

Full Length Research Paper

What factors determine the time allocation of agricultural extension agents on farmers' agricultural fields? Evidence form rural Ethiopia

¹Mekbib Gebretsadik Haile and ²Degnet Abebaw

¹Center for Development Research (ZEF), Bonn University, 53113 Bonn, Germany

²Ethiopian Economics Association, P.O. Box 34282, Addis Ababa, Ethiopia

Accepted 9 November, 2011

In Ethiopia, agricultural extension (AE) agents are expected to play a key role in linking smallholder farmers to agricultural scientists and researchers. AE workers assist farmers in the adoption of improved agricultural technologies and facilitate the adjustment of the new technologies to the local agro-ecological conditions. Using data collected from a total of 236 randomly selected extension agents working in eight purposefully selected weredas in Ethiopia, this study examines factors that affect the time allocation of extension agents on farmers' agricultural fields. The analyses reveal that perceptions of extension workers about the fairness of performance appraisal, equality of male and female agents, job security, resource availability, and workload manageability significantly affected the time that agents worked on farmers' plots. While off- and on-the-job trainings and participation of extension workers in the agricultural planning process encouraged agents to work more on farms. Better years of schooling and larger number of villages to work with had adverse effect on agents' working time. It is therefore suggested that agricultural policy should ensure that extension agents are not only available but also adequately accessible to farmers. More specifically, agricultural policy should bring improvement in the perception of extension agents about their working environment.

Key words: Agricultural extension, agricultural technology, time allocation, perception, Ethiopia.

INTRODUCTION

Ethiopia is one of the developing countries that is

*Corresponding author. E-mail: haymakg@yahoo.com. Tel: +251-911-393302.

Abbreviations: ADLI, Agricultural Development Led Industrialization; AE, Agricultural Extension; CSA, Central Statistical Authority; EEA, Ethiopian Economic Association; FDRE, Federal Democratic Republic of Ethiopia; GTP, Growth and Transformation Plan; IAR, Institute of Agricultural Research; IFPRI, International Food Policy Research Institute; MOFED, Ministry of Finance and Economic Development; PADETES, Participatory Demonstration and Training Extension System; PASDEP, Plan for Accelerated and Sustainable Development to End Poverty; WoARD, *Wereda* office of Agriculture and Rural Development.

acknowledged in implementing agricultural development programs. The country bases its economic development on the agricultural development led industrialization (ADLI), a strategy which prioritizes the agricultural sector to lead the economy. Since more than a decade ago, ADLI has been used intensively to enhance the country's economy in the long run. It is considered as a long-term strategy to achieve faster economic development by adopting labor intensive improved agricultural technologies. The importance of the sector in enhancing the economy cannot be denied. Ethiopia's economy is based on agriculture which accounts for about 45% of GDP, 85% of exports, and 80% of total employment (MoFED, 2006). Nevertheless, the sector suffers from frequent drought, land degradation, traditional crop varieties and poor cultivation practices, and hence is

characterized by low productivity.

In order to address these inherent problems the government of Ethiopia (GoE) developed the Plan for accelerated and sustainable development to end poverty (PASDEP) in 2005/2006. The main objective of the PASDEP plan is to accelerate the transformation of agriculture from subsistence to a more market-oriented sector (FDRE, 2005). The government has emphasized the vital role of agricultural extension (AE) workers during the implementation period. The new five-year plan, the growth and transformation plan (GTP), which was launched in 2010 does also emphasize that agriculture will continue to lead the country's economy in the coming five years. The plan forecasts that agriculture will contribute about 35% of GDP in 2015 (FDRE, 2010).

The GTP clearly specifies that agricultural research and extension will play key role in the agricultural development strategy. Dissemination of existing and new improved agricultural technologies to all farmers, expansion of irrigation, transformation of smallholders to higher-value agricultural producers are some of the components of the GTP that focus on the agricultural sector. The *wereda* office of agriculture and rural development (WoARD) is responsible for the implementation of these agricultural policies at community levels via AE workers assigned to every *kebele*¹ throughout the country. Consequently, AE agents bear a significant amount of work in the sector. These workers should have, among other things, proper perception of their working environment, job satisfaction, adequate training related to their specialization, proper remuneration and other incentives to discharge their responsibilities appropriately.

According to Picciotto and Anderson (1997) the focus of AE service in many countries since the early 1960s has been to increase agricultural production and productivity. AE helps to reduce technology gaps between farmers practicing traditional techniques and those who adopted improved agricultural technologies by providing technical advice, information and training (Oladele and Mabe, 2010). Moreover, AE service contributes to increase the actual yields of farmers' plots towards their potential levels (Anderson and Feder, 2002). Thus AE has a dual purpose in linking scientists and farmers: it assists the adoption of improved agricultural technologies; and it facilitates the adjustment conditions (Kassa and Degnet, 2004). More precisely AE

agents contribute to the development of the agricultural sector, among other things, by disseminating new information and technologies, training and mobilizing farmers, supplying inputs, and administering farmers' credits and loans. This is especially important in a country where only less than 5% of the nation's agricultural produce is generated by farmers who adopt improved and modern agricultural tools and farming practices (CSA, 2010).

