Original article

Biological yields through agricultural extension activities and services: A case study from Al-Baha region – Kingdom of Saudi Arabia

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**ABSTRACT**

**Purpose:** This research determines the extent to which farmers benefit from agricultural extension activities and services through realizing higher biological crop yields in the Al-Baha region of the Kingdom of Saudi Arabia. Additionally, the nature of the relationship between the personal, economic and social characteristics of farmers and the degree to which they benefit from agricultural extension activities and services are studied.

**Methodology:** A simple random sample representing the community of 315 farmers was drawn. Data were collected through a personal interview with a pre-tested questionnaire to satisfy the objectives of the study. Data are subjected to analyses and are interpreted in terms of percentages, arithmetic averages, and standard deviations in addition to the simple Pearson correlation coefficients.

**Results:** The results show that most of the respondents depend on personal experience, friends, family and neighbors, merchants and sellers of agricultural production supplies as sources of agricultural information for enhanced crop yields. Multiple regression analysis reveals that both the educational status and the agricultural information sources are important factors that increase farmers benefit from extension activities. Farmers receive most benefits from the extension activities and services from bringing in foreign workers, conducting field trips to farms, and identifying problems faced by farmers.

**Research limitations/implications:** The outcome of this questionnaire limits generalization of the findings for other parts of the Kingdom due to geographical and natural resources variations.

**Practical implications:** The personal and socio-economic characteristics of the surveyed population provide the extension service with insight into their composition – a basis to formulate workable extension programs. For the extension planners of the area, this effort provides a baseline study and may assist with targeting the appropriate farmers and catering the right solutions to the problems. Such a study will help devise meaningful extension programs and save time and resources.

**Originality/value:** Little previous research on the usefulness of the Extension Service has been conducted in the region.

**Conclusions:** Effective, well-planned extension programs targeting the educated and mature farmers provided more benefits and helped them obtain higher crop yields.

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1. Introduction

Agricultural extension and advisory services and systems are primarily responsible for disseminating technological knowledge to the farmers (Singh and Meena, 2019; Wanigasundera and Atapattu, 2019) and assisting them in upgrading their farming practices and enhancing their management skills (Wanigasundera and Atapattu, 2019). The extension is known as an informal education system capable of facilitating the transfer
and exchange of knowledge that can be transformed into practical information, which, in turn, can assist businesses to grow, increase productivity and generate revenue. In addition to technology transfer, the extension department also delivers education and knowledge of essential services. (Stringfellow et al., 1997; Davidson et al., 2001; Betz, 2009; Qamar, 2012).

Agricultural extension workers are key players. They act as mediators of information or knowledge to facilitate the process of education and learning among the farmers, including women and the youth in the rural areas (Swanson & Rajalahiti, 2010). They can not only act as farmer’s assistants, but also community organizers (Suvedi and Michael, 2016). With their significant role in technology transfer, they establish meaningful coordination between various research fora and farmers. Extension agents act as community teachers, philosophers, leaders, guides, colleagues, and their unique talents. Extension service and its agents have a unique place in the development of agriculture as compared to the other departments. That is why the success or failure of development programs often depends on the capacity and skill of the extension staff (Anaeto et al., 2012). Extension workers can be the main motivators in the modernization of the farming sector (Shah et al., 2013; Suvedi and Michael, 2016).

Extension workers have vital responsibilities in this knowledge transfer: educating growers and producers to increase farmers’ income and link farmers to research-based materials on processing and marketing of agricultural products and services. In the past, the agricultural extension system was primarily responsible but now it helps to organize farmers and linking them to markets (Swanson, 2006; Shepherd, 2007).

Omar (1992) stated that agricultural extension agencies in the Arab countries carry out two basic tasks: the transmission of research results to farmers and assisting them in procuring needed agricultural inputs for farming. However, agricultural extension in the Kingdom of Saudi Arabia still has the responsibility to increase awareness, undertake field activities, make field visits to farmers, disseminate innovative technical information, participate in festivals, directly communicate needed information from time to time, help farmers find solutions to the issues they face, organize training programs for the farmers on various agricultural aspects and help farmers improve practices to realize higher biological results (MEWA, 2016). The General Administration of Agricultural Extension in the Kingdom undertakes multifarious activities to increase the awareness and information levels of farmers. It arranges to upgrade the skills and educational levels of extension staff in the field of crops, fish farming, and livestock production. It is responsible for providing extension services in all the fields and aspects of the agricultural sector. The departments and directorates of agriculture in the Kingdom undertakes 21 general types of activities to serve the farming communities.

