

ECONOMIC DEVELOPMENT OF
NEWDALE CLAY LOAM SOILS AREA

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ABSTRACT

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The majority of the farmers of the Newdale area are not meeting the specified norms of the three goals of farm firms, viz. efficiency, growth of farm, and competitive level of living.

Therefore, this study was undertaken; to measure the growth of the agricultural sector of the area and for the farm firms, to diagnose and define the development problems, to determine the type and magnitude of adjustments on farms awaiting development, to consider (not to determine) the export demand of the area's agricultural products and the consequences of this demand on farming and on the entire regional economy, to attempt to visualize the non-agricultural pursuits and services complementary to sustained growth for agriculture which need to be developed in the area, and to identify the non-economic factors which will accelerate economic development in the area.

Cross-tabular analysis was performed to discover variables affecting growth of the area during 1961-66. A

regression model was used to analyze the growth of individual farm firms. The farm budgeting technique was used to determine the magnitudes of adjustments in farm resources and enterprises needed to satisfy the above goals of farmers.

The following are the main findings:

1. There has been rapid economic growth in the agricultural sector of the Newdale area during 1961-66.
2. Consolidation of land into bigger and more efficient farm units and increasing value (real) of machinery and equipment were contributing factors to the growth of the area.
3. An increase in acreage under wheat and oil-seeds and a decrease in summer fallow helped in the growth of the area.
4. While average growth of the study farms was rapid, there was a striking variation in the growth of individual farms.
5. An increase in farm capital resources (including land and machinery) and in fertilizer expenditures raised farm growth.
6. Farmers' education and their aspirations to higher levels of income added to the growth of their farm firms.
7. The goals specified for the farmers of this study in 1966 were as follows:

For efficiency - Capital-output ratio = 5:1 or less.

Gross expense ratio = 60 per cent
or less

For growth - Change in value of farm production from 1962 to 1966	= \$4,100
Net change in total farm capital (deflated) from 1962 beginning to 1966 end	= \$23,700
Change in total improved acreage from 1962 beginning to 1966 end	= 90 acres
Change in fertilizer expenses from 1962 to 1966	= \$ 860
For level of living - Cash living expenses for family	= \$4,000 per annum
Cash living expenses for couple	= 3,500 per annum
Cash living expenses for bachelor	= 2,500 per annum

To achieve these goals the area should have increased farm capital by more than 10 per cent, value of farm machinery and equipment by more than 4.3 per cent, fertilizer expenditures by more than 15 per cent of their 1966 amounts. Further, more than 10 per cent of the 1966 farm operators needs to be outmigrated to enable the remaining ones to raise their farm acreage. These adjustments would raise farm income by 22 per cent and thereby would satisfy the goals.

8. The specified goals were averages for the WMFBA farms as of 1966. Projections were made of the 1966 norms up to the year 1971,

using linear extrapolations of time trends in the averages. Projections for 1971 are as follows:

For efficiency - Capital - output ratio = 6:1 or less

Gross expense ratio = 65 per cent or less

For growth - Change in value of farm production from 1966 to 1971 = \$6,000

Net change in total farm capital from 1966 to 1971 = \$25,000

Change in total improved acreage from 1966 to 1971 = 80 acres

Change in fertilizer expenses from 1966 to 1971 = \$ 900

For level of living - Cash living expenses for family = \$ 4,750

Cash living expenses for couple = 4,200

Cash living expenses for bachelor = 3,200

9. Studies should be performed to evaluate the adequacy of education and recreation facilities and credit, marketing and employment - creating institutions in the light of requirements of the area.
10. The expansion of agricultural and non-agricultural industries should be examined in the context of exports from the region.

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TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Nature and Scope of the Problem	1
Objectives	11
Hypotheses	11
Assumptions	28
II. THEORIES OF ECONOMIC DEVELOPMENT	29
Theories of Economic Development in	
Macro Context	29
The Classical Theory of Economic Growth .	30
Schumpeter's Theory of Economic	
Development	33
Theory of Economic Growth and Development of	
an Area	35
The Export-base Theory of Regional	
Economic Growth	36
Theories of Economic Growth and Development	
in Micro Context	39
Life Cycle Theory of the Growth of the	
Firm	39
Baumol's Theory of Expansion of the Firm .	39
Penrose's Theory of the Economic Growth	
of the Firm	41

CHAPTER	PAGE
Factors Affecting Economic Development	
of Individual Firms	43
Economic Factors	43
Resource-resource relationship	43
Product-product relationship	49
Capital, Capital-Output Ratio and	
Farm Technology	53
Economic Institutions	54
Psychological Factors	57
Motivation	57
Attitudes	58
Skill	59
Community Services	60
Education	60
Recreational Activities	61
Summary	62
III. ANALYTICAL FRAMEWORK	64
Nature and Sources of Data	64
Model for Analyzing Growth of the Area	66
Model for Analyzing Growth of Individual	
Farm Firms	68
Concepts and Computational Techniques	70
General Model - Correlation and Regression	
Analysis	73

CHAPTER	PAGE
Independent Variables	74
Economic Variables and Regression Analysis	74
Non-economic Variables and Regression Analysis	75
Scale for Risk Attitude and Aspiration to Level of Income . . .	80
Budgeting Farm Firms	82
Specific Goals	84
Concepts and Norms Used for Farm Budgets.	85
IV. CHARACTERISTICS OF THE AREA AND THE STUDY FARMS	89
Location	89
Climate	89
Soils	91
Type of Farming	92
Distribution of Farm Acreage	94
Distribution of Farm Capital	95
Farm Liabilities	97
Fertilizer Expenses	97
Income and Living Expenses	97
Age of Farm Operators	101
Experience in Farming	102

CHAPTER	PAGE
Education of Farm Operators	102
Number of Dependents	103
Non-agricultural Businesses	104
V. FINDINGS	107
Economic Growth of the Area	107
Land	110
Capital	113
Type of Farming	117
Age of Farm Operators	121
Economic Growth of Farm Firms	123
Growth and Economic Factors	124
Growth with Same Amount of Fixed Capital	124
Growth with Increased Amount of Farm Resources	124
Growth and Non-economic Factors	135
Adjustments on Farm Firms and their Impact on Economic Growth	138
Magnitude of Proposed Adjustments	138
Adjustments in Farm Resources	139
Adjustments in Farm Enterprises	144
The Outcome-Income, Costs and Margin for Growth	147

CHAPTER	PAGE
Adjustments in the Entire Area and their Consequences for Economic Growth . .	150
VI. ECONOMIC IMPLICATIONS AND CONCLUSIONS	152
BIBLIOGRAPHY	165
APPENDIX I	
Intercorrelation Coefficients between Different Variables	173
APPENDIX II	
Multiple Regression Analysis of Growth of Individual Farm Firms	176

LIST OF TABLES

TABLE		PAGE
4.1	Average Precipitation (inches) in the Area	90
4.2	Average Temperature in the Area	90
4.3	Classification of Commercial Farms in the Area in 1961 by Product Type	92
4.4	Land Utilization in the Newdale Area and on the Farms under Study	93
4.5	Classification of Farms According to Improved Acreage	95
4.6	Classification of Farms According to Farm Capital	96
4.7	Components of Farm Capital	96
4.8	Classification of Study Farms According to their Farm Liabilities on January 1, 1962.	97
4.9	Classification of Farms According to their Fertilizer Expenses in 1962	98
4.10	Classification of Farms by Value of Farm Production	99
4.11	Classification of Study Farms According to Net Farm Income in 1962	100
4.12	Classification of Farms under Study by their Cash Living Expenses in 1962	100
4.13	Classification of Farms by Age of Operators in 1961	101

TABLE		PAGE
4.14	Classification of Farms under Study by Years of Experience in Farming in 1961.	102
4.15	Classification of Farms under Study by Years of Education in 1961	103
4.16	Classification of Farms under Study According to Number of Dependents per Family in 1961	104
5.1	Classification of Farms of the Newdale Area According to Value of Agricultural Products Sold	109
5.2	Classification of Farms According to Improved Acreage	111
5.3	Classification of Farms According to Farm Capital	114
5.4	Components of Farm Capital in 1961 and in 1966	115
5.5	Classification of Commercial Farms by Product Type	117
5.6	Sources of the Value of Agricultural Products Sold in the Area	119
5.7	Land Utilization in the Area	119
5.8	Classification of Farms According to Age of Farm Operator	122

TABLE		PAGE
5.9	The 1962 Farm Business and Changes During 1962-66 on Two Study Farms of the Newdale Area	125
5.10	Statistical Results of Analysis of Growth of Individual Farm Firms	126
5.11	Per Farm Magnitude of Proposed Adjustments in Farm Resources	140
5.12	Per Farm Use of Fertilizer and Additional Fertilizer Requirements	143
5.13	Per Farm Proposed Adjustments in Livestock Enterprises	145
5.14	Summer Fallow and Yield of Crops	146
5.15	Income, Costs and Margin for Growth	148

LIST OF FIGURES

FIGURE		PAGE
2.1	The use of iso-cost line and iso-product curve to indicate minimum costs	45
2.2	Resources and expansion paths	47
2.3	Expansion path in dynamic context	48
2.4	The use of production possibility curve and iso-revenue line to show maximum profit	50
2.5	Expansion line under dynamic framework . .	52
4.1	Census divisions in the province of Manitoba and study area	89-90

CHAPTER I

INTRODUCTION

NATURE AND SCOPE OF THE PROBLEM

Our society has made great strides, through technological revolution, in increasing the living standards of the majority of our population. But the impact of technological revolution has not been even on each sector of the economy and on each region of the country. It has changed the comparative advantage of different regions and the terms of trade of different sectors. Terms of trade have improved for non-agricultural sectors and deteriorated for agriculture, therefore, agriculture has benefitted to a very limited extent from the technological changes. Only those farmers who have the necessary land, capital and technical skills are able to combine the productive factors efficiently and in sufficient amounts to provide an adequate income. But the majority of the farmers who did not adjust themselves in accordance with the demands of the technological revolution fell into the grip of poverty. Still worse, this revolution created certain poverty pockets where produce of the region lost its demands and/or majority of the farmers of the area did not adjust due to lack of adequate education and other structural bottlenecks. These types of "pocket"

and "case" poverty¹ in the United States have been recognized by Galbraith in his stirring work² "The Affluent Society". Kulshreshtha also found a very high coefficient of variation, 186.2 per cent of the mean, for agricultural income of different regions of Canada.³ Furthermore, the five year farm records of Western Manitoba Farm Business Association⁴ depict that a substantial proportion of farmers could not make a net farm income sufficient to maintain a competitive level of living⁵ and growth of farm business during 1962-66, despite the fact that this area has undergone positive adjustments similar to the province of Manitoba at large during the period.⁶

Poverty not only creates human suffering and a serious misallocation of physical resources but causes people to fall

¹J. K. Galbraith, The Affluent Society (New York: The New American Library, 1958), pp. 146-156.

²Ibid., back cover.

³S. N. Kulshreshtha, Considerations Involved in Developing a Valid Comparison of Farm and Non-farm Incomes in Canada (1926-61), an unpublished Ph.D. thesis, Department of Agricultural Economics, University of Manitoba, May 1965.

⁴The Western Manitoba Farm Business Association is a voluntary association of farmers in the "Newdale area". The purpose of the Association is to cooperate in the farm management research with the Department of Agricultural Economics, University of Manitoba.

⁵Competitive level of living is defined on page 85.

⁶Observed in Summary Statements of WMFBA and 1962 and 1966 Censuses of Canada, Manitoba.

short of their potential as productive and creative human beings. The Newdale area⁷ where farmers are not making "adequate" incomes, has enormous potential for adjustments and opportunities to generate sufficient income for the competitive levels of living and growth of the farm firms. Still, on a large proportion of farms the farm resources are under-utilized. Therefore, policies should be developed to improve individual farm firms and the economic wellbeing of the region.

Keynesian economists argue that by keeping aggregate demand at appropriately high and rising levels, the economy will provide full-employment and will utilize the potential of its people. But this Keynesian theory is based on implicit assumptions, namely, the existence of a homogeneous, mature and industrial economy where no structural bottlenecks exist. Therefore, Menzies argues:

My concern about primary industries and resource-based regions lead me to doubt the ability of Keynesian measures to effect major structural adjustments or to resolve major problems of regional underdevelopment.⁸ He further asserts that a problem - Poverty in Canada - has no hope of solution through the normal functioning of the market economy and quite outside the purview of

⁷"Newdale area" has been defined on page 64 of this thesis.

⁸M. W. Menzies, Poverty in Canada (Manitoba: Manitoba Pool Elevators, 1965), Footnote p. 18.

those conformists to the conventional wisdom of our times who concern themselves only with those economic activities which contribute positively to the wealth of nations.⁹

Galbraith has denounced the Keynesian measures for regional development by referring to Keynesianism as "undiscriminating and obsolete"¹⁰. The Government of Canada also has recognized that regional economic development requires special policies. In June 1961, the Agricultural Rehabilitation and Development Act was passed to alleviate some of the desperate social and economic problems of underdeveloped rural regions of Canada - problems such as low income levels, high underemployment and unemployment and poor educational attainments, with their related problems of inadequate health services, and a basic lack of social amenities.¹¹ Therefore, it can be concluded that the market mechanism (higher aggregate demand) although indispensable, can not by itself solve the problems of underdeveloped rural regions, unless aided by special policies and deliberate actions.

The development of individual farm firms, to some extent, is independent of the development of a region. Some firms develop even if the region is stagnating. In the

⁹Ibid., Introduction.

¹⁰Galbraith, op.cit.

¹¹Menzies, op.cit., p. 3.

Newdale area, one-third member farms of WMFBA registered a decline in value of farm production during 1962-66, whereas one-third member farms had an increase by more than 60 per cent in the same period. There appears to be a multiplicity of causes responsible for such variation. According to Woodworth these causes arise from economic, educational, motivational and cultural handicaps for individual farm families. These handicaps may be associated with goals, habits and customs not conducive to higher income.¹² The attitudes and values of some farm families are such that they have high priority for leisure and minimum risk and low priority for income.

Age of farm operators has a bearing on their attitudes to risk taking and aspiration to levels of income. Strauss observed, "there is a negative relationship between age and economic aspiration and productivity. Old farmers are more conservative than young ones and the former make decisions oriented primarily to minimizing the possibility of losses rather than maximizing profits."¹³ The values and goals of old farmers may be oriented more to non-monetary goals such

¹²R. C. Woodworth, "Solution to the problem of low income in the South: Farm Reorganization," JFE: 39, p. 1465.

¹³M. Strauss, "Managerial selectivity of intensive extension work," Rural Sociology, 24, 1957, pp. 150-61.

as leisure etc. and less to maximization of income. There is an increased tendency on such farms to have a short planning horizon of their farm business. Moreover, in Canadian agriculture there are some farmers who are old and have no heir to continue their farm businesses after their retirement or death. This situation further shortens their planning horizon. Therefore, age of farm operators influences their attitudes to risk taking, aspiration to levels of income and value orientation 'which are stimuli of primary importance to the financial progress of individual farm firms'.¹⁴ Thus those farmers who are old and have an attitude of risk aversion and low priority and aspiration to higher levels of income, obviously achieve little or no growth and thereby become a low income group.¹⁵ Gilson writes about such farms:

Many of farm families in Canadian agriculture neither share fully in the economic and social progress of the nation, nor contribute their part to the efficient production of the agricultural industry. This condition is important to Farm Policy in Canada.¹⁶

¹⁴G. A. Therrien, Risk Attitudes, Values, Insurance Practices and their Contribution to Farm Business Development, an unpublished Master thesis, Dept. of Ag. Eco., University of Manitoba, May 1968.

¹⁵Instead of going into the issue of cause and effect this author considers growth as an a priori consequence of the attitudes.

¹⁶J. C. Gilson, "Nature and Implication of Sub-marginal Farms," Agricultural Institute Review, Vol. 13, No. 2, Mar-April 1958, p. 20.

Changes are required in the psychological motivation of these people - changes from non-economic to economic, from risk aversion to risk seeking, from growth aversion to growth emphasis through education, early retirements and other means.

This study of economic development of the Newdale area is limited mainly to the farming sector of the region. Developmental needs of the non-farming sectors (including non-agricultural export industries of the area) have also been considered where they are complementary to sustained growth for the farming sector.

It is already observed above that a substantial proportion of farmers of the area do not make sufficient income for the maintenance of the family and growth of their farms, but they have underutilized potential and resources. This situation presents a challenge to the society to make use of those unutilized capacities to produce the required income. The basic cause of this low income problem is the presence of uneconomic farms and unskilled and old farmers. In the present state, such farmers can do no more than sustain their existence in poverty and deprivation. Elderly farmers could leave farming if reasonable amount of old age pension is granted in advance (a few years prior to the present retirement age). Another substantial proportion of farmers in the study area, if provided with suitable alternative employment and required training for it, could

leave farming to the benefit of themselves and to the net gain of the remaining farm community and the regional and national economy. Menzies sees this problem and its solution when he states:

The crux of both the poverty problem and agricultural problem is the tragically low level of productivity of a large proportion of human and physical resources in the farming industry. Policies must be developed to release under-utilized physical resources and to free human beings ensnared in hopeless situations so as to give, simultaneously, a new and powerful impetus to rising productivity in agricultural and industrial sectors.¹⁷

Therefore, the major problems in developing agriculture in the area are reorganization related to (1) consolidation of farms consequent to a declining number of farmers either by arranging retirement pensions or by providing non-farm jobs to those interested in outmigration; (2) means of accumulating capital in quantities and in such forms as are adapted to the requirements of a technologically changing large scale farm firm, and (3) the consequences of further adjustment of changes in the composition of farm assets.

The reorganization of the farming of the area requires improvement in human resources. The management ability must be continuously improved to adapt to new technology and to assume responsibility for improving the farm businesses.¹⁸

¹⁷Menzies, op.cit., p. 29.

¹⁸J. C. Gilson, Significance of the Management Factor in Agricultural Production, prepared for the annual meeting of the Appraisal Institute of Canada, Toronto, March 6, 1962.

The attitudes of farmers must be examined and farmers should be encouraged to accept new ideas for rapid development of their farms. Those farmers who are too old to accept new ideas and to keep their farms developing, should be incited to accept pensions and to retire from farming. The other group of farmers who are also "inefficient" but not old should be persuaded to migrate from agriculture and trained for jobs in the non-agricultural sectors. Thus, psychological change is the prerequisite for all reorganization for development and here education plays a decisive role.

The Newdale area may also grow by promoting its agriculture-oriented export industries.¹⁹ The increase in exports induces inflow of income into the area which through the multiplier effects²⁰ may lead to the growth of many

¹⁹It is generally considered that an area specializing in relatively expanding industries of the country, experiences growth. But H. S. Perloff, et al in their book Regions, Resources and Economic Growth (Lincoln: University of Nebraska Press, 1960), p. 104, argued that regions may experience growth even when they specialize in declining industries like agriculture and mining. Regions can be somewhat like individual firms. Some of them grow even if competing firms are having serious trouble, so there are farming areas which by intensive production and growth of service activities can experience growth when other areas with similar kinds of specialization are declining.

²⁰Any sizable autonomous investment within an area entails a series of related economic effects - changes in the volume and composition of inputs and outputs of the industries and changes in the amount and composition of area's exports and imports. These changes affect employment, income, household purchases and induced investment. These effects are known as multiplier effects.

industries and service sectors. Further the expansion of service sectors and non-agricultural industries generates demand for labor force and can absorb under and unemployed farm population. Thus these growth sequences would provide higher absolute and per capita income to the area.

