An Investigation of the Perceived Educational Needs of
The Public Agricultural Extension Agents in Jordan

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Abstract
The study aimed at examining the attitudes of the public extension staff towards the adoption of needs-based extension (NBE) approach, barrires to the adoption and training needs and methods of training for the staff. Likert-type scales were used as tools for data collection, with alpha Cronbach's coefficients ranging from 0.75 to 0.90. Face and content validity were confirmed by a panel of experts from the National Center for Agricultural Research and Extension. Parametric and nonparametric statistics methods were used to analyze the data. The results showed that public extension staff was qualified, medium aged and most were experienced in agriculture and in undertaking surveys. Female agents represented 22% against 5% of women farm holders. Highly identified training needs indicated agents' awareness of the significance of NBE and skills in ICT and agribusiness management in an increasingly competitive environment. Study tours to countries with workable extension systems and professional or academic training were perceived to be important methods of training. Less experienced male agents with BSc in non horticulture degree had more positive attitudes to NBE, and were more likely to highly rate the need for training. Unsupportive financial and cultural environment to extension activities, lack of skills to analyze the data and present results were cited as barriers to the adoption of the NBE. Many of the required skills can be greatly improved with well-targeted in-service training to enable the public extension to initiate and adopt needs based extension programming. The results are applicable to many situations (e.g. health, education services…) locally and elsewhere.

Keywords: Needs assessment, needs based extension programming, extension agents' competencies, training, professional development and barriers.

Introduction

An effective extension organization serves as a linkage between researchers and producers to orient their research towards farmers' problems and to keep them well informed about the results and problems created from adopting new technologies (Swanson, 1997). Hence, extension programs and activities are expected to support properly targeted farm operators with technically sound and financially feasible technologies (Campbell and Barker, 1997; MOA, 1998). To assist with extension programming at the local level, extension agents should conduct needs assessment or situational analysis, especially when they start working in an area (Caravella, 2006). Traditional practices to needs assessment were based on personal value judgment. Bureaucratic and top-down organizations for research and extension were not receptive or responsive to the needs of farmers (Gaya, 1994; Halim and Ali, 1997: Swanson, 1997). Professional needs assessment is a systematic set of procedures undertaken for the purpose of setting priorities and making decisions regarding planning, program development and evaluation and allocation of resources based on information gathered from the people likely to be affected by these programs (McCaslin & Tibezinda, 1997).

A transform from systems that are based on top-down extension and a narrow orientation on production to ones that are more broad and people-centered, requires substantial changes in the culture of the service organizations; in the extension agents' attitudes and behavior and in their capabilities to facilitate social processes. Such a reorientation and transformation of technically oriented extension agents necessitates a broader framework of human resources development in which training is carried out (Moyo and Hagman, 2000). Such training would include marketing processes, farm business management, use of information technologies, extension professional development and data collection and analysis. The priorities for training come from identified needs, which are measured gaps between what is the current state and what should be the competencies of staff, rank-ordering discrepancies; analyzing the greatest discrepancies, selecting a solution strategy and designing an in-service training program for extension staff (Caffarella,1982; McCaslin and Tibezinda,1997; Altschuld and Kumar, 2004; Miller and Miller, 2009).

Many current public agents are inadequately trained to assist farmers in pursuing new economic opportunities (Swanson and Rajalahti, 2010). As in many countries, including Jordan, the Cooperative Extension in most states in the USA employs extension agents who hold academic degrees, which provide subject matter training, but, they often lack skills or strengths in some of the subjects that are needed to be effective extension professionals (Brown, Gibson and Stewart, 2008; Schwarz and Gibson, 2010; Tladi, 2004). Besides, extension agents are often assigned to their positions without adequate preparation. Thus, there is a need to assess the training needs of extension personnel and establish priorities. The identified needs for professional skills include assessing community needs, program planning, utilization of formal and informal extension methods, conducting demonstrations, producing educational materials, using audio-visual aids, administration and monitoring and evaluation of extension programs and activities, determining information needed for evaluations and developing program budgets (McCaslin and Tibezinda,1997). The aim is the development and implementation of a training plan that allows extension agents to address their

weaknesses and to build upon their strengths that will enhance their abilities to maximize their professional knowledge and competences, both in the technical and managerial areas of agricultural production (Brown, Gibson and Stewart, 2008).

Ajzen's Theory of Planned Behavior (TPB) indicated that human behaviors have a common structure and can therefore be predicted. Explaining their human behaviors require examining determinant of intentions; their attitude towards the specific behavior, their subjective norms and their perceived behavioral control. Here, attitudes refer to the individual/ extension agent's positive or negative evaluation of performing a behavior such as NBE, which is determined by beliefs relating to the behavior (behavioral beliefs). Subjective norms refer to the perceptions of whether this behavior (i.e. adopting NBE) is acceptable and encouraged (by the extension authorities). The perceived behavioral control is related to an agent's perception of how difficult the task will be to perform, i.e. self efficacy (such as the agent's judgments of their own capabilities to adopt and implement the NBE) and controllability i.e. agents' perceptions of whether implementing the NBE is up to them because of the availability of resources. This includes factors that are for or against performing the behavior such as past experience and anticipated barriers (Ajzen, 2006).

