

MONITORING IN EXTENSION: FROM PRINCIPLES TO PRACTICAL IMPLEMENTATION

G.H. Düvel¹

Correspondence author: Prof G.H. Düvel, Department of Agricultural Economics, Extension and Rural Development, Faculty of Natural and Agricultural Sciences, University of Pretoria, Pretoria 0002. Tel. +27-12-4203811, Fax. +27-12-4203247, E-mail: gustav.duvel@up.ac.za

Keywords: Monitoring, principles, practical implementation, evaluation.

ABSTRACT

Against the background assumption that effective monitoring, currently seriously lacking in most countries, can significantly contribute towards improvement of current and future extension, this paper explores different indicators as possible monitoring criteria. This is done by identifying important conditions and then assessing different indicators as potential criteria. Intervening variables, and more specifically certain needs and perceptions, are proposed as most appropriate criteria for this purpose, primarily because of empirical evidence regarding their predictive value of adoption behaviour. In conclusion the suggested implementation process is outlined.

1. INTRODUCTION

Monitoring if understood or defined as the ongoing measuring or gauging of progress or impact of extension, it stands in clear contrast to the more customary “summatory” evaluation, which is usually conducted at the end of a program and of which the evaluation results are normally of interest only for managers or managerial decisions. Monitoring, on the other hand, generating ongoing information on the progress regarding the programme objectives, by responding to the results, improve the current effectiveness and delivery and in that way can improve current and future extension. This more than anything else is what we need in extension today. However, worldwide the situation is, as far as monitoring is concerned, not much better. Lip

¹ Professor of Extension and Director of the South African Institute for Agricultural Extension, University of Pretoria, ZA-0002 Pretoria, South Africa.

service is paid to it but there is little evidence of it in practice. Perhaps the main reason for this is a lack of understanding of the concept of monitoring and the appropriate criteria for its implementation.

This paper explores different indicators regarding their appropriateness as monitoring criteria and, based on a theoretical exposition and conditions that should be met, proposes appropriate criteria and provides guidelines as far as their implementation is concerned.

2. THE PERCEIVED IMPORTANCE OF EVALUATION AND MONITORING

Commitment to proper evaluation and monitoring is partially dependent on whether its value is appreciated. The saying that evaluation and monitoring is one of the best, if not the best, ways of improving current and future evaluation, finds support amongst most of the public service extension workers in South Africa. This is evident from results of a national survey summarised in Table 1.

Table 1: The perceived importance rank order of more accountability and evaluation relative to other factors in terms of extension improvement (Düvel, 2002)

Factor	Mean weighted percentage	Rank order position
More training	55.3	1 st
More accountability	53.7	2 nd
More resources	52.9	3 rd
Improved management	48.9	4 th
Better staff selection	47.6	5 th
Better extension approach	44.7	6 th
More commitment	41.4	7 th

The table reflects the perceived comparative importance of different factors regarding their potential contribution towards the improvement of extension. From the above it is clear that accountability is perceived to be very important and on a national basis is only surpassed by 'more training'. Within the provinces there is more variation, and as Table 2 indicates, the importance varies from the first position in the Eastern Cape to as low as the fifth position in the Western Cape.

Table 2: The importance rank order of various factors (expressed as mean weighted percentage) in terms of their potential contribution towards the improvement of extension (Düvel, 2002)

Improvement Factor	E. Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape	TOTAL
Better and more training	52	60	55	57	56	55	55	55	53	55
More Accountability	60	49	50	53	52	54	56	53	38	54
More financial resources	49	40	56	56	53	51	57	56	64	53
Improved Management	44	66	57	45	47	55	77	47	61	49
Better staff selection	48	57	48	46	51	43	38	45	38	48
Better extension approach	43	47	42	43	44	50	45	44	54	45
More commitment	41	42	35	42	40	41	39	46	53	41

The fact that accountability is not seen as equally important in all the provinces can be attributed to the current level of evaluation and consequently the perceived potential improvement that it can bring about. It could also be attributed to the fact that frontline extension personnel perceive evaluation predominantly as a control measure and with it the associated fears and anxieties of not achieving what is expected. The dishonesty associated with the provision of fictive rather than real evaluation data represents further evidence in this regard.

