

Full Length Research Paper

An investigation on the contributions of mediating independent variables to the adoption of co-financing of the delivery of public extension visits

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Most public extension organizations worldwide operate on inadequate budgets. Extension field surveys, therefore, need to be as cost-efficient as possible. The study investigated the comparative contributions of mediating and independent variables to the adoption of co-financing of the delivery of public extension visits. A semi-structured, self-administered questionnaire was used to collect information from 97 small-scale crop farmers in the Free State province of South Africa, from 1 September to 7 October 2010. Non-probability sampling techniques were employed to select respondents. The mediating variables were found to contribute more to the adoption of co-financing for the delivery of public extension visits than the independent variables. Need tension, especially the difference between aspired and present situation with regard to practice adoption and production efficiency made the most individual contributions to the variation in adoption of co-financing for the delivery of public extension visits. Adoption behaviour analysis could therefore be focused on a limited number of mediating variables in surveys. Focusing adoption behaviour investigations on the more direct precursors of behaviour can reduce extension survey costs. This also offers opportunities for generating extra funds to deliver optimal extension visits to farmers. While quantifying the savings is the subject of future research, there are strong grounds for concluding that they are considerable.

Key words: Comparative contributions, mediating variables, independent variables, co-financing, bextension visit delivery, adoption.

INTRODUCTION

Public extension services have generally been criticized for many reasons including inadequate operating resources and a lack of financial sustainability (Rivera, 1991). The global budgetary constraints that have plagued public extension services since the 1980s led to calls for users of such services to contribute towards the cost of the service (Anderson, 2008). Persistent financial problems have contributed to the ineffectiveness of public sector extension (Rivera, 1991). Problems associated with ineffective public extension include poor logistic support, fewer monthly workshops, loss of personnel (Bagchee, 1994); few extension visits to farms such as

less than one to one visit per month (Oladele, 2008) and irregular farm visits (Ulimwengu and Sanyal, 2011). The positive effects of extension contact on adoption and output are well-documented (Buyinza et al., 2008). Specifically, the positive influence of personal contact on the success of knowledge dissemination activities is a common and consistent finding in the literature of adoption (Hoag, 2005; Research Utilization Support and Help, 1996). More visits by extension agents are known to increase the effective price received by farmers and net return on production (Maheswari et al., 2008). Personnel costs however, are identified as one cause of

the financial problems facing public extension services (National Treasury, Republic of South Africa, 2003). The cost of extension visits takes up by far the largest proportion (47.15%) of extension funds (Wilson and Gallup, 1955) and this also contributes to the operating financial woes of public extension. Dinar (1996) quoting Elkana and Epstein (1972) indicate that extension visits take up 39% of the total time of the extension advisor. This indicates that extension visits to farmers take up a lot of financial resources to accomplish. It is therefore, not unexpected when Dinar (1996:2) commented that among the public extension commercialization taking place in both developed and developing countries, activities being sold for charges are those associated with dissemination of information and direct contacts with producers.

In Australia, Marsh and Pannell (2000) observed that the general trend was to charge for the delivery of public extension information and not for the information itself. Discussions on user contributions for public extension delivery in South Africa have been documented in government policy papers (Department of Agriculture, 2005). The literature reviewed showed that no empirical study with regard to the comparative influence of the mediating and independent factors of adoption in the area charging for the delivery of extension visits has yet been conducted in South Africa. This study was, therefore, motivated by the need to reduce in one way, the cost of doing extension work in the area of extension surveys. This was achieved through an investigation of the comparative influence of the mediating and independent factors on farmers' acceptance to contribute financially towards the cost of farm visits by public extension workers. The mediating variables of adoption were hypothesized to contribute more to the adoption of the payment for the delivery of public extension visit than the independent variables.