Needs assessment in Jordan is based on personal value judgment. The assessment results of USAID (2005) study in Jordan stressed the need for improving support and training opportunities for the existing staff. It showed several main areas, in which the extension services need to be either updated or strengthened. According to the Agricultural Census 2007 in Jordan, public extension agents were a source of information for 23% of all holdings, but they are a source of information for 42% of irrigated holdings (Rimawi, 2009). It is against this background that examining the attitudes of the extension agents towards the adoption of the NBE and identifying the training needs of extension professionals and administrators is essential, not only to ensure whether they are properly prepared for their work but also to be sure of the usefulness of existing agricultural education programs. This further enable the agents become professionally qualified in their needs based extension activities and programming, which contributes to the goals and objectives of the National Extension Strategy (MOA, 1998). This study is an attempt to introduce the approach of needs based training programs from which to begin more in-depth need assessment studies regarding the needs of extension staff to developing effective extension programming and activities.

Objectives
The objectives of the study reported here were:
1. To examine the attitudes of the public extension agents towards the adoption of the NBE, and the barriers to the adoption of the approach,
2. To assess the training and information needs of the agents and their preferred methods of training,
3. To examine the variables which account for extension agent differences in their attitudes and training needs.

Methodology

The population for this study was comprised of the public extension agents who work for the National Center for Agricultural Research and Extension (NCARE) of the Ministry of Agriculture (MOA) in Jordan. The total number of public extension agents was 73 agents (NCARE data base, June 2013) at the time of the survey. Considering the small number of the public extension agents, data were collected by personal interview during June-December 2013 from all extension staff who were willing to participate in study. Sixty-eight completed surveys were analyzed for the study. With the high instability of the staff of public extension (Rimawi, 2012), the agents serving at the time of the survey were considered as a sample drawn from a large population of the MOA who would be qualified to work as extension agents in the future. The rate of response was 93%, which indicates that the threat to the external validity of the findings is minimal, as suggested by Lindner and Wingenbach (2002) who concluded that procedures for control of nonresponse error are not necessary when a response rate beyond 85% is achieved.

A semi-structured questionnaire was used as a tool for data collection. Four-points Likert-type items were used for ratings with no middle option to avoid the central tendency bias, i.e. the tendency of respondents to avoid taking a stand by not choosing low or high ratings. The ratings are based on a scale from 1-4, with 1 representing "strongly disagree" and 4 "strongly agree". Open-ended questions were used to provide suggestions about how extension agents can become more effective in their extension activities and thus can improve their role in helping growers. A 7-items scale was used to rate the attitudes of extension agents towards adopting the NBE to identify farmers needs. Two 15-items scales were used to rate the educational needs of the extension agents. Extension agents were asked to rate their current competence of the skills and their rating assessment of the need to improve their professional skills in extension organization and management, communication, extension programming, farm business management and information technology. A 10- items questionnaire was used to rate the attitudes of extension agents towards the preferred mode of training. A 6-items questionnaire was used to rate the importance of barriers preventing extension agents from adopting the needs-based extension (NBE) approach to identify farmers needs ranging from one being "very important " to four being "not important at all".
The instrument was validated by a panel of experts from the NCARE to have sufficient content and face validity, and was then field-tested to ensure usability and reliability. Internal consistency was demonstrated with the coefficient alpha of ranging from 0.75 to 0.90. This suggests that the three scales have relatively high internal consistency, given that a reliability coefficient of .70 or higher is considered acceptable in most social science research situations (Tavakol & Dennick, 2011).

Table 1 presents statistical information of the three scales. Descriptive analyses were used to profile the extension agents. Analytical statistics were employed to analyze the data using the SPSS software based on approximations of the variables to normal distribution using the Kolmogorov-Smirnov (KS) test. Parametric tests (i.e. t and ANOVA tests) were used to analyze the normally distributed competence and training need scales to test differences between or among groups. Non-parametric tests (i.e. Man Whitney, Kruscal Wallis, spearman Rho and the test of independence $\chi 2$) to test differences or to examine associations between groups for the not normally distributed

attitude scale. The Levene test was used to check the equality of variances of the populations, an important assumption for the F-test. The ANOVA procedure was used to detect significant differences among the means of the variable tested, while LSD was used for mean separation to investigate where the differences occurred. Pearson correlation (r) was used to determine the strength of the relationship between the rates of need for training and the quantitative independent variables such as age and years of work experience.

