

Factors influencing the effectiveness of the Training and visit extension system in Lagos State, Nigeria

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Abstract

Crucial factors which influenced the effectiveness of the Training and Visit (T & V) extension system in Lagos State were isolated through factor analytical technique. Data were collected from 214 full-time farmers and 73 village extension agents (VEAs) of the Lagos State Agricultural Development Project (LSADP) in 1994. Eight groups of factors were isolated from farmer-related variables with 25.62% contributions to change in effectiveness of the T & V extension system. Eighteen groups of factor were also isolated from extension worker and organization-related variables with 97.15% contributions to effectiveness. However, factors related to the personality development of the extension personnel were found more influential to the effectiveness of the T and V extension system than factors related to the functional imperatives and both internal and field operations of the T and V extension system.

Introduction

Crucial factors are groups of factors isolated from large number of underlying variables which however determined the effectiveness of the T and V extension system in places of operation. Programme effectiveness is the degree to which the programme under study had attained its set objectives (Farinde, 1995). The Agricultural Development Project (ADPS) became a nationwide programme since 1987 (FACU, 1987) with the adoption and adaptation of the T and V system of agricultural extension by each State ADP. The objectives of this system are to:

- (i) visit and train farmers through regular contact every fortnight;
- (ii) teach farmers improved farm practices (Innovations);
- (iii) assist farmers of technical skills in farming takes place; and

- (iv) improve the socio-economic conditions of the farmers through advice and training.

The system had been regarded as an effective extension system in Nigeria (Ukwapu, 1988 and Atala, *et al*, 1992) based on its peculiar characteristics of regular training of extension personnel and visit to the target system by the extension personnel. Its effectiveness has been linked to its peculiar features that are lacking in the erstwhile ineffective Ministries of Agriculture extension services, and the various structures and mechanisms of linkage innovations that were built into the T and V extension system. The linkage innovations include the Monthly Technology Review Meetings (MTRMs) of researchers and Subject Matter Specialists (SMSs) of ADPs; Fortnightly Trainings (FNTs) of field extension workers; On-farm Adaptive Research (OFAR); and Small Plot Adoption Technique (SPAT) for demonstration of the superiority of recommended practices (Atala, *et al*, 1992 and Ahmed, *et al*, 1995). These innovations were meant or designed to pursue vigorously, the peculiar features of the T and V extension agents and farmer visits, concentration of efforts on only extension activities, single line of administrative and technical command, field-farmer orientation, strong research extension linkages and extension professionalism (Benor and Baxter, 1984).

The operation of these in-built structures and mechanisms and the success of the T and V extension system are influenced greatly by the dynamics of variations in the agro-ecological conditions, socio-economic environments and administrative structures (Benor and Baxter, 1984). The socio-economic environments would constitute factors influencing the socio-economic characteristics of the key operators of the T and V extension systems, e.g. extension personnel (EP) and the farmers. The administrative structures include the T and V extension system organization contents, programme and administrative contents (Farinde, 1995).

The T and V extension system has been subjected to diverse evaluative researches/studies particularly on characteristics such as farmers' participation (Sukrayo, 1983), technical recommendations and extension-research-farmer linkages (Mehta, 1983), effectiveness, and most importantly impact on the beneficiaries (Ukwapu, 1988; Atala, *et al*, 1992, and Farinde, 1995). However, research efforts have not been geared towards identifying the factors associated with the effectiveness of the T and V extension system in Nigeria, particularly in Lagos State. Unless the factors associated with the effectiveness of T and V extension system are identified, the "what", "how" and "why" of proper and effective planning, implementation and evaluation of extension work activities in Lagos State ADP would remain inadequately established. The purpose of this study is to appraise the effectiveness of the T and V

extension system in Lagos State by isolating the crucial factors that are associated with the effectiveness.

Objective of the Study

The specific objectives of the study were:

- (i) to determine the degree of effectiveness of the T and V extension system of the Lagos State ADP and
- (ii) to isolate groups of factors associated with the effectiveness of T and V extension system from
 - (a) farmer-related variables
 - (b) extension worker-related variables and
 - (c) organization-related variables.

