of adoption

$$\text{Rate of adoption} = \frac{\text{number of farmers who adopt the innovation}}{\text{Total number of farmers who heard about it}} * 100$$

Rate of continuation

$$\text{Rate of continuation} = \frac{\text{number of farmers who continued in adoption}}{\text{Total number of farmers who adopted about it}} *100$$

3. Results

Characteristics of respondent farmers

Results in table 1 showed that: ages of the respondents farmers ranged between 20 to 60 years. Over one half of them (53.6 %) were 30 to less than 40 years. The highest percentage of farmers was the illiterate farmers (37.9 %). The majority of farmers had low educational levels. More than one half of respondents (50.7 %) were from Kafr El-Siekh governorate. And most of respondents (82.9 %) had 4 children and more.

The majority of respondents (89.3 %) had a medium and high degree of cosmopoliteness by visiting their home governorates at festivals and similar occasions. Most respondents (83.6 %) were not satisfied with services. And over one half of them (55.7 %) had a low and a medium degree of tendency to change.

With regarded to their attitudes, findings showed that most respondents (90.7 %) have medium and positive attitudes towards settlement, and nearly one half of them (49.3 %) had negative attitudes towards extension. Most respondents (86.4 %) had medium and positive attitudes towards innovations which support their ability to adopt the innovations.

Results in table 2, showed that three sources of information were used by respondents. The most important source was other farmers which was used by all respondents, (used always by 65.7 % of them), while the extension worker was used by 81.1 of respondents (used rarely by 41.4 % of them), and extension fields were used by 61.4 % of respondents.

Adoption & Continuation Rates

As shown in table 3, rates of adoption ranged from 84 % in the case of Sugar Beet and 100 % in the case of Sprinkler Irrigation System, while it was 94 % and 86 % for Wheat Seds1 and El-Gorma Watermelon respectively. Over three quarters was the rate of continuation of Wheat Seds1, and 96 % for El-Gorma Watermelon. While rates of continuation concerning both Sprinkler Irrigation System and Sugar Beet were zero

Barriers to Adoption and Diffusion of the Selected Innovations

This section includes findings of barriers to adoption and diffusion of the selected innovations.

Data in table 4, shown that: high price of fertilizers, its unavailability and high shelling of

grains were at top of the barriers to adoption and diffusion of Wheat Seds1. While barriers to adoption and diffusion of El-Gorma Watermelon were lack of farmers experiences and lack of extension activities.

Barrier to adoption and diffusion of Sprinkler Irrigation System were: it requires more labor, it requires more effort, time, and money, losses in yields caused by transferring pipes, damage of pipes, type of soil is not suitable and prefer surface irrigation system. While sugar factory did not implement its promises, lack and late arrival of transportation means, prefer wheat cultivation and have no experience about it were barriers to adoption and diffusion of Sugar Beet.

Table 1. Frequency and percentage distribution of farmers by their studied characteristics (N = 140) .

No.	Characteristics	F	%
1	**Age (Years)**		
	20 < 30	9	6.4
	30 < 40	75	53.6
	40 < 50	40	28.6
	50 - 60 years	16	11.4
2	**Education**		
	Illiterate	53	37.9
	Read and write	17	12.14
	Have primary education certificate	10	7.14
	Have preparatory education certificate	37	26.4
	Have secondary education certificate	19	13.6
	Have college education degree	4	2.8
3	**Home Governorate**		
	Kafr El- Shiekh	71	50.7
	El-Mansoura	4	2.8
	El-Sharkia	7	5
	The New Valley	25	17.9
	Assiut	11	7.9
	Sohage	16	11.4
	Qena	6	4.3
4	**Number of children**		
	Less than 4	24	17.1
	From 4 to 6	70	50
	More than 6	46	32.9
5	**Cosmopoliteness**		
	Low (less than 4 scores)	15	10.7
	Medium (from 4 to 6 scores)	80	57.2
	High (more than 6 scores)	45	32.1
6	**Satisfaction with services**		
	Low (less than 7 scores)	117	83.6
	Medium (from 7 to 13 scores)	23	16.4
	High (14 scores and more)	0	0
7	**Tendency to change**		
	Low (less than 5 scores)	24	17.1
	Medium (from 5 to 8 scores)	54	38.6
	High (9 scores and more)	62	44.3
8	**Attitude towards settlement**		
	Negative (less than 7 scores)	13	9.3
	Medium (from 7 to 13 scores)	51	36.4
	Positive (14 scores and more)	76	54.3
9	**Attitude towards extension**		
	Negative (less than 7 scores)	69	49.3
	Medium (from 7 to 13 scores)	59	42.1
	Positive (14 scores and more)	12	8.6
10	**Attitude towards innovations**		
	Negative (less than 5 scores)	19	13.6
	Medium (from 5 to 8 scores)	62	44.3
	Positive (9 scores and more)	59	42.1

Source: Questionnaire forms.

Table 2. Frequency and percentage distribution of farmers by their usage of information sources

Information sources	Yes						No	
	Always		Sometimes		Rarely			
	F	%	F	%	F	%	F	%
Extension Worker (Cooperatives)	22	15.7	34	24.3	58	41.4	26	18.6
Extensional fields	22	15.7	47	33.6	17	12.1	54	38.6
Other Farmers	92	65.7	39	27.9	9	6.4	0	0

Source: Questionnaire forms.

Table 3. Adoption rates of the selected innovations.

Innovations	Rate of Adoption	Rate of Continuation
Wheat Seds1	93.8	78.7
El-Gorma Watermelon	86.3	96.3
Sprinkler Irrigation System	100	0
Sugar Beet	84.3	0

Source: Estimated from questionnaire forms.

Table 4. Barriers to adoption and diffusion of the selected innovations.

No.	Barriers to adoption and diffusion of Wheat Seds1(N= 130)	F	%
1	High price of fertilizers	130	100
2	Unavailability of fertilizers	121	93.1
3	High shelling of grains	101	77.7
Barriers to adoption and diffusion of El-Gorma Watermelon (N= 124)			
1	Lack of farmers experiences	98	79
2	Lack of extension activities	74	59.7
Barriers to adoption and diffusion of Sprinkler Irrigation System (N= 140)			
1	It requires more labor	140	100
2	It requires more effort, time, and money	138	98.6
3	Losses in yields caused by transferring pipes	138	98.6
4	Damage of pipes	136	97.1
5	Type of soil is not suitable	79	56.4
6	Prefer surface irrigation system	52	37.1
Barriers to adoption and diffusion of Sugar Beet (N= 140)			
1	Sugar factory did not implement its promises	140	100
2	Lack of transportation means	140	100
3	Late arrival of transportation means	140	100
4	Prefer Wheat cultivation	67	47.9
5	Have no experience about it	53	37.9

Source: Questionnaire forms

Discussion

Based on results of the study, Wheat Seds1 is a successful innovation according to its rates of adoption and continuation that may attributed to the specialty and importance of wheat and it flour in bread industry in rural areas. El-Gorma Watermelon also is a successful innovation that resulted from its easy growing and marketability. While both Sprinkler Irrigation System and growing Sugar Beet are less succeed innovations and growers face many barriers to adopt them, which shows that training programs should be held to improving growers' capacities in the study area

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