THEORETICAL BACKGROUND

A producer's decision whether or not to adopt a new idea has occupied the minds of agricultural extension practitioners for decades. This pre-occupation has centred on trying to understand why producers do not adopt what seem to be "good" ideas that will benefit producers and what factors trigger the adoption of new ideas that enhance farm production and, eventually, profits. Many models of innovation¹ adoption and behaviour change have been developed over the years as a result. Among the earliest investigations into these adoption issues was that by Ryan and Gross (1943) and what is known as the classical adoption and diffusion

¹ The word 'innovation' is used in this study according to Rogers (1983) definition: "an idea, practice, or object that is perceived as new by an individual or other unit of adoption". This definition forms the basis on which farmers' financial contribution towards cost of extension visits (co-financing) is described as an innovation because it is new to the South African public extension service.

model. Since then other models have been put forward; each trying to improve on its predecessors. These include the psychological field theory (Lewin, 1951), the classical 5-stage adoption process (North Central Rural Sociology Committee, 1961), the Campbell model (1966), the Tolman model (1967), the innovation decision process model (Rogers and Shoemaker, 1971) and its revised model (Rogers, 1983), the attitudinal determinants of behaviour (Fishbein and Ajzen, 1975). A framework that has a few variables and yet, comprehensive enough to account for all causes of adoption and non-adoption behaviour still remained elusive. Furthermore, for the field-level extension practitioner, there was need for a framework that did not only explain change but how to bring about change. In order to achieve this user-friendly framework, Düvel (1991) built on the earlier theoretical models (Rogers, 1983; Lewin, 1951) and drastically reduced the large number of intervening factors associated with behaviour analysis in the Tolman model (1967). He proposed the mediating variable concept to replace Tolman's intervening variable concept.

The mediating variables comprise needs, perception and knowledge. To allow for a wider spectrum of specific positive and negative forces, Düvel (1987) put forward a more refined list of Rogers's (1983) attributes of an innovation and, therefore, of perception. In this wise "relative advantage" was refined as relative advantages (Düvel, 1987) and the concept 'prominence' was introduced as an equivalent of Roger's innovation attribute, 'relative advantage' (Düvel, 1987). In this way the relative attractiveness of an innovation is redefined to include its relative advantages and prominence (Düvel, 1987). The relative advantages concept (advantages and disadvantages) concurs with Leeuwis and van den Ban's (2004) comment on the relationship between farmer evaluation of advantages and disadvantage of an innovation and adoption. The other dimension of perception in this redefinition is incompatibility of the innovation with the situation of the adopter (Düvel, 1987). The latter corresponds to the socio-economic, communication etc. circumstances of the adopter. Most of the factors that make a farmer unable or incapable of adoption that is, personal /environmental factors, fall into this category of variables and are of a more independent nature. They are subjectively perceived and make up what is commonly referred to as the independent variables of adoption and are, therefore, normally analysed as independent variables.

Field surveys cost time and money to accomplish. The advantage of reducing the numerous factors that affect adoption to a few that is comprehensive enough to account for behaviour is the significant saving on time and money that is associated with the approach. A comparative investigation of the influence of the independent and mediating variables on the adoption of new ideas such as the payment for the delivery of public extension visits, serves to determine which set of variables should receive more att-

ention in surveys to reduce the size of a survey questionnaire. This invariably reduces the cost of a survey without compromising quality of the results. The mediating and independent variables of adoption as enunciated here were used to investigate farmers' acceptability of payment for the delivery of public extension visits to assess their relative contributions in this regard.

METHODOLOGY

The paper investigated the relative contributions of the mediating and independent variables to farmers' acceptance to contribute financially towards the delivery of public extension visits. Non-probability sampling techniques, convenience and purposive, were used to select respondents because of a lack of farmer list from which to draw a sample. Information was collected from 97 small-scale² crop farmers in three of five districts of the Free State province of South Africa using a semi-structured, self-administered questionnaire from 1 September to 7 October 2010. The three districts chosen by simple random sampling were Motheo, Xhariep and Lewelputswa. The hypothesized relationships between individual independent and individual mediating variables and the acceptance to pay for the delivery of public extension visits are presented in Tables 6 and 7, respectively. The data were analysed using SPSS. The data analyses comprised descriptive statistics and hypothesis testing by means of the Chi Square (χ^2) tests of independence, and the multiple linear regression. More specifically, the multiple linear model afforded better insight into the relative importance of the factors that might explain the acceptability of the idea of farmers' contribution towards the delivery of public extension visits. In this model, both the independent and mediating variables that were found to significantly influence adoption of the innovation under study in the earlier models were entered simultaneously. In general, these procedures were used to test whether any observed differences were statistically significant.

