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## **THE ROLE AND LIMITATIONS OF ECONOMIC INCENTIVES IN CONSERVATION FARMING**

G H Düvel

Based on the assumption that needs play a key role in adoption behaviour, it is hypothesised that especially economic incentives, or a lack thereof, are of critical importance in explaining behaviour concerning recommended veld management systems. The perceived incompatibility of improved veld management with economic aspirations and goals and the doubts concerning production advantages and overall profitability, support the hypothesis and suggest that a strengthening of change-conducive or positive forces is more likely to bring about change than a reduction of negative forces.

### **THE PROBLEM OF VELD DETERIORATION IN THE RSA**

In the RSA, where natural veld comprises over 80 percent of the agricultural land, conservation farming is largely equivalent to effective veld management. However, for many decades veld deterioration has been a major problem.

As early as 1923 the appointed Drought Investigation Commission pointed out that veld deterioration and soil erosion in South Africa had taken on extensive proportions in large parts of South Africa and was continuing unabated. Since then numerous investigations have been launched and recommendations made. Legislation was passed making provision for the prosecution of land users exploiting and destroying the natural resources, and also for financial aid in facilitating the erection of soil conservation works. Furthermore, extension and research services were instigated, state aid schemes were made available during periods of drought, and stock reduction schemes were implemented.

All these actions were unable, however, to stem the veld retrogression which is generally attributed to poor veld management. Up to date effective veld management is still only practised by a small percentage of farmers. This seems to indicate that the adoption of recommended veld management practices is not worthwhile for the majority of farmers. If this is the case, it seems to imply that effective veld management has insufficient or no economic advantages.

Before presenting research findings concerning the relationship between perceived economic incentives and effective veld management, the possible role of economic incentives in the context of behaviour change needs to be illuminated.

### **ECONOMIC INCENTIVES AND BEHAVIOUR CHANGE - A THEORETICAL EXPOSITION**

Any decision to adopt or reject an innovation or farming practice ultimately rests with the farmers themselves. It is for this reason that any form of development, including agricultural development with its strong commitment to the conservation of natural resources, essentially revolves around behavioural change.

If it is accepted, as is generally the case, that human behaviour is purposeful, it seems logical to conclude that there must be a motive behind all behaviour, i.e. adoption behaviour or behaviour preceded by conscious decision-making. This motive can be accepted to be

directly or indirectly need-dependent, especially if needs are interpreted in the wider sense of the word, i.e. when also including need-associated variables such as drives, aspirations, goals and problems. Against this background needs evolve as a key dimension in decision-making and consequently in behavioural change.

This view concerning the critical role of needs, is reconcilable with Lewin's (1951) field theory and boils down to the fact that an innovation (in this case effective veld management or controlled selective grazing) must become part of the individual's psychological field and assume an attractiveness or positive valency in the eyes of the individual before any adoption or behaviour change can occur. This innovation need not necessarily be the farmer's primary goal or objective as such, but it should in some way or other be perceived as a means to or contributing towards its achievement, and thus indirectly to the satisfaction of one or more basic needs.

The overall attractiveness or valency of the innovation can be expected to depend on its compatibility with the individual's needs or objectives or its instrumental relationship with them. This means that the attractiveness or valency of an innovation could be increased by increasing the instrumental relationship, and this would mean the addition of positive or change-conductive forces. Viewed in this light, all positive and negative forces, which are associated with the psychological field (Lewin, 1951) and can be analysed as attributes of an innovation (Düvel, 1975), can in fact be regarded as directly or indirectly need-related. Even the hindrances en route to the pursued goal can, because of their potential influence of indirectly reducing the perceived attractiveness or valency, be regarded as indirectly related to needs (see Figure 1).

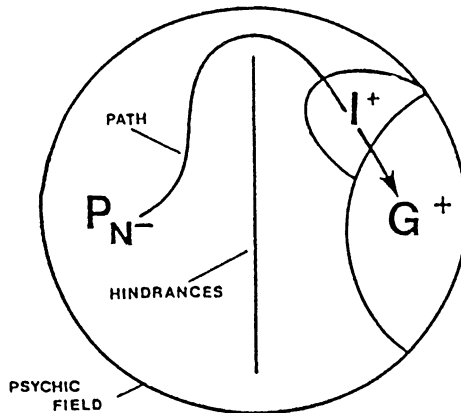


Figure 1: The perceived goal(G)- and need(N)-relatedness of an innovation (I) as prerequisite for adoption by a person (P)

From the above follows that one of the prerequisites for the adoption of recommended veld management practices is that they are perceived by the individual as being related to his goals or aspirations which in turn are, in his own view, worth striving for because of their perceived need-satisfying capacity. This means that the individual has to perceive efficient veld management as being synonymous with one or more of his goals or aspirations, or as being a means towards their achievement.