Economic institutions may become bottlenecks in the process of reorganizing farms and developing the export industries in the area. Therefore, the following important institutions in the Newdale Clay Loam Soils Area need examination:

1. Credit institutions - Banks, Credit Unions, Farm Credit Agencies, etc.
2. Input supplying institutions - Co-ops, dealers, etc.
3. Farm product marketing institutions - elevators, etc.
4. Off-farm employment creating institutions.

Hospital and recreational facilities raise both individual and area productivity by keeping farmers physically fit and mentally fresh. The area has available to it some recreational facilities, but their adequacy must be examined in the light of requirements.

The problematic situation dictates that the development of the area and the individual farm firms needs critical examination of economic, psychological, institutional and recreational factors. Institutional and recreational factors have been visualized but not empirically analyzed due to a

lack of data. More emphasis has been given to the analysis of economic and psychological factors affecting economic development. However, no attempts have been made to determine the export demand of the agricultural products of the area and to examine the multiplier effects of the inflow of additional income in the region. The specific objectives for the study are:

1. To find out the growth of the entire area and of the individual farm firms in the area.
2. To diagnose and define the development problems on individual farms.
3. To determine the type and magnitude of adjustments on farms awaiting development.
4. To consider, not to determine, the export demand of the area's agricultural products and the consequences of this demand on farming and on the entire economy of the area.
5. To recognize the non-agricultural pursuits and services complementary to sustained growth for agriculture which need to be developed in the area.
6. To visualize the non-economic factors which will accelerate economic development of the area.

HYPOTHESES

There appear to be four obvious avenues for the growth of individual farm firms: a farm can grow by (1) reducing production costs for the same level of production; (2) increasing production from the same total farm capital

(fixed); (3) lowering family living expenses, and (4) increasing production by adding farm resources (farm fixed capital). A farm adopts either one of the above avenues or some combination thereof.

Cutting down the Production Costs as a Way to Increase Farm Net Income

The economic literature contains much discussion on resource combination. The economic theories, especially theory on least-cost combination, state that the farm net income can be increased with the same level of output by cutting down cost of production through better combination of resources, if the combination is not already optimum. Therefore, this avenue may be open for some farms which are inefficient.

Since there is no case among 59 member farms of WMFBA (study farms), where the same value of farm production is maintained in 1962 and in 1966 and the cost of production shows a decline for the same period, the above proposition is not tested empirically.

Increase in Production from the Same Resources as an Avenue to Growth of Farm Firms

The farm firms can grow through increase in the value of farm production with the same total farm capital of fixed nature. Usually the decline in capital-output ratio is

associated with improvement in technology, especially improvement in the quality of plant. But even with exactly the same plant, (land, machinery ---- etc.) greater output can be achieved by addition of variable resources. Therefore, the following hypothesis is formulated:

Hypothesis #1 Farm firms with the same amount of fixed capital grow through increasing the value of farm production.

Lowering Family Living Expenses - A Way to the Growth of Farm Firms

A reduction in living expenses, and thereby an increase in saving has been considered as a way of financing development programs of farm firms. It is inferred from Halter's analysis that the increase in the proportion of net revenue allotted for the farm expansion raises the capital accumulation and rate of growth of the firm.²¹ However, unless a farmer maintains an exorbitant level of living, it is often socially and psychologically difficult to cut down the living expenses. Even the possibility of holding the family living expenses at the same level is quite remote for an individual farmer because living standards in his neighborhood are rising which conflicts with his goal to save.

²¹A. N. Halter, "Models for Firm Growth," JFE: 48, p. 1503.

Moreover, the trend of direct and indirect taxes has been also upward. In spite of these, lowering the living expenses can be considered as a way to finance and to attain the higher level of growth for some farm firms.

There is no case among study farmers where there is a persistent reduction in the living expenses from 1962 to 1966. Therefore, examination of the above proposition is not possible with this data.

Increase in Capital Resources as a Source of Growth of Farm Firms

Without an attempt to separate or identify cause and effect it may be pointed out that the increase in total farm resources is associated with increase in value of farm production and thereby growth of farm firms. Thus an individual farm firm with sufficient capital resources may be able to invest in, or employ, profit-maximizing alternatives which could not be employed at the same level by an individual whose availability of capital was limited. Therefore, the addition of farm capital seems to be a main source of growth of farm firms. The first three avenues are not substitutes for this source, because substantial capital must be added to the farm business in order to grow in the long run. The following hypotheses are outlined:

Hypothesis #2	An increase (decrease) in capital resources of individual farm firms has a positive (negative)
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effect on their growth.

Sub-hypothesis #2.1 The larger the net increase in the total farm capital, the higher is the growth of farm firms and, conversely, the smaller the net increase in total farm capital, the lower is the growth.

Sub-hypothesis #2.2 A net change in the value of machinery and equipment has an effect on the growth of farm firms in the same direction.

Sub-hypothesis #2.3 A change in improved acreage farmed has an effect on the growth of farm firms in the same direction.

Size of Business in the Initial Year and Growth of Farm Firms

It is often assumed that a farmer with higher initial resources is able to increase the value of farm production more than a farmer with low initial resources. It is true because a little improvement in production efficiency on a large farm leads to a substantial aggregate increase. Secondly, a farmer with a big business can assume more risk than a small farmer can, in taking on profitable and risky enterprises. Thirdly, a farmer with a big business can borrow more money for farm investment in comparison to small farmers. Fourthly, a big farmer may be able to save more than a small farmer can. Therefore, more money can be invested both through borrowings and savings by large farmers than by small farmers. For purpose of analysis the following

hypotheses are stated:

- Hypothesis #3 The high growth of farm firms is due to their large size of business in the base year and low or negative growth is due to small size of farm business in the base year.
- Sub-hypothesis #3.1 The growth of farm firms varies directly with the value of farm production in the initial year.
- Sub-hypothesis #3.2 The larger (smaller) the total farm capital in the base year, the greater (smaller) is the growth of farm firms.
- Sub-hypothesis #3.3 The larger (smaller) the number of improved acreage farmed in the base year, the greater (smaller) is the growth of farm firms.

Change in Farm Liabilities and Growth of Farm Firms

An agricultural economist has stated that if you want to progress in farming, you have to use others' money. Since agriculture is becoming a capital-intensive industry the contribution of liabilities in building up farm resources is increasing. Halter has observed that the capital accumulation and growth of farm firms are affected greatly by borrowings.²² No doubt personal savings is also an avenue to finance the farm business but a farmer can not afford to postpone the purchase of a tractor, land or any expensive asset until he

²²Ibid., p. 1503.

accumulates the required funds through his own savings. He will be "edged out" of business with his obsolete assets. The best policy is to buy farm assets as quickly as one "requires" them, with the help of borrowings (of course, he has to take into account the rate of interest, opportunity cost and risk associated with the investment), repaying the loan from savings and additional income from new assets. Therefore, the farm liabilities as a factor in the growth of farm firms need examination. The following hypothesis is advanced in this connection:

Hypothesis #4 The change in farm liabilities has a positive effect on the growth of farm firms, i.e., the larger the increase in farm liabilities from 1962 to 1966, the higher is the growth and, conversely, the smaller the increase in farm liabilities, the lower is the growth.

Fertilizer as a Source of Growth of Farm Firms

Ottoson and Epp consider that small farms have the alternative of adding more acres in an effort to increase volume and net income, but the rate of return is less than the rate associated with intensification on the same unit.²³ According to economic theories, production can be increased substantially at a given plant (farm size) by intensification

²³H. W. Ottoson and A. W. Epp, "Size of Farm and Farming Efficiency in Northeastern Nebraska," JFE: 38, p. 811.

(including more fertilizer use). In addition to these, fertilizer use is considered as a measure of technological change on crop farms. Thus, fertilizer use appears as a determinant of the growth of farm firms. Moreover, the increase in fertilizer expenses by four fold on the study farms was one of the major changes in the farming of the area during 1962-66. Therefore, the following hypothesis needs to be advanced for the analysis:

Hypothesis #5 The change in fertilizer expenses leads to the same directional effect on the growth of farm firms.

Adjustments in the Use of Farm Resources and Growth of Farm Firms

Low incomes occur when an individual is unable or unwilling to make adjustments so as to provide an "adequate" income to resource owners.²⁴ Therefore, adjustments in the farm organizations in line with present opportunities of increasing farm income need to be considered as an avenue for the growth of farm firms. The following hypothesis is outlined:

Hypothesis #6 Farmers' relative capacity to adjust with new opportunities (specified in the following three sub-hypotheses) affects the growth of their farm firms.

²⁴Woodworth, op.cit., p. 1462.

Changes in Summer Fallow Acreage and Growth of Farm Firms

Summer fallow is maintained in the area to control weeds and to keep land fertile. It is recommended by agronomists and soil scientists that a farmer can profitably substitute weed spray and fertilizer for summer fallow to do the above job. Therefore, the reduction in the proportion of area under summer fallow can be treated as a measure of farmers' capacity to adjust with this opportunity of increasing farm income. The following hypothesis is advanced:

Sub-hypothesis #6.1 As the ratio of change in summer fallow acreage to the change in total improved acreage increases, the growth of farm firms decreases and, conversely, when the ratio decreases, the growth increases.

Change in Wheat Acreage and Growth of Farm Firms

There has been an increase in the proportion of total improved acreage of the area into wheat crop since 1956. It indicates that the comparative advantage of wheat crop has been improved in the area possibly due to availability and adoption of better technology for this crop in comparison to other crops. This comparative advantage further increased in the recent years due to higher prices and higher

quotas²⁵ prevailing during 1961-65 than those that prevailed in the period from 1957 to 1961. Under these circumstances farmers could be expected to increase acreage under wheat to reap the benefit of better technology, higher prices and higher quotas. Nevertheless, an increase in wheat acreage, per se, can not be considered as a factor advancing growth under all circumstances. A decline in relative advantage of wheat would require a reduction in the proportion of improved acreage allocated to this crop for the attainment of the growth of the farm. However, in this study, an increase in wheat acreage is treated as one of the measures (rough) of farmers' capacity to adjust with this new opportunity of increasing farm income and thereby attaining higher growth of the farm. The following hypothesis is put

Period	Average Quota (Bush./cultivated acre)		Average Price (\$ per bushel)				
	General	Specified to wheat	Wheat (2 Nor. + 3 Nor.)	Oats (3 C.W.)	Flax (1 C.W.)	Barley (2 C.W.)	6 Rc
'56-61	7.0	0.0	1.57	.74	3.10	1.14	
'61-66	9.6	4.7*	1.88	.83	3.28	1.36	
% change from '56 -'61 to '61-'66	-	-	+19.7	+12.2	+5.8	+19.3	

*Since wheat quota was open in one year, the quotas for only four years were involved in calculating this average.

Source: Quota - Calculated from Canadian Wheat Board Annual Reports 1956-57 to 1965-66, Price - calculated from Grain Trade Year Book 1966-67, Winnipeg Grain Exchange.

forth for analysis:

Sub-hypothesis #6.2 The higher the ratio of proportionate change in wheat acreage over proportionate change in total improved acreage,²⁶ the larger is the growth of farm firms and, conversely, the lower the ratio, the smaller is the growth.

Cattle and Growth of Farm Firms

Cattle enterprises are considered as "non-profit"

²⁶The author quantified the independent variable of this hypothesis via three measures:

1. $\frac{(\text{Change in wheat acreage during '62-66})/(\text{'62 wheat acreage})}{(\text{Change in improved acreage during '62-'66})/(\text{'62 improved acreage})}$
2. $\frac{(\text{Change in wheat acreage during 1962-66})/(\text{Change in improved acreage during 1962-66})}{(\text{1966 wheat acreage})/(\text{1966 improved acreage})}$
3. $\frac{(\text{1966 wheat acreage})/(\text{1962 wheat acreage})}{(\text{1966 improved acreage})/(\text{1962 improved acreage})}$

The correlation and regression coefficients between each of these ratios and growth of farm firms were calculated and tested for their significance at .05 level of probability and n-2 degrees of freedom. Each coefficient came out non-significant. Hence, in this study the first of the above ratios was chosen as a quantified form of the independent variable for the analysis. This ratio takes into account the base year acreage and enables the author to maintain the same pattern in measuring each economic variable.

As stated above, data did not support the hypothesis #6.2. Certain cultural practices in the Newdale area appear to be responsible for the refutation of this hypothesis. Farmers of the area do not use newly bought land for wheat cultivation, but often summer fallow a substantial portion for the first year to clean up weeds. These are verified by a negative correlation coefficient between the change in improved acreage and the proportionate change in wheat acreage and a statistically significant correlation coefficient of .22 between the change in improved acreage and the proportionate change in summer fallow. Farmers with higher growth increased their improved acreage significantly. Therefore, the farmers having higher growth had a lower proportion of farm acreage under wheat.

Considering the above implications, the refutation of the hypothesis was ignored when analyzing and proposing adjustments for the growth of farm firms.

enterprises in Manitoba and in the Newdale area by one agricultural economist, due to inefficiency of the animal and the stagnant state of technology.²⁷ In Illinois beef cattle were the lowest return enterprise in 1966 for all types of soils.²⁸ Oppenheimer also writes about beef cattle enterprises:

From a strictly operational point of view and not considering certain tax advantages, it does not take a financial wizard to see that the two or three per cent that an investor can make out of breeding cattle or out of ranchland, does not justify the wildly fluctuating prices and the many hazards of weather, disease and poor management that he must risk.²⁹

Therefore, the progressive farmers can be expected to

²⁷J. Ackerman, "The Times they are A-Changin'," Talk to the Milk Producers Association annual meeting, St. Boniface, Oct. 28, 1965.

_____, An Unhibited Look at the Beef Industry Family Herald, April 1968.

²⁸University of Illinois, Cooperative Extension Service, Summary of Illinois Farm Business Records 1966, Circular 970, p. 6.

²⁹H. Oppenheimer, Cowboy Arithmetic - Cattle as an Investment (Illinois: The Interstate Printers and Publishers, Inc., 1963), p. 155.

transfer farm resources from cattle enterprises into some more "profitable" enterprises (if they are in a competitive range of production possibility curve). Nevertheless, this substitution, per se, can not be treated as a factor contributing growth to the individual farm firms under all circumstances. A rise in products prices and/or improvements in the technology of cattle industry may raise its comparative advantage. In these situations, this industry would induce farmers to expand it for the growth of their farms. However, under present technology and market conditions a reduction in the resources allocated to cattle farming is considered as one of the measures of farmers' capacity to adjust with changing situations for the growth of their farm firms. The following hypothesis is outlined:

Sub-hypothesis #6.3 A change in value of cattle³⁰ has a negative effect on the growth of farm firms, i.e., the larger the increase in value of cattle, the lower is the growth and, conversely, the smaller the increase in value of cattle, the higher is the growth.

³⁰Since dairying enterprise is nominal among the study farms, cattle enterprises have been treated primarily as beef cattle enterprises.

Non-Economic Factors and Growth of Farm Firms

Economists³¹ have well recognized by now that the non-economic factors influence economic growth. Economic growth of farm firms requires changes in psychology and attitude of farmers from risk aversion to risk seeking from growth aversion to growth emphasis, from satisfaction with the present level of income to aspiration toward a higher level of income.

Rapid technological developments in farming entail enormous adjustments for the farmers. These adjustments are possible only if farmers' values are oriented toward engagement in economically rational actions.³² But values differ substantially from farmer to farmer, their divergent values lead to variation in their economic activities and

³¹J. A. Schumpeter, The Theory of Economic Development (New York: Oxford University Press, 1961).

H. Leibenstein, Economic Backwardness and Economic Growth (New York: John Wiley & Sons Inc., 1957).

W. W. Rostow, The Stages of Economic Growth (London: Cambridge University Press, 1965).

E. T. Penrose, The Theory of the Growth of the Firm (New York: John Wiley & Sons Inc., 1960).

³²Parsons and Smelser indicate that, "Economic rationality in the value system sense is the valuation of the goals of economic production" and further it depends on "...the level of valuation of economic production."

Source: T. Parsons and N. J. Smelser, Economy and Society (London: Routledge and Kegan Paul Ltd., 1956), pp. 176-77.

thereby variation in the levels of growth of their farm firms.

Thus the following hypothesis is advanced:

Hypothesis #7 The operators' rational value orientation (specified in the following two sub-hypotheses) influences the growth of farm firms.

Attitude to Risk Taking and Growth of Farm Firms

Several studies have indicated that many farm operators discount long-run returns heavily due to uncertainty in the short-run and as a result make conservative sub-optimum decisions which may minimize losses but not maximize returns.^{33,34} Thus the individual's aversion to risk may cause him to select alternatives which are relatively safe in the short-run and to by-pass opportunities which are profit maximizing in the long-run. A second way in which risk aversion may affect profits is through the reluctance of some individuals to use all the capital which may be available to them. Several studies have found that although marginal returns of capital are higher in farming than are the marginal returns of labor, the reluctance of many farm managers to go

³³J. L. Dillon and E. O. Heady, Theories of Choice in Relation to Farmer Decisions, Iowa Ag. Exp. Station, Res. Bull. 485, 1960.

³⁴R. J. Hildreth and G. W. Dean, _____, Uncertainty, Expectations and Investment Decisions for a Sample of Central Iowa Farmers, Iowa Ag. Exp. Station, Res. Bull. 447, 1957.

into debt results in their failure to use all the capital available to them.³⁵ Thus a manager's aversion to risk as indicated by his reluctance to use existing or borrowed capital necessary to reach the most efficient scale of production may be considered to have a regressing effect on growth. The following hypothesis is stated:

Sub-hypothesis #7.1 The relative risk seeking attitudes of farm operators affect growth of farm firms, i.e., as the level of the risk seeking attitudes of the operators increases, the growth of the farm firm increases and, conversely, as the level of risk aversion increases, the growth decreases.

Farmers' Aspiration Toward Higher Levels of Income and Growth of Farm Firms

The aspiration level of the individual defines the point of satisfaction from the minimum level necessary to satisfy basic psychological needs to the virtually unlimited accrual of wealth at the opposite extreme. An aspiration towards attainment of higher income involves the commitment of resources and thereby higher growth. Other factors being equal, the higher the aspiration level the individual has, the more successful he should be in his attainment of growth of income. The following hypothesis is put forth in this

³⁵F. Fliegel, "Obstacles to Change for the Low-income Farmer," Rural Sociology, 25, pp. 347-51, 1960.

context:

Sub-hypothesis #7.2 The farmers' relative aspiration to higher levels of income contributes to the growth of the farm firms.

A question arises - what creates the variations in the value orientation of farm operators which affects farm growth? These might be hereditary or environmental in nature but the above variations may also be due to education, age and experience of the farm operator. Education, age and experience do not only affect the value orientation, but also affect confidence, knowledge, skills and management ability of farm operators which, in turn, influence growth of their farms.

Years of Education and Growth of Farm Firms

Rational decision making involves an ability on the part of the individual to define a problem out of complex phenomena and to be able to determine what information is needed in order to identify and evaluate alternative solutions to a problem.³⁶ The educated farmer may determine and procure information on different opportunities and different technologies available to him. He might absorb these ideas and apply them to project probable consequences of alternative

³⁶D. J. Hobbs, G. M. Beal and J. M. Bohlen, "The Relation of Farm Operator Values and Attitudes to their Economic Performance," Rural Sociology: 33, p. 66.

courses of action in order to accomplish the desired end. Thus education appears to be a crucial factor in the growth of farm firms. The following hypothesis is stated to empirically test the above postulate:

Hypothesis #8 The level of education of the individual farm operator has a positive effect on the growth of the farm firm.

