

*Full Length Research Paper*

# **Agricultural education and technical competency of development agents in Ethiopia**

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**Agricultural education is basic to the development and maintenance of competency of development agents. The purpose of this research was to explore and describe empirically the perceived competency level of agricultural development agents working in four districts of North Gondar Administrative zone. A descriptive survey type of research was conducted to determine competency level and training needs of 100 development agents in technical competency. Findings showed that development agents were competent theoretically in technical competency and they were in need of training in the use of their technical competences. Recommendations include employers have to designed competence strengthen programs through seminars, workshops, and in-service training.**

**Key words:** Agricultural education, competency, technical, training need.

## **INTRODUCTION**

Agricultural education is an important component in the rural development of Ethiopia (MOFED, 2007). The level of rural development is largely determined by agricultural development, as 85% of the population of Ethiopia is engaged in agriculture. Weakness in agricultural extension is partly to blame for agricultural development success. Agricultural education is, therefore, imperative in the development and utilization of the knowledge, skills, attitudes and the general potential of human resource of the country.

In an effort to transform the subsistence agriculture through agricultural extension, the training of field extension workers takes an important place. This paper was, therefore, projected to assess the technical competency of development agents. Operationally, technical competency is the level of knowledge and understanding possessed by development agents relevant to agricultural production practices including ability to diagnose typical problems and abnormalities correctly (Mulder, 2001). Much of the change we see in today's society has evolved from the rapid emergence of technology, which outdates itself every day. Farmers and other stakeholders are complaining about the competence of graduates of

educational institutions. On the other, educational institutions are struggling to cope with numerous changes to maintain the competence of their graduates (Petel and Woome, 2002). In this scenario, development agents must be knowledgeable and committed to the adoption of agricultural technologies. Agricultural education institutions should step up with the changing world circumstances as well.

Attention to the technical competence and performance of extension workers highlights the relevance of their knowledge, skills and orientations, which agricultural educators and employers assume necessary. Effective extension service involves maintenance of the knowledge and skill of development agents. Technical skills involve not only knowledge of the discipline but also the ability to impart that knowledge to learners (Lindner and Baker, 2003). What development agents know and what to do with it has been stated by Byrnes (1971: 335): "Extension workers must know and understand the content of their disciplines well enough to teach it to someone else and respond to questions about its underlying assumptions and theories." It is easily understood that development agents must not only be familiar with and comprehend basic principles of agriculture but also they must have the courage to apply their knowledge into practical terms. If not the development agent can be of little help to the farmer. Therefore, development agents to teach farmers

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and facilitate the adoption and transfer of agricultural technologies must possess a sort of technical competencies. Agricultural extension system require competent development agents to maintain the productive capacity of agricultural sector. Available local literatures indicate that no study has been done on the level of technical competency of development agents in relation to adoption of improved agricultural technology. Many agricultural scientists have studied the diffusion of agricultural innovations. The dissemination and adoption of agricultural technologies require technically competent and committed extension agents (Mulugeta, 1992). Recognizing the importance of agricultural education for successful extension service, assessing the competency of development agents graduated from the agricultural colleges, whether they are technically competent or not, was the subject of this study.

### Objectives of the study

Assessment of competency of development agents after their formal training is essential not only to ensure whether they are properly prepared for their work but also to be sure the usefulness of existing agricultural education programs. The specific objectives of this study were:

- 1) To determine the level of technical competency of development agents.
- 2) To identify the training needs of developments in selected competency items.

### METHODOLOGY

The target population for this study were development agents who have graduated from the different agricultural colleges (13) working in North Gondar Zone. North Gondar Zone is one of the 11 zones of Amhara Region in Ethiopia and is selected as research site because its large size is convenient to find development agents graduated from all agricultural colleges in the country. Development agents were identified by means of current lists provided by the department of Agriculture of North Gondar. Four districts were selected purposively considering accessibility and distribution of development agents in such a way that important variation in development agents graduating from different colleges could be assured. All development agents were interviewed.

Cross sectional design was used, because of the fact that agricultural education and on-the-job training directly affect professional competency of development agents. Technical competency of development agents was measured by level of technical knowledge based on the ratings on specific task areas. To determine the level of technical competency of development agents, 35 competency items were developed. The 35 competency items were grouped into ten different subject matter categories. The participants were interviewed to rate each competency items relative to their perception of the competency level and importance using a five-point Likert-type scale. The Likert-type scale was chosen because it provides greater flexibility, and it is simple to construct and answer. Mean rating values for each competency items was computed and used to indicate participants' level of

competence. The following schemes, as used by Villarreal (2003), were used to interpret the mean values of competency items.

