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Full Length Research Paper

Training needs of Iranian extension agents about sustainability: The use of Borich's need assessment model

Amirhossein Alibaygi[1]* and Kiumars Zarafshani[2]

[1]Department of Agricultural Extension and Education, Faculty of Agriculture, Razi University, Kermanshah, Iran.
[2]Department of Agricultural Extension and Education, Faculty of Agriculture, Razi University, Kermanshah, Iran.

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This descriptive study probed to in-service training needs of extension agents in West Iran. The statistical population of the study consisted of Agricultural Extension Agents (AEAs) in Kermanshah Province (N = 97) . The entire population was surveyed. Therefore, sampling procedures were not utilized. Based on the Borich Need Assessment Model, a Delphi technique was used to develop 26 competencies needed to assess needs of Agricultural Extension Agents. The perceived level of importance and perceived level of competence of the 26 competencies of AEA were measured. Overall, in-service needs were analyzed and ranked using Mean Weighted Discrepancy Scores (MWDS). The top five competencies in need by Agricultural Extension Agents included agricultural waste management (MWDS = 8.40); participatory technology development (MWDS = 7.02); water conservation (MWDS = 6.73); integrated crop management (MWDS = 6.50); and soil erosion (MWDS = 5.82). The human resource development programs should study how the top in-service areas can be addressed in training workshops.

Key words: Needs assessment, Agricultural Extension Agent, Borich's model, In-service training, and sustainability.

INTRODUCTION

Problems including environmental degradation, the ero-sion of rural communities (migration of rural youth to seek jobs in urban areas), the elimination of small family farms from agriculture, and the inadequate conservation of fragile lands have made agricultural sustainability a signi-ficant concern (Chizari et al., 2006). Economically sound, environmentally protective, and social acceptability were the three widely advocated components of sustainable agriculture (Williams, 2000). The aim of sustainability in agriculture is a healthy and ample food supply for both the present and future generations through the wise utili-zation of natural resources (Al-Subaiee et al., 2005).

Given the need for sustainability in today's world, Agri-cultural Extension Agents (AEAs) are expected to know more, and meet the increasing demands of a diverse farmer population. Dealing with complexity, uncertainty, and conflicting norms, values, and interests associated with sustainability requires a fundamental transformation in the competencies required by AEAs (Wals and Bawden, 2000). These agents are the potential facili-tators of sustainable agricultural and rural development. Therefore, if extension agents are to improve their on-the-job effectiveness, they must receive continuous in-service training in line with their training needs about sustainability. As such, in-service training needs assess-ments are essential for a productive workforce. Once these needs are determined and prioritized, training resources can be utilized more efficiently. In other words, in-service training activities are one way through which AEAs can be provided the knowledge and skills needed to meet successfully the demands of a changing environ-ment (Niven, 1993) and sustainable future.

*Corresponding author. E-mail: baygi1@razi.ac.ir
Phone and Fax: 0098-831-8323732.

Abbreviation

AEAs: Agricultural Extension Agents

To meet this demand, these agents need annual in-service training opportunities.

This study was conducted because of three imperative needs. First, as a self-evaluative procedure, Borich's Needs Assessment Model has never been used in the context of AEAs in Iran. Although this model has previously been used in Iran for need assessment on watershed management information (Karamidehkordi, 2002). Therefore, it may substitute the current measurement techniques that are completed by supervisors or administrators in order to corroborate the subjective responses of the AEAs. Second, the Human Resource Development Council in the Ministry of Agriculture considers in-service trainings important for developing effective teaching in order to select extension agents for salary increases, and tenure. Third, further justification for conducting in-service training needs of AEAs was the belief that there exists a relationship between the opportunity to provide educational needs and job satisfaction. Zarafshani and Alibaygi (2008) and Hammer (1987) suggested that employees provided with opportunities to meet educational needs would be more satisfied than those unable to access in-service trainings.

