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THE ROLE OF INDEPENDENT AND INTERVENING VARIABLES IN MAIZE GROWERS' ADOPTION OF SEED SPACING IN THE NJOMBE DISTRICT OF TANZANIA

C.P. Msuya[1] and G.H. Düvel[2]

ABSTRACT

The on going quest for a better understanding and prediction of adoption behaviour through the identification and analysis of the most influential behaviour determinants gave rise to this study. It was especially designed with the main objective of determining the comparative role of independent and intervening variables on the adoption of seed spacing among maize growers in the Njombe district of Tanzania. A pre-tested structured questionnaire was used to collect data from 113 farmers randomly selected to represent 5 percent samples of four villages selected to represent the biggest variation in terms of the climatic conditions in the district. The outstanding finding of this research is the much stronger and more consistent relationship that intervening variables have compared to the independent variables, which is in support of the research hypothesis. The total contribution of intervening variables to the variation of adoption behaviour is as much as 93 percent, which far exceeds that of the independent variables contributing only 6 percent. This supports the assumption that the intervening variables are the direct precursors of adoption behaviour and that the influence of independent variable becomes manifested in adoption behaviour via the intervening variables. From this emerge exciting possibilities for behaviour interventions of development programmes, but more research is necessary to verify the findings in different countries and cultures and to refine the selection of the most relevant intervening variables.

1. INTRODUCTION

Njombe district is one of the districts that is famous for the production and supply of maize in Tanzania. Most of the extension programmes

[1] *Lecturer at Sokoine University of Agriculture/ Doctoral student, Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, Pretoria 0002 (e-mail: s24246086@tuks.co.za.*

[2] *Professor, Department of Agricultural Economics, Extension and Rural Development, and the Director of the South African Institute for Agricultural Extension, University of Pretoria, Pretoria 0002 (e-mail: gustav.duvel@up.ac.za.*

like Sasakawa Global 2000 and others that had the purpose of promoting maize production practices in a package form, were initiated and introduced in areas particularly suited for maize production, like Njombe district. A package consists of the combined use of recommended maize varieties, fertilizers, seed spacing, pesticides application and weed control. Although many practices are recommended, few have been adopted by farmers and the resulting low production efficiency has been a common phenomenon (Sicilima & Rwenyagira, 2001).

The ongoing search for relevant and meaningful behaviour determinants that can be useful in the understanding, analysis and change of adoption behaviour has prompted this study. It was specifically focused on the role of intervening variables and their influence relative to the commonly used independent variables. Seed spacing was used as dependent variable.

2. METHODOLOGY

A pre-tested, structured questionnaire was used to collect data from 113 farmers randomly selected to represent five percent samples of four villages. The villages were selected to represent the biggest variation in terms of climatic conditions within the Njombe district of Tanzania. The recommended spacing for full season varieties of maize is 25-30 cm by 75-90 cm with one plant per hill or 50 x 90 cm planting two plants of maize per hill. However, it emerged from the survey that most of the surveyed respondents (95) used one seed. Due to this the analyses and discussion focuses on this group of farmers only. Correlations, chi-square, and regressions were used to determine the relationship between the independent and the dependent variables.

3. RESULTS AND DISCUSSION

3.1 Independent factors

The independent factors considered in this study are respondents' age, gender, formal education, farm size, and area under maize.

3.1.1 Age

Young and energetic people have been found to be more venturesome, active and ready to try innovations (Rogers, 1983; John, 1995; Van den Ban and Hawkins, 1996). This implies a negative relationship between age and adoption, and it is consequently assumed that age of the respondents is also likely to be negatively related to the adoption of recommended seed spacing. The results are summarized in Table 1 below.