Age of Operator and Growth of Farm Firms

Several research studies affirm a negative relationship between age and economic aspiration and productivity.³⁷ They reveal that as an individual approaches retirement he becomes more conservative and tends to make decisions oriented towards minimizing the possibility of losses rather than maximizing profits. Peterson has found internal capital rationing to be more prevalent at the later stages of the life cycle.³⁸ Therefore, the growth of farm firms is higher for the young farmers than for the elderly farmers. The following hypothesis is advanced to empirically test the proposition:

Hypothesis #9 The growth of the farm firm has a functional relationship with the age of the farm operator. The relationship between these two variables is inverse.

³⁷Strauss, op.cit.

³⁸G. Peterson, Firm-household interrelationships in Agriculture, unpublished M. S. thesis, Iowa State University, Ames, Iowa, 1951.

Experience in Farming and Growth of Farm Firms

Experience in farming provides confidence to the operator to undertake more risky enterprises. Secondly, it gives operator some knowledge to plan his farm business. According to Bradford and Johnson, "A prime function of management is to improve knowledge (through observing and analyzing)."³⁹ Therefore experience in farming aids the growth of farm firms. The following hypothesis is outlined:

Hypothesis #10 The growth of the farm firm has a functional relationship with the number of years of experience of the farm operator. The relationship between these two variables is positive.

ASSUMPTIONS

The following are crucial assumptions:

1. The area is small relative to the total agricultural area of Western Canada, hence any change in the quantity of resources required (except land) and product produced in the area will not affect their prices.
2. As all farms are located almost on the same type of soils, Newdale clay-loam, soil variations do not affect cost and income structure of the individual farms significantly.
3. Farming decisions are mainly taken by one member of the family.
4. The goal of each farmer is to maximize profit from his farm business.

³⁹L. A. Bradford and G. L. Johnson, Farm Management Analysis, (New York: John Wiley and Sons, Inc., 1966), p. 28.

CHAPTER II

THEORIES OF ECONOMIC DEVELOPMENT

Economic development theories are dealt with in economic literature in macro, regional and micro senses.

THEORIES OF ECONOMIC DEVELOPMENT IN MACRO CONTEXT

"Economic development is a process by which a population increases the efficiency with which it provides desired goods and services, thereby increasing per capita levels of living and general well-being. The process is a dynamic one, involving constant changes in structure and procedures of the economy."¹ In the above definition the level of living is basically a material concept, but it certainly includes increased leisure derived from more efficient use of resources in the production of material goods.

In economic literature another term, economic growth, is used interchangeably with economic development. A few economists have differentiated between economic growth and economic development by arguing that economic growth is a process, whereby an economy's per capita real income increases

¹J. W. Mellor, Economics of Agricultural Development (New York: Cornell University Press, 1966), p. 3.

over a period of time but economic development is more comprehensive term and explicitly includes development of institutions and human resources in addition to economic growth.

All the three main determinants of economic development - economic growth, improvement in institutions and development of human resources - need to be examined in detail. The following are some major theories of economic growth.

The Classical Theory of Economic Growth

The classical economists considered that total output depends upon the size of labor force, the supply of land, the stock of capital, the proportions in which these factors of production are combined and the level of technology. They did not include entrepreneurship explicitly in their system. "They seemed to think that there was always a plentiful supply of better techniques and new commodities to be introduced, but they considered that the rate at which these opportunities could be exploited was limited by the flow of capital for new investment."²

According to the Classical School, when population is relatively small, returns on labor will be high. This will

²B. Higgins, Economic Development (New York: W. W. Norton and Company, Inc., 1959), p. 90.

generate savings and capital accumulation, but the growth of population (labor force) necessarily encounters diminishing returns, owing to scarcity of natural resources, which will lead to insufficiency in capital accumulation, and, therefore, slow down technological progress. If (and when) technological progress is so slow that it does not offset the diminishing returns to land and labor, the margin between production and subsistence requirements of population narrows down and eventually disappears. Therefore, profit amounts to zero. This fall in profit further inhibits capital accumulation and technological progress. This vicious circle goes on and wages remain at a level just sufficient for survival.

Thus the classical theory explains a race between technological progress and population growth, a race in which technological progress would be in the lead for some time but would eventually end, permitting the population growth to take the lead and people are left with only subsistence incomes.

This model has many deficiencies. It appears that the race between technological improvement and population growth has been won by technology so far in many countries. Another crucial short-coming of the model is the inadequacy of its concept of capital. In this model capital accumulation and technological development have been considered as increases

in the supply of tools already in use for newly-added workers to the labor force. Instead, now technological improvement refers to the use of more and better tools, enabling workers to increase their productivity.

In addition to this, many other economists, in particular Harrod,³ Domar,⁴ Kaldor⁵ and Solow⁶ have offered their theories of economic growth. But they express the outward manifestation of the growth process and fail to portray the social and institutional changes that economic development requires.

Leibenstein,⁷ Schumpeter and others explicitly recognize the role of human capital, institutional and structural changes in economic development. Schumpeter explains economic development -

³R. F. Harrod, "Essay in Dynamic Theory," in Reading in Business Cycles and National Income, A. N. Hansen and R. V. Clemence (ed.), (New York: W. W. Norton and Co., Inc., 1959).

⁴G. Ackley, Macro economic Theory, (New York: The Macmillan Company, 1961), p. 513-18.

⁵American Economic Association and the Royal Economic Society, Surveys of Economic Theory - Growth and Development, Vol. II (New York: St. Martin's Press, Inc., 1965), p. 5-75.

⁶Higgins, op.cit.

⁷H. Leibenstein, Economic Backwardness and Economic Growth (New York: John Wiley and Sons, Inc., 1957).

Nor will the mere growth of the economy, growth of the population and wealth, be designated here as a process of development. For it calls forth no qualitatively new phenomena, but only processes of adaptation of the same kind.⁸ ...Development in our sense is then defined by the carrying out of new combinations - introduction of new goods, and new methods of production, the opening of new markets, the conquest of new sources of supply of raw materials, and the carrying out of the new organization.⁹

His theory of economic development is outlined as follows:

Schumpeter's Theory of Economic Development

Schumpeter states that economic development is a discontinuous and accumulative process and it occurs when new combinations grow in time. He assigns importance to the saving and investment process in economic development but considers that development implies mainly combining existing productive resources in a different way to do new things. Thus technical change is more important than saving for economic development.

He emphasizes that credit is an important source of financing the development.

Schumpeter assigns a crucial role to the innovator in the developmental process. His thriving innovator is motivated by the attraction of higher profit and dynasty in industry. The innovator "leads" the means of production into

⁸J. F. Schumpeter, The Theory of Economic Development (New York: Oxford University Press, 1961), p, 63.

⁹Ibid., p. 66.

new channels. He also "leads" in the sense that he interests other producers in his innovations. He is self-centred and relies less on tradition and connections because his characteristic task consists precisely in breaking up old traditions and creating new ones. Although he transforms primarily the economic system, his action has moral, cultural and social consequences also.

Where innovation generates higher profit, other firms in the industry are attracted and adopt it in due course. This leads to reorganization and modernization of the industry and the economy. But this innovator-profit does not remain for long because other firms adopt the technology and new firms come into the industry and force down the profit of each firm.

A further wave of innovation may occur which leads to changes in the existing system - new methods of production and new markets etc., resulting in higher profits. In this way the circular process of innovation and economic development goes on. These waves of innovation and later on adoption by the economy at large entail not only increases in per capita income but also changes in social and institutional structures.

The theory of economic development appears quite useful to explain current economic development and to provide a guidepost for future development. Schumpeter has specified

certain crucial factors in economic development such as the role of the credit institution, the role of the innovator and technology, and the role of psychological, social and institutional factors.

THEORY OF ECONOMIC GROWTH AND DEVELOPMENT OF AN AREA

An area can achieve an increase in per capita income of its population either through increase in the volume of economic activities in the region or through outmigration of population even if the total economic activities would remain at the original level, or slightly drop. The latter may be consistent with achievement of the socially desirable goal of economic efficiency.¹⁰ But the political attitudes of the region will be largely directed toward increasing the economic activities by establishing new industries and improving the position of existing ones. The extent of such activity is well known historically and obvious in the contemporary American political scene....¹¹ The following is a theory of regional economic growth involving an increase in the volume of economic activities.

¹⁰H. S. Perloff, et al., Regions, Resources and Economic Growth (Lincoln: University of Nebraska Press, 1960), p. 56.

¹¹J. Friedman and W. Alonso, Regional Development and Planning (Massachusetts: The M. I. T. Press, 1965), p. 248.

The Export-base Theory of Regional Economic Growth

Area growth has been promoted by the ability of an area to produce goods and services demanded by the "outside world" and to export them at a competitive advantage with respect to other areas. This ability to export creates a flow of income into the area which through the multiplier effect tends to expand internal markets of the area for all sorts of goods and services. Moreover, it further develops "residential" industries¹² and activities which induce growth of the region.

Friedman and Alonso have given a dynamic orientation to the export-base theory. They state:

As the regional market expands and region-serving activities proliferate conditions may develop for self-reinforcing and self-sustaining regional growth, and new internal factors may become important in determining the rates of regional growth, such as external economics associated with social overhead capital and the agglomeration of industries, and internal economies of scale.¹³

This theory is valuable in recognizing the role of the export-base industry in determining the level of absolute and per capita income of a region. While the return to factors of production in export industries indicates the direct

¹²This term is used to designate industries for the local market which develop where the consuming population resides.

¹³Friedman and Alonso, op.cit., p. 225.

importance of these industries for the well-being of the region, it is the indirect effect that is most important. Since residentiary industry depends entirely on the demand within the area, it is dependent on the fate of the export base. This theory further states that the growth of any area is directly related to developments within the national economy and, in some cases, to changes in international trade as well.

But the export-base theory does not consider internal efficiency of the industries of the area and does not provide sufficient scope for the internal growth sequences. For example, residentiary employment does not increase automatically due to the strategic "region-building". . . . industries that have external trade relationships,¹⁴ but the extent of multiplier effect is related to certain "internal" features that characterize the economic and social structure of the area. Nature of the export industries and particularly to the localized industrial linkages and services associated to the export sector are some of the important internal features. The theory is also partial in scope and overlooks other equally significant aspects of regional economic growth such as social and institutional changes.

Although Schumpeter's theory of economic development

¹⁴Perloff, et al., op.cit., p. 61.

deals, as explained in this chapter, with the economy as a whole but provides some propositions which the export-base theory lacks, for the development of an area. Thus the Schumpeterian theory and export-base theories give a good guideline for setting up a model for the economic development of a specific area. The following is deduced from these theories of the economic development of an area.

Economic development of an area requires many aspects of cultural and social organization. One important aspect is the change in psychology - from non-economic and risk aversion attitudes to innovating attitudes. The economic development process involves an establishment of new and expansion of existing export-base industries and entails the replacement of techniques of production in use by those which yield higher profits. In order that these developments may take place, there must be supplied large bodies of "social capital" in the form of roads, means of communication, recreation facilities and improved services including banks, supply services and sales facilities, etc. There must also be acquisition of new skills by the population. The process involves a reallocation of population from farms to non-farming sectors and further involves change from inefficient toward more efficient organization of farms.

The economic development of individual firms leads to the development of an area because each acts as a growth

agent. Psychology and attitudes toward growth have a bearing on the development of the area. Economic development of individual firms further generates demand for social overhead, and calls for the population adjustments between agricultural and non-agricultural sectors. Therefore, theories on growth and the economic development of the individual firm need to be examined, evaluated and co-ordinated.

THEORIES OF ECONOMIC GROWTH AND DEVELOPMENT IN MICRO CONTEXT

A few economists have made attempts to develop theories of growth of firms using biological analogies. They treat the firm as an organism, whose processes of growth are essentially the same as those of a living organism. But these theories do not consider human motivation and conscious human decision as important factors affecting growth. Penrose states:

All the evidence we have indicates that the growth of the firm is connected with attempts of a particular group of human beings to do something, nothing is gained and much is lost if this fact is not explicitly recognized.¹⁵

Baumol's Theory of Expansion of the Firm

According to Baumol, maximization of the rate of growth

¹⁵E. T. Penrose, "Biological Analogies in the Theory of the Firm," American Economic Review 42, No. 5, pp. 804-19.

of total revenue is not consistent with maximization of the current level of total revenue.¹⁶ The former seems a better approximation of the goals of many management groups. The long-run growth maximizer does not consider immediate profit as a constraint, but as a means of financing family living expenses and expansion plans. Profit is complementary to growth to a certain degree but beyond some point it competes with growth. Baumol further adds, "The optimal profit stream will be that intermediate stream which is consistent with the largest rate of growth of output over the firm's lifetime."¹⁷

Halter¹⁸ and Johnson et al.,¹⁹ have used mathematical models in farm growth analysis. These models, along with Baumol's, explain only economic changes and do not explicitly consider changes in social and institutional structures. Therefore, these models provide only a crude guidance. The following theory includes both economic and non-economic factors.

¹⁶W. J. Baumol, "On the Theory of the Expansion of the Firm," AER: 52, No. 5, p. 1086.

¹⁷Ibid.

¹⁸A. N. Halter, "Models of Firm Growth," JFE: 48, No. 5, p. 1503.

¹⁹S. R. Johnson, et al., "Stochastic L. P. and Feasibility Problems in Farm Growth Analysis," JFE: 49, No. 4, p. 908.

Penrose's Theory of the Economic Growth of the Firm

He argues that size of the firm is a by-product of the process of growth, that there is no 'optimum', or even most profitable size of firm in the long-run. In 'pure' competition the limit to output (size) is found only in the assumption that the cost of producing the individual product must rise after a point as additional quantities of it are produced. Managerial diseconomies are considered as a cause for long-run increasing costs. This result is true only if management is treated as a "fixed factor". Quality of management (management skill) may not improve for all firms, but it may for some. In the presence of economies of large scale production and operation, there may be a minimum size of firm. But he rejects the proposition that for every firm, there is some optimum size beyond which it will run into diseconomies. Only for firms incapable of adapting the managerial structure to the requirements of larger operations can one postulate an optimum size. Therefore, in general, increasing long-run average cost can not be considered as a limiting factor for the size of the firm. "Size of firm may depend upon some measure of productive resources firm employs."²⁰

²⁰ E. T. Penrose, The Theory of the Growth of the Firm (New York: John Wiley and Sons, 1960), p. 24.

But he admits that there is a limit to the rate at which any firm can grow in a given period, a limit provided by the capacities of its existing management. There is a limit also to the amount of expansion any firm can undertake in a given period. This limit is set by the resources a firm controls.

"The rate and direction of the growth of firm depend on the extent to which it is alert to act upon opportunities for profitable investment. Thus lack of enterprise in a firm will preclude or substantially retard its growth."²¹ The entrepreneur takes a chance in the hope of gain and commits effort and resources to speculative activity. The enterprising firm permanently commits part of its resources to the task of investigating the possible avenues for profitable expansion, acting on the general assumption that there are always likely to be opportunities for profitable growth. The decision to search for opportunities is an enterprising decision requiring entrepreneurial intuition and imagination and must precede the 'economic' decision to go ahead with the examination of opportunities for expansion. By virtue of special entrepreneurial ability, many small firms without adequate initial financial resources do succeed, do raise capital and do grow into large firms. Therefore, expectation plays a great role in the progress of the firm

²¹Ibid., p. 30.

but it is only a necessary condition for growth, not a sufficient because success depends upon execution of the firm's sound plans.

Penrose's thesis can be summarized like this. Growth is an internal process of the firm through which the productive opportunities of the firm are used to expand its size. For some enterprising firms, there is a continuous incentive to expand and there is no limit to its absolute size. However there is a limit to the rate of growth, i.e., productive opportunities of a firm are limited in any given period.

This theory is quite useful as a model for expansion or growth of the individual firm because it embraces both economic and non-economic factors. From this theory one can deduce the factors responsible for development and can give special treatment to each of them separately.

FACTORS AFFECTING ECONOMIC DEVELOPMENT OF INDIVIDUAL FIRMS

Economic Factors

The following three relationships have a decisive impact on the growth of individual firms.

1. Resource-resource relationship: Theory of combining resources

Heady states, "If two or more factors are employed in production of a single product, cost is at a minimum when the ratio of factor prices is inversely equal to the marginal rate of substitution of the factors."²² It is expressed in equation form as follows:

$$MRS_{X_1 X_2} = \frac{P_{X_1}}{P_{X_2}}$$

Where

$MRS_{X_1 \cdot X_2}$ = Marginal rate
of substitution
of X_1 for X_2

P_{X_1} = Price of X_1

P_{X_2} = Price of X_2

The condition holds as long as the iso-cost line is tangent to the iso-product curve. In Figure 2.1, at point 'a' the slope of iso-product curve $\left(\frac{dX_2}{dX_1}\right)$ is equal to the slope of the iso-cost line (price ratio). The same condition can be stated in another form:

²²E. O. Heady, Economics of Agricultural Production and Resource Use (Iowa: Iowa State University Press, Ames, 1962), p. 172.

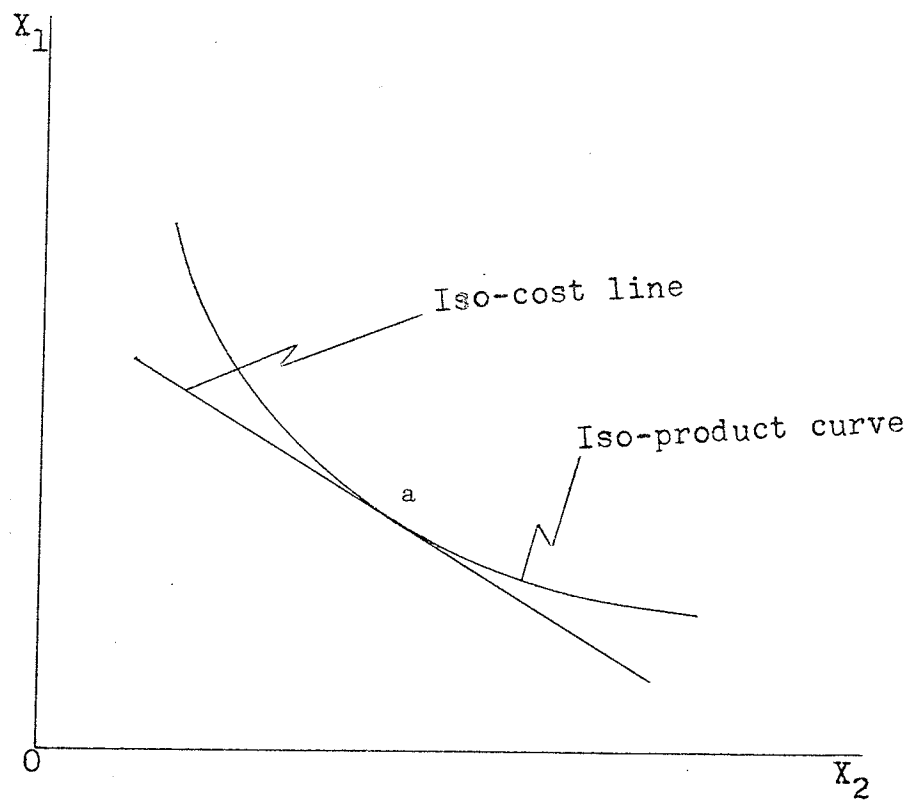


FIGURE 2.1

The use of iso-cost line and iso-product curve
to indicate minimum costs.

$$\frac{MPP_{X_1}}{MPP_{X_2}} = \frac{P_{X_1}}{P_{X_2}}$$

Where

MPP_{X_1} = Marginal Physical Product of X_1

MPP_{X_2} = Marginal Physical Product of X_2

By transposing

$$\frac{MPP_{X_1}}{P_{X_1}} = \frac{MPP_{X_2}}{P_{X_2}}$$

This condition for least-cost combination can be extended for more than two variables.

$$\frac{MPP_{X_1}}{P_{X_1}} = \frac{MPP_{X_2}}{P_{X_2}} = \dots = \frac{MPP_{X_n}}{P_{X_n}}$$

The expansion path is derived by varying the level of output with resources combined in the least-cost combination.