As is the case for any other professional workers, working environment and the workers' perception are crucial factors in the decision making of AE agents regarding their time allocation and performance on agricultural fields. Nevertheless, agricultural agents in many developing countries work under disadvantageous conditions and with insufficient working facilities (Agunga et al., 1997). Inappropriate perception of extension agents about their working environment creates a disincentive for them to effectively work on farms. The amount of time that extension agents work on farmers' plots directly affects their overall job performance, which in turn has an effect on agricultural productivity. Hence, understanding the factors that affect the time allocation of extension agents on farmers' plots is crucial for policy makers. Moreover, identifying and appropriately addressing these factors is critical for the overall agricultural productivity and towards poverty alleviation in the end. The purpose of this paper is, therefore, to investigate the factors that affect AE workers' decision on their time allocation on agricultural farms, and hence their job performance. The paper makes use of data collected from 236 extension agents working in 8 *weredas* from 7 regions in the country.

The rest of the paper is organized as follow: A brief overview of AE in Ethiopia and the theoretical framework; Explanation of data collection process and research methodology; Interpretation of results; conclusion.

LITERATURE REVIEW

Agricultural extension in Ethiopia

It has been about six decades since agricultural research and extension service started in Ethiopia. Since the establishment of the Institute of Agricultural Research (IAR) in 1966, national agricultural research system was organized with autonomous management. The national agricultural research system had several stations addressing the main agro-ecological zones, and the major commodities throughout the country. However, since the early 1990s some independent agricultural research centers were launched in different regions and they were administered by the regional bureau of agriculture. In 1995 the GoE launched the participatory demonstration and training extension system (PADETES)

¹ *Kebele* is the lowest administrative unit in the country. There are three agricultural extension agents assigned to every *kebele*: these are extension agents specialized in crop, in livestock, and in natural resource.

as its AE system. PADETES aims, among other things, at increasing production and productivity of smallholder farmers through improved technologies; and by making extension workers play a great part in the development process.

With ADLI development strategy, Ethiopia benefits from the strong political determination of the government to enhance smallholder farming in the country. This determination is reaffirmed by the recent development plans of the country that give priority to agricultural commercialization and transformation of subsistence smallholder farming. This is paramount importance since the country has about 12 million rural households of which about 84% are smallholder farmers who own farmlands less than 2 hectares (CSA, 2008). According to Hazel et al. (2007) in countries with equitable agricultural distribution and with good agricultural potential, which is the case in Ethiopia, smallholder farming can play a significant role in the economic development of the country. In such conditions AE programs can be significantly pro-poor (Gebremedhin et al., 2009).

There have been significant changes undergoing in the AE service in the country in the last few decades. The country has made significant efforts to increase both the quantity and quality of extension service among rural farmers. Currently, there are more than 60,000 AE agents sharing their expertise to farmers according to their specialization. The AE workers are not limited to serve farmers about resource management and farming techniques per se. Besides supporting and training farmers on resource management and improved farming techniques, AE workers provide more services which directly or indirectly influence agricultural production and productivity. For instance, agents provide a service of information and skill development, input supply, credit and saving, marketing of agricultural produce, etc (Gebremedhin et al., 2009).

Theoretical framework

Several studies showed that the amount of time that instead spent on several other activities has never been significantly lower than that spent at work. According to Becker (1965) and Gronau (1977), individuals make decisions about the optimal allocation of their available time, T towards leisure (T_L), work at home (T_H), and work in the market (T_M). Home consumption time, that is leisure, differs from home production time since the latter is regarded as a time used to produce goods and services that can be close substitutes to goods in the market. Leisure, however, has only poor substitutes in the market. In the extreme, home production time and working time in the market are perfect substitutes if the

individual generates the same utility from the consumption of goods and services whether they are home produced or purchased from the market.

Considering a single-person household, the individual makes decision on his time allocation in order to maximize a utility function derived from the consumption of a composite commodity, Z and Leisure, L :

$$U = U(Z, L) \quad (1)$$

The commodity Z can be either purchased from the market or produced at home and this does not affect the utility. Let Z_M and Z_H refer to the market expenditure for purchased goods and the market-value of home produced commodities, then the total consumption commodity Z can be given by

$$Z = Z_H + Z_M \quad (2)$$

The individual maximizes his utility function in Equation (1) subject to two constraints: budget and time constraints. Thus, the individual maximizes his utility subject to the two resource constraints: the endogenous budget constraint

$$Z_M = wM + V - \gamma C \quad (3)$$

where w is constant wage rate, M denotes field or market work, V denotes other sources of income, C refers to costs associated to working in the market (for example, transportation cost, drudgery costs, etc), and γ is a dummy variable that takes the value 1 if the individual works in the market and 0 otherwise; and the time constraint

$$T = T_M + T_H + T_L + \gamma t \quad (4)$$

Where t is the costs of working in the market (field) in terms of time (for example walking time to and from work place).