Table 1: Distribution of respondents according to their age and their adoption of seed spacing

Seed spacing (cm)	Population or plants per acre (x 1000)	Age (years)							
		<36		36-56		>56		Total	
		n	%	n	%	n	%	N	%
<20 x <60	> 34	3	12.5	0	0.0	0	0.0	3	**3.2**
20-25 x 60-75	21-34	13	54.2	26	52.0	11	52.4	50	**52.6**
25-30 x 75-90	<21	8	33.3	24	48.0	10	47.6	42	**44.2**
Total		**24**	**25.3**	**50**	**52.6**	**21**	**22.1**	**95**	**100.0**

χ^2 = 9.750; df=4; p=0.045
r = 0.173; p=0.094

Although the results show significant differences between the age groups in terms of adoption of seed spacing (χ^2 = 9.750; df=4; p=0.045), the correlation is not significant at a five percent probability ($p < 0.05$), and can be attributed to the fact that the relationship is not quite linear as seen in Table 1. It is only among the youngest group of farmers where there is a tendency towards a not recommended, higher plant population or seeding rate, while there is no difference between the groups above the age of 36 years. For example, 12.5 percent of the youngest group of farmers opted for the highest plant population, while none of the older farmers made this choice.

3.1.2 Gender

Women are considered to be key performers in agriculture but their adoption of recommended practices tends to be lower than that of the men (Shayo, 1991; Stephens, 1992; Bwana, 1996). In view of this it was hypothesized that the adoption of recommended seed spacing, namely the lower plant population, is higher among men than among women respondents. The findings regarding the relationship between gender and adoption are summarized in Table 2.

Table 2: Distribution of respondents according to their gender and the adoption of seed spacing

Seed spacing (cm)	Population or plants per acre (x 1000)	Gender					
		Male		Female		Total	
		n	%	n	%	N	%
<20 x <60	> 34	0	0.0	3	8.1	3	**3.2**
20-25 x 60-75	21-34	29	50.0	21	56.8	50	**52.6**
25-30 x 75-90	<21	29	50.0	13	35.1	42	**44.2**
Total		**58**	**61.1**	**37**	**38.9**	**95**	**100.0**

χ^2 = 6.028; df=2; p=0.049
r = -0.203; p=0.049

According to Table 2 there is a negative correlation (r=-0.203; p=0.049) between gender of the respondents and adoption. The negative correlation suggests that male farmers tend to have higher adoption rates as far as seed spacing or plant population is concerned. For example 50.0 percent male farmers used the required spacing with 20 000 - 25 000 plants population per acre compared to only 35.1 percent female farmers. Although the relationship with gender is unmistakable, the influence is probably not due to the gender as such, but to factors associated with gender, namely access to extension. Female farmers are known to have less access to extension than their male counterparts.

3.1.3 Formal education

Reviewed literature (Anosike & Coughenour, 1990; CIMMYT, 1993; and Lugeye, 1994) indicates the existence of a positive relationship between formal education and adoption leading to the assumption that the farmer's qualification has a positive influence on adoption. An overview of the respondent's education with respect to adoption is presented in Table 3 below.

Although the chi-square test on this variable is statistically significant at five percent probability level, the correlation is not significant (r= 0.058;

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Table 3: Distribution of respondents according to their formal education and seed spacing

Seed spacing (cm)	Population or plants per acre (x 1000)	Years formal education							
		None		1-7		>7		Total	
		n	%	n	%	n	%	N	%
<20 x <60	> 34	0	0.0	1	1.8	2	9.1	3	**3.2**
20-25 x 60-75	21-34	9	52.9	35	62.5	6	27.3	50	**52.6**
25-30 x 75-90	<21	8	47.1	20	35.7	14	63.6	42	**44.2**
Total		**17**	**17.9**	**56**	**58.9**	**22**	**23.2**	**95**	**100.0**

χ^2 = 9.871; df=4; p=0.043
r = 0.058; p=0.576

p=0.576) meaning that there is no relationship between formal education and the adoption behaviour. This can be attributed to the fact that the relationship is not linear and which finds expression in the fact that both the lowest and highest qualification groups have higher adoption rates than the middle group.

These findings are in agreement with the inconsequent influence of education referred to by CIMMYT (1993), but could also be attributed to the appropriateness of the solution namely the recommended seeding rate, which may not be the most appropriate solution in general or in certain situations.