Table 1 : Statistical information of the study scales (n =68)

	Attitude Scale	Professional Development	
		Current Competence Scale	Training Need Scale
No. of items (rates 1-4)	7	15	15
Rates range of the scales	7-28	15-60	15-60
Cronbach's Alpha	0.75	0.90	0.86
Minimum	19.00	17.00	23.00
Maximum	28.00	59.00	60.00
Median	25.00	44.00	47.00
Mean	24.51	43.55	45.69
Std. Deviation	2.72	9.01	8.56
Std. Error of Mean	0.33	1.11	1.10
Confidence interval (95%)	23.68-25.17	41.33-45.76	43.50-47.88
Skewness (SE)	-.538-(0.291)	-.355-(0.295)	-.531-(0.306)
Kurtosis (SE)	-.866-(0.574)	-.111-(0.582)	-.344-(0.604)
Kolmogrov-Smirnov test of normality	$Z = 1.591$ (P <0.013)✶	$Z = 0.559$ (P <0.914)✶✶	$Z = 0.984$ (P <0.287)✶✶

✶ Not normal distribution (P ≤0.05)　　✶✶ Normal distribution (P >0.05)

Shanfield, Hetherly and Matthews (2001) and Rimawi (2002) employed the characteristics of the normal distribution as a basis for categorization of scales into three levels; low level for rates below one standard deviation of the scale mean, medium level for rates which fall within (±) one standard deviation of the scale mean and high level for rates beyond one standard deviation of the scale mean. As the scales of the need for training were found to be normally distributed, categorization of the levels of the need for training will almost always result in about 16% with low needs, another 16% as high, and the rest (two thirds) in the middle. Thus, such categorization would not be helpful, at least, in normally distributed data. Instead, using reasonable cut-off scores provide much more meaningful categorization of the levels of the need for training. As Table 1 shows, the maximum and minimum rates for the training need scale were 60 and 23. Rates below 36 (< 60% of the maximum rate) were labeled as low, rates beyond 45 (≥ 75%) were labeled as high. Rates in the range of 36-44 were labeled as medium. Chi-square test was then used to investigate associations between the levels of the need for training and selected agents' characteristics.

Results and Discussion
Socio-economic characteristics of the extension agents
The socio-economic factors of the extension agents are important in shaping their attitudes and behavior (Ajzen, 2006). Table 2 shows that 53% of the agents were within the ages of 35-44 years and less than 5% were in their 50s, which indicates that most of the agents were in their middle ages. The mean and median age were 40.16 (SD= 6.29) and 39 years which indicate that age distribution is about normal with low variation (CV = 15.6). The majority (78%) of the extension agents were males, which indicates that the extension agents were predominantly males. Considering that women farm holders represent 5.2% in Jordan according to the Agricultural Census (AC) 2007 (DOS, 2009: Rimawi, 2009), statistically wise, female agents are over-represented in public extension in Jordan.

Swanson and Rajalahti, (2010) reported that in most countries, the extension agents have only 2-3 years diploma. In some countries, many of the newly employed agents had only secondary-school level education. These agents could deliver messages, but most are incapable of working with farmers to diversify their farming systems or to teach new farm management and marketing skills. Many current public agents are inadequately trained to assist farmers in pursuing new economic opportunities. Wherever feasible, younger staff members need a minimum of a BSc. degree, including subject matter training (Swanson and Rajalahti, 2010). In Jordan, all the extension agents have a university degree in agriculture, including 16.2% with MSc. degree in agriculture and almost all agents (98.5%) consider the existence of SMSs as important,

Table 2: Distribution of agents according to selected variables

Characteristics	Frequency	Percent
Age ($\overline{x}$=40.2; SD= 6.29 yrs; CV =15.65)		
Less than 35	12	18.8
35-44	34	53.1
45 and more	18	28.1
Total*	64	100.0
Experience in extension ($\overline{x}$=9.63; SD= 6.44 Yrs; CV =66.87)		
up to 5 yrs	21	32.3
6 to 10 yrs	20	30.7
11 to 15 yrs	12	18.5
More than 15 yrs	12	18.5
Total*	65	100.0
Specialization		
Horticulture	26	39.7
Plant protection	18	26.5
Animal production	9	13.2
Agricultural economics	9	13.2
Other/ soil and water resources	6	7.4
Total*	68	100.0

*Total represents the number of valid cases.

of which 78% consider it as very important. Thus, the public extension staff is qualified, and many of the required skills can be greatly improved, should proper management be set up that is centered on a core team of subject matter specialists who would provide technical backstopping support to the field agent alongside well-targeted in-service training.