Multicollinearity of the independent and mediating variables, reflecting variable redundancy which leads to high correlation among the included variables, was assessed by means of Variance Inflation Factor (VIF) and tolerance values to screen off variables to be deleted from the regression analysis (Pallant, 2007). Following Stockburger (1998), in which categorical variables with two levels may be directly entered as predictors or predicted variables in a multiple regression model, a multiple regression model was specified to study the relationship between the independent and mediating variables and payment for the delivery of public extension visits. The prediction of Y is accomplished by the following equation:

$$\hat{Y}_i = b_0 + b_1 X_i + \varepsilon_i \quad (i = 1, 2, 3, \dots, n) \quad (1)$$

Where \hat{Y}_i is the predicted value on the dependent variable that is, payment for the delivery of public extension visits, the b values are the regression weights or the coefficients of the predictor variables, the X 's represent the various predictor variables (independent and

mediating variables), ε_i is the error term and n is the number of observations.

RESULTS

The results of the multicollinearity analysis of the independent and mediating variables used to investigate farmers acceptance to pay for extension farm visits are presented in Tables 1 and 2, respectively. All nine independent variables passed the screening test (Table 1) and were entered into the first regression analysis separately; four of the sixteen mediating variables, however, showed multicollinearity (Table 2) and were deleted while the rest were entered into a separate regression analysis. The deleted variables were, influence of innovation on aspired yield (EAP: YHA), influence of innovation on gross farm income (EAP: GFI), influence of innovation on practice adoption (EAP: PA) and most important plan to achieve goal (PLAN: NC). The results of the first regression analysis of the independent variables and their influence on the adoption of co-financing of public extension visits are presented in Table 3. The results show that all variables except,

"mentorship" positively correlated with the dependent variable, that is, payment for the delivery of public extension farm visits. However, only farming orientation, credibility of the extension service/agent, desired number of visits and group membership made a significant contribution to the variation in adoption of payment for the delivery of public extension visits. Together, these four variables explained 58.8% of the variation in the adoption of the payment delivery of public extension visits. The model was significant ($p = 0.004$).

The results of the fitting of the other multiple regression model developed to assess the aggregate contribution of the mediating variables on the adoption of payment for the delivery of public extension visits are presented in Table 4. The findings indicate that, with the exception of awareness of disadvantages of payment for the delivery of extension visits, all other variables positively correlated with payment for the delivery of public extension visits. The following mediating variables were found to significantly influence the payment for the delivery of public extension visits: "reason for farming", "farmers' goals for the next five years", "unawareness of optimum yield per hectare achievable"; the others were "need tension resulting from the difference between aspired and present yield per hectare", "need tension resulting from the difference between the aspired and present level of practice adoption", and "awareness of the disadvantages of payment for the delivery of public extension visits".

DETERMINANTS OF THE ADOPTION OF PAYMENT FOR THE DELIVERY OF PUBLIC EXTENSION VISITS

The multiple regression results of the relative importance

²There seems to be different ways of categorizing/defining farmers in the literature (Department of Agriculture, 2005; Hadebe et al., 2004; Düvel, 2002). For this reason, an attempt was made to have an appropriate definition for the target group of farmers in this study as follows: Small-scale commercial crop farmers in this study are defined according to the categorization by Düvel (2002) and comprise, therefore, farmers who produce mainly for the market and Land Redistribution for Agricultural Development programme beneficiaries who may have own consumption and the market in view as the ultimate purpose of production.

Table 1. The independent variables hypothesized to explain acceptance to pay for the delivery of public extension visits.

Variable	Unit	Expected sign	Description
FO		?	1 if full time farmer
ENSAI	%	+	Earnings from farming
GRPM		+	1 if belongs to a group
DNV	Number of visits	+	Desired number of visits per month
DEF		+	1 if farmer sees public extension reducing effect of drought spell on gross farm income
FENTS		+	1 If maize, sunflower or Lucerne
MENTOR		+	1 If supported by a mentor
FEXP	Number of years	?	Number of years of planting crop
CREINDEX		+	1 If farmer sees public extension as more credible

Table 2. The mediating variables hypothesized to explain acceptance to pay for the delivery of public extension visits.