3.1.4 Farm size

It is widely accepted that the farmer's farm size tends to influence his/her decision regarding the adoption of recommended practices. Evidence of this relationship has been provided by amongst others, Rogers, 1983; Senkondo *et al.*, 1998 and Kalineza, 2000. The relationship between repondents' farm size and their adoption of the recommended seed spacing is presented in Table 4.

In the case of farm size there is no significant relationship with seed spacing. It is perhaps worth noting that farmers with the biggest farms sizes tended to follow the recommended seeding rate more closely.

Table 4: Distribution of respondents according to their farm size and the adoption of seed spacing

Seed spacing (cm)	Population or plants per acre (x 1000)	Farm size (acres)							
		<3		3-6		>6		Total	
		n	%	n	%	n	%	N	%
<20 x <60	> 34	2	6.7	1	2.4	0	0.0	3	**3.2**
20-25 x 60-75	21-34	14	46.7	26	63.4	10	41.7	50	**52.6**
25-30 x 75-90	<21	14	46.7	14	34.1	14	58.3	42	**44.2**
Total		**30**	**31.6**	**41**	**43.2**	**24**	**25.3**	**95**	**100**

χ^2 = 5.714; df=4; p=0.222 r = 0.113; p=0.275

3.1.5 Area under maize

The area under maize is closely correlated with farm size (r = 0.471, p = 0.000) and consequently similar results are expected. These results are summarised in Table 1.5.

Table 5: Distribution of respondents according to their area under maize and the adoption of seed spacing

Seed spacing (cm)	Population or plants per acre (x 1000)	Area under maize (acres)							
		<1		1-3		>3		Total	
		n	%	n	%	n	%	N	%
<20 x <60	> 34	0	0.0	3	5.5	0	0.0	3	**3.2**
20-25 x 60-75	21-34	7	38.9	34	61.8	9	40.9	50	**52.6**
25-30 x 75-90	<21	11	61.1	18	32.7	13	59.1	42	**44.2**
Total		**18**	**18.9**	**55**	**57.9**	**22**	**23.2**	**95**	**100.0**

χ^2 = 8.189; df=4; p=0.085
r = 0.011; p=0.919

These findings (Table 5) resemble those of farm size (Table 4) in that area under maize also reveals no linear relationship with seed spacing, when using the correlation coefficient as criterion (r = 0.011; p=0.919).

In this case the non-linear distribution is even more pronounced, which becomes evident if the significantly poorer adoption of the middle group (with 1 to 3 acres under maize) is compared with the groups with less and more maize.

3.1.6 Total influence of all independent variables

The comparative and total influences of the different independent variables on seed spacing are reflected in Table 6.

Table 6: Total influence of all selected independent variables on adoption of seed spacing

Variable	Beta	t	P
(Constant)		6.465	0.000
Gender	-0.138	-1.164	0.247
Age	0.148	1.165	0.247
Formal education	0.066	0.525	0.601
Farm size	0.028	0.223	0.824
Area under maize	-0.014	-0.121	0.904

$R^2 = 0.060$, $p = 0.343$

The total contribution of the tested independent variables on the adoption behaviour variance is only 6.0 percent and also not significant (p = 0.343).

This could to imply that the independent variables investigated are not very much important in determining the adoption behaviour as far as seed spacing is concerned. However, it is also possible that the reported seeding rate was not very accurate, or that the recommended seeding rate is not the most appropriate and thus calls for more research.

3.2 Intervening variables

The following section will evaluate the influence of intervening variables on adoption behavior to assess and to ultimately compare their influence with that of the independent personal and environmental variables. The intervening variables considered in this study include various aspects of needs, perception, and knowledge and will subsequently be analysed individually.

