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Implications of under-funding research and agricultural extension in Erstwhile Bophuthatswana: Some lessons for agricultural development in democratic South Africa

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Abstract

The paper explores the former Bophuthatswana's (Bophuthatswana was formerly a Black homeland, granted independence by the apartheid South African government) ability to have met the challenges of increasing food production, on the basis that this depended on the level of investment in agricultural research and extension. This assumes relevance to the all-embracing fact that the erstwhile Bophuthatswana population was approximately 80 percent rural. The paper therefore takes an historical view, and in this regard, an attempt is made to explore in some detail, the management implications and the principles involved in management and leadership, with a view of outlining the possible implications of under – funding research and particularly extension by the erstwhile Bophuthatswana government. It is hoped that the democratic South African government would be in a position to learn from the lessons of failure within the agricultural dynamic of Bophuthatswana, and to charter a course of sound extension and research management, in order to promote the general welfare, understand the implications of underfunding and its consequences to the people of South Africa.

Keywords:Extension, Research, Underfunding, Investment, Market Equilibrium, Productivity, Base Line

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1. Introduction

Increases in agricultural productivity are often attributed to production – oriented agricultural research and extension. Because such activities use resources, an important question is whether or not it pays for society to invest in them. Many studies indicate high returns to a wide range of agricultural research and extension investments (for a summary of these results, see Peterson and Hayami; Arndt; Dalrymple; and Ruttan). However, we still need to assess the long – run consequences of alternative levels of research and extension investment. Investment could be adjusted to achieve desired levels of future agricultural prices relative to other goods and services. Because of the lagged response to agricultural research, it obviously would be impossible to control short – run fluctuations in prices through research and extension investment. However, long – run price trends might be controlled by adjusting such investments. In the ensuing discussion the writer will attempt to analyze investment patterns for agricultural research and extension that could, and will achieve selected levels of expected growth in agricultural output. More specifically an attempt will be made to formulate an economic model of the agricultural sector in which technological change is achieved from investment in agricultural research and extension, and identify optimum patterns of investment based on the rate of return estimates, and, finally assess the consequences of failure to achieve the optimum investment as it relates to the former Bophuthatswana. From all of this, lessons can be learned, and thus expose the management and extension student to perspectives that are important in terms of the management of agriculture, the promotion of economic principles and, the consolidation of application to agribusiness in general. Finally, it exposes the reader and the management student to the vagaries of variables that have a direct impact upon poverty, by virtue of increases in food prices which currently affects the cost of living in South Africa and the world over.

2. Conceptual framework

Economic policies generally are formulated under uncertainty about the eventual levels of important uncontrollable factors. By anticipating these variables, policy – makers can successfully achieve selected economic objectives. - “Hence, economic policies may be viewed as the use of available instruments to achieve desired values and time paths of policy targets” (Fox et al., 1966). The objective of the policy – maker may be to change the price trend of agricultural commodities relative to other goods and services. The problem is to select the investment level of agricultural research and extension so that the target variable, the desired price point, is attained. In general, farm price is an important variable because higher farm prices are translated into higher food prices. Raising food prices can increase the cost of living. Also farm prices are a major determinant of farm sectoral income. If the rate of growth in agricultural productivity is too rapid relative to demand growth, farm prices and farm income may be depressed. Severe adjustment burdens may be imposed on marginal resources in the sector.

3. The model

Estimates of market equilibrium through time depend on the specification of supply and demand schedules. Since investments in research and extension are long – run supply phenomena, a simple model using short – run supply and demand elasticity's would be inappropriate. The supply and demand elasticity's would be inappropriate. The supply and demand relationships must be sufficiently flexible to model the system through time. In developing the model further, the aspect of supply and demand parameters must be taken into consideration. In this regard, the price elasticity's used in the analysis must be based on sound econometric studies of agricultural production. Similarly, the aspect of determinants of productivity growth must be given the necessary importance. Therefore, growth in agricultural productivity defined as an index, can be represented by an increase in output per unit of input. Increases in productivity reflect changes in the quality of inputs, but such changes generally are not captured in the total input measure. These changes can be attributed to an increase in knowledge resulting from education, research and extension.

The relationship between input, quality improvements, research, extension and education may be measured by inserting these variables directly into the production function.