The distribution of extension agents according to their areas of specialization shows that 40% of them majored in horticulture and 26% in plant protection. The rest were specialized in animal production, agricultural economics, soil and water sciences and other fields. The majority (60%) of the extension agents had a working experience of more than 10 years (13.6 yrs), and 37% had working experience in extension for more than 10 years ($\bar{x}$ = 9.6 yrs), but the variation is quite high (CV =67). Thus, the staff had developed large experience that could be passed down to their subordinates on the job. This indicates that the staff is academically qualified and experienced. With proper on-going in-service training, the agents' skills can be greatly improved and they can be more effective and efficient in their extension activities. The extension staff consisted of 44 (67%) field extension agents (of which three identified themselves as researchers and environment extension agent), and the rest were central or regional administrators.

About two fifths of the agents (44%) were found to be involved in surveying farmers. They were involved in data collection such as surveys of olive producers, IPM activities, water use, monitoring and evaluation of extension programs, training activities, and agricultural surveys of the Department of Statistics, NGOs surveys, and promoting exports, RRA collection of data and in many other agriculture-related surveys. This accumulated valuable experience would contribute to the adoption and initiation of NBE in extension programming by the extension authorities.

Objective 1: Attitudes and barriers to the adoption of the (NBE) approach
Attitudes influence behavior and decision making. Positive attitudes indicate potential awareness of extension agents of the farmer's needs and their willingness to provide more effective demand-driven agricultural extension services. Based on the TPB, the intention to perform a behavior is strong when performance of a particular behavior is the product of a favorable attitude from the individual, a surrounding social environment which is conducive to the behavior, and confidence on the part of the individual of his ability to perform the behavior, i.e. it is believed to be achievable (Armitage and Conner, 2001; Ajzen, 2006).

Objective 1.1: Attitudes to needs-based extension (NBE) services
The attitude scale was used to investigate the perception of extension agents of NBE programming and activities. The respondents were asked to rate their attitudes towards the scale items. The ranked agent's ratings of the various items are presented in Table 3. All items were highly rated ($>$ 3:00) and the overall mean was high ($\bar{x}$ = 3.5), with quite low variability (CV $<$ 0.05). Items with ratings higher than 3.50 include; farmers should be provided with NBE information, needs-based priorities are indicators of efficient extension management and NBE work is more effective and higher in quality than value judgment based extension work. Low CVs (0.11-0.21%) in the attitudes indicate low inter variability among the agents.

The results indicate that the agents were aware of the significance of NBE services in a demand-driven extension system. Based on the TPB (behavioral beliefs), the items 1-6 indicates the agents' positive attitudes and willingness to adopt the NBE. Similarly, item 7 indicates that agents are aware that converting from conventional to NBE work needs cultural change and a change in the minds of agents. This is consistent with the TPB, in which subjective norms were reported to have an impact on the intended behavior (i.e. adopting NBE) should it be acceptable and encouraged by the extension authorities (Clark-Richardson, 2003).

Table 3: Attitude scale of the extension agents towards NBE programming

Rank	Scale Items	Overall		
		Mean	SD	CV
1	Farmers should be provided with NBE information	3.78	0.418	0.111
2	NBE priorities indicate efficient management	3.59	0.553	0.154
3	NBE vs. value judgment extension is more effective	3.56	0.608	0.171
4	NBE work is more professional	3.46	0.700	0.202
5	NBE is more supportive to development efforts	3.43	0.719	0.210
6	I am the right person to move to NBE work	3.43	0.581	0.169
7	NBE needs cultural change	3.28	0.666	0.203
	Overall item means	3.502	0.158	0.045
	Overall scale	24.51	2.718	0.111

Objective 1.2: Identifying perceived barriers to the adoption of NBE approach
According to the TPB, subjective norms refer to the perceptions of whether this intended behavior is acceptable and encouraged by the extension authorities (Armitage and Conner, 2001). As item 7 indicates, agents were aware that converting from conventional to NBE work needs cultural change and a change in the minds of agents. The perceived behavioral control is related to an individual's perception of how difficult the task will be to perform, i.e. self efficacy and to controllability. Item 6 indicates the agent's have self-confidence and consider themselves as capable of adopting the NBE. Controllability according to the TPB, relates to agents' perceptions of whether implementing the NBE is for them given their resources. The perceived behavioral control to the adoption of the approach includes factors that are for or against performing the behavior such as past experience and anticipated barriers (Clark-Richardson, 2003). These factors include both external and internal constraints. The external factors include those factors which exist outside the extension department and are regarded as uncontrollable, such as unsupportive financial and cultural environment to extension activities in general. The internal factors are those factors which exist within the extension organization such as undertaking surveys and analyzing data and meaningful presentation of the results that would clearly identify farmers' needs. Generally, the intention to perform a behavior is strong when performance of a particular behavior elicits a favorable attitude from the individual, the surrounding social environment is conducive to the behavior, and the individual feels confident of their ability to perform the behavior (Ajzen, 2006).