The importance of economic needs is evident from the fact that they can be directly associated with most of Maslow's (1954) need categories and especially those of security, social acceptance, recognition and, depending on interpretation, even self-actualisation. This association is of an instrumental nature in the sense that the economic needs or their fulfilment (e.g. maximum income, minimum risk) can be instrumental in or a means towards the satisfaction of the mentioned basic needs.

Although the cliché of man being a *homo economicus* is unacceptable and an oversimplification, economic needs or goals appear to be exceptionally important because they can, as shown above, be regarded as a possible means towards a multitude of basic needs. It is largely for this reason that addressing the financial needs of farmers or using them as point of departure for purposes of persuasion, is sensible and in general very effective.

In certain respects a differentiation can be made within the concept of needs as understood in popular parlance, namely on the basis of an instrumental or influence relationship (Düvel, 1982). For example, the basic need for recognition or esteem may be achieved or satisfied through economic success. This primary goal can in turn be achieved through various means or secondary goals such as the expansion or intensification of a specific enterprise, switching over to another type of farming or breed of cattle, more optimal integration of enterprises or even improving veld condition through better veld management. The goal (secondary goal) perceived as the best alternative (being a product of attractiveness and probability) is the most likely one to be pursued.

When reduced to a simple constellation of opposing forces, the eventual causes of non-adoption can be found in an absence of positive forces or a relative predominance of negative over positive forces (in the case of recommended veld management systems as such or in comparison with other alternatives).

Earlier investigations (Wilken, 1970; Düvel, 1970) were based on the supposition - which was apparently confirmed - that the wide range of perceived negative forces prevented behavioural change. The fact that no significant progress was made since then suggests that the extension services were unsuccessful in reducing or removing the perceived negative forces, either because of ineffective persuasion or because these forces are in fact quasi-constants.

On the other hand even a complete elimination of negative forces cannot, in the absence of positive forces, lead to an imbalance of positive over negative forces and thus bring about change.

### **HYPOTHESIS**

In view of the above, it is hypothesised that the non-adoption of veld management practices can be attributed to insufficient economic incentives or to an incompatibility of conservation farming with the farmer's economic needs.

### METHODOLOGY

The survey was undertaken in the Eastern Transvaal in an area falling under the jurisdiction of the Volksrust Farmers Association. This predominantly mixed sourveld region has an average summer rainfall of about 750 mm p.a. with sheep farming being the most important enterprise.

An important consideration in the selection of this area was that its farmers had been exposed more intensively to extension inputs concerning veld management, and more specifically the recommended controlled selective grazing system (CSG).

77 farmers out of a total of 101 were included in the survey and data were collected by means of a personal interview schedule. The questionnaire was designed to include efficiency measures such as calving and lambing percentages, weaning weights, wool production, wintering, veld management, veld condition as well as the psychological field forces (positive and negative) determined by a need assessment and analysis of respondents' perception of innovation attributes.

### RESULTS

Accepting that the attractiveness or valency of an innovation, in this case the recommended CSG-system, is largely dependent on whether the individual perceives it as being part of his goals or aspirations or as means thereto, a knowledge of these aspirations is essential. Table 1 summarises the respondents' main aspirations and confirms the importance of economic or financial needs (aspirations).

**Table 1**  
**The aspirations (goals) of Volksrust farmers 1982**

Aspirations	Percentage respondents (N = 77)
Non-materialistic	52,1
Financial or economic	40,2
Optimum stock production	2,1
Other (not related to agriculture)	6,5
Veld improvement	0,0

For more than 40 percent of the respondents the most important need is an economic one. Many of the non-materialistic aspirations, which include aspects such as good education for children, having a well-developed or model farm, leading a good and happy life, breeding quality stock, etc., are often only attainable through secondary goals of an economic nature, and can thus, to a large extent, be regarded as economically related. The aspiration of optimum stock production is probably also of an economic nature in so far as it can be a means towards better economic returns.