A necessary condition for an optimal time allocation is that the marginal rate of substitution between goods and leisure should be equal to the marginal product of working at home, which in turn is equal to the shadow price of time (w^*). For $\gamma > 0$ (if the individual works in the market), the marginal product of work at home is also equal to the real wage rate (w).

$$\frac{\partial Z}{\partial T_H} = \frac{\partial U / \partial Z}{\partial U / \partial L} = w^* (= w \text{ if } \gamma > 0) \quad (5)$$

The above outlined model yields a set of reduced-form equations for the endogenous variables as a function of different factors including individual, market (working environment), and other constraints. Of particular interest for our study is the reduced-form equation for the individual's time allocation for activities in the market (field). This equation for an individual working in the market (farm) could be given in the following form

$$T_M = T_M(w, C, V, \gamma, W, X) \quad (6)$$

where W denotes variables that explain the working environment, X refers to all other relevant variables that influence the time allocation of the individual for work. However, in developing countries where markets are imperfect and thin, non-wage factors are more important to influence the working time of employees.

Several factors influence the time allocation of employees at work. This study gives great emphasis to the effects on time allocation for work of the perceptions of AE workers' towards their working environment. Workers may have unique perceptions towards their working environment. These may include workers' perceptions towards assigned tasks, individuals, interpersonal interactions, organizational standards, goals and regulations, physical location, and prospects-rewards-incentives. "The entire organizational environment (particularly as perceived by the organizational member) is considered to have a very important impact on an individual's motivations, satisfactions, and task performance" (Newman, 1977, P. 520). Bennel and Zuidema (1989) indicated that the most important role of agricultural managers is to ensure proper utilization of agricultural workers with appropriate attitude, motivation and perception. Several studies investigated ways by which employees could be encouraged to apply greater effort to their tasks (Welsh, 1980; Herzberg, 1959 as cited in Oloruntoba and Ajayi, 2003; Vernon, 1972). According to Herzberg (1959; cited in Oloruntoba and Ajayi, 2003) negative factors such as physical working conditions, poor pay, organizational policies, interpersonal relations; and positive factors such and recognition by others substantially influence workers' job satisfaction and hence affect their working time. This in turn influences their job performance and agricultural productivity. An empirical study by Oloruntoba and Ajayi as minimal supervision, promotion, growth opportunities, (2003) on private farms in Nigeria showed that most of these propositions hold true. They found that high remuneration, job security, recognition by staff and promotion are significant motivating factors for the private farm employees to work longer hours.

Darlene and Borman (1989) indicated that working environment such as physical surroundings, job

satisfaction and management supervision, and workers' perceptions about these conditions can influence job performance. Job security and safety aspects such as pension scheme and workers' association, and organization policy and management style can produce different perceptions of workers about their working environment (Azril et al., 2010). For instance, institutional policies and management styles that put so much pressure and supervision on their workers should be discouraged as they could create negative perception about the organizational policy among the employees.

The purpose of this study is, therefore, to examine the effect of different factors on the amount of time that extension agents work on farmers' agricultural fields. According to PASDEP, even though extension agents are available in *weredas* and *kebeles*, they are not adequately accessible to farmers (FDRE, 2005). The document reported that close to 50% of the farmers in rural Ethiopia did not find extension service adequate. Thus, the results of this study will have crucial significance for the country's agricultural policy makers while making reviews to ensure that extension services are accessible for farmers on their fields. The study will have importance among other things in terms of pinpointing problem areas that policy makers should give emphasis to.

RESEARCH METHOD

Data

The data used for this study is obtained from a survey that was undertaken jointly by the Ethiopian Economic Association (EEA) and International Food Policy Research Institute (IFPRI) as part of a study on gender and governance in rural service in Ethiopia. The data was collected from eight purposefully selected *weredas* from seven of the administrative regions: namely Tigray, Amhara, Afar, Oromia, Benishangul, SNNPR and Gambella (Table 1). One *wereda* was selected from each of these regions with the exception of Amhara region, from which two *weredas* were selected. All the *kebeles* were selected from these eight *weredas* for the survey, resulting in a total of 156 *kebeles*. Two AE agents, one specializing in crop and one specializing in livestock were interviewed from each kebele. However, in cases where a crop or livestock extension agent was not available, agents specializing in natural extension agents were interviewed in their places. We also interviewed 14 extension agents who have not specialized in any of these three but who work on agriculture in general. The survey questionnaire includes, among other things, information about their demography concerning their field activities, experience, training, performance, evaluation, professional networks, workload, availability of working resources and perception of their working environment. The survey was conducted between April and June 2009.