Materials and Methods

The study was conducted in five purposively selected rural Local Government Areas, namely: Agege, Ibeju Lekki, Epe, Ikorodu and Badagry in Lagos State. Data were collected from 214 full-time farmers through the use of interview schedule. Seventy-three copies of questionnaire were completed by the Lagos State ADP extension agents (EAs) out of the 93 sent to EAs on the job. Multi-stage random sampling technique was used to select five Extension Blocks, twenty circles, 50 villages and 214 farmers interviewed in the study. The EAs of the Lagos State ADP provided information on the characteristics of the EAs (factors related to EA), namely: Age, Years of experience on the job, satisfaction with job, family size, number of contacts with farmers, number of training sessions attended, number of trainings given to SPAT plots established, number of advice given to farmers, and the number of innovations disseminated. Organization-related factors include number of superior/VEA, role specification, supervision by superior officer, extension-farmer ratio, duration of FNT sessions, number of innovations evolved, number of participants at FNT and the number of FNT sessions held.

The farmers supplied information on factors related to themselves, e.g. age, years of formal education, family size, family labour, hired labour, familiarity with VEA, membership participation, farm size, crop yield, sources of information, adoption scores, number of trainings had, number of contacts had with VEA, number of demonstrations participated in, number of SPAT plots had and number of advisory services received.

While all other variables were measured with direct questions which ensured face validity through careful design and pretesting, the effectiveness of the T and V extension system was validated through the use of "Jury method" followed by inter-correlation of the certified

factors of measurement of effectiveness (Farinde, 1995). The highly consistent and highly indices for effectiveness were: number of innovations adopted, number of SPAT plots established by farmer with EAs and number of farm demonstrations in which farmer participated.

Farmers were supposed to be taught and adopt about 20 farm innovations by the time of this study, established about 24 SPAT plots with the assistance of the EAs, and participate in about 24 farm demonstrations based on the regular contact with EAs every fortnight. The least effectiveness score per respondent was 4 while the maximum was 68. The mean score of all the indices was taken as the effectiveness score for each respondent and used to find the level of effectiveness.

Respondents whose mean effectiveness were lower than one standard deviation (7.77) below the mean of the total effectiveness score (25.78), that is (18.01) were classified to belong to the low effectiveness category. Those whose scores were between one standard deviation below the mean (18.01) and one standard deviation above the mean (33.55) were classified to belong to the average effectiveness category. Those whose scores were greater than one standard deviation above the mean were classified as belonging to the high effectiveness category.

Factor and component analyses were used to isolate the crucial factors associated with effectiveness. With factor analysis, it was hypothesized that there are few, more basic and unique variables underlying the larger number variables identified. The 22 and 25 variables from the farmer and VEA respectively were subjected to component analysis and then orthogonal rotation (Varimax). An orthogonal rotation was chosen as done by Boshier (1977) because of the desire to produce uncorrelated factors. Burt-Bank test which takes into account the number of variables subjected to varimax rotation and the order of extraction of the principal components (Koutsoyannis, 1979) was adopted to include item loadings on each factor after rotation. This suggested the following adjustment to the standard error of the correlation coefficient derived from (Child, 1970):

$$\text{Standard error of loading} = \left[\text{Standard error of } r\text{-value} \right] \left[\sqrt{\frac{K}{K + 1 - m}} \right] \dots\dots\dots(1)$$

where K = number of x-variables in the set

= subscript of P_i (Position of the principal component (P) in the extraction process).

Results and Discussion

Factoring and effectiveness of the T and V Extension System

The first factoring produced eight factors while the second, eighteen factors with eigen values greater than 1.00. However, item loading 0.22 or more when $P \leq 0.05$ after rotation were included in each factor isolated from farmer-related variables. Likewise, items loading 0.412 or more when $P \leq 0.05$ after rotation were included in each factor isolated from organization-extension agent related variables. The items loading 0.22 was lower than 0.40, while 0.41 was higher by 0.01 than 0.40 included by Boshier (1977) in each factor after rotation. Three criteria were employed to name the groups of factor isolated in the study. These were:

- i. the researchers' subjective interpretation of experiences from literatures,
- ii. picking synonyms of the highest loaded variable on each factor; and
- iii. joint interpretation or explanation of the meaning of the positive and highly loaded variables on each factor.