- 0.00-1.49 = not competent or not important (very low)
- 1.50-2.49 = less than average (low)
- 2.50-3.49 = average competence or importance (medium)
- 3.50-4.49 = above average competence or importance (high)
- 4.50-5.00 = very competent or important (very high)

Questions were designed to ask development agents supply information on their subject-matter competence. The competency items were prepared based on literature review and presented to panel of experts for review. Additional evidence of instrument reliability was estimated by calculating a Cronbach's alpha coefficient on the final sample to measure internal reliability and stability for the instrument. Cronbach's alpha is a coefficient of reliability used to measure of internal consistency how closely related a set of items. Reliability coefficients were found to range between 0.839 and 0.922, which is still more than the cut-off point, 0.64.

The premise of this study was that development agents need training on specific technical areas if they are to become knowledgeable and successful. Under this assumption, training needs of development agents was assessed and determined using effect size model. In this case, the Cohen's (1988) descriptors<sup>1</sup> were used to interpret the effect size.

The respondents were asked to rate each competency items twice. They first rated each items importance to their agricultural extension career and secondly they rated their competence level in performing the tasks of each items. Then, based on the value of ratings, effect sizes were computed using the formula shown below. The rationale for effect size analysis was to determine the importance and practical value of the differences between importance and competence ratings regarding the competency items (Rimawi, 2003). The discrepancy between importance and competence level ratings can give a measure of extension agent training needs. If the discrepancy between importance and competence level is small, then the extension agent is effectively transferring his or her belief on level of importance and knowledge of specific competences to the audiences (Dlamini, 2004).

$$d = M_1 - M_2 / SD_{pooled}$$

$$SD_{pooled} = \sqrt{[(SD_1 + SD_2) / 2]}$$

Where

d = effect size; operationally defined as a training need in this study  
 $M_1$  = mean importance of the task items as rated by all respondents  
 $M_2$  = mean competence level of the task items as rated by all respondents

$SD_1$  = standard deviation for mean importance of the task items  
 $SD_2$  = standard deviation for mean competence level of the task items

$\sqrt{}$  = Square root of the standard deviation for mean importance of the task items plus the standard deviation for mean competence level of the items divided by two. Table 1

### RESULTS AND DISCUSSION

Of the ten major subject matter competencies, development agents have not expressed their strong

<sup>1</sup> Cohen's descriptors: Small effect size,  $d = 0.40$  or less; Medium effect size,  $d = 0.50 - 0.79$ ; Large effect size,  $d = 0.80$  or above.

**Table 1.** Mean response and standard deviation of technical competencies as perceived by development agents in North Gondar (N=100).

Competency	Certificate	Diploma	Total
Crop cultivation technique	3.66 (0.55)	3.85 (0.46)	3.80 (0.49)
Chemical fertilizer use	3.96 (0.61)	4.00 (0.59)	3.99 (0.59)
Irrigation technology	3.06 (0.63)	3.78 (3.18)	3.56 (2.69)
Crop pest and their control	3.22 (0.57)	3.22 (0.38)	3.22 (0.44)
Use of plant chemicals	3.29 (0.77)	3.39 (0.61)	3.36 (0.66)
Livestock husbandry	3.67 (0.51)	3.81 (0.47)	3.77 (0.48)
Livestock selection	3.14 (0.76)	3.71 (0.58)	3.54 (0.68)
Livestock breeding	3.19 (0.73)	3.76 (0.55)	3.59 (0.66)
Animal health	3.30 (0.65)	3.57 (0.57)	3.49 (0.60)
Animal nutrition	3.69 (0.57)	3.91 (0.52)	3.85 (0.54)
Overall	3.49 (0.38)	3.72 (0.82)	3.68 (0.46)

Figures in parenthesis indicate standard deviation.

agreement to any one of competency items as very competent. Diploma and certificate development agents rated eight and four competency items as having more than average competence level respectively. Moreover, six competency items were also rated as average competence by diploma (1) and certificate (5) development agents. The overall mean technical competency level was found to be 3.68 with a standard deviation of 0.46, suggesting moderate variation in technical competency among development agents relative to the sample size. The technical competency of development agents fall within "more than average" competence category (3.50 to 4.49), with standard deviation of 0.46. A study conducted by Tiraiey (2009) has found similar results. In his study to determine extension workers' competency levels in clients' capacity development, the majority of extension workers rated their competency on leadership development, problem solving and decision-making development, social skills, and technology transfer process skills as high. The finding supported the positive relationship between all competencies and job performance. Similarly, a study by Androulidakis and Siardos (1996) showed that extension agents perceive themselves as being more competent in certain task areas than being relevant. The competencies that have been identified in this study can be incorporated into both the pre-service and in-service training of extension workers.