Veld improvement did not feature as an important aspiration. However, if farmers saw in it a means whereby economic goals or advantages could be attained, veld improvement practices or the CSG-system could appear attractive and stand a chance of being implemented. The reaction to a more direct question concerning the plans farmers have to increase their net income, largely rules out this possibility. In this case only a single farmer mentioned improved feeding which could be associated with better veld management.

Even in the case of a still more specific question concerning plans to increase stock production, only 9 percent of the respondents mentioned better veld management as one of the ways to achieve this objective. These results reveal that the need hierarchy and specifically the economic needs of the majority of respondents do not accommodate improved veld management.

The fact that better veld management does not feature as primary goal or as a means thereto, may be related to respondents' perception of their veld condition. According to Table 2, as many as 58,4 percent and 37,7 percent of the respondents rated their veld as good and fair respectively. Only about 4 percent perceived their veld condition as weak and critical and could be expected to experience a significant need for veld improvement. The potential need can be increased considerably, if farmers could be disillusioned to perceive their veld condition more objectively and realistically. This should be possible since, according to Table 2, respondents rate their veld condition significantly more optimistically than extension workers or pasture specialists (Table 2).

**Table 2**  
**An assessment of veld condition in the Volksrust extension ward by farmers, extension workers and pasture specialists**

	Percentage farms rated			
	Good (%)	Fair (%)	Weak (%)	Critical (%)
Farmers	58,4	37,7	2,6	1,3
Extension workers	11,7	49,4	33,8	5,1
Pasture specialists	14,7	30,9	36,5	20,5

Should farmers, apart from the fact that they overrate their veld condition, also be of the opinion that their veld management is optimal or that it leaves little scope for improvement, the need situation certainly would not favour change. This is in fact the case, as can be deduced from Table 3 according to which 96,1 percent of the farmers rate their veld management as reasonable to good. Although only 11,7 percent of the respondents have reached an acceptable level of veld management, there seems to be, based on farmers' tendency to overrate their efficiency, not much reason for the majority of respondents to change their present method of veld management.

Indications of economic incentives or lack thereof, also appear from an open-ended question concerning the advantages and disadvantage of improved veld management. These findings are summarised in Table 4.

Although the disadvantages could also refer to constraints which, once overcome, are of mere theoretical relevance, it is nevertheless striking that the advantages of higher production (37,0%) are over-shadowed by costs incurred (49,1%).

The general imbalance of total negative forces (disadvantages) over positive forces (advantages) also applies individually to the majority of respondents. As Table 5 indicates, about 76 percent of the respondents perceive as many or more negative forces than positive forces. Only about 23 percent therefore have a force constellation that favours change.



**Table 3**  
**The efficiency of respondents' veld management as perceived by the respondents themselves and by extension workers, Volksrust 1982**

Efficiency of veld management	Percentage respondents as rated by	
	Farmers	Extension personnel
Poor	3,9	39,0
Reasonable	37,7	49,4
Good	58,4	11,6

**Table 4**  
**Perceived advantages and disadvantages of the controlled selective grazing system, Volksrust**

Perception	% farmers
Advantages:	
Higher production	37,0
Veld improvement	5,6
Other	57,4
Disadvantages:	
Costs	49,1
Veld utilisation problems	24,5
Complexity	23,9
Other	14,1

**Table 5**  
**Ratio between number of perceived advantages (positive forces) and disadvantages (negative forces) of Controlled Selective Grazing (CSG)**

Ratio between positive and negative forces	Respondents	
	N	%
Pos > Neg	18	23,37
Pos = Neg	25	33,77
Pos < Neg	33	42,86
Total	77	100,0

A further indication of the role of financial incentives in the case of veld management can be obtained from respondents' perception of specific attributes or aspects thereof. As far as explaining past behaviour is concerned, these perceptions have limited value, as by addressing them they are consciously brought into the psychic field, making it no longer possible to conclude with certainty whether such factors had previously been part of the psychological field and thus a contributing factor to decision-making (adoption or rejection)

or not.