Descriptive statistics

From Table 2, one can observe that the extension agents are, on

Table 1. Sampling distribution of extension agents by district and by region.

District (region)	Sample size				
	Extension agents specialized in				
	Crop	Livestock	Natural resource	General	Total
Sekota (Amhara)	22	18	7	0	47
Bati (Amhara)	10	17	15	1	43
Ofla (Tigray)	19	17	3	0	39
Ibantu (Oromiya)	16	19	2	0	37
Sheko (SNNPR)	15	5	7	6	33
Gog (Gambella)	6	4	3	7	20
Telalak (Afar)	4	5	2	0	11
Yaso (Ben. Gumuz)	3	2	2	0	7
Total	95	87	41	14	237

Source: Survey data, 2009.

In terms of the different activities extension workers are engaged in, Table 3 shows the average percentage of the agents' time allocation for different tasks. One can see from the table that, on average, about 64% of the total time available to all extension agents is spent on farmers' agricultural fields or farmers' homes. Extension workers might go to farmers' homes for different purposes including for advice, holidays, weddings, funerals, and for other social and work related reasons. Office activities such as report writing, meetings and discussion forums take about 18% of the total time available to agents. However, the lion's share of the AE agents does not have access to transportation facilities. About 98% of the agents walk to work on farmers' agricultural fields (Table 4); and only less than 1% of the extension agents do have access to public transport. This has a negative effect on the time that the extension workers spend on farmers' plots of land. Almost none of the extension workers are provided with any means of transportation such as vehicle, bicycle or motorbike from their offices.

Table 5 shows that extension agents in Sekota *wereda* worked the highest aggregate number of hours on farmers agricultural fields during the past planting, harvesting and slack seasons followed by agents in Ibantu and Sheko *weredas*. On the contrary, extension workers in Telalak and Gog *weredas* worked the lowest hours on farmlands. This might be partially because sedentary farming is very common in the former *weredas* but not in the latter two. *Wereda* dummies are used in the empirical analysis to capture such *wereda* specific heterogeneities.

Variables

Dependent variable

We initially considered agricultural productivity to be the dependent variable. However, since there are up to three extension workers in each peasant association who could potentially work on the same agricultural land, it was difficult to disentangle the productivity of an individual extension agent. Thus, the total weekly time (T_M) that each agent worked on farm lands during the last planting, harvesting and slack seasons is taken to be a proxy for agents' productivity. We will, therefore, have multiple regression equations to capture variation of workers' time allocation for farm work across the three seasons. Thus, the dependent variables

T_M^p , T_M^h , and T_M^s are the number of hours that each extension agent worked per week during the farmers' last planting, harvesting and slack seasons respectively.

Independent variables

The explanatory variables used in this study include agents' individual characteristics, salary, perception about work environment including safety and security, interpersonal relationship, availability of job related resources, organizational policies and management style, remuneration, manageability of workload and farm distances; organizational support; number of villages handled by agents; average farm size of households; clustering dummies; and other relevant variables. The choice of these variables is based on the above theoretical framework and previous literature that examined job satisfaction and job performance of AE agents (Long and Swortzel, 2007; Chyung 2005; Koustelios, 2001; Strong and Harder, 2009; Scott et al., 2005). Perceptions about working condition variables were measured in evaluative terms. Extension agents were presented with series of statements that describe their current job characteristics. They were then asked to indicate their level of agreement to the statements. Those who strongly and somewhat agreed with the given statement were coded 1 and those who strongly and somewhat disagreed were coded 0. Moreover, availability and/or access to transportation facilities to reach to working place affects the time that the agents spend on agricultural fields. For instance, in the absence of adequate transport facilities, travelling long distance by foot could affect the amount of their working time. However, since 98% of the extension workers do not have and/or access to any transportation means, this variable is not among our explanatory variables. Finally, since extension workers from the same *wereda* report to the same WoARD, we included district dummies to control for unobserved unique characteristics of each *wereda*. The descriptive statistics of potential explanatory variables included in this study are reported in Table I (Appendix A).

Empirical model

Following the theoretical model discussed, our particular interest i

Table 2. Demographic characteristics of the sampled extension workers.

Description	Extension agents	
Family size, mean (SD)	2.47 (1.77)	
Age, mean (SD)	26.66 (2.99)	
Marital status (%)	Married	40.43
	Single	58.30
	divorced/widowed/other	1.28
	Total	100
Sex (%)	Male	92.98
	Female	8.02
	Total	100
Education Level (%)	TVET* 10+1 to 10+3	68.96
	TVET 12+1 to 12+3	27.15
	Other	3.89
	Total	100

Source: Survey data, 2009. * TVET= Technical and vocational education and training.