Grallocks (1964) was the first to use education, research and extension as separate variables in production functions. Since then, several others have used the approach. The above use of such parameters, or any other model in relationship to improvements in the production sectors of the erstwhile Bophuthatswana, cannot be identified, in spite of surfing the literature and discussing the issue with many in the agricultural sector at that time. Extension's role is distinct from that of research. Therefore, a separate extension variable should be used in the production function. However, measuring the separate influence of extension on agricultural productivity has been difficult because of the multi – co linearity between these variables in time series data. It was found that "even sophisticated econometric techniques such as ridge regression cannot overcome this problem" (Discussion with Head of Department, Extension, School of Agriculture, University of Bophuthatswana, 1992). Evanson (1967), states that "research and extension expenditure in one year may affect productivity over several years."

In terms of empirical analysis, two main questions (which were never asked within the agricultural sector of Bophuthatswana) must be considered. What is the optimum pattern of agricultural research and expenditure? Secondly, what are the consequences of failing to achieve the optimum pattern of expenditure? In analyzing the optimum pattern, selected target values of the farm price variable are related to rates of return on investment. The rate of return declines as research and extension expenditures are used to reduce the annual growth rate in farm prices. In this regard, White and Havlicek (1982: 52) show that "increasing annual expenditures for the 1981 – 1990 period in the United States from $ 1, 878, 4 million to $ 2, 618, 0 million would reduce the annual growth rate in real farm prices from 0, 4 percent to 0, 3 percent. However, the rate of return on research and extension expenditures would drop from 15, 6 percent to 10, and 9 percent." The research and extension expenditure patterns chosen as the base situation by White and Havlicek (1982) is one that would, according to them, result in a 0, 4 percent annual increase in real farm prices. They further state that "this situation was chosen by them for further analysis because it is closest to the actual trend in research and extension expenditures and that the 15, 6 percent rate of return from this

pattern of expenditure corresponds to the level that Ruttan (1960: 531) argues are in the public interest." White and Havlicek (1982) and Ruttan (1980) state that "the indexes of farm production and prices received by farmers are equilibrium values simultaneously determined with optimal pattern of research and extension expenditure. Farm production would be expected to increase by 14, 2 percent over the period, whilst real farm prices, the target variable, would increase by approximately 2, and 7 percent. The productivity index is the ratio of output per unit of input for aggregate agricultural production".

4. Effects of under – funding

Policy – makers may be tempted to under – fund agricultural research at less than optimum levels in order to cut current government funding. (In the Bophuthatswana agricultural sector, apart from a few small sociological research inputs, no serious agricultural research was undertaken and no meaningful research could be unearthed by the writer). However, there may be long – run costs associated with such a strategy. Considering that budgets in general within governments allow a variety of approaches to be evaluated, some selected approaches to reducing research and extension expenditure will be analyzed. First, research and extension expenditure could be cut in the early years and then made up later, so that advances in productivity could continue, leaving consumers no worse off. Hypothetically, this approach would require more government funding over the period, but leave consumers virtually unaffected. Under a second approach, policy – makers could cut support in the early years and the return expenditure to the base situation in later years. Finally, a new, lower expenditure base could be established.

The latter two approaches would result in a direct government saving, but might substantially increase costs to consumers. An important question is whether or not the reduction in government expenditure ultimately would be offset by higher food costs. White and Havlicek (1982) capture three hypothetical cases or scenarios of under funding (relative to the base situation):

- "The first case is when policy – makers decide to reduce research and extension expenditure to 10 percent below the base level for three years, and then spend enough during the later part of the 10 – year period to generate the same level of consumer surplus at the base level. The results in this case indicate that it is possible, although costly, to overcome under – funding for a limited number of years. In the first three years, this strategy would reduce expenditure significantly. However, expenditure would have to be increased substantially above the base in order to leave consumers unaffected. Thus, each Rand the government tries to save initially will ultimately cost the government more.
- The second case of under – funding involves a 10 percent reduction in expenditure for the first three years followed by a return to the base level of expenditure for the fourth and remaining years, with no recovery attempt being made. Productivity and production will be less than the base situation, while equilibrium prices will be higher. Although these differences may not appear very great, they must be put into perspective. Even slightly higher prices translate into a substantial reduction in consumer welfare. The estimated reduction in consumer surplus is small in the first few years, but, as the cumulative effect of under – funding is felt, the magnitude of consumer surplus reduction rises substantially.