Variable	Expected sign	Variable description
Reason for farming	+	If compatible with payment=1
Goal for next five years	+	If compatible with payment=1
Misperceived current adoption efficiency	-	If compatible with payment=1
Unaware of optimum yield per ha achievable	-	If compatible with payment=1
Unaware of optimum practice adoption achievable	-	If compatible with payment=1
Need tension (aspired-present yield/ha)	+	If compatible with payment=1
Need tension (optimum-aspired yield/ha)	+	If compatible with payment=1
Need tension (optimum - present adoption level)	+	If compatible with payment=1
Need tension (optimum – aspired adoption level)	+	If compatible with payment=1
Need tension (aspired – present adoption level)	+	If compatible with payment=1
Unawareness of advantages of payment	-	If compatible with payment=1
Awareness of disadvantages of payment	-	If compatible with payment=1

Table 3. Collinearity statistics of independent variables¹.

Variable	Collinearity statistics	
	Tolerance	VIF
FO	0.438	2.285
ENSA1	0.464	2.156
FENTS	0.389	2.571
FEXP	0.457	2.186
CREINDEX	0.860	1.163
DEF	0.347	2.885
DNV	0.754	1.327
MENTOR	0.843	1.187
GRPM	0.836	1.197

¹Farming Orientation (FO), Percentage earning from farming (ENSA1), Farming enterprise (FENT), Farming experience (FEXP), Credibility of public extension service provider (CREINDEX), Effect of drought spells on gross farm income (DEF), Desired number of visits from public extension agent (DNV), Farming with support of a mentor (MENTOR), Group membership (GRPM).

of the independent and mediating variables in explaining respondents' acceptance to contribute towards the

delivery of public extension visits are presented in Table 5. The results (Table 5) indicate that all the mediating

Table 4. Collinearity statistics of mediating variables².

Variables	Collinearity statistics	
	Tolerance	VIF
Reason NC	0.757	1.321
Goal NC	0.454	2.202
Plan NC	0.025	39.597
PCEA1	0.358	2.790
OPTACH:YHA	0.507	1.974
OPTACH:PA	0.594	1.684
NT1:YHA	0.128	7.834
NT2:YHA	0.943	1.061
NT2:PA	0.187	5.347
NT3:PA	0.654	1.530
NT1:PA	0.152	6.562
EAP:YIELD	0.066	15.229
EAP:GFI	0.066	15.145
EAP:PA	0.041	24.329
UWADVC	0.154	6.474
ADISVC	0.166	6.034

²Need compatibility: Reason for farming (Reason NC), Reason for farming :Goal for next 5 years, (Goal NC), Need incompatibility: Most important plan to achieve goal (Plan NC), Problem perception: adoption of management practices (PCEA1), Unawareness of optimum achievable: Yield per hectare (OPTACH:YHA), Unawareness of optimum achievable: Practice adoption (OPTACH:PA), Need tension (aspired minus current level of output (NT1:YHA), Need tension (optimum minus present level of output (NT2: YHA), Need tension (optimum minus present level of practice adoption) NT2: PA), Need tension (optimum minus aspired level of practice adoption) NT3: PA, Need tension (aspired minus current level of practice adoption) NT1: PA, Influence of innovation on aspired yield (EAP: YIELD), Influence of innovation on gross farm income (EAP:GFI), Influence of innovation on practice adoption (EAP: PA), Unawareness of advantages of innovation (UWADVC), Awareness of disadvantages of innovation (ADISVC).

Table 5. Multiple regression estimates of the effects of the independent variables on the payment for the delivery of public extension visits.