Table 3. Percentage of time AE workers spend on different tasks.

Task	Mean percentage of time spent
On farmers' fields or farmers' homes	63.96
Training farmers	15.70
Attending in-service training	5.02
Office work	18.41
Other	15.13
Total*	118.22

Source: Survey data, 2009. * Extension agents could work multiple tasks at the same time.

AE agent in our case. The time allocation of AE workers on farmers' plots of land may have seasonal variation. Accordingly to capture this seasonal variation, we disaggregate their working time in to three different seasons: planting, harvesting and slack seasons. Thus we have multiple independent reduced-form equations. Since the dependent variable (time at work in each season, T_M) has a continuous linear form and is always non-negative, a multivariate log-linear regression model is employed for this study. We will use an ordinary least square (OLS) estimation method. The log-linear regression equations can be given as follows:

$$\begin{aligned}
 \log T_{Mi}^p &= (X; \beta) + \varepsilon_i^p \\
 \log T_{Mi}^h &= (X; \beta) + \varepsilon_i^h \\
 \log T_{Mi}^s &= (X; \beta) + \varepsilon_i^s \\
 \log T_{Mi} &= (X; \beta) + \varepsilon_i
 \end{aligned} \tag{7}$$

where T_{Mi}^p , T_{Mi}^h , and T_{Mi}^s denote the amount of time that the i^{th}

extension worker worked per week on farmers' agricultural fields during the past planting, harvesting and slack seasons respectively, and T_{Mi} is the average of the aggregate time that extension agents worked per week in the three seasons; X is a matrix of explanatory variables that refer to individual characteristics, perceptions about working environment, specialization dummies and *weredas* dummies for the i^{th} extension worker; β is a vector of parameters to be estimated; and ε_i are extension worker specific error terms.

RESULTS AND DISCUSSION

The final parsimonious regression models were chosen by the 'general-to-specific' modelling strategy (Hendry, 1995; Davidson et al., 1978). All the potential explanatory variables listed in Table I were used in the fully specified log-linear models for all multivariate regression models. We used OLS in the 'general-to-specific' procedure to drop variables that consistently have insignificant t-

Table 4. Common transportation means for extension agents in the survey area.

Transportation means	Percentage of extension agents
Horse/mule/camel	0.43
Foot	97.87
Public transport	0.85
Combination of different mode	0.43
Other	0.43
Total	100

Source: survey data, 2009.

Table 5. Aggregate weekly hours that agents worked on farmers fields in the past season, by *wereda*.

Wereda	Average weekly hours agents worked on farm			
	Planting season	Harvesting season	Slack season	Average
Sekota	41.94	37.62	30.02	36.53
Bati	37.55	27.90	24.07	29.84
Ofla	40.64	31.97	22.44	31.68
Ibantu	39.43	36.92	25.27	33.87
Sheko	42.30	33.79	24.55	33.55
Gog	27.45	20.5	16.85	21.6
Telalak	13.25	10.63	6.25	10.04
Yaso	34.33	34.33	16.67	31.79

Source: survey data, 2009.

statistic values. In the following discussion we rely on the results from the final parsimonious model where the average of the aggregate time that extension agents worked per week is the dependent variable².

Among the personal characteristics of extension workers included in the multivariate linear model above, number of trainings that the agents had in the last five years and significantly affected the time that they worked on farmers' agricultural fields at the 5% level. Giving on-the-job training to agents was found to have a positive effect on their time allocation on farm lands. Extension workers who have sufficient trainings will be well equipped with essential tools, knowledge and confidence to show farmers better farming practices right on the farm. However, extension agents who handled larger number of villages worked shorter hours on agricultural fields in the past season. The larger the number of villages an extension agent has to handle, the larger time that is wasted by walking to/from one village to another. *Ceteris paribus*, years of schooling negatively affected the time that agents worked on agricultural fields. This might be because more educated agents have higher expectations and consider working on a farm not a decent job. Such agents might spend most of their time in

cities and towns looking for a better job which is as per their expectations. Average farm size of female households the agent worked with significantly positively affected his/her working time on farmers' agricultural fields. The larger the farm size of female farmers the more time extension workers spend on the farm, all other factors remaining constant. All other factors remaining constant, extension agents who participated in the number of villages that agents handled strategically *kebele's* agricultural planning process had a positive effect on the hours they worked on farmers' agricultural lands. One explanation may be that extension workers who involve in the *kebele's* agricultural planning feel that they own the plan and work hard to achieve it.

Perceptions of extension workers about the fairness of performance appraisal in the *wereda*, equal opportunity of male and female agents, performance appraisal, resource availability, and workload manageability are among the working environment perception variables that statistically significantly affected the amount of time the agents worked on farmers' fields. Even though they are not statistically significant, perceptions of extension workers about the timeliness of their salary, the fairness of hiring/recruitment, availability of supervisors whenever

Table 6. Econometric results.