3.2.1 Efficiency misperception (EM)

Efficiency misperception is one of the intervening variables that Düvel (1991) identified to be one of the major behaviour determinants. There is a tendency of individuals to overrate their own production and or practice adoption efficiency. This is bound to have a significant effect on adoption behaviour due to the fact that the more the efficiency is overrated, the smaller the problem scope or need tension becomes and thus the smaller the incentive to adopt the recommended innovations. This assumed influence is based on various research findings (Koch, 1987; Düvel, 1991; Düvel, 2004;) and has led to the hypothesis that there is a significant negative relationship between the EM and adoption of recommended seed spacing. Table 7 summarizes the survey results.

Table 7: Distribution of respondents according to their efficiency misperception (EM) and the adoption of seed spacing

Seed spacing (cm)	**Popu-lation Plants per acre (x 1000)**	**Efficiency assessment**											
		Under-rate		**Slightly under-rate**		**Assess correctly**		**Slightly overrate**		**Overrate**		**Total**	
		n	%	**N**	%	**n**	%	**n**	%	**n**	%	**N**	%
<20x<60	> 34	0	0.0	0	0.0	0	0.0	2	5.3	1	100.0	3	**3.2**
20-25x 60-75	21-34	1	25.0	4	40.0	9	21.4	36	94.7	0	0.0	50	**52.6**
25-30x 75-90	<21	3	75.0	6	60.0	33	78.6	0	0.0	0	0.0	42	**44.2**
Total		**4**	**4.2**	**10**	**10.5**	**42**	**44.2**	**38**	**40.0**	**1**	**1.1**	**95**	**100.0**

χ^2 = 83.859; df=8; p=0.000
r = -0.586; p=0.000

About 44 percent of the respondents perceived their current situation of practice adoption correctly, meaning that their responses agreed with the assumed "objective" assessment based on the adoption scale, while 41.1 percent tend to overrate their efficiency. What is conspicuous is that none of the respondents overrating their efficiency, adopted the recommended seeding rate, while 75 percent of those underrating their own seeding rate efficiency, adopted the recommended seeding rate. This is an indication of a significant relationship between the EM and adoption and is supported by the highly significant correlation coefficient (r = -0.586; p=0.000). The more farmers misperceive or overrate their efficiency of practice adoption to be better than it really is, the lower the incentive to change their behaviour towards what is recommended.

3.2.2 Need tension (NT)

Need tension (NT) is another key intervening variable that is expected to have an influence on adoption behaviour. Düvel (1991) defines need tension as the problem scope or perceived discrepancy between the current and the desired or potential situation and numerous studies have provided evidence of a positive relationship with adoption behaviour (Düvel, 1975; Düvel & Scholtz, 1986; Düvel, 1991; Düvel & Botha, 1999; Düvel, 2004). Table 8 summarizes the relationship between NT and adoption of recommended seed spacing.

As shown in Table 8 the need tension or problem scope, as far as seed spacing is concerned, is reasonably high in that about 52.6 percent and 44.2 percent of the respondents seem to have medium and high need tensions respectively. Both the chi-square and correlation analyses indicate that there is a highly significant association between NT and adoption of the recommended seed spacing.

Table 8: Distribution of respondents according to their Need Tension (NT) and the adoption of seed spacing

Seed spacing (cm)	Population or plants per acre (x1000)	Need tension (NT) categories							
		Low NT		Medium NT		High NT		Total	
		n	%	n	%	n	%	N	%
<20 x <60	> 34	3	100	0	0.0	0	0.0	3	**3.2**
20-25 x 60-75	21-34	0	0.0	49	98.0	1	2.4	50	**52.6**
25-30 x 75-90	<21	0	0.0	1	2.0	41	97.6	42	**44.2**
Total		**3**	**3.2**	**50**	**52.6**	**42**	**44.2**	**95**	**100**

χ^2 =181.859; df=4; p=0.000
r = 0.966; p=0.000

This almost perfect linear relationship is reflected in the correlation of 0.966, signifying that the higher the need tension the higher the adoption rates tends to be. This close relationship is further supported by the fact that 97.6 percent of the respondent with high NT had adopted while the percentage of those with medium and low NT is 0.0 percent and 2.0 percent respectively. On the other hand, all the respondents with a low NT seem to have a poor seeding rate adoption, namely a high plant population of more than 40 000 plants per acre.