The least-cost combination is satisfied at every point on the expansion path, g , as illustrated in Figure 2.2, and it holds if resources are unlimited. If one of the resources, X_2 , is permanently fixed at X_2^0 the expansion path will be g^1 (i.e., $a b c^1$) rather than g (Figure 2.2).

In dynamic context if in t_1 a farm has chosen a¹ combination of X_1 and X_2 (Figure 2.3) due to special scarcity

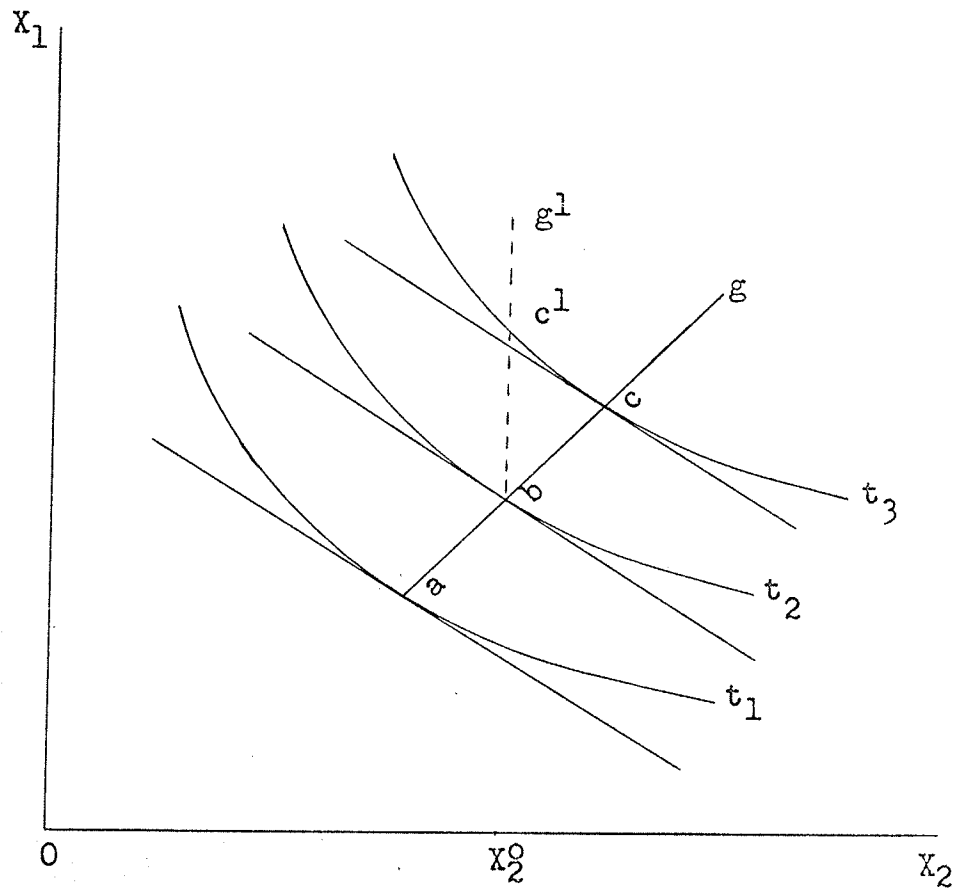


FIGURE 2.2

Resources and expansion paths

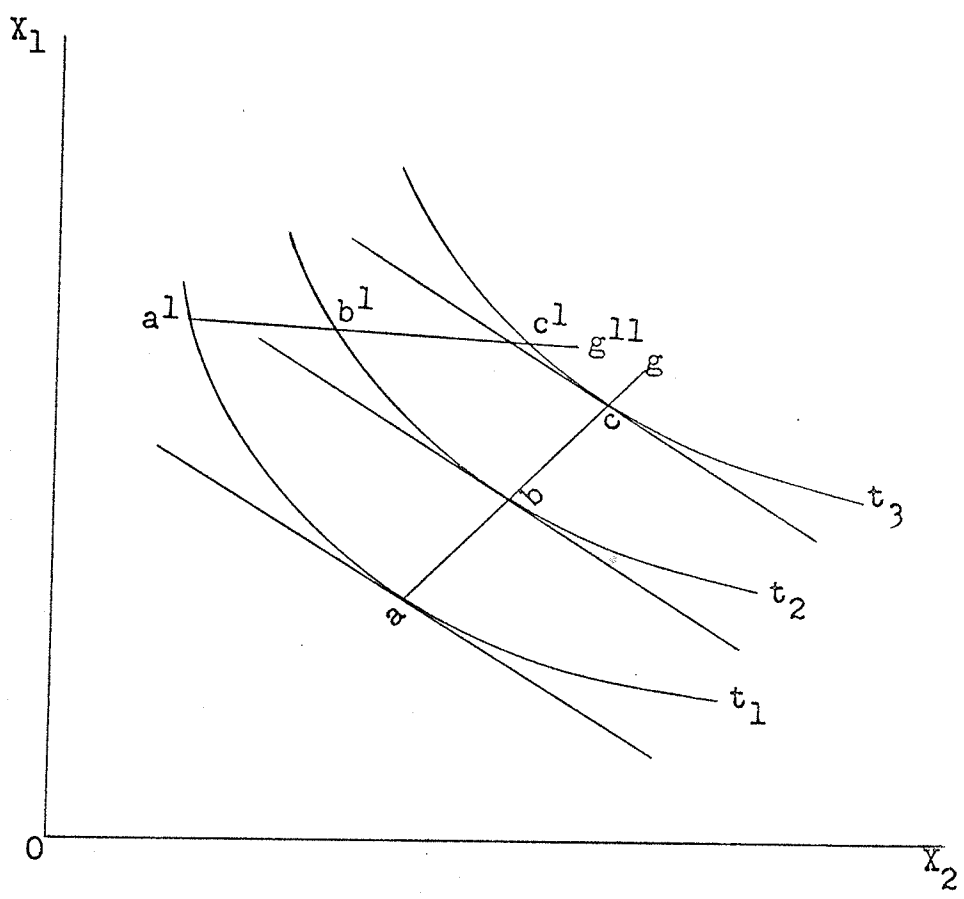


FIGURE 2.3
Expansion path in dynamic context

of X_2 or any other causes, he may be forced to choose b^1 combination of X_1 and X_2 in t_2 due to rigidity in factors, such as machines, once bought, can not be easily liquidated. Therefore, the expansion path for the firm will be g^{11} rather than g .

Product-product relationship: Theory of combining enterprises

Heady writes, "Maximum profits are obtained, with cost or resources fixed in quantity, when marginal rate of product substitution is inversely equal to the product price ratio."²³ It is algebraically expressed as follows:

$$MRS_{Y_2 \cdot Y_1} = \frac{P_{Y_2}}{P_{Y_1}}$$

Where

$MRS_{Y_2 \cdot Y_1}$ = Marginal rate
of substitution
of Y_2 for Y_1 .

P_{Y_2} = Price of Y_2

P_{Y_1} = Price of Y_1

This condition holds as long as the iso-revenue line is tangent to the production possibility curve. The slope of the production possibility curve and the slope of the iso-revenue line (price ratio) are equal at point E in Figure 2.4.

²³Ibid., p. 239.

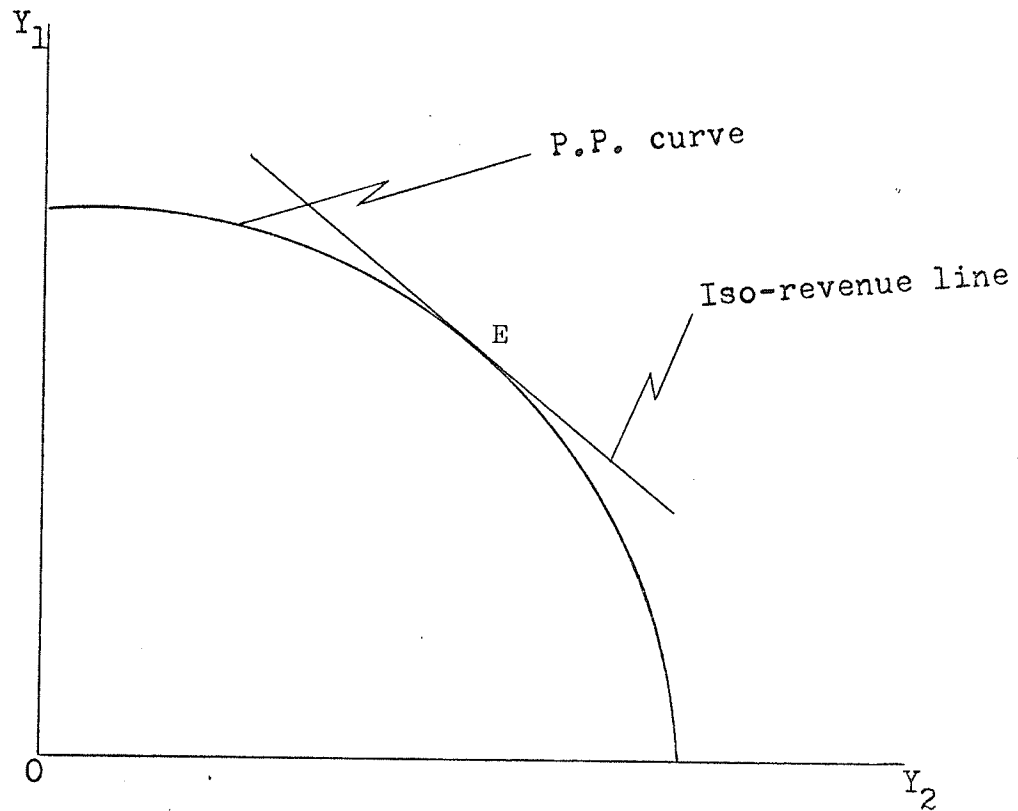


FIGURE 2.4

The use of production possibility curve and
iso-revenue line to show maximum profit

The same condition is expressed in algebraic form as:

$$\frac{MPP_{X_1 \cdot Y_1}}{MPP_{X_1 \cdot Y_2}} = \frac{P_{Y_1}}{P_{Y_2}}$$

by transposing

$$\frac{MPP_{X_1 \cdot Y_1}}{P_{Y_1}} = \frac{MPP_{X_1 \cdot Y_2}}{P_{Y_2}}$$

This condition can be extended to cover any number of enterprises or products.

$$\frac{MPP_{X_1 \cdot Y_1}}{P_{Y_1}} = \frac{MPP_{X_1 \cdot Y_2}}{P_{Y_2}} = \dots = \frac{MPP_{X_1 Y_n}}{P_{Y_n}}$$

The expansion line which can be traced by varying the level of resources (expenditure), presents optimum levels of production of Y_1 and Y_2 , consistent with the profit maximizing condition.

The expansion line $a b c$ as illustrated in Figure 2.5, satisfies the profit maximizing condition. But in dynamic context an expansion line of a farm may be $a^1 b^1 c^1$, if in t_1 he has chosen a^1 combination of Y_1 and Y_2 rather than a , he may be forced to choose b^1 in t_2 rather than b (which satisfies profit maximizing condition) due to fixity in the plant and other restrictions.

Both profit maximization and cost minimization conditions

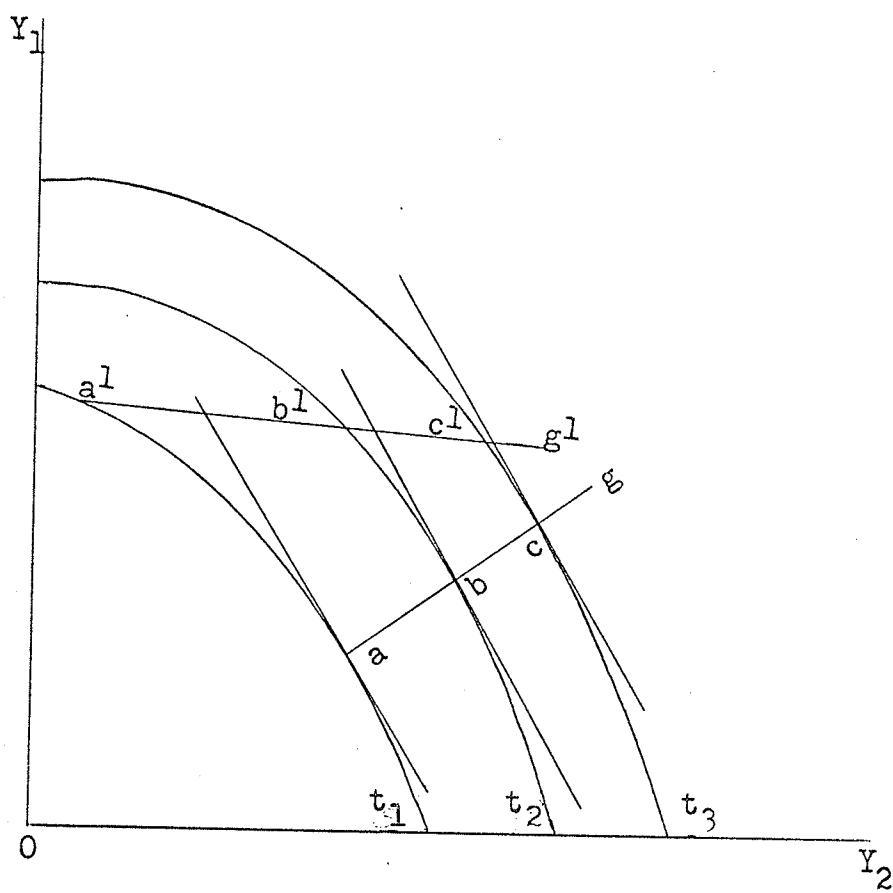


FIGURE 2.5

Expansion line under dynamic framework

can be combined to trace expansion path where the following condition holds:

$$\frac{P_{Y_1} \cdot MPP_{X_1 Y_1}}{P_{X_1}} = \dots \frac{P_{Y_1} \cdot MPP_{X_n Y_1}}{P_{X_n}} = \frac{P_{Y_2} \cdot MPP_{X_1 Y_2}}{P_{X_1}} = \dots \frac{P_{Y_m} \cdot MPP_{X_1 Y_m}}{P_{X_n}}$$

In the Hicksian dynamic framework this condition does not hold because any less than optimum combination either in resources or in products in t_1 affects the combination in t_2 and other successive periods. Moreover, in this model the efficiency (net income) ought to be maximized in each period of production with given resources and enterprises but this condition is not consistent, with conditions of maximum growth, as stated in the earlier part of this chapter, where net income is maximized over a long period. Therefore, this model can not be used in its existing form but it provides some guidance in developing a model which is growth oriented rather than efficiency oriented.

Capital, Capital-Output Ratio and Farm Technology

Penrose visualizes that a limit to the growth of the firm is set by production opportunities and existing resources with the firm. It implies that the firm should procure more resources, especially those which are limiting its growth.

Therefore, a farm firm is required to increase land, capital and management as dictated by cost minimization, profit maximization and growth criteria.

The capital-output ratio indicates technological development, and has a decisive role in the growth of the firm. With a lower $K : Y$ ratio, meaning an improvement in technology, the firm requires less capital to produce the same or higher level of output. In addition to this, a reduced $K : Y$ ratio (for example a new improved tractor) may change the shape and location of iso-product and transformation curves, and may, thereby, change the expansion path of the firm.

Although inputs are the fuel for economic development they are selected, assembled and sold by economic institutions. Therefore, the latter play a crucial role in economic development and need careful examination.

Economic Institutions

In this increasingly complex economic society, individuals are becoming more and more dependent upon group action in the making and carrying out of their decisions. Most economic activities are carried out under the purview of complex and highly specialized institutions. However, current economic analysis mostly ignores, or assumes as given, the institutional framework within which economic

decisions are made and with which economic decisions are implemented.

Economists such as Hicks and Schultz²⁴ recognize the role of institutions in economic analysis. Hicks states that "Another more important limitation..." of his text on Value and Capital is that the book is "...without any inclusion of reference to institutional controls."²⁵ He visualizes the latent need for extending economic analysis to embrace institutions as a force that impedes or facilitates a firm's growth.

Institutions must satisfy the test of functional efficiency: that is, they must test whether or not their existing set up will tolerate or accomodate the changes required for economic growth. Institutions must not merely adapt to an existing environment, but, rather their program and performance must have a dynamic (modernizing) impact on the individuals and groups with whom they come into contact.

The following institutions are crucial for the growth of farm firms of an agricultural area:

1. Credit institutions - Banks, Credit Unions, Farm Credit agencies, etc.
2. Input Supplying Institutions - Co-ops, dealers, etc.

²⁴T. W. Schultz, Transforming Traditional Agriculture (Connecticut: Yale University Press, New Haven, 1965).

²⁵J. R. Hicks, Value and Capital (Oxford: Clarendon Press, 1946), p. 7.

3. Farm product marketing institutions -
dealers, elevators, etc.
4. Off-farm employment creating institutions.

Inefficient credit institutions may be one of the major obstacles to development. One of the functions of sound credit institutions is to extend capital resources to both large and small farmers where production possibilities are good and have efficient management. Another function is to acquaint farmers with credit sources and the opportunities for profitable use of credit on their farms.

The input supplying and farm product marketing institutions should be developed so that they can assume responsibility to supply more and better inputs and to market farm products more efficiently.

Therefore, a developing area needs to be equipped with banks and other credit services, dealers, elevators and off-farm employment creating industries (if outmigration from farming is required).

Non-economic Factors

Economic development does not occur automatically. It occurs due to expansion of human capacities that increase the potential growth promoting activities. But usually this aspect is underrated in economic development literature.

Leibenstein comments:

We must consider in our theory not only the direct growth activities, such as savings and investment, but the less direct activities that lead to an expansion of the growth agents, activities that result in increases in the stock of entrepreneurial activities, in propensity to invest and innovate, in the increase in work skills and managerial capabilities, etc.²⁶

Psychological Factors

Leibenstein states, "The proper psychological attitudes and motivations must somehow become imbedded in the consciousness of a sufficiently large number of people for development to take place."²⁷ Motivation and attitudes are thus the key human factors in economic development.

Motivation

Firm operators are motivated to accept new ideas and new ways of doing things. Very often, new ideas face great resistance from the tradition-minded and the old. In this case the innovator plays a very important role. If a new practice introduced by the innovator proves profitable, then other firms are easily motivated to accept it.

For many individuals economic and technological change have been in conflict with their values. Many people are reluctant to borrow and this is negatively related to

²⁶Leibenstein, op.cit., p. 120.