Hence, major barriers which may hinder adopting NBE services are investigated. Extension agents were asked to rate the barriers believed to limit their adoption of NBE approach. Table 4 presents the ranked ratings and their distribution (very to least

important). The mean ratings for highly rated barriers ranged from 3.37 to 3.63, representing 84-91% of the maximum rate (4.0). These include the lack of finance to conduct the surveys, lack of qualified personnel to undertake the surveys to locally assess needs (designing and implementing the survey, electronically and statistically analyzing data and summarizing and presenting results) and lack of supportive culture to NBE work.

Ratings of the barriers to the adoption of NBE approach were not associated with age groups except for the "lack of skills to summarize and present results" where the ratings were much higher (83%) for the younger groups (P = 0.055). Thus, older agents were not resistant to adoption of the approach. In the contrary, much lower percentage (19%) of those who were 45 Yrs or more consider this factor as barrier.

Table 4: Barriers to the adoption of NBE approach

Barriers to the adoption Lack of:	Very important	Important	Less and least important	Mean score	SD	CV
Finance to conduct surveys	63.2	36.8	0	3.63	0.486	0.134
Skills to analyze data by electronic means	61.8	36.3	2.9	3.59	0.553	0.154
Skills to assess needs	63.2	32.4	4.4	3.57	0.630	0.176
Skills to statistically analyze data	57.6	39.4	3.0	3.55	0.560	0.158
Skills to summarize and present results	52.9	47.1	0	3.53	0.503	0.142
Personnel to undertake the surveys	53.0	42.6	4.4	3.49	0.586	0.168
Supporting culture to NBE work	44.1	50.0	5.9	3.37	0.644	0.191

The favorable attitudes towards the NBE approach, suggest that the agents are more likely to adopt it, provided that the NCARE and extension authorities will endorse it and give it their full support. Some agents indicated the need to assess training needs of farmers every other year, and the assessment should be tailored to the needs of groups of farmers in specific socio-ecological locations. An extension agents stated that good intentions are not enough for activating extension services and adopting NBE approach, the required logistics should be made available including information, financing, transportation and delivery of extension services in order to ensure efficient and effective management of extension.

Thus, based on the TPB, intend to adopt NBE approach is constrained by subjective norms, that are the long standing tradition to value judgment approach of needs assessment, and lack of supportive culture to NBE work. This means that the intended behavior may not be acceptable, or at least, not encouraged by the extension authorities. Converting from conventional to NBE work needs cultural change in the extension organization. Further, the intend to adopt NBE approach is constrained by perceived behavioral control, i.e. the lack of finance to conduct the surveys and lack of skills to analyze data, carry out surveys and to summarize and present results and lack of qualified personnel to undertake the surveys.

Objective 2.1: Assessing the training and information needs of the agents

Table 5 presents the perceived level of competence of the extension agents and their ratings for training toward statements related to program development, monitoring and evaluation, use of varied extension methods including information communication technology (ICT), agribusiness management and use of tools of data analyses and presentation. The agents were asked to rate their competence and their needs for training in these areas. Competence items with high ratings (> 3.00), which indicate a low need for training, include NBE program planning, development and implementation, planning and implementing individual and group extension methods, use of appropriate multimedia extension methods and conducting program monitoring and evaluations. Low rated items include use of software (PPT, SPSS…) to analyze and present data, developing networks and database on the internet and loan management. Medium rated competences (2.4 -2.99), which indicate a medium need for training, include undertaking need assessments and use of group methods to assess needs (FG, PRA…), business management areas including farm management and post-harvest activities and marketing. Only loan management was found to be low rated competency (< 2.4), which indicates a high need for training.

The positive differences between the need for training and competences were considered as training needs in the identified areas of competencies. Table 5 shows that nine training needs with positive gaps were identified, of which, seven areas were found to have high mean ratings (≥ 3). High level training needs were found in the areas of loan management and ICT. These include developing database and internet networks to promote implementing computer-based extension and use of software (PP, SPSS…) to analyze and present data. These results support the findings of Schwarz and Gibson (2010) in the USA who concluded that the majority of extension staff did not require significant training to accomplish their work, but most agreed on the importance of continuing education in information technologies and human development. Extension staffs need to be trained on how to use ICT tools as an extension method. This is where the training becomes important as they should be specialists on the subject while training the farmers, else it will be difficult to convince farmers to adopt ICTs in agriculture.

Medium level training needs include important areas in agribusiness management; post harvest activities and making farmers aware of tools of risk management. Medium level training needs further include areas in business management, conducting comprehensive needs assessments and use of PRA and focus groups to conduct needs assessments. The finding that ICT ranked as priority one for training confirms the results of a study in the USA in which information technology was perceived by the extension agents as 1st priority for training (Schwarz and Gibson, 2010). These results were followed by areas in business management such as post harvest activities and conducting comprehensive needs assessments.

