



Rural Leaders' Mechanisms to Overcome the Constant Decline of the Agricultural Extension Resources

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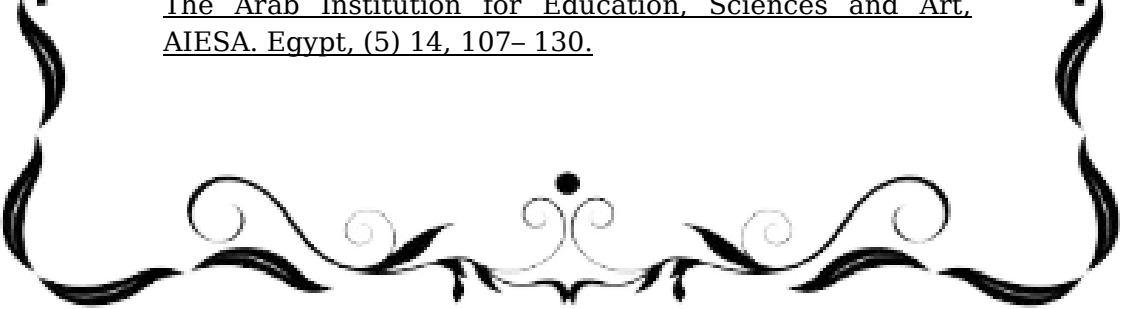
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Rural Leaders' Mechanisms to Overcome the Constant Decline of the Agricultural Extension Resources

Abstract:

We have conducted this study in the New valley governorate of Egypt to recognize Rural Leaders (RLs) mechanisms to meet community knowledge demands with a continuous diminish of the extension efforts. Four oases namely Al-Khargah, Balat, Mut, and Al-Farafrah were selected purposively. A systematic random sample was selected of 84 RLs. We have developed an interview questionnaire for data collection. Frequency, percentage, and weighted average were utilized for data analysis. Findings manifested problems encounter RLs e.g., the retirement of well-experienced Extension Workers (EWs) (51.2%). The number of RLs has been declining due to the death and lack of discovering youth leaders (14.3%). RLs adopted two mechanisms to acquire knowledge 1) asking previously trusted sources e.g., pension EWs (72.6%) and family members (57.1%), 2) seeking knowledge from commercial and new sources e.g., inputs suppliers (25%) and social networks and TV channels (20.2%). To activate RLs role, respondents provided a few suggestions e.g., establishing a contractual relationship with RLs (72.6%), providing them training (38.1%) and incentives (32.1%), engaging research institutions in the extension programs (48.8%), and employ retired EWs (44%). Findings recommend establishing a contractual relationship with RLs and the retired EWs to enhance the extension responsiveness and effectiveness.

Keywords: Rural development, extension resources, extension workers, oasis, New valley.

المستخلص

استهدفت الدراسة التعرف على آليات القادة المحليين في تحقيق الإحتياجات الإرشادية للزراع في ظل النقص المستمر في موارد الإرشاد الزراعي. تم اختيار عينة عشوائية منتظمة بنسبة ٥٠% من الزراع من قائمة الحقول الإرشادية لمحصول القمح لسنة ٢٠٢٠ / 2021 في محافظة الوادي الجديد باجمالى عدد ٨٤ من القادة المحليين. اقتصرت الدراسة على عدد اربع مراكز هي الخارجه، وبلاط، وموط، والفرازة. تم استخدام الإحصاء الوصفي في تحليل بيانات الدراسة. اوضحت النتائج اهم المشاكل التي تواجه القادة المحليين ومنها تقاعد أصحاب الخبرة من العاملين بالإرشاد (٥١.٢%)، نقص عدد القادة انفسهم بسبب الوفاه وعدم الاهتمام بالقاده من الشباب (١٤.٣%). اتبع القادة آليتين للحصول على المعلومات (١) سؤال المصادر السابقة محل الثقة مثل العاملين المتقاعدين بالإرشاد (٧٢.٦%)، افراد الأسرة (٥٧.١%). (٢) الحصول على المعلومات من المصادر الجديدة والتجارية مثل بائعي مستلزمات الإنتاج الزراعي (٢٥%)، شيكات التواصل الإجتماعى والقنوات التليفزيونية (٢٠.٢%). لتفعيل دور القادة المحليين اقترح المبحوثين عدد من المقترحات منها انشاء علاقة تعاقدية مع القادة المحليين (72.6%)، توفير التدريب لهم (٣٨.١%)، والحوافز (٣٢.١%)، اشراك المراكز الإرشادية في البرامج الإرشادية (٤٨.٨%)، وإعادة توظيف المتقاعدين من العاملين بالإرشاد الزراعي. نستخلص من هذه النتائج أهمية وجود علاقة تعاقدية مع القادة المحليين والمتقاعدين من العاملين بالإرشاد الزراعي لتحسين استجابة وفعالية الإرشاد الزراعي.