Even though environmental conditions are not ideal, Saudi Arabia has always attached great importance to the agricultural sector and has given it a priority in various development plans (FAO-AQUASTAT, 2008; Al-Shayaa et al., 2012). The Ministry of Environment Water and Agriculture is a government ministry in Saudi Arabia responsible for achieving sustainability of the environment and natural resources in the Kingdom. The Ministry also oversees developing and applying policies that contribute to achieving water and food security (MEWA, 2020).

The Kingdom designed and implemented the farmers’ friendly projects, plans, and policies. Such measures helped to enhance the production of the local plant, animal, and fish products and meet the basic needs of its dwellers over recent years, and leading to greater levels of food self-sufficiency and abundance of food in 2020.

The Kingdom realized self-sufficiency in many agricultural commodities and products like dates, vegetables, fruits, citrus fruits, broiler chickens, table eggs, fresh milk, and fish and contributed significantly to achieving food security. Ministry’s efforts in developing the agriculture sector helped to increase the productivity of strategic crops, maintaining a sustainable agricultural environment, and supporting farmers (MEWA, 2020).

Among the most suitable areas for farming in the Kingdom, the Al-Baha region occupies a prominent place for various agricultural and farming activities. Due to the high agricultural potential of the area, well-designed extension work-plans have been implemented in the region. Information on new and innovative farming practices are disseminated through a wide range of activities, such as the organization of field days/events for the farmers, informative seminars and lectures, guided tours, field visits, and individual meetings with interested farmers (MEWA, 2020). The number of these activities and services are considered too few to be effective across the size of the Kingdom, which may be due to the many obstacles facing the Agricultural Extension Organization.

Among the most important barriers impacting the efficiency of the extension departments and the other agricultural departments include a shortage of skilled technical staff; the undertaking of extension work by the staff with low qualifications/professional skills; lack of commitment on the part of many farmers to attend seminars and agricultural lectures; shortage of competent agricultural experts arranging training courses with poor practical and theoretical contents; lack of awareness and perceived importance of the role of agricultural extension by the farmers; the increased influx of the foreign workers undertaking farm operations and entering into the farming business; and the lack of incentives for the extension workers in some disciplines as they face risks like beekeeping (Ministry of Agriculture, 2016); lack of trained and specialized farmworkers, lack of funds; a weak relationship between Extension service and the research institutions; poor follow-up, monitoring and evaluation; no job descriptions for agricultural agents. These are some of the prime factors, negatively impacting the quality of extension work in the kingdom (Al-Zahrani et al., 2016; Baig et al., 2017).

No doubt, the problems faced by the agricultural extension service are not new; they have been around for years and are viewed as ongoing and long-term challenges as pointed out by Al-Zaidi and Al Shenaifi (1988), Al-Odhaibi (1989), Al-Zahrani (1990), Al-Fahiqi (1996), Al-Hajj (2001), and Al-Zaidi and Al-Hajj (2004). There have been numerous studies that dealt with the services provided and activities carried by the Agricultural Extension Department and the extent of their beneficial levels (Muktar et al., 2016; Danso-Abbeam et al., 2018).

In this situation, it seems imperative to reconsider the role of agricultural extension and redefine the responsibilities of Extension service and its agents in light of the newly emerging issues and the everyday scientific innovations in farming. Not very many studies on the identification of beneficial and more useful extension activities are available. Therefore, it is important to gauge the extent to which farmers benefit from agricultural extension activities and services in the kingdom in general and Al-Baha in particular. Thus, there is a need for such a study to conduct. The present study in the Al-Baha region – Kingdom of Saudi Arabia is an endeavor in this direction.

1.1. Purpose and objectives

This research studies the extent to which farmers benefit from agricultural extension activities and services in the Al-Baha region in the Kingdom of Saudi Arabia. The following are sub-objectives:

1. Identifying the benefits from the agricultural extension activities and services provided by the Agricultural Extension Authority from the farmers’ point of view.
2. Defining the most important sources of information that farmers rely on to obtain agricultural information.