Variables	Coefficient	T-statistic (Rob. SEs)
Personal characteristics		
Intercept	3.92	9.25 (0.42)***
Gender	0.03	0.23 (0.14)
Age	-0.01	-0.44 (0.01)
Marital status	-0.01	-0.12 (0.06)
Number of children below 14	0.03	0.73 (0.04)
Education	-0.03	-1.63 (0.02)
Work experience	0.003	0.22 (0.01)
Number of training	0.02	4.02 (0.004)***
Involved in the kebele's agricultural planning	0.16	1.46 (0.11)
Number of villages handled	-0.03	-4.26 (0.01)***
Average farm size of female households worked with	0.05	1.76 (0.03)*
Working environment perception variable		
Timeliness of salary	0.07	0.69 (0.11)
Merit based recruitment	0.04	0.58 (0.07)
Equal opportunities for male and female	-0.19	-2.62 (0.07)***
Performance appraisal	0.13	2.29 (0.06)**
Job insecurity	0.09	1.47 (0.06)
Resource availability	0.18	2.24 (0.08)**
Corruption in other weredas	0.13	1.83 (0.07)*
Disagreed with organizational policies	-0.02	-0.23 (0.07)
Supervisor is around	0.05	0.73 (0.06)
Workload manageability	-0.13	-1.88 (0.07)*
Specialization dummies		
Agents specialized in livestock	-0.004	-0.06 (0.07)
Agents specialized in natural resource management	-0.02	-0.24 (0.08)
General extension agents	-0.12	-0.98 (0.12)
District dummies		
Bati	-0.46	-4.41 (0.10)***
Gog	-0.30	-1.64 (0.19)
Ibantu	-0.14	-1.17 (0.12)
Ofla	-0.43	-3.60 (0.12)***
Sheko	-0.01	-0.05 (0.15)
Telalak	-1.06	-4.24 (0.25)***
Yaso	-0.08	-0.56 (0.15)
VIF	2.10	
Number of observations	236	
R-squared	0.43	

***, **, and* are significant at 1%, 5%, and 10% levels, respectively. The dependent variable is the logarithm of the average aggregate time that agents worked per week during the past planting, harvesting and planting seasons.

needed, and organizational policies/programs are other working environment perception variables with expected

signs. *Ceteris paribus*, those AE workers who have a perception that there is fair performance appraisal in their

wereda, on average, worked more time on farmers' agricultural fields compared to those who feel otherwise. Another variable that was found to affect the time that agents worked on farmers' agricultural fields is their perception about the availability of enough resources to carry out their responsibilities. *Ceteris Paribus*, on average, extension agents who feel that the resources they need are available were more likely to work more hours on farmers' plots. Surprisingly the perception of extension workers about their workload manageability statistically significantly and negatively affected the time they worked on agricultural fields. One explanation might be the fact that these extension agents underestimate their job and consider their task to be easy and they spend most of their time in office, with their family, in cities and other places.

Dummy variables for *weredas* Bati, Ofla and Telalak, Sekota being the reference *wereda*, were found to be statistically significant. The result implies that extension agents working in these three *weredas* were likely to work fewer hours on farmers' agricultural lands than those working in Sekota *wereda*, *ceteris paribus*. For instance, extension workers in Telalak (Afar) worked, on average, the lowest number of hours on farmers' agricultural fields per week in the past season. Consistent to the descriptive analysis the explanation may be that sedentary farming is not common in this *weredas* and the agents might not spend much time on the farm (Table 6).

CONCLUSIONS AND RECOMMENDATIONS

Agriculture is the main stay of the country's economy. The current government has emphasized in developing and investing in the sector. AE workers are given the lion's share of the responsibility for this agricultural development strategy. Accordingly, this study investigated the factors affecting the agricultural productivity of extension agents working in rural Ethiopia. Data from a survey of 236 AE agents working throughout the country were used for our empirical analysis.

The results showed that many variables that explain the perception of agents about their working environment significantly influenced their working time on farmers' agricultural fields. For instance, those agents who feel that there is fair performance appraisal in the *wereda*, sufficient resources to work with, and those who feel that they should work harder to secure their job in the future worked more hours on agricultural fields. It is therefore, paramount importance to frequently follow up the fairness of the performance appraisal and the availability of enough resources for the extension agents to work with in the *weredas*. There must also be some way of finding out, fining and firing extension workers who shirk on their

work. On the other hand, those extension agents who feel that their task is manageable worked fewer hours on farmers' plots. It is therefore important to set a standard for the extension agents to achieve, and make the target level of performance not to be so easily achievable.