The production aspects are probably most directly related to economic incentives. Respondents' perception concerning them are summarised in Table 6.

At first glance the perceptions appear reasonably positive. There is reason for alarm, however, when one considers that only about half of the respondents are aware or convinced of the economic advantages, which can be expected to be important prerequisites if farmers are to consider the adoption of better veld management. In fact, they should be of reasonable strength in order to effectively counteract the negative forces (e.g. compatibility aspects). Theoretically a slight imbalance of positive over negative forces should result in movement, but unfortunately no sufficiently sensitive measure is available yet that reliably and accurately measures the strength of forces as valencies. It is disturbing, however, that correlations between these perceptions and veld management are insignificant or even tend to be negative. This confirms the conclusion that respondents that have adopted better veld management systems don't necessarily have a more favourable perception of CSG. In many cases it even tends to be less favourable.

**Table 6**  
**The perception of production attributes of Controlled Selective Grazing and the relationship with veld management**

Item	Distribution of respondents			Correlation with veld management (%)
	Positive (%)	Neutral (%)	Negative (%)	
Income	54,25	23,38	23,25	-0,047
Carrying capacity	45,45	22,08	32,47	-0,031
Reproduction	55,84	16,88	27,27	-0,137
Weaning weights	51,95	20,78	27,27	-0,028
Wool production	44,16	31,17	24,68	-0,175
Wintering	31,17	12,99	55,84	0,015
Veld improvement (palatable grasses)	46,75	19,48	33,77	0,034

Another possible explanation for these unusual findings is unreliability, or purely speculative answers, especially among the less efficient farmers. This suspicion is borne out by the wide variation of opinions. Respondents rated fair and poor in terms of veld management had perceptions concerning the advantage of higher income which varied from 2 to as much as 70 percent.

After years of extension inputs most farmers are probably aware of the supposed advantages of better veld management. It is however possible that this is merely a cognitive awareness or knowledge of advantages rather than a conviction concerning positive forces based on experience or insight. There is therefore reason to suspect that farmers, after having been exposed to many years of extension inputs, have cognitively assimilated a lot of knowledge, without necessarily having been convinced.

A further possibility is that the explanation of behaviour or action tendency (T) is, as

suggested by Atkinson (1982) not only determined by the valency strength (V) but also by the perceived probability (P) of goal attainment.

$$T = V \times P$$

Whatever the case may be, the question can rightly be asked whether pasture scientists have come up with sufficient observable and trustworthy evidence to make more favourable and rational perception at all feasible. It is also doubtful whether there can already be talk of appropriate technology, judging by a comparative rating by respondents of the CSG-system and their own system or what they believe to be the best alternative (see Table 7).

Table 7 reveals that less than 40 percent of the respondents regard the CSG-system as better than the next best alternative. However, for only about half of them the difference is substantial (more than 25 percent better). These findings suggest that the recommended CSG-system is in terms of prominence or attractiveness (valency) not competitive enough when compared with farmers' alternative systems of veld management.

**Table 7**  
**The relationship between respondents' veld management and their perception concerning the prominence of Controlled Selective Grazing (CSG) relative to what they regard as the most acceptable alternative**

Perceived prominence	Respondents per veld management category					
	Poor		Fair		Good	
	No.	%	No.	%	No.	%
CSG is much better than alternative (> 25% better)	12	21,4	3	16,7	0	0
CSG is better than alternative (<25% better)	12	21,4	1	5,5	1	33,3
CSG equals alternative	12	21,4	1	5,5	0	0
CSG inferior to alternative (<25%)	12	21,4	4	22,3	0	0
CSG much inferior to alternative (>25%)	8	14,4	7	50,0	2	66,7
Total	56	100,0	18	100,0	3	100,0

$r = -0,316; p = 0,005$

What is rather perturbing and gives food for thought is that the better veld managers are not necessarily more outspoken in favour of the recommended CSG-system. The tendency rather seems to be reversed, as is evident from Table 7 and the negative correlation coefficient ( $r = -0,316; p = 0,005$ ).