- The final under – funding case involves establishing and maintaining a lower level of funding than in the base situation. In this case, research and extension programmes are 10 percent below the base situation for the entire period. This expenditure pattern has a greater effect on the farm output and prices than a temporary reduction. Although, initially, the savings in government expenditure are higher than the loss in consumer surplus, the reduction in consumer surplus increases rapidly through time, and soon far outweighs the budget savings. This relationship can be expressed and explained by the lagged effect of research and extension expenditure on productivity."

From the above, it is more than obvious that these scenarios will have certain serious implications. "For example, agricultural research and extension expenditure in one year will affect agricultural productivity and, hence, farm and food prices for many years in the future. The contribution of these expenditures to agricultural productivity is relatively small in the first few years, increases to a maximum in the sixth and seventh years and then declines through the fourteenth year" (White and Havlicek, 1982). It is, therefore, self – explanatory that in choosing the appropriate level of expenditure in each year, policy – makers should take into account multi – period effects. Since expenditure in each year will affect productivity in later years, inadequate funding of agricultural research and extension activities in one period will be very difficult to overcome later. The problem of selecting the optimal level of expenditure is also stochastic. Therefore, the uncertainty surrounding research breakthroughs makes it difficult and impossible to control future outcomes exactly. However, it is indeed a starting point in terms of a scientific approach to research and extension, which most decidedly would have a positive and meaningful impact upon agricultural development. It would also allow for some measure of prediction of the outcomes intended by policy – makers and further allow for some sort of qualitative and quantitative analysis of input /output relationships in the current agricultural and extension dynamic of democratic South Africa. This was sorely lacking and urgently required in the assessment process of the former Bophuthatswana's declining agriculture.

5. The consequences of under – funding

Leading from the above discussion and, in relationship to the scenarios outlined in respect of the consequences of under – funding extension from a global viewpoint, the writer finds it necessary to draw from an internal audit report (Number 92 /64) provided by Agricor's Department of Finance, in order to prove what the consequences of under – funding extension could be upon South African Agriculture, and, as it was upon rural development and agriculture in the erstwhile Bophuthatswana.. The primary objective was to ascertain whether the preparation and control of the Corporation's budget facilitated the achievement of the Corporation's mission in terms of extension. The scope of the exercise was as follows:

- The effect of the Programme Approach on the preparation of the Corporation's budget;
- The comparison of the Corporation's development expenditure with the budgeted operation expenditure for the financial years 1991 /1992 and 1992 /1993;
- The budgetary control of operating expenditure by the district offices for the 1991 /1992 financial year; and

- The financial reporting status using budget figures from the district offices.

Since 1991 /1992, the development budget was drawn up on the basis of the Programme Approach instead of the Project Approach. According to the Programme Approach, the development budget must reflect and address the needs of the community. Furthermore, the development budget allocated for the 1992 /1993 financial years showed an increase in the ratio of the expenditure towards agricultural village development activities (from 34 cents to 80 cents out of every rand expended.) As shown below, out of every R1 spent on development, 80 cents was spent on the following: agricultural village and rural industrial programmes. The detailed findings as presented by Senaratne (1992:4) are reflected in Tables 1.1 and 1.2.

Table 1.1. Actual Corresponding Expenditure to Development Expenditure

ITEM	1992/93 RAND	(BUDGETED) CENTS	1991/92 RAND	ACTUAL RAND
Introductory Programme	114,400	.00	0	0
Agricultural, Village Development and Industry Programme	17,281,644	.08	15,638,831	.34
Consolidation Farms Service Centres	1,500,297	.07	4,206,524	.09
Property Development	1,607,268	.08	17,533,618	.37
Agricultural Business	0	0	6,231,931	.37
Farm System Research, Genetic Conservation	331,000	.02	651,693	.01
Breeding Schemes	441,294	.02	2,868,452	.06
TOTAL	21,275,903	0.27	47,131,049	1.00

(Source: Senaratne, Group Financial Manager, Internal Audit, Report Number 92/64, Agricor, 1992:4)

In 1991 /1992, the actual corresponding expenditure had been 34 cents to R1 of development expenditure. However, in the same financial year, six out of eleven districts exceeded their operating expenditure over the original approved budget. As shown in table 1.2 (Senaratne, 1992).