3. CONDITIONS FOR MONITORING CRITERIA

Unlike summatory evaluation which tries to measure the end results of a programme, monitoring is focused on gathering information to improve the extension delivery in an ongoing and reiterative process. For such monitoring to be effective and useful the criteria used should meet the following conditions:

- (1) Criteria should be accessible to frequent measuring and monitoring. As extension inputs are being made or as soon afterwards as possible, it should be possible to read or measure or gauge the change (almost like reading dashboard panel meters). Efficiency aspects like yield or quality of the produce, and even

practices that are seasonal in nature don't meet this requirement as they normally allow only one assessment per year.

- (2) They should measure as directly as possible the change that occurs rather than the indirect results of such change. This means that the criteria should as far as possible represent the actual foci of extension endeavours.

In view of these conditions the various categories of criteria can now be assessed regarding their suitability as monitoring criteria.

4. APPROPRIATENESS OF VARIOUS CRITERIA

The hierarchical list of criteria developed by Bennet (1976) is one of the most commonly quoted frameworks, and can be used as a basis for an assessment of the appropriateness of different criteria for monitoring purposes.

Table 3: Bennet's (1976) hierarchy of evaluation criteria and an assessment of their appropriateness as monitoring criteria

Level	Description	Appropriateness
Level 8	Consequences for society, e.g. reduced unemployment	1
Level 7	Outcome or results of behaviour for target group, e.g. change in yield, etc	2
Level 6	Behaviour changes e.g. changes in practice adoption	3
Level 5	Change in behaviour determinants, e.g. knowledge, attitude, skills	5
Level 4	Farmers' opinion about extension activities	3
Level 3	Farmer participation (No. of farmers attended, percentage target group reached)	3
Level 2	Implementation of program activities, i.e. deviation from programme	3
Level 1	Programming of extension activities How has programme been planned with reference to manpower and resources, etc	2

The criteria in Table 3 can be clearly divided into input (levels 1-3) and output (levels 5-8) criteria with level 4 being somewhat out of place as it

stipulates the source of evaluation, and as such can relate to both input and output issues.

When assessing the general situation in South Africa, it can be concluded that where evaluation is done, the criteria are usually of an input nature. These criteria are valuable from a management point of view, like giving account of an allocated budget and controlling the inputs and the degree to which planned programmes have been carried out. However, they are insufficient and fall short of what is required in terms of real accountability, namely justifying the input or costs of extension in terms output achieved. This justifies a bigger emphasis on the output criteria, whose relevance and interrelationship is reflected in Figure 1.

Behaviour determinants (Level 5) fall into the category of independent and intervening variables (see Figure 1), while all the output criteria (Levels 5-8) resort under the categories of behaviour and consequences of behaviour.

The appropriateness of these output indicators as monitoring criteria can be briefly summarised as follows:

(1) Society Impact

From a general society or common good point of view, these are the most important indicators. Also for politicians who often have a say in the budget allocation, performance in this area is what ultimately matters and, more than anything else, justifies public expenditure. However, it is extremely difficult to reliably attribute the changes in impact to changes brought about by extension. Fortunately politicians are usually less concerned and critical about it and consequently every effort should be made to make all possible information (even if it is no valid evidence) available to them.

(2) Economic efficiency

Criteria of economic efficiency are probably the most important and meaningful indicators of the general goals of production efficiency normally pursued in agricultural development. Unfortunately information regarding them is not available unless records are kept, and