The same applies to the relationship between managerial aptitude (as measured by Burger, 1965) and respondents' perception of the prominence of the CSG-system. The significant negative correlation ( $r = -0,37; p = 0,02; \chi^2 = 18,0; p = 0,0001; 4 \text{ d.f.}$ )

suggests that the better managers tend to be less convinced of the advantages or profitability of the CSG-system. This is contrary to the normal findings concerning the relationship between managerial aptitude and the adoption of appropriate technology, thus seriously questioning the appropriateness of the CSG-system from an economic point of view.

To some extent the same applies to veld management in general. In Table 8 different personal and environmental factors are correlated with veld management as well as with one of its most important sub-facets, namely stocking rate.

**Table 8**  
**The relationship between some personal and environment factors and veld management and stocking rate**

Personal and environmental factors	Veld management				Stocking rate			
	r	p	chi <sup>2</sup>	p	r	p	chi <sup>2</sup>	p
Age	-0,06	0,61	7,49	0,11	0,06	0,59	3,56	0,47
Education	0,15	0,18	11,93	0,75	0,06	0,60	24,69	0,08*
Agric. education	0,04	0,72	2,39	0,88	0,10	0,40	8,24	0,22
Farming experience	-0,004	0,98	3,58	0,73	0,07	0,56	8,69	0,19
Social status	0,18	0,13	6,06	0,20	0,21	0,07*	5,32	0,26
Net farm income	0,02	0,88	3,00	0,56	0,29	0,01*	3,28	0,51
Managerial aptitude	0,22	0,88	3,83	0,43	-0,01	0,98	7,97	0,09*

(\* significant;  $p < 0,10$ ); (\*\* highly significant;  $p < 0,01$ )

Contrary to general tendencies where the above personal factors usually correlate positively with practice adoption (Rogers, 1983), the complete absence of positive correlations in the case of veld management questions its appropriateness. If the advantages had been beyond question or more observable, positive correlations could have been expected. That it is more profitable to mismanage or overgraze the veld seems to be supported by the significant positive correlation ( $r = 0,29$ ;  $p = 0,01$ ) between net farm income and stocking rate.

### SUMMARY AND CONCLUSIONS

The findings support the hypothesis that the large-scale non-adoption of veld management is largely due to a lack of economic incentives, the most important being that respondents' needs are in general incompatible with conservation farming. With as many as 97 percent of the respondents veld improvement or better veld management did not feature as a possible means in the realization of their economic aspirations or goals.

The lack of financial incentives is also reflected by the fact that

- less than 70 percent of respondents believe that the increased income from both better veld management and wintering will justify the expenses,
- only 53 percent saw production advantages in better veld management and veld improvement (although as many as 44 percent of these believed that there were better alternatives than the CSG-system) and
- the CSG-system is only regarded by 55 percent of the respondents as the best alternative. The remaining 45 percent perceived the CSG-system as being less prominent or

advantageous than other alternatives.

- 80 percent of the respondents considerably over-estimate their veld condition and
- 90 percent over-estimate the efficiency of their veld management.

The fact that little headway has been made in the improvement of veld management in spite of several decades of extension inputs creates the impression that especially in the sourveld regions of the Eastern Transvaal, the CSG-system is unacceptable to farmers. Even the relatively negative perception of the few "adopters" confirms this. Are extension workers then trying the impossible, namely to "sell" the unsellable? The imbalance of psychological field forces is so predominantly negative that a considerable amount of change or force manipulation will be necessary before change can occur. The widely held belief that an imbalance of positive over negative forces can be achieved by a mere reduction of negative forces (improving the compatibility aspects) is in this case very unlikely. It rather seems that the basic cause for non-adoption is the absence or inadequacy of positive forces, i.e. the recommended grazing system (CSG) is not in line with respondents' needs, or more specifically with their economic or financial needs.

There are limitations as to the extent that economic incentives or the overall attractiveness from an economic point of view, can be increased. One possibility is a form of subsidy which, however, will have to be perceived as an incentive for veld improvement and not as a goal as such. Purposeful efforts to increase the observability of economic advantages by means of farm demonstrations and applied farm research being credible and persuasive in the eyes of the farmer, should also receive more attention.

What is likely to have the biggest change impact is the creation of additional incentives (over and above the economic ones) such as norms that can become a basis for recognition and prestige. This implies the establishment of an additional objective within the individual's psychological field, which is compatible with or can be achieved through improved veld management. The widely increasing concern about pollution and community pressure concerning environment conservation may well fulfil this function.

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