Considering individual competencies rated as less than average importance, identifying common plant diseases (2.28) receives the lowest mean value by diploma holders as compared to certificate ones (2.59). This might be attributed to limited knowledge gained from college courses because of absence of availability laboratory services. In their study, Kassa and Degnet (2004) were asking extension agents to judge their own practical extension skills. Their finding reveals that about 52% of extension agents agreed to their practical skills less than

adequate. It was noted that the lack of competency of development agents is attributed to their poor education background, too theoretical training, uncoordinated, irregular limited in-service training.

Though knowledge acquired from agricultural colleges is vital to the acquisition of basic competencies, the role of on the job training is unavoidable in the acquisition of competences. Competency acquired from college education is subject to change continually in the work places (Stone, 1997). Therefore, on the job training should be considered to fill the competency gap of development agents persistently. During data collection it was observed that short-term training and field supervision (guidance) were the available competence development opportunities. In-service training is rarely carried out. Thus, a series of on the job and in-service training program deserves attention to fill the competence gaps of development agents.

Results of the training need of development agents revealed overall large effect sizes by both diploma (0.894) and certificate (0.841) development agents. Large effect size ( $d=0.80$  or above) was an indication for large gaps in competence levels of agents. Competencies receiving large size ( $d=0.80$  or above) level of agreement were crop cultivation techniques and chemical fertilizer use. A higher value of effect size indicates high training need in the area of crop cultivation techniques and chemical fertilizer use. The results of effect size analysis by education level revealed that training need of development agents in the area of crop cultivation technique is larger for both diploma (0.927) and certificate (0.952) agents, while training need of diploma and certificate holder agents in chemical fertilizer use was also large, with effect size of 0.919 and 0.902 respectively.

These findings suggest the existence of wide gaps in the technical competence of development agent in crop cultivation techniques and chemical fertilizer use. In agreement with present study, Tladi (2004) has assesses

**Table 2.** Training need (effect size) of development agents by education level (N=100).

Competency	Diploma	Certificate
Crop cultivation technique	0.952	0.927
Chemical fertilizer use	0.902	0.919
Irrigation technology	0.282	0.193
Crop pest and their control	0.373	0.369
Use of plant chemicals	0.225	0.293
Livestock husbandry	-0.571	-0.228
Livestock selection	-0.265	-0.420
Livestock breeding	-0.388	0
Animal health	0.173	0.337
Animal nutrition	0.433	0.307
Overall	0.841	0.894

training needs of extension agents. The result of the study shows that extension agents showed a deficiency in 56% of the job skills. Similarly, Aberra et al. (2001) suggested that regular on-the-job training for extension agents is essential to disseminate technologies and thereby increase production and productivity of farmers Table 2.

## CONCLUSION AND RECOMMENDATIONS

Overall, development agents targeted for competency study were averagely competent in their technical competency. They exhibited better technical competency in six competency areas and average in three competency areas. Although overall technical competency is 'average, there is an urgent need for growth and development in those low rated competency items. The findings of this study have strong implications for continuous professional development for those involved agricultural extension services.

An implication relative to the present study exists that low levels of technical competency in identifying plant diseases and insect pests may cause negative consequences for minimizing crop production constraints. Development agents are required to demonstrate their knowledge and skills in the control of nuisance crop pests. Performance of any crop production activity requires certain knowledge competencies in the area of identifying crop pests to devise appropriate control or preventive mechanisms.

Lower competence ratings were observed compared to importance ratings. This signifies that Development agents express their high training needs in most low rated competency areas. The findings of training need of development agents has positive and negative implications. On the positive side, it suggests that development agents do not suffer from low level of technical competence. On the other side, it suggests that they do not have higher levels of technical competence.

Thus development agents should continuously update their technical knowledge to meet the needs of modern of agricultural industry. Training in the area of their specialty is essential to cope up with advanced knowledge levels. Since technology advances and updates itself every time in the area of crop productivity improvements, technology adoption requires competent extension personnel. The findings of this study imply that Regional Bureau of Agriculture needs to conduct on-the-job training to fill technical gaps of development agents, particularly in the area of crop cultivation techniques and chemical fertilizer application.

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