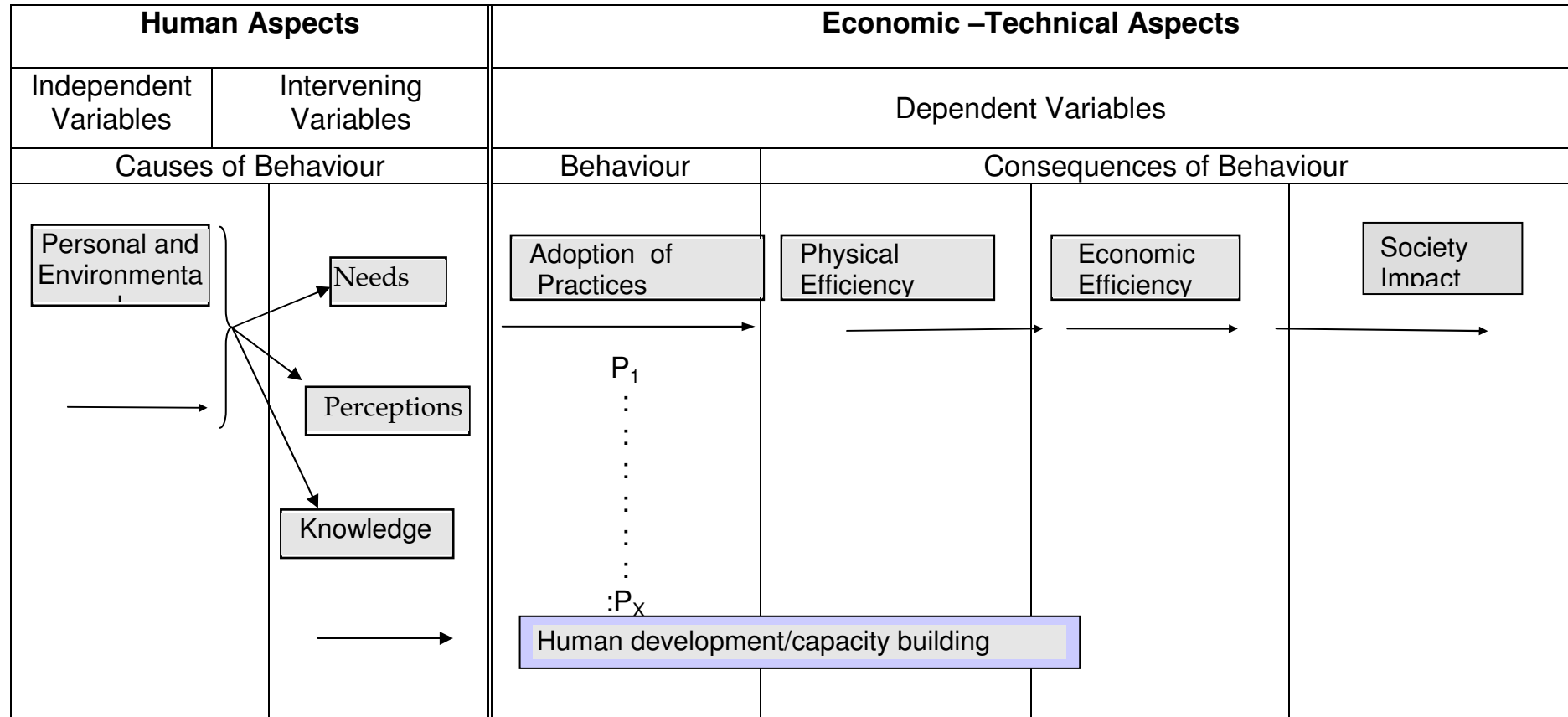


Figure 1: The relationship between behaviour-determining and behaviour-dependent variables in agricultural development

even where available, cumbersome to collect. Therefore, rather than basing assessments on unreliable information, it may be advisable to focus on the preceding and more accurate and reliable physical indicators of efficiency.

(3) Physical efficiency

Physical efficiency aspects like yield, quality of a product, conservation condition, etc. are amongst the criteria most commonly used in South Africa, but usually only for summatory purposes at the end of a programme or project. For this purpose these criteria are ideal, but an over-emphasis of them can be misleading if not seen in the context of the resulting economic results. Their limitation as monitoring criteria lies in their long-term nature, which in turn is (a) because these criteria cannot be measured frequently – usually only once a year at harvest or marketing (e.g. the yield of maize) and (b) because their early assessment is meaningless or misleading. The latter reason is based on the fact that these criteria are usually the result or outcome of a series of practices to be applied correctly and timeously, so that any premature assessment is of mere academic value. For example if an indicator like a high yield can only be attained through the implementation of a number of practices, the evaluation or assessment of the yield is only meaningful if all the various practices have received attention, and as long as this is not the case, the efficiency aspect is a more inferior indicator than the preceding or causal practices. Something that, no doubt, counts in favour of the efficiency measures is their ease of assessment or quantification.