3.2.3 Awareness

Awareness is another intervening variable that has been found to have an influence on adoption behaviour (Düvel, 2001; Düvel, 2004). It refers to an awareness of recommended solutions or the optimum that is achievable in terms of efficiency. In this case awareness refers as the knowledge of recommended seed spacing in the study area, and farmers were asked to indicate which seed spacing is recommended in their area. The responses are presented in Table 9.

Table 9: Distribution of respondents according to their awareness of the recommendation and their adoption of seed spacing

Seed spacing (cm)	Population or plants per acre (x 1000)	Awareness of solution					
		Not aware		Aware		Total	
		n	%	n	%	N	%
<20 x <60	> 34	3	4.9	0	0.0	3	**3.2**
20-25 x 60-75	21-34	41	67.2	9	26.5	50	**52.6**
25-30 x 75-90	<21	17	27.9	25	73.5	42	**44.2**
Total		**61**	**64.2**	**34**	**35.8**	**95**	**100.0**

χ^2 = 18.853; df = 2; p=0.000
r = 0.439; p=0.000

According to Table 9 the overwhelming majority (64.2 percent) of maize growers in the Njombe district is not aware of the recommended plant population or number of maize plants per acre recommended for that area and thus can hardly be expected to implement it. This unawareness and its relationship with the adoption behaviour finds its expression in a highly significant correlation of r = 0.439 (p = 0.00) showing that awareness of the solution is clearly associated with its adoption. For example 73.5 percent of the respondents that were aware of recommended seed spacing had adopted while only 27.9 percent of those who had no knowledge of it did so.

3.2.4 Prominence

Prominence, which is defined as the degree to which an innovation is perceived as being better than the idea it supersedes, is another intervening variable evaluated in this study. It is contended that the more an innovation or a practice is perceived to be relatively better than the traditional practices, the higher the adoption is likely to be (Düvel, 1991 and Düvel, 2004). Table 10 summarizes the survey results.

Table 10: Distribution of respondents according to their perceived prominence of the recommended seed spacing and their adoption of it

Seed spacing (cm)	Population/ acre (x 1000)	Prominence							
		Low prominence		Medium prominence		High prominence		Total	
		N	%	n	%	n	%	N	%
<20 x <60	> 34	2	28.6	1	2.2	0	0.0	3	**3.2**
20-25 x 60-75	21-34	4	57.1	43	93.5	3	7.1	50	**52.6**
25-30 x 75-90	<21	1	14.3	2	4.3	39	92.9	42	**44.2**
Total		**7**	**7.4**	**46**	**48.4**	**42**	**44.2**	**95**	**100.0**

χ^2 = 87.338; df=4; p=0.000
r = 0.792; p=0.000

The large percentage respondents (44.2) regard low plant populations (20 000 to 25 000 plants per acre) as more prominent and thus better than high plant populations for obtaining higher maize yields. 92.9 percent of them are implementing the low plant populations, which suggests a close relationship between the perceived prominence and adoption. Furthermore, not a single respondent with a high prominence had a high plant population. This close relationship finds expression in the highly significant correlation coefficient of 0.792 (p = 0.00) between the perceived prominence and adoption.

3.2.5 Total influence of intervening variables

The results of all the intervening variables entered into the regression model are presented in Table 11 below.

According to Table 11 the greatest contribution to the adoption behaviour comes from the NT (beta = 0.923; p = 0.000) and the perceived efficiency (beta = -0.067, p = 0.044). In total the intervening variables contribute as much as 93.6 percent of the variation in adoption behaviour, which emphasises the importance of intervening variables in behaviour prediction.