الكلمات المفتاحية: التنمية الريفية، موارد الإرشاد الزراعي، العاملين بالإرشاد، الواحات، الوادي الجديد.

The agricultural extension in developing countries lacks the infrastructure and manpower that maintain effective communication to meet the growing number of farmers and diverse demands. To illustrate, public extension lacks adequate financial resources to meet the costs of the extension activities. Which may affect significantly the budget of the operational activities at the field level (McDonough, 2019; Swanson, 2008). At the same time, Extension Workers (EWs) may be engaged in non-educational activities, e.g., seeking field data and preparing tables of crops forecasting and census. Such circumstances have

been severely affected the extension responsiveness and the coverage rate in both quantitative and qualitative measurements (Feder et al., 2001).

The participatory-based extension approach enables EWs to develop strategies to function under inconvenient circumstances. It emphasizes engaging lead farmers in the innovation and learning process. Rural leaders (RLs) contribute to overcoming the shortage of extension agents, increasing the outreach and extension coverage rate, and saving costs (Davis et al., 2020). They are more aware of the challenges and opportunities relevant to developing local livelihoods. Equally important, they may contribute to organizing farmers' efforts to gain knowledge, inputs, and services as a collective action. Also, they engage in the innovation creation process (Blum, 2016). However, lead farmers function as complements but not substitutes of extension staff (Davis et al., 2020).

The extension system should utilize such advantages, add efforts to identify farmers' leaders and provide them the relevant training to deal with any shortfall in their capacity. Therefore, extension staff should constantly contact RLs at the district level to identify potential leaders, skilling them, and provide them with economic incentives as well as social recognition to motivate them to contribute as volunteer trainer farmers (Alex, Gary, Willem Zijp, Derek Byerlee, 2002; Swanson, 2008).

The agriculture sector of Egypt faces many challenges e.g., land fragmentation; intensive labor and traditional farm applications; limited land and water resources combined with a high level of vulnerability to climate change. Such challenges confront reaching the full potential of the agricultural sector of Egypt. It also, affected the services provided to the farmers, as they lack farming services e.g. seeds, fertilizers, and credit, besides, poor access to the extension services and lack of market

information (Kruseman & Vullings, 2007; M. Y. Shalaby et al., 2011).

We can describe the extension system of Egypt as a government-based advisory system, with a limited opportunity for farmers' participation in the process of needs assessment and program development (McDonough, 2019). Recently, public extension is shifting towards decentralized planning and operating system (W. Rivera et al., 1997). However, Agriculture Extension and Advisory System (AEAS) encounter many challenges that limit its responsiveness and effectiveness (M. Y. Shalaby et al., 2011). For instance 1) understaffing, 2) limited financial resources (Monem & Ghandour, 2020), 3) poor response to new market demands and product diversification, 4) lack of addressing the problems and opportunities encountered by farmers, 5) lack of organization among researchers, extension staff, and farmers (McDonough et al., 2015; W. M. Rivera et al., 2005).

Moreover, the Ministry of agriculture has adopted a hiring freeze policy for extension staff, which means most of the extension agents are about to retire. This policy led to a serious reduction of the number of Village Extension Workers (VEW) from 3,274 in 2011 to around 800 in 2014 (Dhehibi et al., 2018). On the other hand, EWs have been overtasked of reporting cases of violation of law and regulations e.g. illegal construction on agricultural land, which resulted in distorting the relationship between farmers and EWs (Kassim et al., 2018). So that, Abdelhakam (2005) reported an insufficient number of qualified EWs to develop remote areas. They are also suffering from 1) lack of transportation facilities, 2) low salaries, and 3) inconvenient working conditions.

Advancing the principles of AEAS is essential to encounter such challenges in particular in marginal areas

(Kruseman & Vullings, 2007). Chiefly, investigating all opportunities and potential human resources that can contribute to technology transfer and raising farmers' awareness (McDonough, 2019; M. Y. Shalaby et al., 2011). Including, utilizing the leverage of local leaders; who are generally respected among members of rural communities of Egypt; to reach the vulnerable and marginalized areas and farmer' categories (Dhehibi et al., 2018).