A serious limitation of these criteria is that they are not only a function of the preceding adoption of practices, but also of external or environmental influences, like climate, markets, etc. This means that in spite of a successful extension effort resulting in improved practice adoption, the yield could have decreased because of a lower rainfall.

(4) Adoption of practices

The mere fact that the behaviour in the form of adoption of practices is the precursor to efficiency (result of behaviour) and also the fact that usually a multitude of practices contribute to a single efficiency

indicator, makes these behaviour indicators more appropriate and more useful monitoring criteria.

However, in spite of the multitude of criteria that they offer (which in turn has the prospect of more evidence being provided), and their more short term nature, they still have serious limitations as monitoring criteria. Most of the adoption criteria are still of a relatively long-term nature and can often only be assessed once in a year and therefore do not lend themselves to ongoing monitoring. For example the level of fertilisation, the seeding rate (plant population), cultivar choice etc. can only be assessed once a year, viz. at the beginning of a growing season. However, these criteria are a more direct result of extension inputs and are less influenced by external factors like climatic conditions, etc.

Where the emphasis is primarily on human development, it stands to reason that the respective objectives with the necessary criteria need to be developed. Finding appropriate criteria for their evaluation is not always easy, but capturing change in this regard, has the advantage that its value will not be easily underestimated simply because it is difficult to quantify and consequently difficult to bring into an input/output equation.

(5) Behaviour determinants

The only way that extension can influence the behaviour of farmers, namely their practice adoption, is by influencing the behaviour determinants on condition that these can be influenced or changed. This does not apply to all behaviour determinants, and certainly not to the independent variables, which usually refer to such aspects like age, education, farming experience, managerial aptitude, farm size, etc. This is one of the reasons why a clear distinction should be made between the independent and the more intervening variables. The latter variables are, as far as the extensionist's interest in evaluation is concerned, the most important and critical criteria. The more specific advantages of using the intervening variables as criteria for monitoring change are the following:

- * They are, as direct determinants of behaviour, the logical focus of intervention, and consequently also the logical criteria of evaluation.

- * They will, if monitored, reveal why (or why not) change has occurred. It is also through these variables that progress (or the lack of it) can be monitored and that the extensionist can get an indication concerning the adaptations that need to be made in terms of message, method or approach.
- * The number of intervening variables or aspects thereof (forces of change), that are relevant in the case of every practice, and for which individual specific objectives can be formulated, represent a large number of criteria that can be monitored and thus provide a continuous flow of evidence of progress – something that extension managers who have to negotiate and justify budgets urgently need.
- * They allow for a fair and just merit assessment or recognition of performance. It is not uncommon for an extensionist to either get undue credit for change that can only be partially accredited to him, or -- perhaps even more frequently -- not to get credit for what he has accomplished, simply because the change is of a covert nature and has not yet been manifested in visible behaviour or the results of it. Since all extension inputs are directly focused on the intervening variables or forces of behaviour, a monitoring of them is the most direct reflection of what is being or what has been achieved

5. INTERVENING VARIABLES AS MONITORING CRITERIA

As already mentioned the appropriate variables for monitoring change are the intervening variables, and more specifically the cognitive variables associated with needs, perceptions and knowledge. These have been selected and tested in extensive research projects over a number of years (Düvel, 1975; Düvel & Louw, 1978; De Klerk & Düvel, 1982; Düvel & Scholtz, 1986; Marincowitz & Düvel, 1987; Düvel & Botha, 1990 and Düvel, 1991). In more recent research (Habtemariam & Düvel, 2003 ; Msuya, 2006) the predictive value of these intervening variables has been verified in different cultures, as Table 4, which compares the influence of independent and intervening variables in two different countries and commodities, clearly illustrates.

The intervening variables that have been found to be closely related to adoption behaviour are needs, perception and knowledge. The more

specific determinants within each of these categories will now be briefly outlined.