Singh and Mohammed (1982), in a study of the training needs of extension workers in Northern Iraq found that the main areas of training required by extension workers were extension methods, communication, program planing, and technical knowledge in soil fertility, crop production, and irrigation. Findings from a study by Menon and Annamali (1979) indicated that the most significant training needs of village level workers in Tamil Nadu, India were specialization in agriculture, administration of extension programs, extension program planning, farmer training methods, understanding the farm as a social system, agricultural education planning, and methods of human resources development. Gamon et al. (1992) found that orientation for new extension professionals in Iowa should emphasize meeting with county, area, and state staff, time and resource management, motivation of clientele, and teaching methods. Chizari et al. (1999), in an analysis of extension agents' educational needs regarding sustainable agriculture in Khorasan Province, Iran found that the highest rated topics were integrated pest management, economics of sustainable agriculture, the role of agricultural extension, and natural resource conservation. Tladi (2004) in an assessment of training needs of extension agents in South-Central Botswana found that the agents needed training in 14 job skill areas including among others, interpersonal communication skills, practical farm skills, conducting needs assessment surveys and mobilizing people to form groups. Chizari, Alibaygi, and Breazeale (2006) found that the most important training needs of multi-functional extension workers in Isfahan Province, Iran were in the areas of participatory extension, participatory techniques in rural development, biodiversity protection methods, sustainable fertilization methods, and improved utilization of indigenous knowledge of rural people.

As can be seen from the literature review, there is little information available on training needs of extension agents concerning sustainability issues. Hence, this study is considered to be a significant contribution toward filling this gap. However, the authors fully acknowledge that additional steps will also be required. As in all educational programming efforts, training is only one component. Constant feedback will be required from the training participants and in Extension settings such as Kermanshah Province, stakeholder input will also be important.

Theoretical framework

According to Monetter (1997), the individual or group that falls short of the desirable standard is said to be in need. Various experts based on certain criteria in the society identify this typology of need. Need is also measured by comparing the characteristics of those in receipt of a service with others who are not. If these others exhibit the same characteristics and they are not receiving the required service, they are said to be in need. However, this study is concerned with training needs, which is defined as a difference between desired status of learners and status of learners (Popham, 1993) . Specifically, this study is inspired by a definition of training needs proposed by Borich (1980). According to Borich, a need is described as a discrepancy or gap between "what is", or the present state of affairs in regard to the group and situation of interest, and "what should be", or desired state of affairs (Witkin and Altschuld, 1995; 2000). McKillip (1987) described a need as a value judgment that some group has a problem that can be solved. Tyler (1971) defined a need as a difference between a present condition and an acceptable norm. "Any difference between "desired status of learners and "current status of learners" equals a training need" (Popham, 1993).

Among need assessment models, a discrepancy model proposed by Borich (1980) is widely used in agricultural education and it was determined to be the best instrument to achieve the purpose and objectives of this study. Borich (1980) pioneered his methodological model in an effort to design such a survey instrument that would allow one to collect data that can be weighed and ranked in order of priority. By doing so, responses can be linked to a practical decision framework to improve a training program. Borich defined a training need as "a discrepancy between an educational goal and trainee performance in relation to this goal." He further suggested that training programs could utilize his model by employing the two extreme positions: what is (the measured behaviors, skills, and competencies of trainees) and what should be (the goals of the training program). Note the concept of competency implied by the needs assessment model: Competencies are the application of knowledge, technical skills, and personal characteristics leading to outstanding

performance (Boltes, 1997). Competency models such as Borich Needs Assessment Model are designed around the skills individuals and groups need to be effective in the future and are used for making human resources decisions. Furthermore, competency-based training encourages AEAs to assess their level of competence in a given area and participate in training that is relevant, useful and often customized to their learning styles. According to Borich, the discrepancy between these two positions can be used as an index to determine the effectiveness of training. The Borich Needs Assessment Model involves four steps:

i) List competencies.
ii) Survey in-service teachers.
iii) Rank competencies.
iii) Compare high priority competencies with training program content.

The important practical characteristic of Borich Need Assessment Model is that it relies on extension agents' judgments about their own performances. The assumption underlying the needs model is that the performer (AEA) can best judge his or her own performance and, when explicitly asked to do so, can make an objective judgment. This can enhance the credibility of the self-report and provide an additional vantage point from which to judge discrepancies between program intents and AEAs' performance. Several studies have used Borich's Needs Assessment Model to identify in-service training needs of agriculture educators (Garton and Chung, 1996, 1997; Edwards and Briers, 1999; Mundt and Connors, 1999; Layfield and Dobbins, 2000; Duncan et al., 2005; Newman and Johnson, 1994). Overall, the Borich model adds validity to the process of assessing respondents' perception about the importance of educational programming needs particularly in the area of in- service education for homogeneous group of people. The advantage of this model is the ability to lock in the type and quality of the data that will be received (Borich, 1980). It attempts to gather additional information from the respondents regarding their current knowledge of the topic and their ability to apply this information. The attempt of the model is to determine the congruence between what the educators should be able to do and what the educators can do. Although not difficult to conduct, assessment of in-service training needs require organization and a commitment of time. While this is the first time that this model is being used in the context of Iranian Agricultural Extension Organizations, additional application of Borich's model is needed to test the utility of this model across Extension Institutions in Iran.