The discrepancy values based on the mean perceptions of the extension staff were negative values for the rest of the items in the areas of professional extension development; extension methods and programming, indicating that extension agents considered themselves as competent and perhaps, not in need for training in these areas.

Yet, the scores of these items ranged between 2.8 to less than 2.93 (70-73% of the maximum value), indicating that they do perceive the need for training, but apparently, they attach lower priority for these areas. These results indicate that the agents were aware of the significance of skills in ICT and agribusiness management in an increasingly competitive environment. These results support the findings of Schwarz and Gibson (2010) who concluded that the majority of extension staff did not require significant training to accomplish their work, but most agreed on the importance of continuing education in information technologies and human development. Based on the information gathered from this assessment, the prioritized results would be the basis to design a training program to address the competencies and training needs areas. As concluded by Caffarella (1982), this should enable the NCARE to establish priorities and facilitate action planning directed at improving farming practices and quality of life.

Table 5: Rank orders of the extension agents perceptions of their competencies and training needs in these areas

Scales items		Professional competence						Gap (1 – 2)
		Competencies			Training needs			
		Mean (2)	SD	CV	Mean (1)	SD	CV	
1	Planning and implementing extension program	3.50	.639	0.183	2.80	1.077	0.385	-0.70
2	Planning and implementing individual extension methods	3.44	.704	0.205	2.85	1.123	0.394	-0.59
3	Planning and conducting NBE programs	3.44	.726	0.211	2.85	.980	0.344	-0.59
4	Planning and implementing group extension methods	3.42	.703	0.206	2.84	1.113	0.392	-0.58
5	use of appropriate multimedia extension methods	3.27	.735	0.225	2.82	1.118	0.396	-0.45
6	Conducting program monitoring and evaluations	3.21	.886	0.276	2.92	1.053	0.361	-0.29
7	Use of FG to conduct needs assessments	2.88	.969	0.336	2.93	.981	0.335	0.05*
8	Conducting comprehensive needs assessments	2.76	.962	0.349	3.07	.834	0.272	0.31*
9	Business management areas	2.70	1.095	0.406	3.16	.879	0.278	0.46*
10	Making farmers aware of tools of risk management	2.67	1.057	0.396	3.41	.761	0.223	0.74**
11	Post harvest activities	2.64	1.104	0.418	3.16	.898	0.284	0.52**
12	Use of PRA to conduct needs assessments	2.61	.959	0.367	2.79	1.035	0.371	0.18*
13	Use of software (PP, SPSS…) to analyze and present data	2.41	1.081	0.449	3.43	.741	0.216	1.02***
14	Developing database and internet networks	2.41	1.123	0.466	3.44	.764	0.222	1.03***
15	Loan management	2.20	.996	0.453	3.21	.897	0.279	1.01***
	Overall item means	3.046	0.241	0.079	2.903	0.439	0.151	
	Overall scale	43.55	9.008	0.207	45.69	8.557	0.187	

Other suggested professional development areas by the respondents include; web-based information services for agricultural extension and research, technical aspects in subject matter areas such as water requirements for plants, pest and biological control, fertigation, problem solving approach, strategic planning, communication skills, environmental and forest extension services, helping farmers to establish and develop marketing and supplies cooperatives and English language.

Objective 2.2: Examining the preferred methods of training by the extension agents
A number of methods and education materials are available to help prepare and equip extension agents to enhance their competency and their professional skills. However, it is to be recalled that effective learning can be more appropriately achieved by combining various methods in the context of multi-media approach which can reinforce and multiply the impact of agent learning (Fraser and Villet, 1994).

Attitudes of extension agents towards the most effective methods of training were investigated to help policy makers to design training programs. The various training methods identified by agents as more effective are ranked in Table 6. Highly rated methods ($\geq$ 3.0) include study tours to more developed extension systems in other countries, followed by local exchange of experience which was emphasized by many agents, training at local or international institutions attending conferences, training for a degree at academic institutions, workshops & seminars and training at academic institutions. Low variability in the highly rated methods (CV < 0.20) reflects consistency in the perception of agents towards the effective training methods.

Table 6: Extension agents' perceptions concerning methods of training (n= 68)

Training methods:	Strongly Agree (%)	Agree (%)	Strongly Disagree& Disagree (%)	Ranked Mean	SD	CV
Study tours	73.0	25.0	1.5	3.72	.484	0.130
Local exchange of experience	73.5	22.1	4.4	3.69	.553	0.150
At local or international institutions	67.2	29.9	3.0	3.63	.599	0.165
Attending conferences	61.8	32.4	5.9	3.56	.608	0.171
Academic degree training	52.9	33.8	4.4	3.54	.679	0.192
Workshops & seminars	52.9	33.9	13.2	3.37	.790	0.234
Professional training at academic institutions	47.1	41.2	11.7	3.32	.762	0.230
Electronic materials (CD, USP...)	26.5	44.1	29.4	2.94	.808	0.275
Distant learning (printed materials, web based...)	16,2	52.9	30.9	2.76	.831	0.301

Medium rated methods (2.4 to < 3.0) include electronic materials (CD, USP...) and distant learning (printed materials...). Training activities are costly and time-consuming, which makes information communications technology (ICT) training very appealing, as it is less costly, it does not need physical classroom facilities and its scheduling is much more convenient. E-learning makes it possible to have instructors who would otherwise be very difficult, if not impossible to reach (Quesada-Pineda, Conn, and Scarlett, 2011).