Problem statement

Rural leaders face a remarkable increase in rural community demands of knowledge due to the geographical expansion, variant cropping patterns, and the impact of climate change. On the other hand, agriculture extension has witnessed a cumulative budget reduction and a hiring freeze. It is worth recognizing RLs mechanizes to deal with such circumstances, also their suggestions to stimulate the extension services

Objectives of the study

1. To identify problems confronting the agricultural sector from rural leaders' point of view.
2. To highlight rural leaders' mechanisms to overcome the increasing shortage of the agricultural extension activities.
3. To determine rural leaders' suggestions to overcome the problems resulting from the growing shortage of agricultural extension efforts.

Materials and Methods

We conducted this study in the New Valley governorate which is one of the main regions for the agricultural expansion in Egypt. It's about 458,000 km² areas representing close to half of the total area of Egypt. It's situated in the south part of the western desert of Egypt. It comprises of a chain of oases. These oases comprise 6 districts i.e. Al-Khargah, Paris, Balat, Mut, Al-Qasr, and Al-Farafrah (New Valley Governorate Information Center, 2019; The Egyptian Agency of Environmental Affair,

2008). Oasis is a small, closed, fragile ecosystem surrounded by desert. Climate is generally hot and dry with a high evaporation rate, while the annual precipitation rate is around zero (A. Shalaby & Khedr, 2021). It is subject to the deterioration of both land and water resources due to salinization and the continuous decline of the groundwater level (Hegazi et al., 2005; Sharaky, 2021). The New Valley relies completely on groundwater for agriculture, drinking, and other purposes. Palm date is the main crop. Wheat and Egyptian clover, bean, tomatoes, and potatoes are the common crops of the winter season. Rice and sorghum are the common crops of the summer season, besides perennial crops e.g. Alfalfa. (Iwasaki & Kashiwagi, 2021).

Indeed, the oasis communities are very coherent and show a high level of social interaction. They are distinguished rural people in terms of awareness of threats against their agro-ecosystem and lifestyle (S. Mohamed, 2021).

Systematic random sampling was employed to select the 84 respondents of this study representing 50% of demonstration fields per district. To explain, fields of rural leaders used to be selected by the extension staff to perform demonstration fields.

Thus, the list of demonstration fields of the wheat crops was regarded as the sampling frame for this study. The list included 261 demonstration fields across the governorate. However, due to the long distance between the New valley districts, only 4 districts were chosen purposely as shown in

Table 1.

The study deployed descriptive methods in data collection and analysis i.e., frequency, percentage, and weighted average. The survey was carried out during January and February 2021. Statistical Package and Service Solution (SPSS) version 21 was used to analyse qualitative data.

Table 1: Sample distribution among districts of New valley governorate

District	Al-Khargah	Balat	Mut	Al-Farafrah	Total
No. of demonstration fields	63	19	49	33	164
Sample (% 50)	32	10	25	17	84

Source: Khargah Agricultural Administration (2021)

An interview questionnaire was developed to depict RLs' socioeconomic characteristics, RLs' perception about the Agricultural Extension Services (AES), problems confront the agricultural production, satisfaction regarding variant features of current AES, RLs' mechanisms to overcome the increased shortage of the AES, and finally RLs' suggestions to overcome the problems resulting from the increased shortage of the AES.

Operational definition: mechanisms refer to ways and sources that RLs utilize to acquire knowledge and solutions to develop their own technical, and management skills and practices, to improve their farming system rather than the public extension.

Results and Discussion

1. Socioeconomic characteristics of rural leaders

Table 2 demonstrates the socioeconomic characteristics of RLs. Around three-fourth of RLs are above 47 years old (77.4%) and have a school education (71.4%), nonetheless, only 35.7% have agricultural education. More than half haven't additional income sources (52.4%). Indeed, only about one-fourth has an additional agricultural income source (27.4%), which shows the importance of the agricultural sector for the oases community livelihoods. Also, findings manifest the magnitude of land fragmentation as more than half have up to 5 feddan (54.8%) and 85.8% have up to 10 feddan (feddan=4200 m²). It worth mentioning that farmer utilize only (25-50 %) of the holding area

based on water availability particularly in the summer. Further, findings indicate more than 90 % of RLs apply flood irrigation.