The number of villages handled by agents had negative effect on the agricultural productivity of the extension workers in the past season. It is therefore important to reduce the time wasted by travelling to and from villages by allocating an optimal number of villages to each agent. However, participating extension agents in the *kebele's* agricultural planning process increases their motivation and willingness to work more hours on farmers' plots. One reason is that agents feel that they own the agricultural plan and strive to achieve it. Moreover, providing on-the-job training also increased the motivation of extension agents to work more hours on farms. Finally, extension agents in Sekota *wereda* worked significantly more hours on farmers' agricultural fields than those in most other *weredas*. It might be of importance for each other WoRADs to prepare ways that their extension agents learn from those in Sekota *wereda*. Experience sharing schemes among these *weredas* may have a crucial role on this aspect.

REFERENCES

- Agunga R, Ojomo C, Na S (1997). Burnout, job satisfaction and work situations as perceived by district extension officers, Ondo State, Nigeria. *J. int. Agric. Ext. Edu.*, 4: 47-56.
- Anderson JR, Feder G (2002). Rural Extension Services, World Bank, Agriculture and Rural Development Department, Washington DC.
- Azril MSH, Jegak U, Asiah M, Azman AN, Bahaman AS, Jamilah O Thomas K (2010). Can Quality of Work Life Affect Work Performance among Government Agriculture Extension Officers? A Case from Malaysia. *J. Soc. Sci.*, 6: 64-73.
- Becker GS (1965). A Theory of the Allocation of Time. *Econ. J.*, 75: 493-517.
- Bennel P, Zuidema L (1989). Human resource management and agricultural research: Overview and issues. Proceedings of the regional workshop on human resource management in NARS, Harare, Zimbabwe.
- Chyung SY (2005). Analyze Motivation-Hygiene Factors to Improve Satisfaction Level of Your Online Training Program. 18th Annual Conference on Distance Teaching and Learning.
- CSA (2008). Central Statistical Authority (CSA). Statistical Abstract, 2007/08. Addis Ababa, Ethiopia.
- CSA (2010). The Federal Democratic Republic of Ethiopia Central Statistical Agency Agricultural Sample Survey. Report on farm management practices, June 2010. Addis Ababa, Ethiopia.
- Darlene MO, Borman WC (1989). More Evidence on Relationships between the Work environment and Job Performance. *Human Perform.*, 2: 113-130.
- Davidson J, Hendry D, Srba F, Yeo S (1978). Econometric modeling of the aggregate time-series relationship between consumers' expenditures and income in the United Kingdom. *Econ. J.*, 88: 661-692.
- FDRE (2005). Plan for accelerated and sustained development to end poverty. Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa, Ethiopia.

- FDRE (2010). Growth and Transformation Plan. Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa, Ethiopia.
- Gebremedhin B, Jaleta M, Hoekstra D (2009). Smallholders, institutional services, and commercial transformation in Ethiopia. *Agric. Econ.*, 40 (s1), 773–787.
- Gronau R (1977). Leisure, Home Production, and Work--the Theory of the Allocation of Time Revisited. *J. Pol. Econ.*, 85: 1099-1123.
- Hazel P, Poulton C, Wiggins S, Dorward A (2007). The future of small farms for poverty reduction and growth. 2020 Discussion Paper No. 42. International Food Policy Research Institute (IFPRI), Washington, DC.
- Hendry D (1995). *Dynamic Econometrics*. Oxford University Press: Oxford.
- Kassa B, Degnet A (2004). Challenges Facing Agricultural Extension Agents: A Case Study from South-western Ethiopia. African Development Bank, Blackwell Publishing Ltd. Oxford, UK.
- Koustelios A (2001). Personal characteristics and job satisfaction of Greek teachers. *Int. J. Edu. Manag.*, 15: 354-358.
- Long JL, Swartzel KA (2007). Factors influencing individual job performance of Extension agents in the Mississippi State University Extension Service. Proceedings of the 2007 American Association for Agricultural Education Research Conference, Volume 34. Minneapolis, Minnesota.
- MoFED (2006). Ministry of Finance and Economic Development (MoFED), Survey of the Ethiopian Economy. Addis Ababa, Ethiopia.
- Newman JE (1977). Development of a Measure of Perceived Work Environment (PWE). *Acad. Manage J.*, 20: 520-534.
- Oladele OI, Mabe LK (2010). Job burnout and coping strategies among extension officers in North west province, South Africa. *Afri. J. Agric. Res.*, 5(17): 2321-2325.
- Oloruntoba A, Ajayi MT (2003). Motivational factors and employees' job satisfaction in large-scale private farming in Ogun state, Nigeria. *J. int. Agric. Ext. Edu.*, 10: 67-72.
- Piccioito R, Anderson JR (1997). Reconsidering Agricultural Extension. *World Bank Res. Obs.*, 12: 249-259.
- Scott M, Swartzel KA, Taylor WN (2005). Extension Agents' Perceptions of Fundamental Job Characteristics and Their Level of Job Satisfaction. *J. Southern Agric. Edu. Res.*, 55: 88-101.
- Strong R, Harder, A (2009). Implications of Maintenance and Motivation Factors on Extension Agent Turnover. *J. Ext.*, 47(1) Article 1FEA2. Available at: www.joe.org/joe/2009february/a2.php
- Vernon VH (1972). *Working under pressure*. Staple Press. London.
- Welsh AN (1980). *Managing people*. Coles Publishing Co. Ltd., Toronto.