²⁷Ibid.

adoption of new practices. Therefore, individuals need to be motivated to adopt attitudes conducive to acceptance of change which is favourable to economic development.

Attitudes

A risk-assuming or risk-avoiding attitude is also a decisive factor in the development of the farm firm. Farmers having excessive risk aversion, may not develop fast enough because they do not want to borrow funds, and do not adopt profitable but risky enterprises and technology. Hess and Hiller point out:

The decision not to borrow funds is conditioned largely by the operator's attitude toward assuming debt. This attitude arises from the feeling that assuming a debt means assuming risk of becoming insolvent in the short-run if conditions become too unfavourable.²⁸

Therrien also concluded that farmers with higher risk taking attitudes had greater financial progress than farmers with low risk taking attitudes.²⁹ But, on the other hand, excessive risk taking is also dangerous because a large error may drive the farmer out of business. There can be conceived an optimum degree of risk taking. According to Bradford and

²⁸C. V. Hess and L. F. Miller, Some Personal, Economic and Social Factors Influencing Dairymen's Actions and Success Pennsylvania Agri. Expt. St. Bull 577, 1964, p. 16.

²⁹G. A. Therrien, Risk Attitudes, Values, Insurance Practices and their Contribution to Farm Business Development, unpublished M. Sc. thesis, Dept. of Ag. Econo., University of Manitoba, p. 178.

Johnson, "...the amount of risk a manager is willing to take depends upon such factors as (1) the amount of assets he has to lose; (2) the status of his family; (3) his age; (4) the society in which he lives; (5) the effect of possible gains and losses upon his social position and (6) his love of adventure."³⁰ Therefore, one can conclude that the last factor - love for adventure - indicates that possession of a risk taking attitude depends upon what psychology one has, of course, this psychology is influenced by age, assets, etc. Therrien observed that younger farmers had more aggressive risk taking attitudes than older ones.³¹

In addition to risk taking attitudes, the attitude towards wealth or leisure, progressiveness or aversion to progress affects the firm's economic development. Therrien found that appropriate attitudes toward attainment of higher income levels are conducive to rapid financial progress of farm firms.³²

Skill

Acquisition of the skill to do a job in a better way is pivotal for development. Kendrick concluded that increased

³⁰Bradford and Johnson, Farm Management Analysis (New York: John Wiley and Sons, 1966), p. 9.

³¹Therrien, op.cit., p. 170.

³²Ibid., p. 173.

factor productivity (better skill-technological improvements) accounted for more than one half of the 3.3 per cent average rate of growth in real products in the United States economy between 1899 and 1953.³³ Martin, et al., found that farm operators who are not good managers can not be lifted out of low-income categories even by free gift of additional farm resources.³⁴ Therefore, educational programs which improve skill and management ability require special attention in economic development programs.

Community Services

Education

Investment in human capital, i.e. education, is a major force of economic and social development. It helps in changing attitudes in favour of accepting new ideas. Griliches reported that education per farm worker was a statistically significant variable affecting gross output per commercial farm.³⁵ Since education enhances the rate of outmigration from farming, it helps in the development of

³³J. W. Kendrick, "Productivity trends: capital and labor," Review of Economics and Statistics 38: 248-57, Aug. 1957.

³⁴L. R. Martin, J. C. Arthur and H. S. Singh, "The Effects of Different Levels of Management and Capital on the Income of Small Farmers in the South," JFE: 42, 90-100.

³⁵Zve Griliches, An Aggregate Agricultural Production Function and the Measurement of Technical Change, Paper read at the Dublin meeting of the Econometric Society, Aug. 20, 1962.

individual farm firms in Canada.

Type and quality of education are important in building up managerial capability of individual farmers. The beginning farmers need to have vocational education so that they can welcome changes and act as innovators. This education creates interest among farmers in farm magazines and bulletins, thereby extending new ideas.

Since human capital develops through investment in education and recreation, the latter also needs examination.

Recreational Activities

According to Martin, "...expenditures on health and on aesthetic and recreational experiences increase individual and aggregate productivity, as well as provide for the enriching growth of cultural experiences."³⁶ Therefore the presence of cultural and recreational activities accelerates economic development of individual farm firm by raising its operator's productivity. These activities provide facilities to the farmers for their refreshment after doing agricultural work.

It can be concluded that both economic and non-economic factors have a catalytic role to play in the process of development of individual farm firms and of a farming area.

³⁶L. R. Martin, "Research needed on the contribution of human, social and community capital to Economic Growth," JFE: 45, No. 1, p. 87.

SUMMARY

From this examination of different theories of macro, regional and micro economic growth and development, the following can be concluded:

- I. Economic development is a process whereby level of absolute and per capita income and level of living are increased but it also involves improvement in the structure of an economy.
- II. Development of an individual firm depends upon its manager's own initiative, attitude and ability. Existing managerial ability and capital can limit growth for a period of time. But there is no limit for expansion in the long-run.
- III. Economic development of an area and individual farm firms involves improvement in:
 1. Establishing new and expanding existing export-base industries.
 2. Efficiency in use of resources of the area.
 - a) Efficient resource use in the sector under consideration.
 - b) Transfer of surplus resources from one sector to another.
 3. Technology.
 4. Economic institutions - banks, co-ops, dealers, elevators, etc.
 5. Community services
 - a) Educational facilities.
 - b) Recreational facilities.

6. Psychology of people.
 - a) Risk taking attitude.
 - b) Progressive attitude.
 - c) Skill.

CHAPTER III

ANALYTICAL FRAMEWORK

This chapter deals with sources of data and analytical tools used to determine the factors explaining economic growth. The chapter is outlined in the following order:

- A. Nature and Sources of Data
- B. Model for Analyzing Growth of the Area
- C. Model for Analyzing Growth of Individual Farm Firms
- D. Budgeting of Individual Farm Firms.

A. NATURE AND SOURCES OF DATA

The distribution of farms, in the Newdale area, according to acreage, value of farm products sold, farm capital, land tenure and age have been taken from the 1961 and 1966 Censuses of Canada, Manitoba. These censuses also provide information on land use in the area.

It was proposed to include only 13 municipalities, Clanwilliam, Langford, Minto, Odanah, Rosedale, Blanshard, Harrison, Park L. S. D., Saskatchewan, Shoal Lake, Strathclair, Hamiota and Minniota of Census divisions 10, 11, and 13 in the area. But due to the lack of required data by municipality the study area has been extended to include all

of these three census divisions. The extension of size of the area from 13 municipalities to 25 creates more heterogeneity in fertility, soils, land use and type of farming in the area.

Inventory, cost and income data for 1962-66 at the farm firm level have been taken from summary cards of 59 member farms of WMFBA. Information on age, experience and education of farm operators were compiled from records of WMFBA. Scores on attitude to risk taking and scores on aspiration to income levels of the study farms were collected from G. A. Therrien who constructed them for almost the same farmers in 1967 while doing research for his Masters' thesis in the Department of Agricultural Economics, University of Manitoba.

The generalization of findings over the Newdale area, based upon the Association data is limited due to two reasons. First, the number of farms (59) under study is very small (1.08 per cent) in comparison to number of farms (5,598) in the area. Second, data collected through the above method are not of random nature (the method involved in our investigation can be considered as a case study method). Statisticians consider the data collected through random sample survey as ideal because they provide an objective basis for generalization, and a mathematical framework within which the probability of error and variation can logically be

determined. Alfred Marshall recognized that the general conclusions of random sample studies are more trustworthy and more easily generalized than those from case studies but considered the latter as ideal in providing opportunity for an intensive study of the variables and their relationships. Through the case study method one can obtain detailed information on the process of growth of the individual farm over a period of time.

The Association data give an insight into the growth of the farm business within a social and economic environment. But data collected by random sample surveys have limited value in situations where sociological, psychological and institutional problems are involved. Therefore, a study of 59 farms is quite satisfactory and useful to identify development problems and to focus on their solution.

B. MODEL FOR ANALYZING GROWTH OF THE AREA

Growth of the area can be defined as a change in the area income per year. Since annual income data for the area are not available, the growth was not determined for each individual year. Hence growth for the five year interval 1961 - 1966, was calculated for the area. Cross-sectional data - farms classified according to value of agricultural products sold - were used to focus on structural adjustments.

Therefore, the distribution of farms according to value of agricultural products sold for 1961 and 1966 were compared. Comparisons of improved acreage and farm capital were made in order to determine factors responsible for the growth of the area during this period. Changes in the value of farm machinery, equipment and livestock for 1961-66 were computed. Ages of farm operators in 1961 and in 1966 were examined. These comparisons indicate factors affecting the area growth (measured in terms of value of agricultural products sold¹ per farm), but on a crude basis because they were made only for a few resources measured as inventory stocks, not flow of input services. The most important resource, i.e., management, was not measured. Moreover, these comparisons involve only the magnitude of these resources and do not tell anything about their combination or quality.

Thus an intensive study of individual farm firms appears important so as to be able to examine their growth and to identify important variables affecting their growth. This study also provides some insight into the growth of the area as a whole.

¹The author assumes that no sizeable storage of agricultural products carried over the previous years were cleared in the year under consideration. It implies that the agricultural products which were sold in 1961 (June 1, 1960 to May 31, 1961) and in 1966 (June 1, 1965 to May 31, 1966) were produced in the same periods.

C. MODEL FOR ANALYZING GROWTH OF INDIVIDUAL
FARM FIRMS

Baumol states that maximizing profit in a given period is not consistent with maximum rate of growth in the same period.² In other words by maximizing profit in each year, a farm firm gets less than maximum growth rate over a period of time. But many economists use expansion path of the theory of the firm in marginal analysis as a growth path of individual firms. This expansion path involves the magnitude and combination of resources and level and combination of enterprises of the farm firm. In Chapter II of this study, the following method for determining the expansion path and expansion line was outlined:

$$\frac{MVP_{X_1} \cdot Y_1}{P_{X_1}} = \frac{MVP_{X_2} \cdot Y_1}{P_{X_2}} = \dots = \frac{MVP_{X_n} Y_1}{P_{X_n}} = \frac{MVP_{X_1} Y_2}{P_{X_1}} =$$

$$\dots = \frac{MVP_{X_n} Y_n}{P_{X_n}}$$

This condition requires the following assumptions:

1. Perfect competition.
2. A given technology.

²W. J. Baumol, "On the Theory of Expansion of the Firm," AER: 52, No. 5, pp. 1078-87.

3. Perfect divisibility in products and factors.
4. Homogeneous inputs.
5. Perfect knowledge.

Assumptions number 3, 4 and 5 are bothersome ones in connection with the expansion (growth) path. Due to a little increase or decrease in marginal value product or price of machinery (X_1) in the above condition, a farmer can not get a little smaller or little bigger machinery, even if he wants to make a change to satisfy above condition. Further, this model is mono-periodic and does not consider fixity and durability aspects of certain resources such as machinery, i.e., if bought in one year, can not be changed in the next, even though the above marginal condition for growth does not hold. Moreover, this model does not introduce uncertainty. Hence, this model is not used.

Halter³ has used mathematical model in farm growth analysis. This model treats the interest rate as a major variable for the growth of farm firm. But the rate of interest is fixed and comparable for all farmers of the study area. Therefore, this mathematical model will not be of much use in explaining the difference in the growth of different farm firms in the area.

³A. N. Halter, "Models for Firm Growth," JFE: 48, No. 5, p. 1503.

In this situation a simple model wherein changes in costs, income and farm resources over five years (1961-66) and non-economic factors are examined, may explain the variation in the rate of development of individual firms.

Concepts and Computational Techniques

At the farm firm level, economic growth is defined as an increase in net farm income over a period of time, in contrast to Johnson et al.⁴ who define growth of a farm as the change in the stock of physical assets. The ultimate objective of farm firms is to maximize net farm return over a period of time. The increase in assets is a means to attain this end rather than an end itself. Secondly, the change in assets does not assure economic growth because assets do not include all resources of growth. They do not account for quality and quantity of labour and management and changes in combination of resources which affect growth. Therefore, a change in farm net income could be treated as a main criterion for farm growth.

In this analysis, growth has been measured as a change in value of farm production rather than change in net farm income. Since data are available only on value of agricultural products sold and not on net farm income for

⁴S. R. Johnson, et al., "Stochastic Linear Programming and Feasibility Problems in Farm Growth Analysis," JFE: 49, No. 4, p. 908.

the entire Newdale area, the aggregation of growth on the study farms and its generalization for the entire area would be difficult, if growth is taken as change in net farm income. The correlation coefficient between 1962-66 change in net farm income and change in value of farm production is as high as .87 for the study farms. Thus, either measure appears quite consistent, therefore, change in value of farm production is taken as a measure of farm growth.

Five year margin for growth is also considered as a measure for growth. Margin for growth is defined as the balance or savings (from farming sources only) which a farmer gets after subtracting family living expenses from net farm income. Margin for growth is also considered as a return to operator's capital because family living expenses are treated as payment for the operator's labor and management. Farm business data of the 59 study farms show that the correlation coefficient between the five year margin for growth (1962 to 1966) and 1962-66 change in value of farm production is .42 which is statistically significant at the .001 level of probability. It seems that both measures of growth are quite consistent.

The objective, sole or partial, of a few farmers is to enjoy capital gains on farm property, especially land. Therefore, the criterion of growth should be consistent with this objective. The correlation coefficient between 5 year

(1961 to 1966) capital gains and change in value of farm production is .53 for the same 59 farms which is statistically significant at the .001 level. This further strengthens the basis of singling out change in value of farm production as a measure of growth.

The years 1962⁵ and 1966 have been used to find a four year change in value of farm production on individual farms. It does not say anything explicitly about the value of farm production during the intervening years. In this case, only 1962 and 1966 are used to calculate growth (absolute change), any fluctuation in 1966 (or 1962) will indicate abnormally high (low) growth of the farm firm, but if each year of 1962-66 is included, then fluctuation of 1966 may be dampened down and one can get a better picture of growth. Therefore, to take into account each year's value of farm production, fitting the 5 year trends for each farm seems to be a better technique. But the chosen technique assumes that the weather effect is the same for all farms. Therefore, change in value of farm production from 1962 to 1966 will provide a good approximation to the growth of individual farm firms.

⁵The author intended to select 1961 to determine five year change. However, since 1961 was a drought year, the change has been computed for only the four year period 1962-66.

Factors Responsible for the Variation in the Growth of
Individual Farm Firms

Higher Growth with Same Resources

It is hypothesized that value of farm production can be increased by using the same capital but raising quantity and quality of other inputs. To test this hypothesis, farms having the same capital at the beginning of 1962 and at the end of 1966 but with increased value of farm production were selected. Since there were only two such farms, cross-tabular analysis was used to examine the adjustments in their resources and thereby to sort out important factors responsible for this growth on these farm firms.

Growth with Increased Resources

General Model - Correlation and Regression Analysis

Since growth is a highly complex phenomenon, many factors have been considered as responsible for the variation in growth of individual farm firms. The correlation analysis was used to find out association between dependent variable, i.e., growth, and each of the independent variables (stated in hypotheses). Each calculated correlation coefficient was tested for its significance at the 5 per cent level and $n-2$ degrees of freedom. The following model of simple regression

analysis⁶ was used:

$$Y = a_i + b_i X_i \quad (i = 1, 2, 3 \dots n)$$

Y = growth (change in value of farm production) of individual farm firms.

X = independent variable.

The estimated b values indicate the magnitude of effect of each independent variable, X_i , on the dependent variable, Y. Each regression coefficient was tested for its significance at the .05 level of probability and $n-2$ degrees of freedom.

Independent Variables

The change in the stock of physical assets is one of the major factors causing growth of individual farm firms. Since farm assets are highly aggregative, their components were examined separately. The absolute change in the acreage and in the value of machinery and equipment from the beginning of 1962 to the end of 1966 were calculated for individual farm firms and used as independent variables. The second hypothesis involving factors stated above was tested with the above regression model.

It was hypothesized that the size of operation of farm business in the initial year affects the growth of farm

⁶A multiple regression analysis was also performed and can be found in Appendix II.

firms. The value of farm production in 1962, total farm capital and the number of improved acres farmed in the beginning of 1962 were considered as measures of scale of farm business. Therefore, they are considered as independent variables in the regression equation to test hypothesis #3.

The change in farm liabilities from 1962 to 1966 and the change in fertilizer expenses from 1962 to 1966 were hypothesized as factors influencing farm growth. Therefore, the above factors were treated as independent variables in the above mentioned regression equation to test hypothesis #4 and #5. In the same way, measures of farmer's capacity to adjust (ratio of change in summer fallow acres and change in total improved acres, ratio of proportionate change in wheat acreage over proportionate change in total improved acres and change in value of cattle) to new opportunities and situations were taken as independent variables in simple linear regression equations to test hypothesis #6.

Non-economic Independent Variables and Regression Analysis

In this section, first a brief description is given to different types of measurement. Then, construction of attitude and aspiration scales is described and discussed. Suitable statistical tests are selected to test the hypotheses.

Social scientists assign different types of statistical tests, parametric and nonparametric, for different qualities of data measured by different techniques. Siegel states:

...If a researcher collects data made up of numerical scores and then manipulates these scores by, say, adding and dividing (which are necessary operations in finding means and standard deviations) he is assuming that the structure of his measurement is isomorphic to that numerical structure known as arithmetic. That is, he is assuming that he has attained a high level of measurement.⁷

The following are different types of scales (involving different levels of measurement) and appropriate statistics and statistical tests.

The Nominal or Classificatory Scale

In this case numbers and other symbols are assigned to identify the groups to which various objects belong. In nominal scale, the scaling operation is partitioning a given class into a set of mutually exclusive sub-classes. The only relation involved is that of equivalence, i.e., the members of any one sub-class must be equivalent in the property being scaled. Assigning numbers or symbols to different type of farms are example of nominal scale (e.g., Wheat specialized farms = I, small grains specialized farms = II, Dairying farms = III, Poultry farms = IV . . .).

⁷S. Siegel, Nonparametric Statistics for Behavioural Sciences (New York: McGraw-Hill Book Co., Inc., 1956), p. 22.

Siegel states, "...the symbols which designate the various groups on a nominal scale may be interchanged without altering the essential information in the scale, the only kind of admissible descriptive statistics are those which would be unchanged by such a transformation, the mode, frequency counts, etc."⁸ Therefore, hypotheses involving distribution of frequencies among groups can be tested by cross-tabular analysis and nonparametric tests, especially contingency coefficient test of χ^2 .

The Ordinal or Ranking Scale

The objects in one category of a scale are not just different from objects in other categories of that scale but they relate to them in some explicit manner. The most common relation is "higher than" or "greater than". If the relation holds for all pairs of categories so that a complete rank ordering of classes arises, we have an ordinal scale. A ranking of farms according to size of farm business can be considered as an example of this scale. In this case, hypotheses can be tested by using nonparametric tests such as χ^2 and Spearman rank correlation. Siegel states, "The only assumption made by some ranking tests is that the scores we observe are drawn from an underlying continuous

⁸Ibid., p. 23.

distribution."⁹ This assumption is not a major restriction in applying nonparametric tests, when observations are in rank form.

Parametric tests should not be used with data in rank scale. Siegel emphasizes:

...Parametric statistical tests which use means and standard deviations (i.e., which require the operations of arithmetic on original scores) ought not to be used with data in an ordinal scale. The properties of an ordinal scale are not isomorphic to the numerical system known as arithmetic. When only the rank order of scores is known, means and standard deviations found on the scores themselves are in error to the extent that the successive intervals (distance between classes) on the scale are not equal.¹⁰

Therefore, parametric test can not be used to test hypotheses with rank data.