Table 4: The predictive value (total variance explained) of independent and intervening variables on practice adoption and production efficiency in different countries and different commodities, expressed as a percentage ($R^2 \times 100$)

Dependent variables	Independent var.	Intervening var.
	%	%
Maize Production (Ethiopia) ¹		
(a) Practice adoption	33.1	87
(b) Production efficiency	26.7	97
Maize Production (Tanzania) ²		
(a) Variety choice	18.7	86.6
(b) Phosphate fertilization	24.8	73.2
(c) Nitrogen fertilization	29.5	74.8
(d) Total fertilization	32.9	82.0
(e) Seed spacing	6.0	93.6
Dairy Production (Ethiopia) ¹		
(a) Practice adoption	17.8	68.3
(b) Production efficiency	19.3	80.9

¹ Habtemariam & Düvel (2003), ² Msuya (2006)

The intervening variables that have been found to be closely related to adoption behaviour are needs, perception and knowledge. The more specific determinants within each of these categories will now be briefly outlined.

(1) Needs

The need-related causes that have been found to determine the non-adoption of recommended practices are (a) a lacking need or aspiration and (b) need incompatibility.

The lacking aspiration relates more specifically to (i) a tendency on the part of the farmer to overrate his own efficiency, e.g. his poor grazing condition or production efficiency, (ii) to an unawareness of the possibilities or the optimum and/or (iii) to a satisfaction with the present

situation or having a sub-optimal aspiration. The need incompatibility refers to the innovation as not representing a need related goal or a means of achieving such a goal. All these four (4) need related aspects can be summarised as follows:

- (a) Lacking need or aspiration: (i) overrate own efficiency (1)
(ii) unaware of solution or optimum (2)
(iii) satisfied with current or sub-optimal alternative (3)
- (b) Need incompatibility (4)

All the aspects related to a lacking need or aspiration have to do with the problem perception where a problem is regarded as being the difference between "what is" (present situation) and "what can be" or is strived at, viz. the desired situation (Düvel, 1994:189). If the existing situation, e.g. the efficiency of production or rangeland condition, is overrated due to "misperception" the perceived scope of the problem or potential need tension is reduced. If, at the same time, there is limited knowledge concerning the optimum that is achievable, the potential problem and need can be further reduced to an insignificant level. The need incompatibility means that an innovation or recommended practice does not fit the life space or need situation of the individual in the sense that it is not perceived as either a need related goal, or as a means of achieving such a goal.

(2) Perceptions

Although perceptions and needs (especially aspirations and goals) are related and interwoven, the necessity to identify all direct behaviour determinants as specifically as possible, justifies a separate focus on perception. Where needs usually relate to the positive or driving forces which in total constitute the attractiveness, perceptions are of a more specific nature and are analysed on the basis of attributes of innovations. Rogers' (1983) classification of innovation attributes does not suit this purpose, mainly because of the broad and unspecific categories. In order to make provision for a wider spectrum of specific forces (for the purpose of cause identification as well as for addressing these causes in the attempt to promote change), these attributes have been redefined (Düvel, 1987). The categories that can be directly associated with field forces are

relative advantages, compatibility aspects and prominence and consequently give direct access to the possible identification of relevant positive and negative forces.

An unfavourable perception as cause of unwillingness to adopt, can thus have the following causes:

- (a) Insufficient prominence, i.e. the recommended practice is seen as less prominent or less advantageous than the current one or than another alternative. This perception aspect corresponds with Rogers' (1983) definition of "relative advantage" (5)
 - (b) Unawareness of the advantages of the recommended solution (6)
 - (c) Awareness or concern of disadvantages of the recommended solution (7)
 - (d) Situational incompatibility, viz. an awareness of constraints preventing the implementation of the solution or recommended practice (8)
- (3) Knowledge

Knowledge that is relevant in the case of innovation or practice adoption can be categorised as follows:

- (a) Basic knowledge or knowledge of principles
- (b) Knowledge or awareness of the solution (innovation). [See (2) under needs.]
- (c) Knowledge of the relative advantage. [See (6) under needs.]
- (d) Knowledge or skill in respect of the application of an innovation or practice

From a motivation point of view it is really only the knowledge concerning the recommended solution (b) and its relative advantages (c) that is important. These aspects of knowledge or cognition can also be regarded as intrinsic parts of perception and thus largely overlap with it

(See the cross reference above). It is for this reason that an analysis of perception also caters for the most relevant aspects of knowledge.