Table 1.2. Over-Expenditure of Certain Districts in Relationship to Operating Expenditure versus Original Approved Budget

Name of District	Budget for 1991/1992 R	Actual Total Expenditure R	Variance R
Molopo	5,108,065	5,329,191	(221,126)
Lehurutshe	3,920,310	4,338,475	(418,165)
Ganyesa	3,201,649	3,460,639	(258,990)
Thaba Nchu	4,131,192	4,543,669	(412,477)
Kudumane	3,290,180	4,378,378	(1,088,228)
Moretele	3,454,559	4,202,717	(748,158)

(Source: Senaratne, Group Financial Manager, Internal Audit, Report Number 92/64, Agricor, 1992:4)

According to Senaratne (1992:5), "Section 4, 18 of the budget policy states that approval of additional funds in excess of overall approved budget rests with the Group Financial Manager in collaboration with the

Managing Director. None of these districts had been granted approval for additional funds. This was due to a 'free for all' and due to the loss of control of fund management, leading to the situation that important projects and operations could not be implemented due to the lack of funds. This was further exacerbated by inadequate budgetary controls by cost centre in general. There was, in fact, no written approval for any over expenditure on budgets and this can be proved by the system of monthly consolidation reports." Senaratne (1992) further points out that "budget allocation for operating expenditure was becoming disproportionate to development. Agricor spentR1, 68 in operating expenditure for the 1991 '/1992 financial year; the ratio of development expenditure changes, therefore, from R1 to R4, 19 cents. There is no doubt that this new trend would have forced the Corporation to reevaluate the entire operating expenditure structure." This is captured in Table 1.3 hereunder:

Table 1.3. Trend of Development Expenditure as a Reflection of the Consequences of Under – Funding

Operational versus. Development Expenditure	**1992/1993 Expenditure (ACTUAL) (R million)**	**1992/1993 BUDGET (R million)**
Operating Expenditure	78	88
Development Expenditure	47	21
TOTAL	125	109

(Source: Senaratne, Group Financial Manager, Internal Audit, Report Number 92/64, Agricor, 1992:4)

From the tables it can be concluded that under – funding of any extension system will have devastating effects upon agriculture, human and rural development in this region (now the new North West Province of South Africa), in the future. It would have also allowed for some measure of prediction of the outcomes intended by policy – makers and would have further allowed for some sort of qualitative and quantitative analysis of input /output relationships, which were sorely lacking and urgently required in the assessment process of Bophuthatswana's declining agriculture.

6. Failure of the extension services

To underscore the above, it is necessary to provide empirical evidence of the failure of the extension service. The shift in extension implementation by Agricor was instituted in the first quarter of 1991, with an emphasis on livestock production, and the empowerment of the so – called commercial farmer, and the process of decentralized management into three broad regions (Agricor et al., 1991). Observations reveal that this decentralization process took place theoretically only. At the time Agricor took over the extension service there were some serious problems in respect to a host of issues. These problems were not addressed meaningfully. Some of these problems revolved around poor salaries, limited transport, poor housing, lack of development finance, lack of career opportunities and so on. The system was emasculated by the system itself, and overtly repressed the system of democracy, leading to a situation were allegiances to a

dysfunctional, repressive, and bureaucratic government, became the order of the day. This led to a situation of the failure of the extension service but above all the model for extension in terms of the issues raised in this paper could not be implemented, in order to usher in a new era for the consolidation and production of increased volumes of food by the farmers, it had to serve. This negated the issues of dealing decisively with the felt or perceived needs of farmers, negated their empowerment and thus kept them weak and poor, negated the promotion of the general welfare, stymied agricultural development and thus contributed to massive poverty in this region, now defined as the North West Province of the Republic of South Africa.

7. Conclusion

This paper attempted to charter a course for the development of extension, in order to clearly show that extension must play a pivotal role in the development of poor farmers, with the aim of producing more food for the impoverished masses. Above all to check and reduce escalating high food prices. It showed that the principles of the management of extension, is cardinal in order to deal with poverty, inequality and unemployment, in order to create the impetus for rural agriculture and rural development, and thus secure the nation from any food crisis that may occur in the future. To this end governments in general must interact with the extension system, in order to provide the necessary expertise, funding and professional and technical expertise to secure the future of the agricultural base of South Africa, from the perspective of sound and meaningful interaction and promotion of sub – sistence farmers through, a viable, capable, committed, professional cadre of extension officers, who must be supported by sound extension policy imperatives, and the promotion of agriculture using sound economic, extension and management principles.

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NOTE: The reader should consult the works of Arndt; Dalrymple; Peterson and Hyami; and Ruttan – High returns from research and extension investments. The reader must consult the literature to glean more insight, understanding in relationship to these important agricultural extension issues.