The Interval Scale

Siegel defines, "When a scale has all the characteristics of an ordinal scale, and when in addition the distances between two members on the scale are of known size, then measurement considerably stronger than ordinality has been achieved. In this sort of measurement, the ratio of any two intervals is independent of the unit of measurement and of the zero point."¹¹

⁹Ibid., p. 25.

¹⁰Ibid., p. 26.

¹¹Ibid.

The operations and relations which are used for the preparation of an interval scale are such that the differences in the scale are isomorphic to the structure of arithmetic. Numbers may be associated with the positions of the objects on an interval scale so that mean and standard deviation are being calculated.

According to Siegel, "Any change in the numbers associated with the positions of the objects measured in an interval scale must preserve not only the orderings of the objects but also the relative differences between the objects."¹² The measurement of temperature in both Centigrade and Fahrenheit is considered as an example of interval scale.

Parametric statistics such as means, standard deviation Pearson correlation and regression, and statistical tests such as t and F are applicable to data in an interval scale.

The Ratio Scale

Siegel notes, "When a scale has all the characteristics of an interval scale and in addition has true zero point as its origin, it is called a ratio scale. In a ratio scale, the ratio of any two scale points is independent of the unit of measurement."¹³ The ounces and pounds measurement have a

¹²Ibid., p. 28.

¹³Ibid., p. 29.

zero point. Moreover the ratio between these two weights is independent of the unit of measurement. Therefore, they can be considered as an example of ratio scale.

Since ratio scale is isomorphic to the structure of arithmetic, the parametric statistics and statistical tests are applicable to data in ratio scale.

Scale for Risk Attitude and Aspiration to Level of Income

It is hypothesized that operators' attitude to risk taking and operators' aspirations regarding their level of income affect growth of farm firms. To test these hypotheses, score data on operators' attitude to risk taking and farmers' aspiration regarding level of income have been obtained from G. A. Therrien, as mentioned earlier. He used standardized interview forms to get answers of questions in the same order which permitted greater uniformity and a more reliable comparison between individuals. The majority of the questions for risk attitude were primarily open questions. But, for aspiration to level of income the questions were closed end.¹⁴

Since values and attitudes are not measured directly, but only inferred from an individual's behaviour, the underlying assumption is that the direction of an individual's

¹⁴G. A. Therrien, Risk Attitudes, Values, Insurance and their Contribution to Farm Business Development, unpublished Masters' thesis, Dept. of Ag. Ec., University of Manitoba, May 1968, p. 88.

response, or reaction to a statement involving a value judgement provides some insight concerning the values of the individual in a relative sense. Therefore, the measurement is in no way absolute, but rather only determines the relative ranking of individuals.

In developing each scale the initial step consisted of preparing a relatively large number of attitude statements, or value judgements. These were considered to be statements which might be made, either in a positive or negative sense, by an individual holding a particular value. Two agricultural economists, specializing in farm management, G. E. Ackerman and J. P. Hudson were asked to scale independently the items for attitude to risk taking and for aspiration to level of income. The consistency between scores of each judge was examined. They assigned points between 1 to 5 items (statement), one strong aversion to risk or satisfaction with their level of income and five strong interest (risk seeker or completely dissatisfied with present level of income). An individual farm operator's score was the sum of his score on all items. Following this scoring procedure, the greater the total score of a subject, the more positive is the operator's attitude.

The correlation and regression analyses and Student t tests were used to test the hypotheses with the above score type data since the constructed scales are of equal interval

types. Other studies such as the one by D. J. Hobbs, et al., constructed similar scales¹⁵ and used parametric tests in their analyses.¹⁶ Therefore, the score on operator's attitude to risk taking and farmer's aspiration to level of income were used as independent variables with growth of farm firms as the dependent variable in a simple regression function to test hypothesis #9.

Age and education of farm operators and their experiences in farming have been hypothesized as factors influencing growth of farm firms. All of these factors are measured in years. Since year measurement scale is equal interval scale, these factors were treated as independent variables in the simple regression equation to measure their effects on growth and thereby to test hypotheses #10, 11 and 12.

Thus simple correlation and regression analyses were used to test each hypothesis and conclusions were drawn about the factors inhibiting or accelerating growth.

D. BUDGETING FARM FIRMS

Net farm income of a substantial proportion of farmers

¹⁵D. J. Hobbs, G. M. Beal and J. M. Bohlen, "The relation of farm operator values and attitudes to their economic performance," Rural Sociology: 33, June 1964, pp. 81-100.

¹⁶Ibid., pp. 125-27.

of the Newdale area was not sufficient to maintain their competitive levels of living and growth of their farms during 1962-66.¹⁷ Therefore, there is a need to make some special adjustments in light of conclusions drawn about the factors affecting growth of the farm firms of the area. These adjustments may lead to reorganization of the farms and the farming system and thereby, would advance growth of the entire area and would improve economic conditions of the farmers. Thus, farm budgets need to be prepared to determine the farm organization, magnitude of additional resources required and amount of existing resources to be released from farming for the attainment of faster growth of individual farm firms and the area. However, since growth process is a continuous phenomena, these adjustments will not be necessarily once for ever adjustments.

It is hypothesized that young farmers have higher risk taking and aspiration to level of income attitudes than old farmers and the latter group keeps a short planning horizon for their farm businesses. Therefore, they do not accept new ideas and do not introduce big changes, especially in farm capital. But young farmers maintain long planning horizons, welcome new ideas and incorporate profitable changes in their farm businesses. Therefore, the approach

¹⁷J. Ackerman, Western Manitoba Farm Business Association Reports, 1962 to 1966, Dept. of Ag. Eco., University of Manitoba.

to the growth of farm firms of these two groups should be different. The old farmers might easily accept improvements requiring low risk but quick turn over. On the other hand, young farmers might prefer to introduce profit maximizing opportunities in spite of high associated risk and slow turn over.

The correlation coefficient between age and the relative risk taking attitude of operators of 55 study farms of WMFBA is $-.31$ which is statistically significant at the $.05$ level of probability. But the correlation coefficient between age and aspiration to higher level of income is only $-.02$ which is not significant. Moreover, the age of farm operators does not turn out to be a significant factor explaining farm growth. Therefore, the above hypothesis does not hold true in the analysis of the study farms. The idea of separate approaches of the growth of farm firms for young and old operators was withheld and adjustments were proposed for the growth of different farm firms without much emphasis on the age of the operators. The following are considered as obvious goals of farm business:

Specific Goals

- a) Welfare (level of living) of farm family
- b) Growth of farm firm
- c) Efficiency of farm firm.

The first goal, competitive level of living, is an objective of economic development and an ultimate goal of farmers in general. In the case of the second and third goals, maximum efficiency does not entail maximum growth, in some range both efficiency and growth are competitive goals, but in some range they are complementary because to have growth, a farmer must get sufficient net income for his living and repayment of debts. In other words, he must maintain a reasonable efficiency in his farm business in the short-run to attain growth in the long-run. Therefore, the sub-optimum level of both these goals which seem to be complementary for both ends have been taken.

Concepts and Norms¹⁸ used for Farm Budgets

The following norms have been set for competitive level of living:

Cash living expenses for family	= \$4,000 per annum
Cash living expenses for couple	= 3,500 per annum
Cash living expenses for bachelor	= 2,500 per annum

These amounts have been considered normal from a welfare point of view. The amount of \$4,000 per family has been derived by averaging out the 1966 cash living expenses of 60 farmers who were on the lower end of the size scale (total capital used), out of the total of 82 farmers in the WMFBA.

¹⁸Norms, specified in this study, are valid only for the year 1966 and for the area - Newdale clay loam soils area. Cost-price relationships prevailed during 1962-66 have no guarantee to prevail in the period 1966-71.

The following are norms for growth of farm firms:

△ in value of farm production from '62 to '66	= \$4,100
Net △ in total farm capital from '62 beginning to '66 end	= 23,700
△ in total improved acreage from '62 beginning to '66 end	= 90 acres
Change in fertilizer expenses	= \$ 860

These are the average magnitudes of the variables influencing growth of the 59 study farm firms of the Newdale area during 1962-66. In the above norms, emphasis has been given to changes because the initial scale of business did not turn out in the analysis as a significant variable for the growth of individual farm firms.

The following norms pertaining to efficiency¹⁹ are taken from WMFBA Report 1966.

Capital - output ratio	= 5:1
Gross expense ratio	= 60 per cent

The following are other major norms which are taken from the 1966 WMFBA Report and have been used in budgeting out different farm firms:

1. Machinery investment per acre	= \$30.00
2. Machinery cost per acre - Fixed	= 5.00
Cash	= 3.00
3. Gross expenses	= 5.00
(Fertilizer)	= 2.00

¹⁹Economic literatures describe efficiency as an optimum or maximum efficiency. But in this study efficiency word has been used loosely. Specified norms of capital-output ratio and gross expense ratio are the average performance of the WMFBA farms for the year 1966. Therefore, they can not claim to be norms for maximum efficiency.

4.	Cost of production per acre	=	\$ 20.00
5.	Price of land per acre	=	100.00
6.	Improvement cost of land per acre	=	40.00
7.	Yield per acre		
	Wheat	=	30 bu.
	Oats	=	50 bu.
	Barley	=	45 bu.
	Mixed grains	=	60 bu.
	Hay	=	1.5 tons
8.	Crops per improved acre	=	\$ 30.00
9.	Summer fallow	=	25 per cent of improved land
10.	Per cent total acreage into improved land	=	70
11.	Per cent improved land into cash crops	=	60

These norms are averages for the 82 farms in the WMFBA in 1966.

The 59 study farms have been classified into three groups. Those farms who met norms for all the three goals, competitive level of living, growth and efficiency, were grouped together. It is assumed that these farms did not require special adjustments, therefore, they had not been budgeted out. The second group of farms met only one or two tests. They were called "Farms requiring minor adjustments". The third group consists of those farms who did not meet any one of these three tests. This group was called "Farms requiring major adjustments". The border or marginal farms

which did not fall clearly into either group were examined in the context of their 1962 scale of farm business, 1962 fertilizer expenses, the change in area under wheat, change in liabilities, education and aspiration to level of income, and then decision was made about their group. The farms of those two groups who did not meet all tests, were budgeted out to determine the additional resources required for the development of those farms. The farm budgets also tell the degree of adjustment and reorganization of resources and enterprises on these farms.

Updating of Norms

Some of the above specified norms, which appear to be the key to this study have been updated to 1971. The following are updated norms of competitive level of living:

Cash living expenses for family	= \$4,750 per annum
Cash living expenses for couple	= 4,200 per annum
Cash living expenses for bachelor	= 3,200 per annum

The amount of \$4,750 was derived by updating the 1966 norms through straight line projection of the trend of cash living expenses during 1956-66. The amounts for couple and bachelor were determined by updating their 1966 norms in light of an increase in cash living expenses for family.

These projections are based upon two assumptions:

1. The 1961-66 rate of increase in farm incomes will prevail in the period 1966-71.

2. The rate of inflation occurred during 1961-66 will also prevail in the period 1966-71.

The following are the updated norms for growth of farm firms:

Change in value of farm production from 1966 to 1971	= \$6,000
Net change in total farm capital from 1966 to 1971	= 25,000
Change in total improved acreage from 1966 to 1971	= 80 acres
Change in fertilizer expenses from 1966 to 1971	= \$ 900

To arrive at the above amounts, the 1966 norms were updated to 1971 on the basis of information available on these items in the WMFBA reports 1961 to 1966. These projections involve an assumption that the rate of inflation that prevailed during 1961-66 will prevail over the period 1966-71.

The following are updated efficiency norms:

Capital - output ratio	= 6:1
Gross expense ratio	= 65 per cent

These updated norms were derived on the basis of the trends of these ratios during 1961-66 and foreseeable conditions in the Canadian farm economy during 1966-71.

CHAPTER IV

CHARACTERISTICS OF THE AREA AND THE STUDY FARMS

Location

The area under study consists of Census divisions 10, 11 and 13 of Western Manitoba. The area extends from Township 13 to 22 and from Range 8 to 30. Within these boundaries the area covers about four million acres¹ and includes 25 municipalities. Further, the area includes the towns of Neepawa, Minnedosa, Rapid City, Oakview, Newdale, Strathclair and Shoal Lake.² The area is shown in Figure 4.1.

Climate

Climatic conditions are favourable for cultivation of large variety of crops. The amount of precipitation and its seasonal distribution are quite suitable for cultivation of grain crops (Table 4.1).

¹Dominion Bureau of Statistics, 1966 Census of Canada - Agriculture, Manitoba (Ottawa: Queen's Printer)

²Town is defined as a place where population exceeds 200.

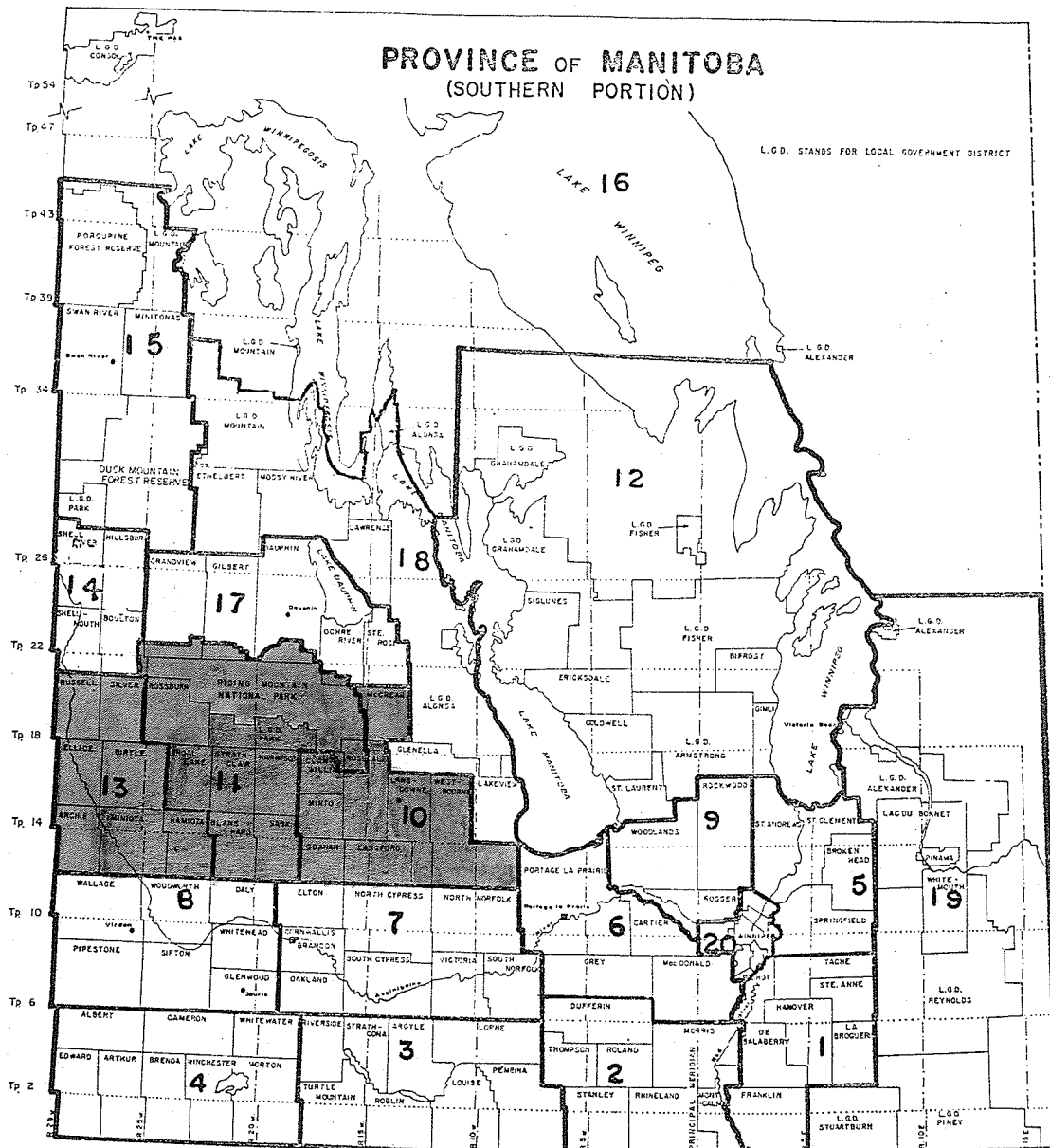


FIGURE 4.1
Census divisions and study area

TABLE 4.1

AVERAGE PRECIPITATION (INCHES) IN THE AREA³

Location	Annual Average Precip.	Precipitation (inches) in different months						
		April	May	June	July	Aug.	Sept.	Oct.
Hamiota	N.A.	.84	1.55	3.66	2.72	2.46	1.38	.77
Minnedosa	17.69	.82	2.02	3.30	2.94	2.37	1.51	1.00
Neepawa	18.91	.93	1.86	3.26	2.85	2.58	1.63	1.29

N. A. = Data not available.

Temperature is another major element affecting agricultural production. The Economic Atlas of Manitoba

TABLE 4.2

AVERAGE TEMPERATURE IN THE AREA⁴

Location	Average Annual Temp.	Average of daily mean temperature							Av. temp. May to Aug.
		Apr.	May	June	July	Aug.	Sept.	Oct.	
Hamiota	34.9	37.0	50.9	59.7	66.6	63.6	52.7	40.8	60.2
Minnedosa	35.1	37.7	50.6	58.6	65.8	62.6	52.2	40.6	59.4
Neepawa	35.6	37.8	50.9	60.4	66.3	64.1	53.6	41.8	60.4

³Meteorological Branch, Dept. of Transport, Toronto, Climatic Data Sheet #7, 1965.

⁴Ibid., Climatic Data Sheet #13, 1965.

states that plant growth requires 60.5°F as the minimum average temperature during May to August. The area just meets this condition (Table 4.2).

The area has on an average 93 frost-free days, ranging from 50 to 126 days. The latest spring frost occurs on an average on June 3 and the earliest fall frost on an average on September 4.⁵

The area has the maximum number of hail days in Manitoba. An average of 10 year period indicates that hail occurs for 2.7 days per year in the area.⁶

Thus, the climate of the area creates uncertainty but permits cultivation of a variety of crops.

Soils

The soils of the area are primarily black soils (some grey wooded) and are of glacial till origin. Topography is undulating with numerous small undrained depressions. The soils are described as the "Newdale Clay Loam Rolling Phase", and their organic matter content and water-holding capacity are quite high. They are the most fertile soils in the province⁷ and are grouped into Class I (Soils having no

⁵Ibid., Climatic Summaries, Vol. 3, Frost Data 1956.

⁶Dept of Industry and Commerce, Province of Manitoba, Economic Atlas of Manitoba (Winnipeg: Stovel-Advocate Press Ltd., 1960), p. 16.

⁷Ibid., p. 13.

important limitations in use for crops) and Class II⁸ (Soils having moderate limitations that reduce the choice of crops or requiring moderate conservation practices) and are suitable for cultivation of any regionally adapted crop. Therefore, the climatic and soil conditions indicate that the area has a competitive potential for economic growth.