Other repeatedly suggested methods for training include practical and long training in the private sector, training in large horticulture farms and subject matter expert training. Many agents suggested the need for well established plan for training that best fit the long term needs of farming areas.

Objective 3: Statistical testing of selected socio-economic characteristics and the attitude, competence and training scales
As Table 1 shows, the actual scale scores ranged between 19 and 28 points for the attitude scale ($\bar{x}$= 24.51 : 87.5% of the maximum rating), 17 and 59 points for the competence scale ($\bar{x}$= 43.55: 72.6% of the maximum rating) and 23 and 60 points for the training need scale ($\bar{x}$= 45.69: 76.2% of the maximum rating). The attitude scale was not normally distributed ($p < 0.05$), and the other two scales were normally distributed (KS test: $p > 0.05$). A symmetrical distribution has a skewness of zero. The distributions have negative skew. Similarly, the distributions have negative kurtosis coefficients which indicate that the distributions are platykurtic, i.e. values are more spread out more around the mean. Table 1 show the skewness or kurtosis coefficients are much less than the values of 2 standard errors of the skewness or kurtosis for the three scales, which indicate that distributions have no significant skewness or kurtosis problem (Brown, 1997).

Tables 7 present the results of parametric and non parametric tests. The variables that showed highly statistically significant relationships with the attitude scale include gender and place of work. Mean ranks for males (MW test: P=0.004) and for extension agents who were stationed in the south (KW test: P=0.001) were significantly higher. Low or no statistically significant relationships were observed for the level of education and specialization. Mean ranks were higher for agents with B.S. degree (P= 0.08) and for agents who are specialized in plant protection or agricultural economics (P=0.10). Agents with longer experience (>15 Yrs) or with M.S. degree or who are specialized in horticulture and animal production were less likely to rate highly the need for training. No significant differences were observed by age, extension experience and type of job.

No statistically significant relationships were observed in almost all the relationships with the competence scale. Only years of extension experience were correlated with the competence scale (P= 0.02). Otherwise, ratings were very similar irrespective of the type of work, age, education, place of work, gender and field of specialization. Similar results apply for the training needs scale, including the (low) significant correlation between years of extension experience and the training needs scale (P= 0.087).

Table 7: Statistical tests results of selected socio-economic factors and the attitude, competence and training scales / levels (n=68)

	Test	Value	p-value
The attitude scale tests results			
Job (administrator, field agent)	MW	Z = -1.127	0.260
Education level (B.S., M.S.) by Attitude level	χ2	χ2 3 =.040	0.081
Gender (M , F)	MW	Z =-2.868	0.004
Place of work (northern, middle and southern regions)	KW	χ2 =13.759	0.001
Age (<35, 35-44, >44 Yrs)	KW	χ2 =.088	0.957
Specialization (horticulture, plant protection, animal production, economics and soil & water) by Attitude level	χ2	χ2= 7.689	0.104
Extension experience (Yrs)	Rho	ρ = -.154	0.222
The competence scale tests results			
Job (administrator, field agent)	t	t = -1.048	0.298
Education level (B.S., M.S.)	t	t = 0.953	0.344
Gender (M , F)	t	t = 0.852	0.397
Place of work (northern, middle and southern regions)	F	F = 0.681	0.510
Age (<35, 35-44, >44 Yrs)	F	F = 0.255	0.776
Specialization (horticulture, plant protection, animal production, agri-economics and soil & water	F	F = 0.393	0.813
Extension experience (Yrs)	r	r = -.289	0.020
The training needs scale tests results			
Job (administrator, field agent)	t	t = -1.020	0.312
Education level (B.S., M.S.)	t	t = 0.883	0.381
Gender (M , F)	t	t = 1.837	0.071
Place of work (northern, middle and southern regions)	F	F = 0.687	0.507
Age (<35, 35-445, >44 Yrs)	F	F = 0.054	0.947
Specialization (Horticulture, plant protection, animal production, agri-economics and soil & water	F	F = 1.240	0.304
Extension experience (Yrs)	r	r = -.225	0.087