Table 2: Socio-economic characteristics of rural leaders (n=84)

Items	Characteristics	F	%
Age (year)	- 46	19	22.6
	47-58	36	42.9
	59 -70	29	34.5
Level of education	Literate	16	19
	School education	60	71.4
	University degree	8	9.5
Specialization	No	16	19
	Non-agricultural	38	45.2
	Agricultural	30	35.7
Additional profession/income	No	44	52.4
	Non-agricultural	17	20.2
	Agricultural	23	27.4
Farm area	- 5 feddan (4200 m ²)	46	54.8
	6-10	26	31
	11-	12	14.3
Family size	- 4	16	19
	5-6	45	53.6
	7-	23	27.4
Irrigation system	Flood irrigation	77	91.7
	Flood and modern irrigation	7	8.3
	Modern irrigation	-	-
Experience of agricultural (year)	- 20	12	14.3
	21-40	40	47.6
	41-	32	38.1

Source: findings of the study

2. Rural leaders' perception towards the extension services

Tables from 3 to 5 demonstrate RLs' perception towards the AES i.e., current information sources, problems they need the extension to cover, and satisfaction of the current AES:

2.1. Current agricultural information sources used by rural leaders

Table 3 lists the current agricultural information sources used by the respondents, which shows that the official extension agents i.e., the administrator of the agric. farmers' cooperatives, the department of agricultural extension, and the agricultural administration are in the first five sources together with family members and fellow farmers and inputs suppliers. Regional Research Centres (RRCs) and staff of the agricultural development projects are the seventh and tenth sources of information. This may be due to the specific programs and locations they are working in. Responding to the pandemic Covid 19, indirect sources have taken place to represent around half of the information sources including social media and searching the web.

Table 3: Current agricultural information sources used by rural leaders (n=84).

Agricultural information sources	Rarely		Sometimes		Always		WAV G
	F	%	F	%	F	%	
The administrator of the agric. cooperatives	14	16.7	10	11.9	60	71.4	35.7
Family members and fellow farmers	17	20.2	12	14.3	55	65.5	34.3
Department of agricultural extension	19	22.6	18	21.4	47	56	32.7
The agricultural administration	36	42.9	12	14.3	36	42.9	28.0
Inputs suppliers	31	36.9	24	28.6	29	34.5	27.7
Radio and television programs	32	38.1	30	35.7	22	26.2	26.3

Regional research centres	48	57.1	5	6	31	36.9	25.2
Brochures, flyers, and printed materials	38	45.2	27	32.1	19	22.6	24.8
Social media	50	59.5	18	21.4	16	19	22.3
The staff of the agric. development projects	41	48.8	35	41.7	8	9.5	22.5
Newspapers and magazines	58	69	12	14.3	14	16.7	20.7
Searching the web	60	71.4	8	9.5	16	19.0	20.7
Brokers of agricultural commodities	72	85.7	12	14.3	-	-	16.0

Source: findings of the study

2.2. The problems encounter RLs and anticipate the extension to contribute to overcome.

An open-ended question was designed to identify current problems that encounter RLs and the agriculture extension is anticipated to contribute to overcoming them. Responses were divided into eight domains: crops production, animal production, marketing, preserving natural resources, farm management, rural women and youth, public service, rural community development, and development of RLs. show marketing agricultural commodities is the most frequent domain of problems as three of the problems were the highest frequent problems among all domains of more than 80% i.e., high transportation costs, lack of wholesale market, and lack of fair price. Three of the problems in the domain of preserving natural resources were mentioned by more than 50 % of RLs, the constant decrease of the groundwater resulted in decreasing the water flow and increasing the operating and maintaining costs. Equally important, results indicate the importance of farm management relevant problems i.e., lack of credible sources of farm inputs e.g., seeds, fertilizers,

and pesticides and high density and irregularity of old palm date orchard of a percentage of 75 and 51.2 % respectively.

Regarding the development of RLs, respondents reported 4 problems as follows: 1) the retirement of the experienced EWs, while no fresh graduates are hired, which interrupt knowledge transfer among generations, 2) poor communication with EWs due to the shortage of extension staff, 3) there is only one VEW per each agricultural unit (area ranges from 1500 to 3000 feddan), and 4) shortage of RLs due to the death and lack of promoting middle age and youth leaders of a percentage of 51.2, 46.4, 29.8, and 14.3 % respectively.