Type of Farming

TABLE 4.3

CLASSIFICATION OF COMMERCIAL FARMS⁹ IN THE AREA IN 1961 BY PRODUCT TYPE

Product Type	Distribution of Commercial Farms	
	Number	Per cent
Wheat	1895	35.7
Small grains (excluding wheat)	1496	28.2
Special crops ¹⁰	20	0.4
Field crops combination	160	3.0
Dairying	86	1.6
Cattle, Hogs and Sheep (Excluding dairy farms)	817	15.4
Poultry	30	0.6
Livestock combination	670	12.6
Other combinations	133	2.5
Total Commercial Farms	5307	100.0

⁸Dept. of Forest and Rural Development, Canada. The Canada Land Inventory - Report No. 4 - Land Capability Classification for Forestry, 1967 (Ottawa: Queen's Printer,) p. 28.

⁹D. B. S., 1961 Census of Canada, Manitoba (Ottawa: Queen's Printer).

¹⁰Special crops include: Field crops (other than small grains) fruits and vegetables and forestry.

Wheat cultivation has been the most important type of farming in the area and on the study farms. Twenty-eight per cent of the area farms were specialized in production of small grains in 1961 (Table 4.3). Thus, this farming was second to wheat. Cattle, hogs and sheep were major enterprises on 15.4 per cent of the total area farms (Table 4.3).

Wheat was the principal crop, occupying 24.8 per cent of total improved land in 1961 in the Newdale area and 27.4 per cent in the farms under study (Table 4.4). Therefore,

TABLE 4.4
LAND UTILIZATION IN THE NEWDALE AREA AND
ON THE FARMS UNDER STUDY

Items	Newdale Area ¹¹		Study Farms		Acres per farm
	Area in 1961 (Thous. acres)	Dist'n (%)	Total area in 1962 (hundred acres)	Dist'n (%)	
Wheat	477	24.8	76.2	27.4	129
Oats	241	12.5	33.4	12.0	57
Barley	159	8.3	17.7	6.4	30
Mixed grains	20	1.0	9.0	3.2	15
Special crops	71	3.7	8.6	3.1	15
Hay	138	7.2	32.3	11.6	55
Improved pasture	98	5.1	10.5	3.8	18
Summer fall. Other imp. land	669 48	34.8 2.5	90.5 -	32.5 -	153 -
Total imp.	1921	100.0	278.3	100.0	472
Unimproved	1106	36.5	148.1	34.7	251
Total farm land	3027	-	426.4	-	723

¹¹D. B. S. 1961 Census of Canada, Manitoba.

this land utilization data affirm the above drawn conclusion that wheat was major enterprise in the area (also on the study farms). Small grains including oats, barley and mixed grains, were second to wheat in the area and on the study farms. Therefore, it is concluded that the grain farming was predominant in the area, as on the farms under study.

About 63 per cent of total farm land was improved in the area. Out of this improved land, 5 per cent was in improved pasture and 35 per cent was in summer fallow (Table 4.4).

On farms under study 65 per cent total farm land was improved and 3.8 per cent and 32 per cent of total improved land were in pasture and summer fallow respectively.

Eighty per cent of the total farm land is owned and 20 per cent is rented in the area.¹²

Farm Organization - Distribution of Farm Acreage

Per farm improved land was 310 acres in the area and 472 acres among the study farms in 1961. Half-section units were most common in the area, whereas most of the study farmers had one section unit. Seventy-four per cent of the farms of the Newdale area and 37 per cent of the farms of the study group had less than 400 improved acres (Table 4.5).

¹²Ibid.

TABLE 4.5

CLASSIFICATION OF FARMS ACCORDING TO IMPROVED ACREAGE

Size Group	Newdale Area ¹³		Study Farms	
	No. of farms in 1961	Dist'n (%)	No. of farms in the beginning of 1962	Dist'n %
Under 239	2599	42.3	6	10.2
240 - 399	1965	32.0	16	27.1
400 - 559	994	16.2	21	35.6
560 - 759	374	6.1	10	16.9
760 - 1119	170	2.7	5	8.5
1120+ - 1599	28	0.4	1	1.7
1600+	16	0.3	0	0
Total Farms	6146	100.0	59	100.0
Per farm imp. land (acres)	310		472	

Distribution of Farm Capital

The per farm average capital was \$25,938 in the area in 1961 whereas it was \$43,887 on the study farms (Table 4.6). But 58 per cent of the area farms had less than \$24,950 farm capital. Thus farms in the area are highly concentrated in the small capital groups. The distribution of capital among the study farms was not particularly skewed (Table 4.6).

¹³Ibid.

TABLE 4.6
CLASSIFICATION OF FARMS ACCORDING TO FARM CAPITAL

Capital Class	Newdale Area ¹⁴		Study Farms	
	No. of farms in 1961	Dist'n (%)	No. of farms in 1962 beginning	Dist'n (%)
Less than \$4,950	241	3.9	0	0
\$ 4,950 - 7,449	324	5.3	0	0
7,450 - 9,949	409	6.6	0	0
9,950 - 14,949	896	14.6	2	3.4
14,950 - 24,949	1688	27.5	7	11.9
24,950 - 49,949	2063	33.6	33	55.9
49,950 - 99,949	489	8.0	15	25.4
99,950 ⁺	36	0.6	2	3.4
Total Farms	6146	100.0	59	100.0
Capital per Farm	\$25,938		43,887	

TABLE 4.7
COMPONENTS OF FARM CAPITAL

Items	Newdale Area ¹⁵		Study Farms		
	Million \$ in 1961	Per cent	Thous. \$ in the beginning of 1962	Per cent	\$ per farm
Value of land and bldgs.	93.6	58.7	966	37.3	16,372
Value of mach. and equip ¹⁶	40.8	25.6	733	28.3	12,418
Value of live-stock and poultry	25.1	15.7	507	20.3	8,929
Total farm capital	159.5	100.0	2,589	-	43,887

¹⁴Ibid.

¹⁵Ibid.

¹⁶Total of items listed in the table do not sum to total farm capital because grains and feed and supplies inventories are not included.

Farm Liabilities

The average liabilities per farm was only \$9,534 in the study farms in 1961. About 66 per cent of the study farms had liabilities less than \$9,950 (Table 4.8).

TABLE 4.8

CLASSIFICATION OF STUDY FARMS ACCORDING TO THEIR
FARM LIABILITIES ON JANUARY 1, 1962

Liabilities Group	Distribution of Farms	
	Number	Per cent
Less than \$1950	7	11.9
\$ 1,950 - 2,949	6	10.2
2,950 - 3,949	3	5.1
3,950 - 4,949	7	11.9
4,950 - 7,449	12	20.3
7,450 - 9,949	4	6.8
9,950 - 14,949	11	18.5
14,950 - 24,949	4	6.8
24,950 ⁺	5	8.5
Total Farms	59	100.0
Liabilities per farm	\$9,534	

Fertilizer Expenses

Per farm fertilizer expenses were only \$352 among the study farms in 1962. Surprisingly, one-fifth of farmers did not use any fertilizer and 55 per cent used less than \$500. Only seven farms used more than \$800 worth.

Income and Living Expenses

Per farm value of farm production of the study farms was \$15,417 in 1962. The distribution of the farm income does not appear skewed (Table 4.10). But the distribution

TABLE 4.9

CLASSIFICATION OF FARMS ACCORDING TO THEIR FERTILIZER
EXPENSES IN 1962

Class	Distribution of Farms	
	Number	Per cent
0	12	20.2
\$ 1 - 99	3	5.1
100 - 199	7	11.9
200 - 299	4	6.8
300 - 399	5	8.5
400 - 499	13	22.0
500 - 599	3	5.1
600 - 699	3	5.3
700 - 799	2	3.4
800+	7	11.9
Total Farms	59	100.0
Per Farm Fertilizer Expenses	\$352	

of farm income in the entire Newdale area was sharply skewed. About 71 per cent farmers of the Newdale area sold farm products worth less than \$5,000 and 94 per cent sold produce worth less than \$10,000 in 1961¹⁷ (Table 4.10).

¹⁷1961 value of agricultural products sold refers to agricultural sales reported for the 12-month period, June 1, 1960 to May 31, 1961.

TABLE 4.10
CLASSIFICATION OF FARMS BY VALUE OF FARM PRODUCTION

Economic Class	Newdale Area ¹⁸ according to value of agr. products sold		Study Farms - according to value of farm production	
	No. of farms in 1961	Dist'n (%)	No. of farms in 1962	Dist'n (%)
\$25,000 ⁺	20	.3	5	8.5
15,000 - 24,999	75	1.2	21	35.6
10,000 - 14,999	250	4.1	23	39.0
5,000 - 9,999	1430	23.3	9	15.2
3,750 - 4,999	1006	16.4	0	0
2,500 - 3,749	1141	18.6	1	1.7
Less than 2,500	2224	36.1	0	0
Total	6146	100.0	59	100.0
Average income per farm			\$15,417	

Most of the study farmers were concentrated in lower net farm income groups in 1962 (Table 4.11). About 30 per cent had less than \$5,000 net farm income.

The average cash living expenses of the 59 study farms was \$3,722 in 1962. In addition to this, 46 per cent of farm families had cash living expenses less than \$3,000 and 81 per cent had less than \$5,000 (Table 4.12). The acute financial shortage and, therefore, the need for growth are more apparent from examination of cash living expenses in relation to net farm income. Net farm income of six farmers was less than their cash living expenses in 1962. Moreover,

¹⁸D. B. S. 1961 Census of Canada (Manitoba).

TABLE 4.11

CLASSIFICATION OF STUDY FARMS ACCORDING TO NET
FARM INCOME IN 1962

Economic Class	Distribution of Farms	
	Number	Per cent
\$ 1,000 - 2,999	4	6.8
3,000 - 4,999	13	22.0
5,000 - 6,999	18	30.5
7,000 - 8,999	13	22.0
9,000 - 10,999	3	5.1
11,000 - 12,999	5	8.5
13,000 - 14,999	2	3.4
15,000 ⁺	1	1.7
Total Farms	59	100.0
Average net income per farm	\$6,913	

TABLE 4.12

CLASSIFICATION OF FARMS UNDER STUDY BY THEIR
CASH LIVING EXPENSES IN 1962

Cash Living Expenses - Class	Distribution of Farms	
	Number	Per cent
Less than \$1,000	1	1.7
\$1,000 - 2,999	26	44.0
3,000 - 4,999	21	35.6
5,000 - 6,999	7	11.9
7,000 - 8,999	1	1.7
9,000 ⁺	3	5.1
Total Farms	59	100.0
Average Cash Living Expenses per family	\$3,722	

19 farmers had net farm income less than the total of cash living expenses and five per cent return on their 1962 farm equity (that is an opportunity return - an operator can earn at least five per cent interest on a savings account in a bank).

Non-economic factors, considered as possible stimuli for the growth of the area and individual farm firms, were age, experience and education of farm operators and the number of financial dependents.

Age of Farm Operators

Forty-three per cent of farm operators of the Newdale area were under 45 years of age. Whereas 30 per cent were

TABLE 4.13

CLASSIFICATION OF FARMS BY AGE OF OPERATORS IN 1961

Age Class	Distribution of farms of Newdale area ¹⁹		Distribution of the study farms	
	Number	Per cent	Number	Per cent
Under 25 years	161	2.6	2	3.4
25 - 34	845	13.7	25	42.3
35 - 44	1620	26.4	23	39.0
45 - 54	1655	26.9	8	13.6
55 - 59	697	11.3	1	1.7
60 - 64	513	8.4	0	0
65 - 69	352	5.7	0	0
70 years and over	303	4.9	0	0
Total	6146	100.0	59	100.0

¹⁹Ibid.

approaching retiring age (more than 55 years). The age situation is not exactly the same for the study farms (Table 4.13). There is only one farmer aged 55 years out of 59 farmers.

Experience in Farming

About 33 per cent of the study farmers had less than 10 years of experience in farming in 1961. Moreover, the proportion of farms having less than 15 years experience in farming was 65 per cent (Table 4.14).

TABLE 4.14

CLASSIFICATION OF FARMS UNDER STUDY BY YEARS OF EXPERIENCE IN FARMING IN 1961

Years	Distribution of Farms	
	Number	Per cent
Less than 5	7	12.3
5 - 9	12	21.0
10 - 14	18	31.7
15 - 19	10	17.5
20 - 24	9	15.8
25 ⁺	1	1.7
Total Farms ²⁰	57	100.0

Education of Farm Operators

The average years of education was 10.5 among study farms. Sixteen out of 57 farms²¹ were graduates of the

²⁰Data was not available for two farmers.

²¹Data for two farmers was not available.

University of Manitoba, Diploma course and four held university degrees (Table 4.15). The study farmers, in general, do not appear deficient in formal education. But these study farmers are not strictly representative of the area in this respect.

TABLE 4.15

CLASSIFICATION OF FARMS UNDER STUDY BY YEARS OF
EDUCATION in 1961

Years	Distribution of Farms	
	Number	Per cent
4	1	1.7
7	1	1.7
8	4	7.0
9	6 (1 Dip.)	10.5
10	18 (5 Dip.)	31.7
11	17 (9 Dip.)	29.9
12	6 (1 Dip.)	10.5
15	4	7.0
Total	57	100.0
Average years of education	10.5 years	

Since they join an Association, i.e., WMFBA, their education may be above average for the area.

Number of Dependents

The average number of dependents on the study farms was 3.4 per farm in 1961. The distribution is not skewed. (Table 4.16).

On the basis of above economic analyses and examination of non-economic factors, especially age of farm operators, it

TABLE 4.16

CLASSIFICATION OF FARMS UNDER STUDY ACCORDING TO
NUMBER OF DEPENDENTS PER FAMILY IN 1961

Number of Dependents	Distribution of Farms	
	Number	Per cent
0	5	9.1
1	3	5.4
2	8	14.6
3	12	21.8
4	13	23.6
5	8	14.6
6	4	7.3
7	2	3.6
Total Farms ²²	55	100.0
Average number of dependents per farm	3.4	

is concluded that the area and most of the farms require adjustment, growth and reorganization along the following lines: (1) increase in farm capital including land and machinery; (2) increase in farm liabilities (if personal saving is not adequate) to buy farm capital in (1); (3) increase in fertilizer, and (4) early retirement of the old farmers of the area.

Non-agricultural Businesses

The largest non-farm business in the area is a manufacturer of farm machinery components located in Minnedosa. A distillery is also under construction at the

²²Data was not available for four farms.

present time.

The only mineral development is a salt-mine at Neepawa.²³

There are cold storage plants and manufacturers of bakery products, flour and feed. Two bigger towns, Neepawa and Minnedosa, supply lumber and wood products, paints, iron and steel, stone and dairy products.²⁴

The area has many recreation sites and accomodations. Neepawa, Hamiota and Minnedosa have golf courses and Tourist Accomodation. In addition to these, Riding Mountain National Park maintains Tourist Accomodations, Camp Grounds, a golf course and sand beaches.²⁵ Skiing facilities have been developed recently near McCreary.

The area is serviced by a main line of the Canadian Pacific Railway and several small lines, a few Provincial Highways and one landing strip (Neepawa).²⁶

As soils of the area are the most fertile in Manitoba and climatic conditions are suitable for variety of crops, the area has enormous potential for grain farming. The distribution of farms according to farm acreage, value of

²³Dept. of Industry and Commerce, Province of Manitoba, Economic Atlas of Manitoba (Winnipeg: Stovel-Advocate Press Ltd., 1960), p. 63.

²⁴Ibid., p. 71.

²⁵Ibid. p. 71.

²⁶Ibid., p. 73.

farm products sold, net farm income, cash living expenses and age indicate that farms of the area need substantial positive adjustments. The area has the required infrastructure and non-agricultural businesses to assist development.

CHAPTER V

FINDINGS

This chapter includes the findings obtained by analyzing the economic development of the Newdale area and of individual farm firms. The chapter is organized in the following fashion.

- A. Economic Growth of the Area.
- B. Economic Growth of Farm Firms.
- C. Adjustments on Farm Firms and their Impact on Economic Growth.
- D. Adjustments in the Entire Area and their Consequences for Economic Growth.

A. ECONOMIC GROWTH OF THE AREA

The net farm income of the farmers of the Newdale area was less than family living expenses in 1961. The average value of agricultural products sold amounted to \$4211 in 1961. Since the gross-expense ratio was 50 per cent¹ in 1961, only \$2105 was left over as net farm income for family consumption and the growth of the farm, whereas average family living expenses were about \$3300² for the same year.

¹J. Ackerman and T. Riecker, "Development of Economic Criteria for Classifying Farms," JFE: 46, p. 1232.

²Pulled out from the 1961 Reports of WMFBA and CDFBA (Carman District Farm Business Association).

But the area has shown enormous economic growth during 1961-66. The total value of agricultural products sold in the area in 1966 has risen by 56 per cent (which amounts to 50.8 per cent when adjusted for a rise in prices of purchases for farm family living³) over that of 1961. The average value of agricultural products sold per farm amounted to \$7228 (which is \$6558 after adjusted for a rise in prices of purchases for farm family living) in 1966. Since the gross-expense ratio has increased to 58 per cent,⁴ this greater value of agricultural products sold in 1966 resulted in \$3036 as the net farm income. This increased net farm income is still insufficient for the family living expenses (\$4,000 in 1966) and the growth of the farm (5 per cent on equity). Thus there is a need for economic growth of the area.

This view of growth is too superficial however. Classification of farms of the area according to value of agricultural products sold will provide better insight into economic growth during 1961-66.

³Price indexes of purchases for farm family living are available in Year Book of Manitoba Agriculture, 1967. Manitoba Department of Agriculture, Winnipeg.

⁴Average of 1965 and 1966 Gross-Expense ratios of member farmers of WMFBA.

TABLE 5.1

CLASSIFICATION OF FARMS OF THE NEWDALE AREA ACCORDING
TO VALUE OF AGRICULTURAL PRODUCTS SOLD

Economic Class	1961		1966	
	No.	%	No.	%
Less than \$2,500	2219	36.1	1147	20.5
2,500- 3,749	1141	18.6	700	12.5
3,750- 4,999	1006	16.4	734	13.1
5,000- 9,999	1430	23.3	1848	33.0
10,000-14,999	250	4.1	688	12.3
15,000-24,999	75	1.2	362	6.5
25,000 and over	20	0.3	111	2.0
Institutional	5	0.1	4	0.1
Total	6146	100.0	5598	100.0

Source: Dominion Bureau of Statistics 1961 and 1966 Censuses of Canada (Manitoba), (Ottawa: Queen's Printer).

The number of farms selling agricultural products of less than \$5,000 has declined by 1785 during 1961-66, a reduction of 41 per cent from 1961. The proportion of such farms also declined from 73.0 per cent in 1961 to 46.1 per cent in 1966. The proportion of farms selling agricultural

products in the range \$5,000 - \$9,999 increased during the period. The number of farms selling \$10,000 and more increased by 816 during 1961-66, an increase by 238 per cent over 1961. The proportion of these farms also increased from 5.6 per cent in 1961 to 20.8 per cent in 1966 (Table 5.1). Therefore, it is obvious that farms are moving fairly quickly into higher gross income brackets, especially in income brackets higher than \$10,000. The total number of farms in the area declined by 548 during 1961-66. Since the number of farms has increased in all income brackets selling \$5,000 and more worth of agricultural products, it may be concluded that the most of the 548 farmers who left farming during 1961-66 were in lower income brackets (less than \$5,000) in 1961. These positive adjustments are responsible for the fast growth (56 per cent) of the area during 1961-66. This fast growth⁵ may be a result of increase in magnitude and/or changes in combinations of resources and enterprises. So there is need to examine these changes.