Appendix

Appendix A. Descriptive statistics of variables in this study

Table I. Descriptive statistics of dependent and potential explanatory variables.

Variable		Mean	Std Dev.
Dependent Variable			
Amount of time (hours) agents worked per week on farmers' agricultural fields during	planting season (T_M^p)	38.15	16.68
	harvesting season (T_M^h)	31.76	16.22
	slack season (T_M^s)	23.76	12.85
Independent variables			
Personal characteristics and other variables			
Age		26.66	4.99
Gender (1= Male, 0 = Female)		0.92	0.27
Marital status (1 = Married , 0 = Otherwise)		0.40	0.49
Number of children of age 14 and under (Children14)		0.61	1.05
Years of schooling		15.56	1.81
Experience in years		5.33	4.21
Number of trainings obtained in the last 5 years		6.63	8.32
Salary		939.44	162.38
Number of villages the agent handles		5.57	4.56
Received award? (Yes = 1, 0 = No)		0.17	0.38
Total time required to reach to <i>kebele</i> centre from the agent home (mts)		29.44	46.86
Involved in the kebele's agricultural planning process (Yes = 1, 0 = No)		0.69	0.46
Had experience Sharing-visits? (Yes = 1, 0 = No)		0.63	0.48
Average households' farm size that the agent works on	Male-headed households	2.17	2.49
	Female-headed households	1.16	1.13
Working environment perception variables			
I feel recognized by farmers and co-workers as a hard worker (1= agree, 0= disagree)		0.93	0.25
My salary and other benefits I receive allow me to maintain a decent standard of living (1=agree, 0=disagree)		0.39	0.49
DAs are paid equal to service providers in other wereda sector offices who do comparable tasks (1= agree, 0= disagree)		0.41	0.49
DAs always receive their salaries on time (1= agree, 0 = disagree)		0.74	0.44
The pay scales in WoARD reflect differences in workload and responsibility between different grades (1= agree, 0 = disagree)		0.46	0.50
DAs are hired purely on the basis of merit (1= agree, 0 = disagree)		0.51	0.50
DAs are promoted purely on the basis of merit (1= agree, 0 = disagree)		0.44	0.50
There are good opportunities for promotion in the WoARD (1= agree, 0 = disagree)		0.37	0.49
Performance appraisals in this wereda's WoARD are carried out in a fair way (1= agree, 0 = disagree)		0.48	0.50
DAs have a reason to be worried about losing their jobs in the near future (1= agree, 0 = disagree)		0.38	0.49
DAs in this wereda have enough resources available to carry out their work as required by professional norms (1= agree, 0 = disagree)		0.17	0.38
Corruption or misuse of funds is a problem in other weredas' WoARDs (1= agree, 0 = disagree)		0.50	0.50
I often disagree with the policies or programs we are asked to implement (1= agree, 0 = disagree)		0.33	0.47
There is hardly any political interference in our work (1= agree, 0 = disagree)		0.45	0.50
The majority of people in this office are well-qualified to do their job (1= agree, 0 = disagree)		0.56	0.50
The majority of DAs in this <i>wereda</i> work the expected hours (1= agree, 0 = disagree)		0.66	0.48

It is hard to make my supervisor happy (1= agree, 0 = disagree)	0.59	0.49
My supervisor knows enough about my daily activities to know if I am doing good or poor work (1= agree, 0 = disagree)	0.53	0.50
My supervisor is always around when (s)he is needed (1= agree, 0 = disagree)	0.51	0.50
My workload is manageable (1= agree, 0 = disagree)	0.44	0.50
The farm distances from where I stay are manageable (1= agree, 0 = disagree)	0.42	0.49
Inputs I need for my work come on time (1= agree, 0 = disagree)	0.13	0.33
I am satisfied with my job (1= agree, 0 = disagree)	0.79	0.41

Specialization dummies

Agents specialized in crop	0.37	0.48
Agents specialized in livestock	0.40	0.49
Agents specialized in natural resource management	0.17	0.38
General extension agents	0.06	0.24

Wereda dummies

Bati	0.18	0.39
Gog	0.08	0.28
Ibantu	0.16	0.36
Ofla	0.16	0.37
Sekota	0.20	0.40
Sheko	0.14	0.35
Telalak	0.05	0.21
Yaso	0.03	0.17
Bati	0.18	0.39

Source: survey data, 2009.