The mean effectiveness score from the VEAs was 25.78 with a standard deviation of 7.77, while it was 26.79 with 23.67 standard deviation from the farmers. Detailed analysis showed that effectiveness of the T and V extension system in Lagos State was average. This then suggested that more still need to be done on the part of VEAs (operators of the T and V extension system) to improve their performance on the job.

Groups of factors isolated from farmer-related variables

Data in Table 1 show the results of varimax factor rotation pattern of farmer-related variables. Eight groups of factors were isolated from the 25 farmer-related variables with the measures that were highly loaded on each of them.

Factor I: Motivation of farmers toward farming as business:

This was identified by 14 measures of loading which can be grouped into personal, social, economic and psychological characteristics. Factor 1 was named based on the third criterion above. The positive and highly loaded measures included familiarity with VEAs ($a' = 0.782$), hired labour ($a' = 0.88$), farm size ($a' = 0.592$); and knowledge of crop production ($a' = 0.68$). The findings tend to show the fact that, the kind of motivation given to the farmer depends very much on the personal attributes exhibited by individual farmers.

Factor II: Regular and continuous training and visit:

This was defined by six measures of loading out of which three that were positive and highly loaded were jointly interpreted to name the factor. The measures include, number of contacts with VEAs ($\alpha=0.505$), crop size ($\alpha=0.967$) and number of SPAT plots assisted to established (0.023).

Factor III: Acquisition of knowledge of farm/agricultural Practices:

The name emerged from the third criterion. Factor III was defined by six measures of loading out of which three were positively loaded. These were: knowledge of crop production ($\alpha = 0.913$), number of demonstration in which farmer participated ($\alpha = 0.738$) and number of advisory services had from the VEAs ($\alpha = 0.87$).

Factor IV: Awareness and adoption of relevant agricultural recommendations:

Criteria one and three were used to name the factor. This was described by two measures namely: sources of information ($\alpha = 0.920$) and adoption scores ($\alpha = 0.801$). Reliable sources of information are needed to convince the farmer on the social and economic importance of an innovation.

Factor V: Socio-Psychological analysis of extension-farmer relationship:

Criterion 3 was used to name the factor, which was identified by five measures of loading. However, only three measures were highly loaded namely: familiarity with VEA ($\alpha = 0.514$), farmer perception of VEA ($\alpha = 0.774$) and cosmopolitaness ($\alpha = 0.585$). Measures of knowledge of crop production ($\alpha = 0.16$) and crop yield ($\alpha = 0.45$) carried lower loadings. This factor would establish basis for rational farm decisions to be made.

Factor VI: Group affiliation:

Criterion 2 was employed to name this factor, which was identified by three measures of loading. These were membership participation in group ($\alpha = 0.791$), cosmopolitaness ($\alpha = 0.289$) and number of trainings had ($\alpha = 0.263$). Degree of extension work orientation of the farmers influenced their level of participation in group activities, group organization and training programmes.

Factor VII: Family decision about farm output:

Criterion one was used to name factor VII. This was defined by three measures of family size ($\alpha = 0.78$), family labour ($\alpha = 0.308$) and crop yield ($\alpha = 0.283$). The decision of the family about its goals, orientations

and values determine how many of the family members are available for farming. It would also determine the size of the farm business. The negative loading of family labour means that the more the goals the more diversified the family orientations and the higher the family values, the lower the family labour available for farming business.

Factor VIII: Value of farm output:

This consists of measures of number of training had ($\alpha = 0.546$), farm size ($\alpha = 0.243$) and crop yield ($\alpha = 0.234$). This means that the more farmer engages in training programmes, the more the farm size (both physical and farm output).

Contribution of the groups of factor isolated from farmer-related variables to effectiveness

Data in Table 2 show the contribution of each of the groups of factors to change in effectiveness of the T and V extension system. The findings showed that motivation of farmer towards farming as a business (10.56%), regular and continuous training and visit to farmer (3.53%) and acquisition of knowledge of crop production (2.73%) were mostly associated with the effectiveness of the T and V extension system. Hence they contributed highest in order of importance to changes in effectiveness. Their influences on the personality development of farmer might be responsible for their contributions. Value of farm outputs which may be for consumption or marketing (sale) (1.23%) was least associated with effectiveness, however, the cumulative percentage contributions of the eight groups of factor from farmer-related variables was considerably low (26.62%). This suggested that there were still other crucial factors that are associated with the effectiveness of the T and V extension system, but yet to be identified.