Purpose and objectives

The purpose of this study was to identify and prioritize in-service training needs of Agricultural Extension Agents (AEAs) in Kermanshah Province, West Iran concerning sustainability. Specifically, the objectives of the study were to:

i. Describe the demographic profile of Kermanshah Province AEAs.
ii. Identify AEAs' perceived level of importance of 26 competencies regarding sustainability.
iii. Identify AEAs' perceived level of competency of 26 competencies regarding sustainability.
iv. Determine in-service needs of AEAs' in area of sustainability.

MATERIALS AND METHODS

The study's design is a descriptive study. It focused on the population of all AEAs in Kermanshah Province in the West Iran consisting of 97 agents. The list of AEAs was obtained from the Agricultural Organization of Kermanshah Province. Census populations were used and as such, the findings from this study can only be generalized to the population. The data collection was undertaken in two phases. The first stage was a Delphi technique involving 34 sustainable agriculture experts in Colleges of Agriculture and Agricultural Organizations in West Iran. The Delphi technique is an accepted method of obtaining group consensus among purposively selected experts (Stufflebeam, et al., 1985). The first-round questionnaire consisted of one open-ended question that solicited the experts' opinions about competencies. Bases on the summary of responses from the first round questionnaire, 44 competencies were summarized for the second-round questionnaire. This questionnaire was validated by Agricultural Education and Extension faculty members and postgraduate students at Razi University in West Iran. In the third round, the selected experts were asked to rate the same competencies as the second round again in light of a summary of the findings on the second round. Based on the responses of the final round questionnaire, 26 competencies were identified to be included in the final questionnaire.

AEAs were asked to rate the 26 competencies related on a Likert-type scale to in-service needs. Number 1 on the scale signifies the least important competency and number 5 was the most important competency. AEAs were asked to rate their self-perceived levels of the 26 competencies by using a Likert-type scale with number 1 meaning the least proficient in a particular competency and number 5 as the most proficient.

To ascertain the reliability of the questionnaire, a pilot test was administered to 20 AEAs not targeted in the study. Reliability as a measure of internal consistency was established using Cronbach's alpha. Reliability values were 0.79 for the importance level and 0.85 for the competence level. Data were collected by sending the instrument and cover letter to all AEAs in the study. One follow-up telephone call was made 7 days after the original mailing. This process yielded 90 completed questionnaires or a return rate of 93%. Data were analyzed using the Statistical Package for the Social Science (SPSS 11.5). Descriptive statistics (frequencies, means, and standard deviations) were used to analyze data. A Mean Weighted Discrepancy Score (MWDS) was calculated to describe the overall rankings for each of the competencies. To determine the Mean Weighted Discrepancy Score (MWDS), the following statistical methods were used. A discrepancy score was calculated for each individual on each competency by taking the importance rating minus the ability (competency) rating. A weighted discrepancy score was then calculated on each individual for each of the professional competency by multiplying the discrepancy score by the mean importance rating. A mean weighted discrepancy score for each of the competencies was calculated by taking

Table 1. Agriculture Extension Agents' perceived level of importance (N = 90).

Competency	M*	SD
Participatory technology development	4.94	0.80
Integrated crop management	4.73	0.64
Agricultural waste management	4.69	0.65
Gender analysis	4.59	0.57
Livestock manure management	4.58	0.57
Narrow strip intercropping	4.54	0.76
Integrated pest management	4.49	0.50
Reduced use of fertilizers	4.48	0.51
Water conservation	4.47	0.76
Insect-resistant crops	4.42	0.62
Participatory monitoring and evaluation	4.38	0.84
Soil erosion	4.33	0.72
Organic farming	4.30	0.84
Herbicide-resistant crops	4.22	0.56
Integrated weed management	4.16	0.80
PRA tools	4.15	0.65
Composting	4.11	0.57
Reduced use of chemicals	4.10	0.76
Allelopathy	4.08	0.65
Farmer's organization establishment	3.90	0.51
No-tillage	3.84	0.76
Participatory needs analysis	3.76	0.62
Beneficiary participation	3.73	0.65
Biological control of pests	3.65	0.57
Crop rotation	3.46	0.76
Agro forestry	3.24	0.65

*Note. Scale: 1 = Not Important; 5 = Very Important.

the sum of the weighted discrepancy scores and dividing by the number of observations. Using the mean weighed discrepancy scores, the 26 competencies were then ranked (Zarafshani and Alibaygi, 2008; Garton and Chung, 1997; Newman and Johnson, 1994; Bar-rick et al., 1983; Borich, 1980).