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Table 11: Influence of intervening variables on adoption of seed spacing

Variable	Beta	t	p
(Constant)		9.896	0.000
Efficiency misperception	-0.067	-2.047	0.044
Need tension	0.923	17.261	0.000
Awareness	-0.038	-1.181	0.241
Prominence	0.028	0.557	0.579

$R^2 = 0.936$; $p = 0.00$

4. SUMMARY AND CONCLUSIONS

The outstanding finding of this study is the tremendous prediction value of intervening variables as far as adoption behaviour is concerned, especially when compared to the independent variables. Figure 1 gives a comparative overview of the total influence of each of these variables.

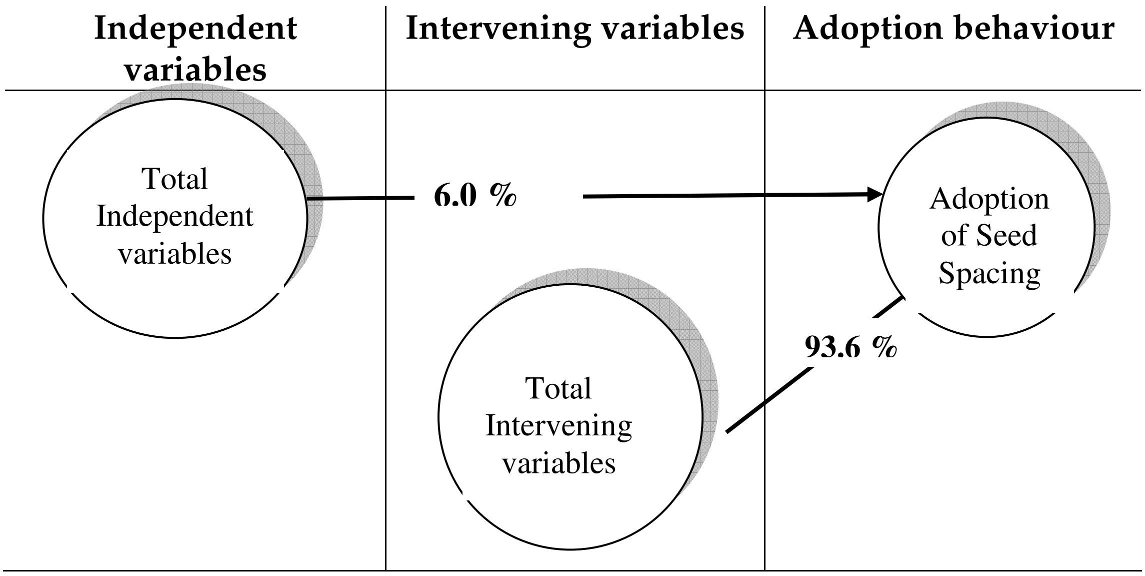

Figure 1: The comparative influence of independent and intervening variables the adoption of seed spacing

While the intervening variables explain as much as 93,6 percent of the variation in seed spacing adoption, the contribution of the independent variables is a mere 6 percent. The logical explanation for this highly significant difference is that the intervening variables are probably the immediate and direct determinants of adoption behaviour and that the influence of independent variables only becomes manifested in adoption behaviour *via* the intervening ones.

The results and the corresponding interpretations are somewhat blemished by the uncertainty regarding the appropriateness of seeding rate as a recommended practice. Doubts regarding the appropriateness of the practice lie in the insignificant correlation between seeding rate and production efficiency (r= 0.182; p= 0.078). Also the fact that qualification, which is normally positively correlated with adoption, fails to show a positive relationship with seeding rate, strengthens this suspicion.

An important implication of this study is that the focus of extension can be narrowed down to that of the intervening variables. They are limited in number and thus manageable from a survey point of view and can be associated with the Lewin's (1951) forces of change. As such they represent the focus of extension and since they are – unlike the independent variables – changeable, they can be ideally used as monitoring criteria.

The similarity of these results with those found under Ethiopian (Habtemariam & Düvel, 2003) and South African (Düvel, 1991) conditions seems to indicate that this approach, focused on intervening variables, could apply in most cultures. However, more research is necessary to verify this and also to continue the search for additional intervening variables that may have a high predictive value on decision making relating to adoption behaviour.