Groups of factor isolated from the organization and extension worker-related variables

The results of the Varimax rotation of the organization and EA related variables are presented in Table 3. Eighteen groups of factor were found from the rotation of the twenty-five variables subjected to factor analysis.

Factor I: Research-Extension Linkage:

The second criterion was used to name the factor. This was defined by measures of number of production recommendations evolved; ($\alpha = 0.900$), number of farm problems taken to research ($\alpha = 0.932$), number of researchers' visits to farmer ($\alpha = 0.892$) and number of participants at FNT ($\alpha = 0.462$).

Factor II: Regular and Continuous Training:

The third criterion was employed to name the factor which was identified by three measures. These are: number of visits to EA ($\alpha = 0.913$), number of FNT sessions had ($\alpha = 0.878$) and number of visits to farmers ($\alpha = 0.477$). Regular and Continuous training of the extension personnel is required both

- (a) to upgrade and update the professional skills and
- (b) to teach and discuss with the farmers new production recommendations.

Factor III: Motivation of the VEAs:

This was named base on the third criterion. It was defined by measures of satisfaction with job conditions ($\alpha = 0.918$) and duration of FNT sessions ($\alpha = 0.934$). For the extension workers to perform better on the job, both the "Dissatisfiers" (Hygiene factors) and "Satisfiers" (Motivators) should be provided.

Factor IV: Maturity of extension workers on the job:

The third criterion was employed to name the factor. It was identified by measures of age ($\alpha = 0.898$) and years of experience on the job ($\alpha = 0.645$). Maturity of the EAs should be in terms of mental/intellectual maturity.

Factor V: Length of knowledge acquisition by extension worker:

This consist of measures of experience on the job ($\alpha = 0.528$) and years of formal education ($\alpha = 0.955$). Both pre-service and on the job training are pre-requisite for effective extension work. The factor was named by criterion – 3.

Factor VI: Educational Philosophy of extension:

This was identified by measures of number of training/topic given to farmers ($\alpha = 0.954$) and number of visits to farmers ($\alpha = 0.433$). Factor II is similar to Factor IV. However, the former (regular and continuous training) is teacher's oriented, while the later educational philosophy of extension is learner's oriented.

Factor VII: Role definition:

This was named by criterion – 2. However, it was defined by measures of role identification ($\alpha = 0.954$) and number of participants of FNTs ($\alpha = 0.401$). Definition or specification of roles would guide against multiplicity and conflict of roles.

Factor VIII: Teaching methods:

This was named by criterion 3. It was defined by measure of number of participants at FNT ($\alpha = 0.416$), number of visits to farmers ($\alpha = 0.464$) and number of demonstrations given to farmer ($\alpha = 0.820$).

Factor IX: Frequency of use of Small Plot Adoption Techniques:

This was a single measure, independent of other measures. It was named by criteria – 2 and defined by measure of number of SPAT plots established ($\alpha = 0.930$).

Factor X: Unity of Command:

This was named by criteria 3. However, it was defined by measures of number of superior officer to whom an EA is responsible ($\alpha = 0.870$) and number of participants at FNT session ($\alpha = 0.440$). The number of superior officers above the VEA in the organizational structure determines the span of control which invariably explains the types of supervision within the extension system organization.

Factor XI: — Factor XVIII: are single factor loadings identified by themselves and they were independent of other measures with very high loadings. Criterion – 2 was employed to name them.

Factor XI: Intensity of SPAT Sessions:

($\alpha = 0.961$), *Factor XII:* Role performance by the VEA ($\alpha = 0.923$); *Factor XIII:* Size of the family ($\alpha = 0.799$); *Factor XIV:* Supervision by Superior Officer ($\alpha = 0.846$); *Factor XV:* Degree of Advisory Services ($\alpha = 0.973$); *Factor XVIII:* Extension: Farmer ratio ($\alpha = 0.859$) and *Factor XVIII:* Contact farmers ($\alpha = 0.850$). Some of these factors are similar to the elements of the key principles of the Training and Visit extension system as enunciated by (Benor *et. al.* 1984, Williams, *et. al.* 1984 and Khan *et. al.* 1984).