RESULTS

The demographic profile of Kermanshah Province AEAs

Among the 90 respondents, 34% were over 40 years of age, 40.10% were between 30 and 39 years of age and 25.9% were between 20 and 29. Eighty-nine percent had an agricultural background and the remaining 11% did not. Of the 90 respondents, 46% had a high school diploma and 52.5% had some college training, and 1.5% of the respondents had educational levels below that of a high school diploma. Frothy five percent of respondents were from rural villages and 55% were from urban areas. 78.7% of the respondents had more than 10 years of work experience and at least 5 years of residence in rural areas. The remaining 21.3% of the responding extension workers had less than 10 years of work experience and had resided in a rural area for less than five years. Cooperative learning techniques were the most preferred training method (50%), followed by workshops (25.55%), group discussions (15.45%), and lectures (9%). The respondents were also asked to indicate where they would prefer to receive their in-service training. The majority (81%) indicated that they would prefer to receive in-service training at an agricultural college.

AEAs' perceived level of importance of 26 competencies

AEAs were asked to rate 26 statements using the following scale: Not Important (M = 1.0 - 1.49), Of Little Importance (M = 1.5 - 2.49), Somewhat Important (M = 2.5 - 3.49), Important (M = 3.5 - 4.49), and Very Important (M = 4.5 - 5.0). As reported in Table 1, AEAs believed that participatory technology development (M = 4.94), integrated crop management (M = 4.73), Agricultural waste management (M = 4.69), gender analysis (M = 4.59), livestock manure management (M = 4.58), and narrow strip intercropping (M = 4.54) were very important competencies. The remainder of the items, as perceived by AEAs, was deemed important to somewhat important.

AEAs' perceived level of competency of 26 competencies

Agricultural extension agents were asked to rate 26 statements using the following scale: Not Competent (M = 1.0 - 1.49), Little Competent (M =1.5-2.49), Somewhat Competent (M = 2.5 - 3.49), Competent (M = 3.5 - 4.49), and Very Competent (M = 4.5 - 5.0). As shown in Table 2, the AEAs believed that they were competent in 10 competency areas and somewhat competent in 13 competency areas. However, they felt little competent in crop rotation (M = 2.46), livestock manure management (M = 2.45), and allelopathy (M = 2.32).

In-service needs of AEAs' in area of sustainability

Table 3 reveals the five highest-ranking in-service needs, as determined by the mean weighted discrepancy scores (MWDS) – agricultural waste management, participatory technology development, water conservation, integrated crop management, and soil erosion. Farmer's organization establishment, livestock manure management and beneficiary participation were the lowest ranked in-service needs as perceived by AEAs.

Six of the 26 competencies, as perceived by AEAs, received a mean weighted discrepancy score less than 2.0, indicating less of a need for in-service. The six lowest

Table 2. Agriculture Extension Agents' perceived level of competence

Competency	M*	SD
Biological control of pests	3.89	0.72
Narrow strip intercropping	3.78	0.80
PRA tools	3.75	0.76
Composting	3.70	0.62
Agro forestry	3.68	0.65
Integrated pest management	3.65	0.84
No-tillage	3.62	0.64
Integrated crop management	3.58	0.65
Participatory monitoring and evaluation	3.57	0.76
Gender analysis	3.52	0.65
Farmer's organization establishment	3.49	0.65
Participatory needs analysis	3.47	0.76
Insect-resistant crops	3.44	0.62
Reduced use of fertilizers	3.41	0.51
Beneficiary participation	3.30	0.57
Integrated weed management	3.24	0.56
Herbicide-resistant crops	3.21	0.64
Organic farming	3.11	0.56
Water conservation	3.09	0.65
Soil erosion	3.08	0.57
Reduced use of chemicals	2.99	0.76
Participatory technology development	2.97	0.57
Agricultural waste management	2.49	0.80
Crop rotation	2.46	0.51
Livestock manure management	2.45	0.65
Allelopathy	2.32	0.65

*Note. Scale: 1 = Not Competent; 5 = Very Competent.