3. Finding the relationship between the personal, social, and economic characteristics of farmers in the Al-Baha region and their benefits from the activities and extension services provided by the agricultural extension agency.

1.2. Methodology

The entire population of this research consists of all the owners of farms registered with the General Administration of Agriculture in Al-Baha Region, totaling 3353 farmers. A simple random sample was taken of 315 farmers (the number was determined according to the Krejcie and Morgan equation), representing 9.4% of the farmers. The data were collected through personal interviews using a questionnaire that was judged and tested for validity. The SPSS “version 20” Statistical Package for Social Science was used to analyze the data.

2. Results and discussion

2.1. Personal, economic and social characteristics

Information on the personal, social, and economic characteristics of farmers in the research area is presented in Table-1. Most respondents of farmers (76.7%) are 45 years of age or over, and the average age was 56 years, with a standard deviation of 15.29 years. More than half of the respondents of farmers (57.4%) have small families (less than 6 members), while 42.6% of respondents had medium and large families. The average family size was 6 members with a standard deviation of 3.1. Only 41.1% of the families had at least one member working as an agricultural worker.

The educational level of farmers varied from 15.1% illiterate to 11.9% educated at colleges and universities. Most of the respondents (73.3%) were not primarily farmers but instead had other jobs along with farming. More than two-thirds of the agricultural respondents (68.9%) own less than 2 ha of agricultural land. About a quarter, 25.2% of the farmers hold between 2 and 4 ha of agricultural land. The average agricultural holdings were 2.1 ha.

2.2. Sources of agricultural information for farmers

It is evident from Table 2 that farmers depend greatly on personal experience; family and friends, neighbors; and merchants and sellers of agricultural (inputs) production supplies for their agricultural information. These information sources were followed by agricultural extension, the governorate branch of agriculture, agricultural television programs, agricultural radio programs, extension publications, the internet, local leaders, and the general administration of agriculture in the region. However, the least sources of information used by the farmers were mobile or cell phones, extension films, agricultural cooperative societies, agricultural exhibitions, and agricultural training centers. The results are consistent with those reported by Al-Houtan (2011).

2.3. The extent to which farmers benefit from extension activities and services

Table 3 shows the extent to which the interviewed farmers benefit from agricultural extension services and activities arranged in descending order by the average score from the respondents. From their point of view, giving permission to bring in foreign labor, con-

Table 1

| Characteristics            | N   | Percent |
|---------------------------|-----|---------|
| Age                       |     |         |
| From 29 to less than 45 years old | 73  | 23.3    |
| From 45 - less than 60 years old | 116 | 36.7    |
| 60 years and over         | 126 | 40.0    |
| Family size               |     |         |
| Less than 6               | 181 | 57.4    |
| From 6 to less than 10    | 100 | 31.9    |
| 10 and above              | 34  | 10.7    |
| Educational Status        |     |         |
| Illiterate                | 48  | 15.1    |
| Reads and writes          | 57  | 18.1    |
| Primary (1–6 grade)       | 64  | 20.4    |
| Middle school (7–9 grade) | 58  | 18.5    |
| Secondary (10–12 grade)   | 51  | 16.2    |
| College and university degree | 37  | 11.9    |
| Size of the agricultural holding |     |         |
| Less than 2 ha            | 217 | 68.9    |
| From 2 to less than 4 ha  | 79  | 25.2    |
| 4 ha or more              | 19  | 5.90    |
| Foreign employment        |     |         |
| 1–2 workers               | 70  | 22.2    |
| 3–4 workers               | 84  | 26.7    |
| 5 workers or more         | 161 | 51.1    |