These findings match the findings of previous studies as Mohamed (2012) reported half of the EWs were more than 50 years old. Similarly, Rami (2021) found RLs lack both facilities and infrastructure and face challenges in all themes they are willing to contribute to including strengthening the external network, information dissemination, and developing an efficient work plan. In like manner, shortage and poor performance of EWs were reported (Dhehibi et al., 2018). After investigating the agricultural extension system of Egypt Abdel & Hassan (2019) reported the following shortages: inadequate budget for extension activities; poor contribution in national campaigns; aged extension staff; poor transportation facilities, and unclear legal framework. Moreover, public extension showed a poor level of quality indicators compared to other extension providers e.g., access, utilization, satisfaction, and timeliness except the trust indicator. The public extension was recorded as more trusted than other resources (Badr, 2019; Kassem et al., 2020). Lack of financial resources and incentives was reported as the second barrier against AKIS' sustainability next to the poor regulatory framework, then, lack of awareness of the importance of AKIS and the weak role of intermediate actors of the AKIS (Zahran et al., 2020).

Table 4: Current problems encounter RLs and anticipate the agriculture extension to contribute to overcome (n=84).

Problems or barriers	F	%
Crops production		
High temperature limits crops options and affects crops productivity and loss.	44	52.4
Spreading of red weevil	40	47.6
Lack of machineries, particularly, machineries of date palm head services	36	42.9
Water rotation of 12-14 days doesn't fit most of vegetables	31	36.9
Cheating pesticides	31	36.9
Spreading Nematodes	26	31
Lack of central administrated pests' biocontrol	13	15.5
Animal production		
Disfunction of artificial fertilization and therefore understanding reasons and overcoming it is required.	50	59.5
Animal productivity and growth are affected by high temperature. New breeds and improve local ones are required to withstand weather conditions.	39	46.4
The poor opportunities for manufacturing dairy products.	28	33.3
Prevalence of seasonal diseases	19	22.6
The price of dry clover rose from 150 to 500 pounds per ton.	18	21.4
Marketing agricultural commodities		
High transportation costs for crops and livestock besides toll ways and permissions.	78	92.9
There's no wholesale market for crops or animals.	76	90.5
There's no clear and fair pricing policy.	72	85.7
There is a surplus of milk production against poor demand.	48	57.1
The poor marketing resulted in most farmers growing a small area of variant vegetables of domestic consumption.	32	38.1
Delivering the yield of sugar beet is very difficult.	14	16.7

Problems or barriers	F	%
Preserving natural resources		
High costs of operating and maintaining wells as groundwater is getting more deepen.	57	67.9
Continuous shortage of wells water flow.	53	63.1
Poor soil quality and high salinity particularly iron sulphate.	47	56
Lack of recycling the agricultural wastes, particularly wastes of palm trees.	37	44
Cancelling the extra days of the water rotation allocated to prevent sand dunes.	34	40.5
Poor community participation in the proposed irrigation development project.	25	29.8
Parcels fragmentation.	22	26.2
Using of drainage water in watering crops.	15	17.9
Pesticides affect beekeeping.	12	14.3
Farm management		
Farmers lack credible sources of farm inputs seeds, fertilizers, and pesticides.	63	75
High density and irregularity of the old palm date orchard.	43	51.2
Rural women and youth		
Inadequate encouragement and support for micro-enterprises.	13	15.5
Inadequate funding for micro-enterprises.	11	13.1
Public service and rural community development.		
Problems of cooperative work and agricultural associations	32	38.1
Weak coordination between official bodies and civil society to encounter Covid 19	27	32.1
NGOs are inadequate and need capacity building efforts	15	17.9
Development of rural leaders		
The retirement of well experienced EWs, while lately hired EWs need training	43	51.2
Poor communication with EWs due to a shortage of the	39	46.4

Problems or barriers	F	%
extension staff		
There is only one agricultural supervisor per agricultural unit.	25	29.8
Shortage of local leaders due to the death and lack of discovering and promoting middle-aged leaders and youth	12	14.3

Source: findings of the study

2.3. Rural leaders' satisfaction regarding current extension activities

A scale of 12 phrases was developed to assess RLs' satisfaction regarding current AES as shown in Table 5. Each phrase concerns one of the service features. The weighted average was utilized to arbitrate among variant features. Generally, findings indicate all features are below 50% of the weight. All features concern the direct relation between the extension staff and RLs are located in the unsatisfied features e.g., involving RLs in planning extension activities and providing them with training and printed materials.