Conclusions, implications and recommendations

To contribute to the development of appropriate extension services that would support farmers in a market-driven and competitive farming, this study aimed at empowering extension agents through training programs to increase their credibility with the growers they serve. More than half of the agents (53%) were in their middle ages (35-44 Yrs). Female agents are well represented (22%) against 5% of women farm holders according to the Agricultural Census 2007 (Rimawi, 2009). All the agents have a university degree, of which one in every seven agents with M.S. degree in agriculture. About two thirds are majored in plant production or protection and have experience in agriculture of more than 10 years. Two fifths have experience in extension of more than 10 years. Male agents with B.S. degree, who specialized in plant protection or agricultural economics, with shorter experience had more positive attitudes to NBE. Agents with lower education and shorter experience were more likely to rate highly the need for training. Yet, no significant differences were observed by age and type of job. Therefore, the extension staff had developed large experience that could be passed down to the growers and to their subordinates on the job. They are qualified,

experienced and can be more effective and efficient in their extension activities. Many of the required skills can be greatly improved with proper management, well-targeted in-service professional development programs and by establishing a core team of subject matter specialists to provide backstopping support to the field agent. Thus, initiation and adoption of NBE programming are feasible both technically and resource-wise.

The results indicate that the agents are aware of the significance of NBE services in a demand-driven extension system. Based on the TPB, the extension agents have positive attitudes and willingness to adopt the NBE. But, intend to adopt NBE is constrained by both external and internal factors. The external factors include unsupportive financial and cultural environment to extension activities in general. Traditional practices to NBE on personal value judgment and long established culture which constraints change are barriers to adoption of NBE. Thus, converting from conventional needs assessment based on personal value judgment to NBE calls for endorsement and financial support from the extension department and cultural change within the extension organization. The internal factors include lack of skills to undertake surveys, analyze data and to meaningfully present the results that would clearly identify farmers' needs. Thus, alternative needs assessment practices requires better skills, more time, availability of information and improved management. Extension department must explain the benefits of NBE and tailor studies toward the interest of farmers. Without grower participation in the design and implementation process, growers will be reluctant to adopt improved practices. Hence, creating supportive environment, making finance available and proper training will be conducive to the adoption and implementation of the NBE.

Extension agents perceive themselves as possessing a low level of competence in nine of the professional development areas examined in this study, indicating a high need for training. Two of the training needs were in the area of ICT and three in the area of agribusiness management. The other medium rated needs were in the area of conducting needs assessment. The results indicate that the agents are aware of the significance of skills in agribusiness management in an increasingly competitive environment. Based on the information gathered from this assessment, the most important results would be the basis to design a training program to address the competencies and training needs areas. Most effective methods of training, as perceived by the agents, include study tours to more developed extension systems in other countries, followed by professional training or for a degree at local or international institutions and attending conferences.

Adopting NBE calls for developing a policy framework for the extension system, formal guidelines and improved management. This requires integration mechanism of the NBE in the extension activities to develop appropriate programs and educational activities. A detailed manual can be made available to help agents and other extension workers on how to conduct needs assessment. A variety of needs assessment techniques have to be outlined to enable the agents to compare needs assessment techniques and choose the best technique for their purposes. The example of the Pennsylvania State Extension published handbook, "Needs assessment for extension agents and other informal educators" can be followed. The purpose of handbook was to introduce extension workers to needs assessment theory and to the techniques useful in their work and to provide a shelf reference for planning and implementing local level needs

assessments (Etling, 1995). Needs assessment methods include group discussion with key informants, RPA, focus groups interviews, formal surveys and brainstorming (McCaslin & Tibezinda, 1997).

Surveying needs assessment is not as simple a procedure as many suspect. Done simply and quickly, it does not yield much beyond people's perceptions of what they think they need, want or would like. If the ultimate objective is to improve people's lives through some form of social intervention, standard needs assessments are usually inadequate. What is recommended is a variation of the concept of "triangulation" - that is, assessing needs from multiple information sources and angles (Sofranko and Khan, 1988). Thus, it has to be supported by information collection from secondary data and key informants.

The implications of the study are applicable to many situations beyond the case of Jordan. A well thought out and documented needs assessment is not only beneficial to the extension agents, but may also be valuable to others who work with similar clientele such as in health and education services in many other countries (Caravella, 2006). Because many other countries such as Pakistan (Khan et al., 2012), Botswana (Tladi, 2004), Uganda (Erbaugh, Kibwika and Donnermeyer, 2007) and Nigeria (Ovwigho, 2011) have also assessed the training needs of extension agents, the implications of the study are not limited to the Jordanian public extension. As the needs of communities constantly evolve, the extension system as a whole must adapt to keep up with the changes to meet the needs of growers. Thus, extension agents need to intensify their efforts to NBE programming. This will facilitate communicating grower's problems to researchers so that appropriate programs and solutions can be offered (Radhakrishna, 2001). This also helps in promoting future funding of extension activities in the context of performance-based budgeting.

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