Variables	Beta	T	P
Farming orientation	0.127	1.006	0.001*
Percentage farm earnings	0.173	1.488	0.142
Farming enterprise	0.236	1.862	0.067
Farming experience	0.203	-1.739	0.087
Credibility	0.549	6.429	0.000*
Drought effect on gross farm income under paid public extension	0.233	1.740	0.086
Desired number of visits	0.290	3.183	0.002*
Mentor	-0.020	-.231	0.818
Group membership	0.149	1.724	0.009*
Constant	—	-5.266	0.000

$R^2 = 0.588$, Significant at 0.01*.

variables had a positive relationship with payment for the delivery of public extension visits. None of independent variables however, significantly influenced the adoption of payment for the delivery of public extension visits. The need-related factors were also dominant over the perception related variables in influencing adoption. All the three variables that significantly influenced the

adoption of payment for the delivery of public extension visits were need-related, explaining 87.9% of the variation in the adoption of the innovation under study. Need tension, especially the difference between aspired and present situation with regard to practice adoption and production efficiency, made the most individual contributions at 0.353 and 0.473, respectively, to the

Table 6. Multiple regression estimates of the effects of mediating variables on payment for the delivery of public extension visits.

Variables	Beta	T	P
Reason for farming	0.074	1.746	0.026
Goal for next five years	0.099	2.300	0.025
Misperceived current adoption efficiency	0.083	1.407	0.163
Unaware of optimum yield per ha achievable	0.093	1.809	0.074
Unaware of optimum practice adoption achievable	0.110	2.320	0.023
Need tension (aspired-present yield/ha)	0.429	5.847	0.000*
Need tension (optimum-aspired yield/ha)	0.004	.093	0.926
Need tension (optimum - present adoption level)	0.117	.536	0.128
Need tension (optimum – aspired adoption level)	0.010	.236	0.814
Need tension (aspired – present adoption level)	0.291	3.484	0.001*
Unawareness of advantages of payment	0.122	1.574	0.119
Awareness of disadvantages of payment	-0.201	-4.042	0.035
Constant	-	-3.203	0.002

$R^2 = 0.885$ * significant at 0.01 lev.

adoption of co-financing for the delivery of public extension visits.

DISCUSSION

Various adoption studies have shown inconsistent relationships between the independent variables and adoption behaviour (Chukwuone and Agwu, 2005; Campiche et al., 2004). The discussion here will, therefore, centre on those independent variables as well as the mediating variables that made a significant impact on the adoption of co-financing for the delivery of public extension visits.

Farming orientation

There is ambiguity in the literature concerning the expected difference between full-time and part-time farmers with respect to adoption (Table 6). Some of these studies include Sulaiman and Sadamate (2000) and Kenkel and Norris (1995). The finding in this study (Table 3), therefore, supports the hypothesis that farming orientation might positively influence payment for the delivery of public extension visits. In this case, full time farmers were more inclined than part time farmers to pay for the delivery of public extension visits. A possible reason could be the assumption that part-time farmers were very busy and so did not have the luxury of time to search for information for their farm work and so would be eager to invest in new ideas such as paying for the delivery of extension visits did not hold for farmers in this survey. This was supported by the fact that fewer part-time farmers (53.6% compared with 74.5% of full-time farmers) indicated they were willing to pay for the delivery of public extension visits which could afford more contacts with the extension officer. More contacts are

assumed to result in the transfer of more improved farm management practices.

Full-time farmers on the other hand, depend on farming for their livelihoods. They are, therefore, willing in a sense, to invest in the delivery of public extension visits as shown by the results in this study, which could invariably result in more contacts with the extension agent for more farm management practices. This is expected to eventually improve their efficiency of production. The finding in this study, therefore, conforms to the prevalent views found in the agricultural economics and extension literature.

Group membership

The finding in this study (Table 3) that group membership has a significant positive effect on adoption was similar to what is reported in previous studies (Ajayi, 2006; Habtemariam, 2004; Gautam, 2000). This positive relationship might be due to respondents' realization of reduced cost of service to individual members in the group setting. Daramola (1989) however, did not find co-operative membership to significantly influence the probability of fertilizer adoption decisions; in fact, its influence was negative. A possible reason for Daramola's finding could be culturally-related where people tend to be individualistic because of lack of trust of other people in group settings. Another possible explanation why people might not join groups such as farmer co-operative as in Daramola's sample where 54% of respondents did not belong to co-operatives, and therefore, the reason why such groups might not influence the adoption of farm innovations, might be due to past disappointments with groups.