Table 5: Rural leaders' satisfaction regarding variant features of current extension activities (n=84)

Extension activities	Unsatisfied		Neutral		Satisfied		WAV G
	F	%	F	%	F	%	
Coordination with RLs in performing Ex Ac	21	25	37	44	26	31	28.8
Problem solving effectiveness	28	33.3	31	36.9	25	29.8	27.5
Communicating problems to the RRCs	30	35.7	33	39.3	21	25	26.5
Meeting the ecosystem circumstances	43	51.2	22	26.2	19	22.6	24.0
Extension responsiveness	40	47.6	31	36.9	13	15.5	23.5

Adequacy of Ex Ac	41	48.8	32	38.1	11	20.2	23.0
Involving RLs in planning Ex Ac	46	54.8	23	27.4	15	17.8	22.8
Providing training opportunities for RLs	48	57.1	21	25	15	17.9	22.5
Provide RLs with printed brochures and flyers	52	61.9	19	22.6	13	15.5	21.5
Encouraging innovativeness and nurturing PF	53	63.1	22	26.2	9	10.7	20.7
Constantly quest to discover and develop RLs	62	73.8	17	20.2	5	6	18.5
Supplying RLs with incentives/inputs	66	78.6	15	17.9	3	3.6	17.5

Note: WAVG = Weighted average, Rural leaders = RLs. Extension activities = Ex Ac, Pioneer Farmers = PF, Regional Research Centres = RRCs

Source: findings of the study

Rural leaders' mechanisms to overcome the shortage of the extension activities

Rural leaders reported nine mechanisms to overcome the current situation as shown in Table 6. More than 50% of the respondents reported the first three mechanisms i.e., personal communication with pension EWs, depending on my own experience, and asking advice from other experienced family and fellow farmers. The three mechanisms can be characterized as local, direct, and previously examined. However, personal experiences were reported as the main source of information (Aly Salama, 2019). Around 25% of the respondents reported five mechanisms including printed materials, self-assessment of the proposed solution, contacting the credible agricultural inputs

suppliers and searching the web and social networks, and watching TV programs. These mechanisms seem to be public and indirect. It is worth mentioning that all mechanisms reported are non-paid ones. In other studies RLs proposed linkages and networking among AKIS actors within and beyond the local communities to develop rural areas and accomplish sustainable extension services (Mathews, 2021; Zahran et al., 2020).

Table 6: Rural leaders' mechanisms to overcome the increasing shortage of the agricultural extension efforts (n=84).

Rural leaders' mechanisms	F	%
Personal communication with pension EWs	61	72.6
I depend on my own experience	51	60.7
I ask advice from other experienced family and fellow farmers	48	57.1
I get help from flyers, brochures, and other printed materials	23	27.4
I try myself the proposed solution in a small area	22	26.2
I contact the credible agricultural inputs suppliers.	21	25
I join social networks and search the web.	17	20.2
I regularly watch the agricultural Egyptian channel and similar programs	17	20.2
I contact personally with the head office of the agricultural administration.	7	8.3

Source: findings of the study

4. Rural leaders' suggestions to activate their contribution in the extension efforts

Table 7 provides a list of RLs' suggestions to overcome the increased shortage of the AES. The first and noteworthy suggestion was establishing a contractual relationship for RLs to ensure their commitment to save time and efforts to serve as an agricultural extension assistant of a proportion of 72.6%. The

second suggestion was activating the role of RRCs in training the RLs and offering AES. This suggestion reflects the need to compensate for the shortage of the extension activities as well as the confidence of RRCs. To overcome the hiring freeze of the extension staff since the 1980s, RLs proposed relying on the retired extension staff in administrating the farmers' cooperatives and capacitating RLs to perform a farmer-to-farmer extension of a proportion of 44% and 38.1% respectively. The next four suggestions concerned both incentives and educational aids e.g., constantly updating and providing printed materials and TV programs. Finally, respondents propounded the social capital to contribute to solve the problem through activating the role of the Agricultural Consultancy Board (ACB) in providing the AES. ACB is a public-governmental organization. It locates in all districts. ACB board includes representatives of both community and official partners. It carries out some agricultural business and has some assets e.g., pigeon tower and bee yard. Rural leaders suggest employing the revenue and the power of ACB to enhance the AES.

Table 7: Rural leaders' suggestions to overcome the problems resulted from the increased shortage of the agricultural extension efforts (n=84).