Table 3. Mean Weighted Discrepancy Scores (MWDS) for level of importance and level of competence on selected teaching and learning competencies

Competency	MWDS
Agricultural waste management	8.40
Participatory technology development	7.02
Water conservation	6.73
Integrated crop management	6.50
Soil erosion	5.82
Organic farming	5.71
Gender analysis	5.69
Reduced use of fertilizers	4.95
Reduced use of chemicals	4.72
Insect-resistant crops	4.59
Herbicide-resistant crops	4.40
Biological control of pests	4.33
Integrated pest management	4.05
Integrated weed management	3.93
Narrow strip intercropping	3.88
No-tillage	3.65
Participatory monitoring and evaluation	3.55
Participatory needs analysis	2.90
Allelopathy	2.84
Agro forestry	2.54
Crop rotation	1.98
PRA tools	1.88
Composting	1.75
Beneficiary participation	1.51
Livestock manure management	1.32
Farmer's organization establishment	.80

rated competencies were: crop rotation (1.98), PRA tools (1.88), composting (1.75), beneficiary participation (1.51), livestock manure management (1.32), and farmer's organization establishment.

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Achieving sustainability in agricultural operations requires in-service training programs and encouraging AEAs to collaborate for planning and implementing these programs. The purpose of this study was to identify and describe in-service training needs of AEAs associated with sustainability in West Iran. All 26 competencies, as perceived by the AEAs, were either important or very important components of a total program except for agroforestry, and crop rotation as being somewhat important. AEAs believed they were competent in performing 10 of the 26 competency areas, and only little competent in allelopathy, livestock manure management, and crop rotation. The AEAs' in-service needs were determined by the mean weighed discrepancy scores for each of the competency areas.

The competency with the greatest need for in-service education, as perceived by the AEAs, was agricultural waste management. Agricultural waste management is highly significant because of the millions of tons of annual waste in vegetal, animal, environmental and natural resources products as well as millions of hectors of land degradation. Based on mohammadi (2006) Agricultural waste management extension deals with raising the efficiency and productivity of the agricultural industry, intellectually and/ or economically. Producers should be fully aware of the mechanism by which waste in agricultural commodities diminishes to a considerable level. In agriculture, knowledge and decision-making capacity determine how production factor (that is, oil, water, capital, chemicals, etc) are utilized. Agricultural extension is a focal issue in formulating and disseminating knowledge and helping farmers to be competent decision makers.

Participatory technology development was identified as the second needed area of in-service training associated with sustainability. This conclusion supports the research of Chizari and Alibaygi (2006), and Chizari (1999). Lastly, the in-service needs of least importance, as perceived by

the AEAs, were those of farmer's organization establishment, livestock manure management, and beneficiary participation.

According to the findings of this study, AEAs' in-service programs should focus on agricultural waste management extension, participatory technology development, and water conservation methods. These competencies should be addressed in workshops conducted by Human Resource Development programs in Agricultural Organization in West Iran to meet the professional needs of agricultural extension agents regarding sustainability. Fur-thermore, Borich's Need Assessment Model proved to be effective in that AEAs are given the opportunity to judge their performance objectively. In the past, AEAs' training needs were assessed subjectively by administrators with limited participation of extension agents. This model, however, should be used across agricultural organizations in Iran in order to improve its psychometric properties.

Based upon the results of this study, the implication clearly exists that a high priority should be given to planing, developing, and implementing in-service training programs for agricultural extension agents regarding sustainability issues. Since the urgency to address sustainability issues in agriculture is not only a regional challenge, the implications of this study for sustainable extension agriculture programs among agricultural communities extends beyond West Iran. Higher agricultural education institutes can cooperate with the agricultural organization in developing these in-service training programs.

While the input from the participating extension agents is important, it is recommended that other stakeholders now be contacted to assess their view of the findings. A participatory approach to extension work has been advanced through this study and therefore would benefit from additional input and/or confirmation by others of the results. It is further recommended that benchmarks be established to measure progress from the suggested training in meeting the goal of increasing extension agent effectiveness related to sustainability.

Due to sustainability issues across regional boundaries, it is appropriate to replicate this study in other parts of Iran as well. Finally, it is recommended that a study of farmers' attitude toward sustainable agriculture practices should also be conducted. Planning sustainable agricultural programs based on the findings of this study can positively affects the diffusion rate of sustainable agricultural practices by farmers as the principal actors in promoting sustainability in agriculture.

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