The finding in this study and others clearly suggest that, although group membership is a great enhancer of the adult learning and adoption process, adoption might

Table 7. Multiple regression estimates of the effects of mediating and independent variables on the payment for the delivery of public extension visits.

Variable	Beta	T	P
Farming orientation	.011	.285	.777
Credibility index	.041	1.013	.314
Desired number of visits	.009	.224	.823
Group membership	.069	1.679	.097
Reason for farming	.058	1.398	.166
Goal for next five years	.061	1.144	.256
Unawareness of optimum practice adoption achievable	.160	3.704	.000*
Need tension (aspired –present yield per ha)	.473	6.841	.000*
Need tension (aspired – present level of adoption)	.353	4.837	.000*
Awareness of disadvantages of innovation	.017	.248	.805
Constant	-	-4.000	.000

$R^2 = .879$, * Significant at .01.

not be guaranteed by group membership.

Desired number of visits

Past studies show different results between respondents' current number of visits received and payment for public extension services. Non-significant results have been reported in this regard (Ajayi, 2006; Daramola, 1989). Sulaiman and Van den Ban (2003), on the other hand, mention that one important condition for paid services was the farmers' insistence on field visit based advice.

The emphasis on these previous investigations was on payment for general extension services based on the status quo number of visits. The accent of the present study was different because the focus was on payment for the delivery of more visits as a means to access more farm management practices. Findings in this study (Table 3) showed that farmers' desired number of visits has a positive significant influence on their acceptance to pay for farm visits as hypothesized (Table 6). Most of the respondents (70 to 89.5%) who wished to receive between 2 and 4 visits per month, with a mean of 3.16 visits per month (SD = 1.213), were prepared to pay.

The mean number of visits reported here was close to the designated visits of one every two weeks (or 2 visits per month) in the Kenya extension project (Gautam, 2000) and similar to the 2 visits per month requested by livestock farmers in Turkey (Budak et al., 2010).

Credibility of public extension service provider

Findings in this study (Table 3) indicate that credibility had a significant positive effect on payment as hypothesized (Table 6). This finding concurs with Ajayi (2006). What should be of concern to policy makers is the fact that 45% of 44 respondents did not find the public

extension credible and therefore, would not pay. About 54% however, would still like to pay for the delivery of public extension; perhaps this was because this was the only source they could afford compared with private extension. Policy makers should think seriously about improving the competency of field level extension practitioners and make the cost more affordable so that payment for the delivery of visits becomes more attractive to farmers.

Reason for farming

The mere assumption that human behaviour is purposeful implies that there are reasons why respondents engage in farming. The purposes or reasons could be expected to reflect the individual's needs, either directly or indirectly (Düvel, 1991). The understanding that since needs represent the basic motives governing purposeful human behaviour, they are critical in understanding respondents' behaviour concerning payment for public extension visits. Of particular importance is whether these reasons are compatible with payment for public extension visits, something that could be expected to be the case if respondents' respective objectives could be achieved with paying for extension visits. The multiple regression results of the influence of respondents' reasons for farming on their acceptance to pay for public extension visits were investigated and are presented in Table 4. This variable had a significant positive relationship with payment as expected (Table 7). This finding concurs with Afful (1995).

Goals for next five years

The assertion that behaviour is after all directed toward a goal object as a means for need (internal) satisfaction

(Düvel, 1982) and the difficulty of reliably measuring the intra-personally located needs, led to the proposition to pay attention to the farmers' goals/aspirations/objectives in situation surveys (Düvel, 1982). Respondents' goals for the next five years were thus assessed to determine any influence relationship on their acceptance to pay for public extension visits. The results show that respondents' goals for the next five years positively related to payment as expected and the influence was significant (Table 4). Afful (1995) made a similar finding regarding farmers' reasons for keeping cattle.