Rural leaders' suggestions	F	%
Establishing a contractual relationship with RLs to serve as agric. extension assistants	61	72.6
Activating the role of the RRCs in training the RLs and offering extension activities	41	48.8
Agricultural pension workers must supervise the agricultural cooperatives	37	44
Offering training for RLs to apply for farmer-to-farmer extension.	32	38.1
Constantly update and supply guides flyers, brochures, and other printed material.	29	34.5

Offering incentives e.g., seeds and fertilizers for RLs to encourage voluntary work.	27	32.1
More attention should be drawn to the agricultural TV channel to increase its utility	21	25
Activating the role of agric. consultancy board in providing the extension services	12	14.3
Establish a committee of farmers and local officials to select and upscale new leaders	7	8.3

Source: findings of the study

Conclusion and recommendations

Findings reported the importance of employing retired EWs, establishing contractual relationships with the RLs, and activating ACB to enhance the extension activities. Thus, RLs provided limited number of mechanisms to overcome the shortage of the AES. Which may advocate the government to employ terms of pluralistic extension. And deal with the RLs as partners as well as receivers of the AES and employ them as intermediate channels to increase the outreach at the same level of resources.

References

- Abdel, H., & Hassan, M. (2019). *Formulating Agricultural Extension Policy in Egypt: Requirements , Dimensions , and Main Stakeholders ' Participation*. Department of Rural Sociology and Agricultural Extension, Faculty of Agriculture Cairo University.
- Abdelhakam, A. M. (2005). Agricultural Extension in Egypt. Chapter II. *FAO Regional Workshop on Options of Reform for Agricultural Extension in the Near East*, 22–26.
- Alex, Gary, Willem Zijp, Derek Byerlee, and others. (2002). *Rural extension and advisory services: New directions* (Rural Development Strategy Background Paper #9). Agriculture & Rural Development Department, World Bank.
- Aly Salama, H. E. E.-D. (2019). Improving Agricultural Extension Services through Knowledge Management Practices in the Delta Region of Egypt: An Applied Study of Knowledge Management Model. *Asian Journal of Agricultural Extension, Economics & Sociology*, 36(4), 1–14. <https://doi.org/10.9734/ajaees/2019/v36i430250>
- Badr, M. M. (2019). Farmers' Willingness to Pay for Agricultural Extension Service, A Case Study of Nubaria's Farmers, Egypt. *Asian Journal of Agricultural Extension, Economics & Sociology*, 30(2), 1–13. <https://doi.org/10.9734/ajaees/2019/v30i230107>
- Blum, R. S. V. and M. L. (2016). *Tailoring rural advisory services for family farms*. FAO.
- Davis, K., Babu, S. C., & Ragasa, C. (Eds.). (2020). *Agricultural Extension: Global Status and Performance in Selected Countries*. International Food Policy Research Institute (IFPRI). <https://doi.org/10.1126/science.38.975.331>
- Dhehibi, B., Kassam, S. N., & Shefir, E. M. El. (2018). *Power to the partners ? Public Private Partnerships (PPPs) as an*

- approach for more pluralistic agricultural extension service in Egypt.* 6(1), 583–593.
- Feder, G., Willett, A., & Zijp, W. (2001). Agricultural Extension: Generic Challenges and the Ingredients for Solutions. *Knowledge Generation and Technical Change*, 313–353. https://doi.org/10.1007/978-1-4615-1499-2_15
- Hegazi, A. M., Afifi, M. Y., El Shorbagy, M. A., Elwan, A. A., & El-Demerdashe, S. (Eds.). (2005). *Egyptian National Action Program To Combat Desertification*. Ministry of Agriculture and Land Reclamation, Desert Research Center.
- Iwasaki, E., & Kashiwagi, K. (2021). Crop Diversification and Its Efficiency in Rashda Village, Dakhla Oasis. In E. Iwasaki, A. M. Negm, & S. F. Elbeih (Eds.), *Sustainable Water Solutions in the Western Desert, Egypt: Dakhla Oasis* (pp. 161–181). Springer International Publishing.
- Kassem, H. S., Shabana, R. M., Ghoneim, Y. A., & Alotaibi, B. M. (2020). Farmers' perception of the quality of mobile-based extension services in egypt: A comparison between public and private provision. *Information Development*, 36(2), 161–180. <https://doi.org/10.1177/0266666919832649>
- Kassim, Y., Mahmoud, M., Kurdi, S., & Breisinger, C. (2018). *An agricultural policy review of Egypt: First steps towards a new strategy* (No. 11). IFPRI.
- Khargah Agricultural Administration. (2021). *List of Demonstration Fields of Wheat Crop*.
- Kruseman, G., & Vullings, L. A. E. (2007). *Rural development policy in Egypt towards 2025: targeted conditional income support: a suitable option?* (Alterra-Rapport: 1526). Alterra. <https://edepot.wur.nl/36702>