Table 2

| Characteristics            | N   | Percent |
|---------------------------|-----|---------|
| Social status             |     |         |
| Married                   | 280 | 89      |
| Single                    | 35  | 11      |
| Agricultural workers from a family |     |         |
| No member of the family is an agricultural worker | 48  | 15.2    |
| One member is an agricultural worker | 129 | 41.1    |
| Two members are Ag. workers | 45  | 14.4    |
| From 3 to 4 members are the Agricultural workers | 60  | 18.9    |
| 5 or more                 | 33  | 10.4    |
| Profession                |     |         |
| Employee                  | 164 | 52.2    |
| Farmer                    | 84  | 26.7    |
| Retired                   | 35  | 11.1    |
| Does not work             | 32  | 10.2    |
| Agricultural activity     |     |         |
| Animal production         | 257 | 81.48   |
| Field crops               | 250 | 79.26   |
| Vegetable crops           | 246 | 78.15   |
| Fruit crops               | 199 | 63.33   |
| Beekeeping                | 140 | 44.40   |
| Date Palms                | 93  | 29.63   |
| Annual income             |     |         |
| Less than 50 thousand Riyals | 223  | 70.7    |
| From 50 to less than 100 thousand Saudi Riyals | 63  | 20.0    |
| 100 thousand Riyals or more | 29  | 9.30    |

Each farmer was given the opportunity to mention more than one agricultural activity.
The extent to which farmers benefit from extension services and activities.

Sources of agricultural information used by the respondent farmers.

| Sources of Agricultural Information used by the respondent farmers | Arithmetic mean (n = 315) | S. D |
|---|---|---|
| Personal experience | 3.50 | 0.95 |
| Friends, family and neighbors | 3.11 | 0.89 |
| Dealers and sellers of agricultural production supplies | 3.02 | 1.01 |
| Extension worker | 2.59 | 1.04 |
| The governorate branch of agriculture | 2.50 | 1.02 |
| Agricultural TV programs | 2.30 | 0.95 |
| Agricultural radio programs | 2.24 | 0.92 |
| Extension publications | 2.20 | 0.94 |
| World wide web/Internet | 2.19 | 1.15 |
| Local leaders | 2.18 | 1.04 |
| The General Administration of Agriculture in the Region | 2.16 | 0.99 |
| Mobile network | 1.94 | 1.07 |
| Agricultural Extension Films | 1.90 | 0.97 |
| Agricultural Cooperative Societies | 1.90 | 1.10 |
| Agricultural Exhibitions | 1.80 | 1.00 |
| Agricultural Training Centers | 1.70 | 1.00 |

Table 3: The extent to which farmers benefit from extension services and activities.

| Extension activities and services | Arithmetic mean (n = 315) | S. D |
|---|---|---|
| Granting permissions to bring in foreign workers | 3.70 | 0.73 |
| Take field tours on farms | 3.60 | 0.48 |
| Identifying the problems facing farmers | 3.60 | 0.51 |
| Frequent visits to farmers on their farms | 3.56 | 0.55 |
| Facilitate farmers' access to loans | 3.54 | 0.65 |
| Training of farmers in pest control | 3.54 | 0.66 |
| Distribution of seedlings to growers | 3.53 | 0.50 |
| Responding to farmers' inquiries by telephone or in the office | 3.40 | 0.66 |
| Carrying out agricultural pest control work | 3.39 | 0.70 |
| Training of farmers to do agricultural practices | 3.30 | 0.95 |
| Supplying farmers with agricultural supplies | 3.25 | 0.73 |
| Establishment of apiaries | 3.23 | 0.91 |
| Participate in agricultural extension television programs | 3.21 | 0.73 |
| Participate in agricultural extension radio programs | 3.14 | 0.84 |
| Establishing demonstration fields on farmers' farms | 3.07 | 1.04 |
| Displaying extension films for the farmers | 3.06 | 0.95 |
| Study of the current situation | 2.83 | 1.00 |
| Holding extension meetings with farmers on a regular basis | 2.67 | 1.13 |
| Transferring the administrative problems faced by the farmer | 2.63 | 1.03 |
| Establishing agricultural nurseries | 2.61 | 1.03 |
| Transferring research results to farmers and information and assisting them in applying them | 2.60 | 1.03 |
| Farm planning assistance | 2.53 | 1.10 |
| Resolve agricultural land disputes among the farmers | 2.45 | 1.10 |
| Implement extension programs | 2.44 | 1.04 |
| Cooperating with other government agencies to implement extension programs | 2.43 | 1.03 |
| Coordination with local institutions | 2.41 | 0.96 |
| Evaluation of extension programs | 2.40 | 1.01 |
| Providing farmers with extension publications | 2.40 | 1.09 |
| Completing the procedures for the growers to extract the wheat grains from the silos | 2.34 | 1.07 |
| Planning extension programs | 2.26 | 1.02 |
| Technical supervision of specialized projects | 2.22 | 0.94 |
| Invite farmers to visit the guide in his office | 2.21 | 1.00 |
| Helping the citizen to establish home gardens | 2.15 | 1.00 |
| Supervising agricultural quarries | 2.09 | 1.07 |
| Familiarizing young people with their role and encouraging them to do so | 2.06 | 0.91 |
| Carrying out administrative and office work | 1.98 | 0.92 |
| Implement agricultural laws | 1.31 | 0.50 |