Contributions of groups of factor isolated from Organization and extension worker – related variables to effectiveness

Data in Table 4 show that 18 groups of factors with their respective contribution to change in effectiveness were isolated from organization and extension worker – related variables. Factor I – research-Extension linkage was the highest contributor to change in effectiveness with 17.35% contributions. Factor II – Regular and continuous training was the second highest contributor with 11.6%. This was followed closely by Factor III – Motivation of extension workers and Factor IV – Maturity of extension workers with 9.99% and 9.82% contributions, respectively.

However, Factor V to Factor VIII contributed averagely between 5.0 – 7.4% to variation in effectiveness of T and V extension system. This might be due to the fact that the operationalization of Factor V – Factor VIII depends on the ideals and principles of administration (functional imperatives) of T and V extension system in the project areas. The highest contributors Factor I – Factor IV have greater bearing on the operators (extension) personnels and subject matter specialists–researchers) of the T and V extension system, hence influenced the professional skill development of the EAs.

Factor IX to Factor XIV contributed between 2.0% – 4.5%. They are much more related with the internal operations of the T and V extension system. Therefore, their operationalization must be properly effected to guide against internal problems that may hinder effective extension work. The remaining four factors (XV to XVIII) add less than 2% to change in effectiveness, hence they form the lowest group of contributors. The four factors are much more related to the field operations of the T and V extension system. The total percentage contributions of the 18 groups of factor identified was 97.15% which was far higher than 26.62% contributions from the groups of factors identified from farmer-related variables.

Conclusions

The effectiveness of the Training and Visit extension system was appraised and crucial factors associated with it were isolated. This was average from the EAs and farmers, respectively. It was established that groups of factors related to farmer personality development and those related to the operators (extension personnel and SMSs-researchers) of the T and V extension system were highly influential in terms of their contributions to effectiveness. They were followed by factors related to the functional imperatives, internal operations and field operations in descending order of influence and contributions to the effectiveness of the T and V extension system.

Recommendations

For effective operation of the T and V extension system in Lagos State the following recommendations are made:

1. The operators of the T and V extension system, e.g. extension personnel, SMSs and researchers should emphasize the proper operationalization of those factors found highly associated with its effectiveness.

2. The Lagos State Government through the Lagos State Agricultural Development Programme Authority should embark on development programme with the main focus on:
 - (a) how to motivate the farmers to be convinced that farming is a profitable venture. This could be done through training of the farmers to identify and embark on viable small scale farming enterprises.
 - (b) provision of job incentives to the extension personnel to be able to perform better on the job.

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Table 1: Results of Varimax rotated Factor Matrix for farmers related factors showing correlation coefficient of highly loaded variables with components significant factors extracted as associated with effectiveness.

	Highly loaded X-variables X ₁ - X ₂₂	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Factor VII	Factor VIII
X ₁	Age of farmer	-0.904							
X ₂	Years of formal education	-0.313						0.780	
X ₃	Size of the family	-0.510						-0.308	
X ₄	Family farm labour	0.461	0.226						
X ₅	Family labour	0.830							0.663
X ₆	Familiarity with VEW	0.782				0.514			
X ₇	Number of Contacts with VEW	-0.639	0.505	0.242					
X ₈	Membership participation in group						0.791		
X ₉	Farmers' perception of the village Extension Workers	-0.328				0.774			
X ₁₀	Cosmopolitaness					0.585	0.289		
X ₁₁	Knowledge of crop production	0.680				0.615			
X ₁₂	Farm size	0.595							-0.242
X ₁₃	Crop yield		0.540	0.223		0.450		0.283	-0.234
X ₁₄	Sources of information				0.920				
X ₁₅	Adoption Scores	-0.371			0.801				
X ₁₆	Crop Size		0.966						
X ₁₇	Knowledge Score			0.913					
X ₁₈	Number of training sessions had	-0.298	-0.225	0.238			0.263		0.546
X ₁₉	Number of Contacts with VEW	-0.0824	0.443						
X ₂₀	Number of demonstrations participated in			0.738					
X ₂₁	Number of SPAT plots had		0.922						
X ₂₂	Number of advisory services had	-0.247		0.870					

Factor Sign (+ or -)

a' > 0.22, P < 0.05 (One tailed test).