Need tension

As hypothesized (Table 7), findings (Table 4) indicated that need tension resulting from a difference between aspired and present output (tons) per hectare has a positive and significant effect on payment for the delivery of public extension visits. Similar results were obtained for need tension arising from a difference between aspired and present level of practice adoption. These results are in line with past studies (Msuya, 2007). There seemed, however, to be a pattern of consistent significant positive results with need tension associated with a difference between aspired and present situation but inconsistent results for need tension in relation to perceived optimum and present situation or perceived optimum and aspired situation. These aberrant findings seem to be caused by respondents' lack of agreement with what was optimum; or perhaps respondents equated the optimum with their perceived aspired level that is, did not see any difference between their aspired yields or practice adoption level and what is perceived as the optimum and thus yielding little perceptual difference. There was no indication of previous investigations in the literature reviewed concerning the inconsistent results reported here of the influence relationships between these two dimensions of need tension and adoption. For this reason, it might be unjustifiable to make definitive statements as to whether or not these findings conform to expectations. More research is needed to confirm or reject the validity of this claim.

Awareness of disadvantages

The hypothesis concerning the negative relationship between respondents' awareness of the disadvantages of payment for the delivery of public extension visits and payment was as expected (Table 7). This influence was significant but negative (Table 4). Hudson and Hite (2002) similarly found that producers who perceive that the costs of the innovation under study outweigh the benefits had a much lower willingness to pay than producers who believed the benefits outweigh the costs.

Comparative contributions of independent and mediating variables to adoption

The independent variables separately contributed 58.8% (Table 3) to explain the variation in payment while the mediating variables explained 88.5% in the variation in payment (Table 4). Ajayi (2006) similarly found that the independent variables contributed 41.2% to farmers' willingness to pay for general extension services; there was however, no investigation of the mediating variables in his study. Habtemariam (2004) also found that the aggregate effect of the independent variables on the variation in production efficiency of maize farmers was 48.9% which was still lower than the effect of the mediating variables, which was 63.6%. The findings in this study (Tables 5) further confirmed the overall study hypothesis that the mediating variables contribute more to adoption of payment for the delivery of public extension visits than the independent variables. This finding is consistent with the results of past studies (Msuya, 2007; Habtemariam, 2004). This was evident from the fact that the effect of the independent variables was masked in the presence of the mediating variables because none of them significantly influenced the adoption of payment for the delivery of public extension visits. In other words, the independent variables manifest through the mediating variables. The total effect of both mediating and independent variables in explaining the variance in adoption was 87.9%. This might be due to the masked effect of the independent variables. This study was based on non-probability sampling and this makes it inappropriate to generalize the results to the wider population of small-scale commercial crop farmers in South Africa.

Even though this limitation does not invalidate the findings in terms of their ability to answer the main research hypothesis and contribute to the body of knowledge in extension science, a replication of the study by means of probability sampling methods would make it possible to generalize these findings in the larger population of small-scale commercial crop farmers in the country.

Conclusions

The mediating variables were found to contribute more to the adoption of co-financing for the delivery of public extension visits than the independent variables. The following mediating variables were found to significantly influence the payment for the delivery of public extension visits: reason for farming; farmers' goals for the next five years; unawareness of optimum yield per hectare achievable; need tension resulting from the difference between aspired and present output per hectare; need tension resulting from the difference between the aspired and present level of practice adoption; and awareness of

the disadvantages of payment for the delivery of public extension visits. Need tension, especially the difference between aspired and present situation with regard to practice adoption and production efficiency made the most individual contributions to the variation in adoption of co-financing for the delivery of public extension visits. The effect of the independent variables manifest through the mediating variables so adoption behaviour analysis could be focussed on a limited number of mediating variables in surveys. Narrowing the focus of adoption behaviour analysis to the more direct and immediate precursors of behaviour offers opportunities for a more rigorous assessment of the more relevant variables which can be changed as opposed to the more static independent variables. More importantly, focussing on the limited number of mediating variables identified in this study helps to cut down the cost of adoption behaviour surveys. This also offers opportunities for generating extra funds to deliver optimal extension visits to farmers. Cutting costs is essential in a period when public extension services face operational financial problems. The research implication of these findings is the need for future study to quantify how much income could be generated from such farmer contributions for extension visits.

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