2.4. The relationship between some personal, social, and economic characteristics of farmers and their benefits from extension services and activities

Table 4 illustrates the correlation between some of the personal, social and economic characteristics of farmers (included in the survey) and the benefits they get from the extension services and activities. It is evident from the table that there is a significant inverse correlation at the level of 0.01 between age and the benefits from services and extension activities as a dependent variable. The simple correlation coefficient reached −0.317, i.e., the benefit from those services and activities decreases as the farmer’s age increases. The table also shows that the correlation between the size of the agricultural holdings, educational status, and exposure to sources of agricultural knowledge and the utilization of services and outreach activities was positive and significant at the 0.01 level (at the 0.05 level for information). The simple correlation coefficient was 0.212, 0.552, and 0.152, respectively. This means that the farmers with the largest holdings, those with the highest educational level, and those who are more exposed to agricultural information sources are more likely to benefit from extension services and activities. These observations are consistent with the findings of Omar (1992), Al-Fahiqi (1996), Swanson et al. (1997). (see Table 5).

Table 4: Correlation between some personal, social and economic characteristics and sources of agricultural information for farmers and their benefits from the activities.

| Independent variables | Simple correlation coefficient |
|---|---|
| Age | −0.317* |
| The size of the agricultural holding | 0.212* |
| Educational Status | 0.552* |
| Exposure to sources of agricultural information | 0.152* |

* Significant at the 0.01 level.

** Significant at the 0.05 level.
Table 5
Factors determining the extent to which Respondent farmers benefit from the extension activities and services in the Al-Baha Region.

| Independent variables                      | R²   | R² COM | f     | Sig  |
|-------------------------------------------|------|--------|-------|------|
| Educational Status                        | 0.305| 0.305  | 114.18| 0.01 |
| Exposure to sources of agricultural info   | 0.045| 0.350  | 69.84 | 0.01 |

2.5. Factors influencing farmers’ benefit from extension services and activities

In order to discover the most important determinants of benefits from the activities and extension services, the method of progressive Stepwise Multiple Regression is used.

The degree of benefit from services and extension activities was considered the dependent variable, while some personal, social and economic characteristics of the researched farmers and their exposure to agricultural information sources in the research area were considered independent variables. The results indicate that the educational status of the respondents and their exposure to agricultural information sources are important precursors for benefits from agricultural extension services and activities. This finding has important implications on the way the agricultural extension agency deals with farmers. Extension agents need to take into account the apparent disparity in educational levels and introduce extension methods and programs that are compatible with different educational levels.

2.6. Recommendations

1. Agricultural extension agents/officers must have precise and specific job descriptions with clear responsibilities and tasks to be undertaken. They must adhere to their assigned extension related activities, written in their portfolio.

2. Extension agents must remain focused and concentrate on extension work through their activities and services. Extension staff must carry out their extension activities in the light of the objectives of the extension organization. Extension agents need to encourage and support farming communities to participate in extension programs.

3. There is a need to increase the number of qualified agricultural extension workers, and support them financially and morally. These workers must keep up with the latest scientific knowledge and upgrade their skills through training. Non-extension personnel need to carry out more of the administrative and service tasks.

4. Extension organizations should set up field extension centers or offices close to farming communities.

5. Evaluation processes should be unbiased, impartial, and independent. They need to be capable of evaluating the performance of the extension work, services, and activities provided by the agricultural extension agent. Performance and evaluation must consider follow up visits made by extension agents.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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