- Mathews, M. C. (2021). How village leaders in rural Amazonia create bonding, bridging, and linking social capital configurations to achieve development goals, and why they are so difficult to maintain over time. *World Development*, *146*, 105541. <https://www.sciencedirect.com/science/article/pii/S0305750X21001534>
- McDonough, C. (2019). *The Application of Participatory Extension through Agricultural Innovation Systems in the Middle East*.
- McDonough, C., Nuberg, I. K., & Pitchford, W. S. (2015). Barriers to Participatory Extension in Egypt: Agricultural Workers' Perspectives. *The Journal of Agricultural Education and Extension*, *21*(2), 159–176. <https://doi.org/10.1080/1389224X.2014.927374>
- Mohamed, M. (2012). The Effectiveness of Agricultural Extension Programs in the Desert Areas of Nubaria, Egypt: A Case Study of a Sugar Beet Program. In *Ph. D. degree in the International Ph. D. Program for Agricultural Sciences in Gottingen (IPAG)*. Georg-August-University, Göttingen, Germany.
- Mohamed, S. (2021). The Egyptian Western Desert: Water, Agriculture and Culture of Oasis Communities. In E. Iwasaki, A. M. Negm, & S. F. Elbeih (Eds.), *Sustainable Water Solutions in the Western Desert, Egypt: Dakhla Oasis* (pp. 13–26). Springer International Publishing. https://doi.org/10.1007/978-3-030-64005-7_2
- Monem, M. A. S. A., & Ghandour, I. A. El. (2020). Role of Science, Technology and Innovation in Addressing Climate Change Challenges in Egypt. In E.-S. E. Omran & A. M. Negm (Eds.), *Climate Change Impacts on Agriculture and Food Security in Egypt* (pp. 59–79). Springer Water. https://doi.org/10.1007/978-3-030-41629-4_9

- New Valley Governorate Information Center. (2019). *Information Notes of the New Valley Governorate*.
- Rami, A. M., Aziz, F., Zaremohzzabieh, Z., & Ibrahim, A. (2021). Assessing the challenges of local leaders in rural community development: A qualitative study in Malaysia. *Pertanika Journal of Social Sciences and Humanities*, 29(S1), 1–18. <https://doi.org/10.47836/pjssh.29.s1.01>
- Rivera, W., Elshafie, E. M., & Aboul-Seoud, K. (1997). The Public Sector Agricultural Extension System in Egypt: a Pluralistic Complex in Transition. *Journal of International Agricultural and Extension Education*, 4(3), 67–74. <https://doi.org/10.5191/jiaee.1997.04307>
- Rivera, W. M., Kalim Qamar, M., & Mwandemere, H. K. (2005). *Enhancing Coordination among AKIS/RD Actors: An Analytical Comparative Review of Country Studies on Agricultural Knowledge and Information Systems for Rural Development (AKIS/RD)*.
- Shalaby, A., & Khedr, H. S. (2021). Remote Sensing and GIS for Land Use/Land Cover Change Detection in Dakhla Oasis. In E. Iwasaki, A. M. Negm, & S. F. Elbeih (Eds.), *Sustainable Water Solutions in the Western Desert, Egypt: Dakhla Oasis* (pp. 145–159). Springer International Publishing. https://doi.org/10.1007/978-3-030-64005-7_9
- Shalaby, M. Y., Al-Zahrani, K. H., Baig, M. B., Straquadine, G. S., & Aldosari, F. (2011). Threats and challenges to sustainable agriculture and rural development in Egypt: Implications for agricultural extension. *Journal of Animal and Plant Sciences*, 21(3), 581–588.
- Sharaky, A. M. (2021). Aeolian Sand Transport Potential and Its Environmental Impact in Dakhla Oasis, Egypt. In E. Iwasaki, A. M. Negm, & S. F. Elbeih (Eds.), *Sustainable Water Solutions in the Western Desert, Egypt: Dakhla Oasis*

(pp. 103–122). Springer International Publishing.

Swanson, B. E. (2008). *Global review of good agricultural extension and advisory service practices*. FAO.

The Egyptian Agency of Environmental Affair. (2008). *Environmental work plan of New Valley Governorate 2008*.

Zahran, Y., Kassem, H. S., Naba, S. M., & Alotaibi, B. A. (2020). Shifting from fragmentation to integration: A proposed framework for strengthening agricultural knowledge and innovation system in Egypt. *Sustainability (Switzerland)*, 12(12), 1–25.

<https://doi.org/10.3390/su12125131>