REFERENCES

ANOSIKE, N. & COUGHENOUR, C.M., 1990. The social-economic basis of farm enterprise diversification decision. *Journal of Rural sociology* 55(1):1-24

BWANA, E.N., 1996. *An assessment of the adoption of improved food grain storage structures in Mara Region.* MSc. Thesis (Unpublished). Sokoine University of Agriculture, Morogoro, Tanzania.

CIMMYT, 1993. *The adoption of agricultural technology: A guide for survey design.* Mexico.

DÜVEL, G.H., 1975. The mediating functions of perception in innovation decision-making. *South African Journal of Agricultural Extension*. 4 : 25-36.

DÜVEL, G.H., 1991. Towards a model for the promotion of complex innovations through programmed extension. *South African Journal of Agricultural Extension,* 15:1-10.

DÜVEL, G.H., 2004. *Programmed extension (Program development and implementation).* Study guide. Department of Agricultural Economics, Extension and Rural Development, University of Pretoria.

DÜVEL, G.H. & BOTHA, A.J., 1999. Human constraints to sustainable agriculture in the arid regions of South Africa. *The Journal of Agricultural Education and Extension, 6(1): 47-60.*

DÜVEL, G.H. & SCHOLTZ, H.P.J., 1986. The non-acceptability of recommended veld management practives. *South African Journal of Agricultural Extension* 16:19-25.

HABTEMARIAM, A.G. & DÜVEL, G.H., 2003. Towards a categorisation of behaviour determinants with a view to a more meaningul analysis, intervention and evaluation of adoption behaviour. *South African Journal of Agricultural Extension,* 32:73-84.

JOHN, A.C.S., 1995. *Social factors constraining the uptake of technology in agriculture*. A thesis submitted for the degree of Doctor of philosophy. Unpublished. University of New Castle. Upon Tyne, U.K.

KALINEZA, H.M.M., 2000. *Factors influencing the adoption of soil conservation measures: A case study in Gairo, Kilosa District.* MSc. Thesis. Sokoine University of Agriculture, Morogoro, Tanzania

KOCH B.H., 1987. Problem perception as precondition of behaviour change. *South African Journal of Agricultural Extension,* 16:19-25.

LEWIN, K., 1951. *Field theory in social science.* Selected theoretical papers. New York: Harper & Row.

LUGEYE, S., 1994. The role of farmers' indigenous knowledge in natural resources and management. In: *Proceeding of 1st Workshop on sustainable agriculture and conservation of environment.* Edited by Hatibu, N.; Mafu, S.T.A. Machang'u R.S.; and Rutatora, D.F. 26-27 July 1994, Morogoro, Tanzania, pp. 116-125

ROGERS, E.M., 1983. *Diffusion of innovations*. Third Edition. The Free Press A Division of Macmillan Publishing Co., Inc. New York.

SENKONDO, E.M.M, MDOE, N.S.Y., HATIBU, N., MAHOO, H. & GOWING, J., 1998. Factors influencing adoption of rain water harvesting technologies in Western Pare Low Lands of Tanzania. *Tanzania Journal of Agricultural Sciences.* 1(1):81-89.

SHAYO, E., 1991. Women in agricultural extension. *Proceedings of a National workshop*. In: A.Z. Mattee; I.J Lupanga; N.M. Mollel and S.C. Lugeye (eds). 25-27 November, 1991, Dodoma, Tanzania. TSAEE/CSE, pp 11-15.

SICILIMA, N.P. & RWENYAGIRA, B.W., 2001. *Agricultural extension in Tanzania: The way forward.* Paper presented at the Stakeholders Workshop in Respect of the B.Sc. Agricultural Education and Extension Degree at Sokoine University of Agriculture (SUA) 11-12 July, 2001. 17pp.

STEPHENS, A. 1992. Yes, technology is gender neutral but…women in Asia might not agree. *Ceres*, 108: 32-35.

VAN DEN BAN, A.W & HAWKINS, H.S., 1996. *Agricultural extension*. Longman, London, U.K.