Table 2: Principal component Analysis of farmers related factors showing percentage variation in effectiveness as caused by each of the component cases/factors extracted.

Component Number	Factor label (Name)	Percentage Variation*	Comulative Percentage
I	Motivation of farmers towards farming as a business	10.56	10.56
II	Regular and continuous training and visit	3.53	14.09
III	Acquisition of knowledge of Agricultural practices	2.73	16.82
IV	Awareness and adoption of Agricultural practices	2.24	19.06
V	Socio-psychological analysis of extension-farmers relationship	2.01	21.07
VI	Group affiliation	1.88	22.95
VII	Family decision about farm output	1.44	24.39
VIII	Value of farm output	1.23	26.62

* Eigen value greater than one.

Results of Varimax rotated Factor Matrix for organizational and extension workers' related factors showing correlation coefficient of highly loaded variables with components significant factors extracted as associated with effectiveness.

Highly loaded X-variables	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Factor VII	Factor VIII	Factor IX	Factor X	Factor XI	Factor XII	Factor XIII	Factor XIV	Factor XV	Factor XVI	Factor XVII	Factor XVIII
X ₁ -X ₂₄	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
X ₁ Age of the VEW				0.898														
X ₂ Experience on the job				0.645	0.528													
X ₃ Size of the family																		
X ₄ Years of formal schooling					0.365								0.739					
X ₅ Unity of command/number of superior officer											0.870							
X ₆ Role identification						0.954								0.846				
X ₇ Supervision by superior																		
X ₈ Satisfaction with job			0.918														0.859	
X ₉ VEW Farmer tation																	0.850	
X ₁₀ Number of Contacts farmer/VEW																		
X ₁₁ No. of hours of FNT (Duration)			0.934															
X ₁₂ No. of production recommendations evolved																		
X ₁₃ Number of farm problems taken to research	0.300																	
X ₁₄ Number of visits by researcher	0.332																	
X ₁₅ Number of visits by VEW	0.892																	
X ₁₆ Role performance by VEW		0.913																
X ₁₇ Number of participant if FNT	0.462																	
X ₁₈ Number of FNT Sessions had		0.878																
X ₁₉ Number of FNT Sessions attended																		
X ₂₀ Number of Trainings given to farmer						0.994												
X ₂₁ Number of visits paid to farmer	0.477																	
X ₂₂ Number of demonstrations given					0.433													
X ₂₃ Number of SPAT pilots established								0.464										
X ₂₄ Number of advisory services given								0.820							0.930			
X ₂₅ Number of innovations disseminated										0.943								
											0.973							

Factor loading Sign (+ or -)
R > 0.418, P < 0.05 (One tailed test)

Table 4: Principal component Analysis of organization and extension worker-related factors showing percentage variation in Effectiveness as caused by each component aids/factor extracted.

Component Number	Factor Label names	Percentage variation*	Cumulative % variation
I	Research-Extension linkage	17.3498	17.35
II	Regular and continuous training	11.5984	28.95
III	Motivation of extension workers	9.9856	38.93
IV	Maturity of extension workers	9.8175	45.75
V	Length of knowledge acquisition	7.3398	56.09
VI	Educational philosophy of extension	5.9881	62.08
VII	Role definition	5.7275	67.81
VIII	Teaching methods	5.0331	72.84
IX	Frequency of use of SPAT	4.4691	77.31
X	Unity of command	3.4864	80.80
XI	Intensity of FNT session	3.1309	88.93
XIII	Size of the family	2.4783	86.53
XIV	Supervision by superior officers	2.2371	89.03
XV	Degree of advisory services	1.9339	93.20
XVI	Number of innovations disseminated	1.5073	94.71
XVII	Extension: Farmer ratio	1.3441	96.05
XVIII	Contact farmers	1.0979	97.15
XIX-XXV	Not selected	2.8530**	100.00

* Eigen value greater than one

* *Eigen value less than one.