The knowledge of principles is important in certain circumstances where the insight it provides can have a bearing on the intensity with which the relative advantages are perceived as field forces. This Basic knowledge is also fundamental if the farmer is to become independent or self-sufficient in terms of decision-making and self-help. Practical knowledge is usually not critical as it is one of the last pre-requisites for implementation or, in terms of Lewin's (1951) model, one of the last areas through which it is necessary to move before goal achievement.

6. PRACTICAL IMPLEMENTATION

Having established a sound theoretical basis for the monitoring of extension to be primarily focused on intervening behaviour determinants, the following represents a very brief overview of the implementation procedure. Essential aspects of the practical procedure are the following:

- (a) Problem conceptualisation. This hypothetical exercise includes both the technical and human aspect. In the technical phase, the priority problem is defined and the causes identified, which invariably represent the various recommended agricultural practices. For each of the agricultural practices the hypothetical human causes –using the guideline of causes (1) to (8) presented in the above par. 5. – are then identified.
- (b) Baseline assessment. Having completed the problem conceptualisation (problem tree), representing a hypothetical construct of all possible agricultural, technical and economic and human causes, and the baseline assessment consists of a questionnaire construction and subsequent survey to establish whether and to what degree the hypothesised causes do in fact apply. A survey of some sort is inevitable, but should be purposeful with the problem conceptualisation or problem tree dictating what information is to be gathered.
- (c) Formulation of Objectives (objectives tree). The objectives are based on the survey findings which provide the baseline

- standards while the level to be achieved or strived for (both in terms of standard and time frame) should be a target arrived at by consensus of the programme development committee. This means that measurable objectives are not only to be developed for every efficiency aspect (primary goal) and every practice to be promoted (secondary objective) but also for every behaviour determinant of every practice (specific objectives). (See intervening variables 1 to 8).
- (d) Developing programme of change. The only possible or meaningful communication programme that can be developed is one that is focused on changing or influencing the intervening behaviour determinants (intervening variables 1-8). They are the foci of all extension inputs through various delivery methods. In practice this means that appropriate extension methods are selected for every specific objective.
- (e) Monitoring change. If every extension input is focused on influencing the forces of change, of which the baseline information is known from the baseline survey, it means that after every input, the change in the force(s) can be monitored.

7. CONCLUSION

With increasing pressure on extension to become more professional, more scientific and thus more effective and efficient, evaluation and monitoring procedures like the above, will have to be seriously considered and perhaps even introduced as policy. It is no longer necessary and even acceptable to continue with the widely used "hit or miss" approach, by ignoring the human factor or, what is more common among extensionists, by projecting ourselves with our perceptions, preferences, opinions, reasoning, etc. on the clients in the hope of "hitting" and having success somewhere. The above scientific-based, situation-appropriate (in terms of message content and design), purposeful and continuously monitored approach can be a major step towards, if not the hall mark of, professional extension.

REFERENCES

- BENNET, C.F., 1976. *Analysing impacts of extension programs*. USDA Extension Service, Washington DC.
- DE KLERK, C.H. & DÜVEL, G.H., 1982. Human and environmental influences on practice adoption and reproduction efficiency in the high potential cattle farming areas of South West Africa. *South African Journal of Agricultural Extension*, 11:1-15.
- 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., 1994. A need and perception oriented approach for analysing and promoting behaviour change in agricultural development. In: H.Albrecht (ed.): *Einsicht als Agens des Handelns: Beratung und Angewandte Psychologie*. Weikersheim: Margraf Verlag.
- 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. & LOUW, J.C., 1978. Differential perception: A communication obstacle. *South African Journal of Agricultural Extension* 7:3-14.
- DÜVEL, G.H. & SCHOLTZ, H.P.J., 1986. The non-acceptability of recommended veld management practices. *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 meaningful analysis, intervention and evaluation of adoption behaviour. *South African Journal of Agricultural Extension*, 32:73-84.

MARINCOWITZ, G.J.O. & DÜVEL, G.H., 1987. The role of needs in the adoption and promotion of boer goat farming, *South African Journal of Agricultural Extension*, 16:11-18.

MSUYA, C.P., 2006. *The comparative role of intervening and independent variables in the adoption behaviour of maize growers in Njombe District, Tanzania*. PhD thesis, University of Pretoria (unpublished).

ROGERS, E.M., 1983. *Diffusion of innovations*. Third Edition. New York: The Free Press.