Land

The total farm area was 2.3 per cent higher in 1966 than in 1961. The average size of farms in 1961 was 492 acres and it increased to 553 acres in 1966. This increase in size has taken place mainly by reduction in number of farms

⁵The prices of farm products have increased by 11.2 per cent during 1961-66. Source: Manitoba Dept. of Agri. Year Book of Manitoba Agriculture, 1967.

in the area. Improved area was 63.5 per cent of total area in 1961 but it increased to 65.3 in 1966. The classification of farms according to improved land will provide a better picture of dimension and magnitude of adjustments in farm organization during 1961-66.

TABLE 5.2
CLASSIFICATION OF FARMS ACCORDING TO IMPROVED ACREAGE

Size Group	1961		1966		
	No.	%	No.	%	
Less than 130 acres	964	15.7	757	13.5	35.2
130 - 179	700	11.4	511	9.1	
180 - 239	935	15.2	707	12.6	
240 - 399	1965	32.0	1724	30.8	49.3
400 - 559	994	16.2	1035	18.5	
560 - 759	374	6.1	497	8.9	15.5
760 - 1119	170	2.7	278	5.0	
1120 - 1599	28	0.4	66	1.2	
1600 & over	16	0.3	23	0.4	
Total	6146	100.0	5598	100.0	

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba).

The number of farms having less than 560 improved acres declined by 824 during 1961-66, a reduction of 17 per cent over 1961. The proportion of these farms was 90.5 per cent in 1961 and 84.5 per cent in 1966 (Table 5.2). On the other hand, number of farmers having 560 acres and more increased from 588 in 1961 to 864 in 1966, an increase of 47 per cent. The proportion of these farms increased from 9.5 per cent to 15.5 per cent during the period.

There are two major adjustments in land, one is an increase in total improved land of the area, second is consolidation of land into larger farms through the disappearance of small farms. Since improved acreage increased by only 5.2 per cent in 1966 over 1961, this factor does not appear to be crucial in explaining the growth of the area during 1961-66. The second factor seems to be decisive because 12 per cent of the farms moved into bigger size brackets possibly by acquiring land from those 548 farms who left farming. This factor leads to higher growth of the area by three ways: (1) Since most of the farmers who left farming could be considered as inefficient,⁶ now the land moved into the hands of more efficient farmers. (2) The undersized farmers (having limited physical and financial

⁶W. R. Butcher and N. K. Whittlesey, "Trends and Problems in Growth of Farm Size," JFE: 48, pp. 1513-20.

resources) who outmigrated,⁷ might not have any saving out of their income for the expansion of their farm businesses. When the same land resources were assimilated by big farmers, additional income resulted, which might provide additional saving for the growth of the farm. (3) An increase in farm acreage permits introduction of modern and better technology which provides higher net farm income (sometime higher gross income also) by shifting average cost curve of the firm downward, and thereby may lead to additional saving and growth. Moreover, the four year records (1963-66) of WMFBA depict higher value of farm production per acre on farms maintaining higher farm acreage than on farms maintaining smaller farm acreage. Therefore, it can be inferred that the disappearance of small and inefficient farm units and consequent increase in farm size and thereby introduction of better farm technology were growth advancing factors for the area.

Capital

The total farm capital increased by 59.3 per cent in the area during 1961-66. The average capital per farm was \$25,938 in 1961 and \$45,360 in 1966, an increase of 74.9 per cent over 1961.

⁷Butcher and Whittlesey, op.cit., pp. 1513-20.

TABLE 5.3
CLASSIFICATION OF FARMS ACCORDING TO FARM CAPITAL

Capital Class	1961		1966	
	No.	%	No.	%
Less than \$4,950	241	3.9	112	2.0
4,950- 7,449	324	5.3	124	2.2
7,450- 9,949	409	6.6	188	3.4
9,950-14,949	896	14.6	385	6.9
14,950-24,949	1688	27.5	892	15.9
24,950-49,949	2063	33.6	1972	35.2
49,950-99,949	489	8.0	1602	28.6
99,950 and more	36	.6	323	5.8
	1870	30.4	809	14.5
	3751	61.1	2864	51.1
	525	8.6	1925	34.4
Total	6146	100.0	5598	100.0

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba).

The number of farms having less than \$14,950 capital declined from 1870 in 1961 to 809 in 1966, a decline of 56.7 per cent (Table 5.3). The proportion of farms in this group also fell from 30.4 per cent to 14.5 per cent over this

period. The number of farms in the capital range \$14,950 - \$49,949 also declined. On the other hand, the number of farms having capital of \$49,950 and more have risen from 525 in 1961 to 1925 in 1966, thus showing an increase of 266.7 per cent. The proportion of these groups was 8.6 per cent in 1961 but rose to 34.4 per cent in 1966. So the increase in number of farms in higher capital classes is immense. The increase in total farm capital by 59 per cent and fast movement of farms in higher capital classes seem to be growth advancing factors. The following examination of the components of capital gives a still clearer picture.

TABLE 5.4
COMPONENTS OF FARM CAPITAL IN 1961 AND 1966

Item	1961 (thous. \$)	1966 (thous. \$)	Change (thous. \$)	% Change
Value of land and buildings	93,568	165,134	71,566	76.5
Value of machinery and equipment	40,761	58,524	17,763	43.6
Value of live- stock and poultry	25,089	30,266	5,177	20.6
Total	159,418	253,925	94,507	59.2

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba).

The increase in the value of land and buildings in 1961-66 is higher than the increase in other components of farm capital for the same period (Table 5.4). But the meagre increases in total farm land by 2.3 per cent and in total improved land by 5.2 per cent can not explain this 76.5 per cent increase in value of land and buildings. This 76.5 per cent increase may be accounted for by mainly increase in land value which is not considered indicative of development. Therefore, the increase in the value of land and buildings during 1961-66 can not be considered as a main determinant of economic growth.

The value of machinery and equipment is 43.6 per cent (which amounts to 38.6 per cent when adjusted for a rise in price of farm machinery⁸) higher in 1966 than in 1961 (Table 5.4). The increase in the value of machinery and equipment explains the rise in their quantity (number) and quality. Motor trucks have increased by 16.7 per cent, tractor by 7.7 per cent and grain combines registered an increase of 11.1 per cent. Moreover, these increases occurred in spite of a decline in the number of farms during the period under consideration. The increase in the value of machinery and equipment has been also accounted for by the improvement in the technology. Therefore, this increase

⁸D. B. S. Prices and Price Indexes January 1968
(Ottawa: Queen's Printers).

in the value of machinery and equipment is considered as a growth contributing force.

The value of livestock and poultry has also increased by 20.3 per cent (which comes 17.3 per cent, if adjusted for a rise in price of farm animals⁹) during this period. But their proportion in total capital declined from 15.7 per cent in 1961 to 11.9 per cent in 1966. Therefore, no conclusion can be drawn about the effect of the increase in value of livestock and poultry on the growth of the area.

Enterprise Combination: Type of Farming

The enterprise combination affects the magnitude and variability of the growth of an agricultural area.

TABLE 5.5

CLASSIFICATION OF COMMERCIAL FARMS BY PRODUCT TYPE

Type	1961		1966	
	No.	%	No.	%
Wheat	1895	35.7	2016	45.4
Small grains	1496	28.2	1156	26.0
Field crops + Fruits + Forest etc.	20	0.4	11	0.2
Field crops combination	160	3.0	40	0.9
Dairying	86	1.6	34	0.8
Cattle + Hogs + Sheep	817	15.4	747	16.8
Poultry	30	0.6	19	0.4
Livestock combination	670	12.6	321	7.2
Other combination	133	2.5	99	2.2
Total	5307	100.0	4443	100.0

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba)

⁹Ibid.

The number of farms specializing in wheat increased by 6.4 per cent, in spite of a decline in total number of farms in the area. The proportion of wheat farms increased from 35.7 per cent in 1961 to 45.4 per cent in 1966 (Table 5.5). The decline in number of dairying, poultry and livestock combination farms was quite sharp, declining by about 50 per cent over the period 1961-66 (Table 5.5). These adjustments occurred due to increase in comparative advantage of wheat enterprise through higher price and quota in 1961-66 than in 1957-61. It is also observed that dairying¹¹ and poultry enterprises were not profitable in the Newdale area during 1961-66, therefore, the increase in comparative advantage of wheat reduced their place.

Table 5.6 verifies the above trend. The proportion of poultry and dairying declined and the proportion of wheat rose. Therefore, these adjustments in type of farming during this period appear to be a contributing factor to the growth of the area.

An analysis of land utilization in Table 5.7 gives a detailed idea of the changes in pasture, summer fallow and a wide variety of crops.

¹⁰It is shown in the footnote of page 20 of this thesis.

¹¹J. Ackerman, "The Times they are A-changing'," Talk to the Milk Producers Association annual meeting, St. Boniface Oct. 28, 1965.

TABLE 5.6

SOURCES OF THE VALUE OF AGRICULTURAL PRODUCTS
SOLD IN THE AREA

Items	1961		1966	
	(in thous. \$)	%	(in thous. \$)	%
Wheat	9986	38.6	18369	45.5
Other cash grains + oil seeds	4872	18.8	7295	18.0
Hay and fodder	61	0.2	138	0.3
Other crop receipts	814	3.1	166	0.4
Cattle	5856	22.6	9289	23.0
Pigs	1725	6.7	2768	6.8
Poultry	850	3.3	884	2.2
Dairying	1440	5.6	1255	3.1
Other agril. products	277	1.1	298	0.7
Total	25880	100.0	40463	100.0

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba)

TABLE 5.7

LAND UTILIZATION IN THE AREA

Item	1961		1966	
	Area (thous. acres)	%	Area (thous. acres)	%
Wheat	477	24.8	606	30.0
Oats for grain	241	12.5	216	10.7
Barley	159	8.3	162	8.0
Mixed grain	20	1.0	22	1.1
Tame hay & other fodder crop	138	7.2	141	7.0
Oilseeds	63	3.3	120	5.9
Others	8	.4	12	.6
Area under crops	1106	57.6	1279	63.3

TABLE 5.7 (continued)

Item	1961		1966	
	Area (thous. acres)	%	Area (thous. acres)	%
Improved pasture	98	5.1	106	5.2
Summer fallow	669	34.8	588	29.1
Other improved land	48	2.5	49	2.4
Improved area	1921	100.0	2022	100.0
Unimproved land	1106	36.5	1074	34.7
Total area of all farms	3027	-	3096	-

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba).

The area under wheat is 27 per cent higher in 1966 than in 1961. The proportion of the area under wheat out of total area increased from 24.8 per cent in 1961 to 30.0 per cent in 1966. The area under oilseeds (flaxseeds, soybeans and rapeseeds) was almost doubled during the period. The area under oats declined (Table 5.7). Area under improved pasture is almost same in both the periods. The proportion of summer fallow declined from 34.8 per cent in 1961 to 29.1 per cent in 1966. Summer fallow has been maintained in the area to conserve moisture and to control weeds. But now better cultural practices and weedicides are available, which do the same operations cheaply, therefore, farmers are

curtailing area under summer fallow. It can be concluded that the decline in summer fallow and unimproved land helped the economic growth and the increase in acreage under oilseeds and wheat might be growth promoting factors for the area during 1961-66.

In addition to the examination of adjustments in the physical factors, the changes in qualitative factors of the farm operators during 1961-66 need to be examined in the light of economic growth of the area.

Age of Farm Operators

There was a general decline in number of farms during 1961-66 but decline was higher in the age groups below 45 years than in age groups 55 years and above (Table 5.8). It seems that the number was declining more by low entry in farming rather than the outmigration of farm operators. The proportion of farms in age groups less than 45 years was 42.7 per cent in 1961 and 38.6 per cent in 1966. Similarly, the proportion of age groups 55 years and above was 30.3 per cent in 1961 and 32.5 per cent in 1966. With these marginal changes in the proportions it is very difficult to infer anything about the relationship between age composition of the operators and economic growth.

TABLE 5.8
CLASSIFICATION OF FARMS ACCORDING TO AGE OF FARM OPERATOR

Age Class	1961		1966	
	No.	%	No.	%
Less than 25 years	161	2.6	116	2.1
25 - 34	845	13.7	679	12.1
35 - 44	1620	26.4	1365	24.4
45 - 54	1655	26.9	1620	28.9
55 - 59	697	11.3	736	13.1
60 - 64	513	8.4	510	9.1
65 - 69	352	5.7	300	5.4
More than 70	303	4.9	272	4.9

Source: D. B. S. 1961 and 1966 Censuses of Canada (Manitoba).

After analyzing the growth, the changes in magnitude and combination of resources and enterprises and their implications for growth the following conclusions are drawn.

1. The economic growth of the area has been fast during 1961-66.
2. The consolidation of land in hands of bigger and efficient farmers helped the growth of the area.
3. The increase in value of machinery and equipment was a contributory factor to the growth of the area.

4. The decrease in magnitude of dairying and poultry industries also contributed to the development of the area probably through transference of resources from these enterprises to more profitable ones.
5. The increase in acreage under wheat and oilseeds and decrease in summer fallow helped in the growth of the area.
6. The value of agricultural products sold and net farm income were not sufficient for the family living and the growth of the farm firm in 1966.
7. Since the area requires further development the above avenues were evaluated for development.

B. ECONOMIC GROWTH OF FARM FIRMS

The average growth of the 59 farms of WMFBA was \$4,145 per farm during 1962-66. But there was enormous variation in the growth of individual farm firms, the coefficient of variation was as high as 219 per cent of the mean. It seems that both economic and non-economic variables are responsible for variations in the growth of individual farm firms. To determine the variables, the hypotheses deduced logically in Chapter I are tested empirically below.

The findings of cross-tabular and statistical analyses are given in this section. The implications of these findings are explored in Chapter VI.

Statement and Tests of Hypotheses

Hypothesis #1 Farm firms with the same amount of fixed capital grow through increasing the value of farm production.

The hypothesis stated in null form is: farm firms with the same amount of fixed capital do not grow through increasing the value of farm production. There are two cases among the study farms of WMFBA, where they had almost same amount of capital in 1962 and in 1966 but growth was caused because of the increase in value of farm production. This increase occurred due to a drastic reduction in the value of cattle, an increase in per cent land under cash crops and an increase in fertilizer and "other" crop expenses (Table 5.9). Since any conclusion drawn on the basis of analysis of only two farms is quite unreliable, the above hypothesis is left untested.

Hypothesis #2 An increase (decrease in capital resources of individual farm firms has a positive (negative) effect on their growth.

Sub-hypothesis #2.1 The larger the net increase in total farm capital, the higher is the growth of farm firms and, conversely, the smaller the net increase in total farm capital, the lower is the growth.

TABLE 5.9

THE 1962 FARM BUSINESS AND CHANGES DURING 1962-66
ON TWO STUDY FARMS OF THE NEWDALE AREA

Items	Farm #1	Farm #2	Average of 59 farms
Total farm capital in beginning of 1962	\$ 66,521	59,835	43,883
Total farm capital in end of 1966 (adjusted for capital gains in 1962-66)	\$ 64,142	57,251	67,623
Value of farm production in 1962	\$ 13,672	11,583	14,262
Δ in value of farm production (1962-66)	\$ +3,599	+9,754	+4,145
No. of improved acreage in 1962	495	360	472
Δ in improved acreage ('62-'66)	+ 20	+ 194	+ 96
Value of machinery and equipment in 1962	\$ 15,510	12,524	12,417
Net Δ in value of machinery and equipment ('62-'66)	+2,683	1,035	+5,972
Value of cattle in beg. of 1962	17,973	26,950	9,500
Δ in value of cattle ('62-'66)	-7,223	-6,900	- 23
Acreage under cash crops in 1962	239	113	228

TABLE 5.10

STATISTICAL RESULTS OF ANALYSIS OF GROWTH OF
INDIVIDUAL FARM FIRMS

Dependent variable - growth of farms (change in value of farm production from 1962 to 1966)					
Variables	r	R ²	Constant	b _i	Standard error
Net change in total farm capital from beginning of 1962 to end of 1966	.568**	.322	-1840.8	.252**	.048
Net change in value of farm machinery and equipment from beginning of 1962 to end of 1966	.429**	.184	107.4	.676**	.189
Change in improved farm acreage from beginning 1962 to end 1966	.745**	.554	959.8	33.246**	3.949
Value of production in 1962	.142 ⁺	.020	2020.5	.149 ⁺	.137
Total farm capital in beginning of 1962	.182 ⁺⁺	.033	606.4	.081 ⁺⁺	.058
Improved farm acreage in beginning of 1962	.029	.001	3571.9	1.214	5.578
Change in farm liabilities from 1962 to 1966	.436**	.190	506.0	.261**	.071

TABLE 5.10 (continued)

Variables	r	R ²	Constant	b _i	Standard error
Change in fertilizer expenses during 1962-66	.523**	.274	- 657.4	5.548**	1.197
(Change in acreage under summer fallow during 1962-66)/(Change in improved acreage during 1962-66)	-.001	.000	4139.6	-2.931	314.798
(Change in wheat acreage during 1962-66)/(1962 wheat acreage)					
(Change in improved acreage during 1962-66)/(1962 total improved acreage)	.056	.003	3987.6	22.973	54.498
Change in value of farm cattle during 1962-66	-.222*	.049	4136.8	-.339*	.197
^a Score on risk taking attitude of farm operator	.107 ^T	.011	-1613.4	95.428 ^T	122.273
^a Score on aspiration to level of income of farm operator	.352**	.124	-4323.1	1091.379**	398.323

TABLE 5.10 (continued)

Variables	r	R ²	Constant	b _i	Standard error
^a Number of years of education of farm operator	.252*	.064	-8504.8	1239.708*	653.951
Age of farm operator in 1961	-.087	.008	7883.1	-100.762	153.002
^a Number of years of experience of farm operator in 1961	.026	.001	3879.7	40.464	212.305

a = Data of only 55 farms were used in the analysis due to unavailability of data for remaining four.

Level of significance:

- ** = 1 per cent
- * = 5 per cent
- ++ = 10 per cent
- + = 15 per cent
- T = 25 per cent

The hypothesis stated in null form is: the larger the net increase in total farm capital, the lower is the growth of farm firms and, conversely, the smaller the net increase in total farm capital, the higher is the growth. The correlation coefficient between the growth of farm firms and net change in total farm capital during 1962-66 amounts to .568 which is significant at the .01 level of probability. The regression coefficient which is .252, is statistically significant at the one per cent level. This coefficient tells that one dollar net increase (decrease) in total farm capital results in an increase (decrease) of \$.252 in farm growth. Therefore, the null hypothesis is refuted and it infers that the net change in total farm capital contributes to the growth of farm firms in the same direction.

Sub-hypothesis #2.2 A net change in the value of machinery and equipment has an effect on the growth of farm firms in the same direction.

The hypothesis stated in the null form is: a net change in the value of machinery and equipment does not affect the growth of farm firms in the same direction. The correlation coefficient between growth of farms and net change in their value of machinery and equipment is .429 which is statistically significant at the .01 level of probability. The regression coefficient which is .676, is also significant at one per cent. This coefficient states that one dollar net increase (decrease) in value of machinery and equipment leads to an increase (decrease) in farm growth by \$.676. Therefore, the

null hypothesis¹² is rejected and it is concluded that the net change in value of machinery and equipment results the growth of farms in the same direction.

Sub-hypothesis #2.3 A change in the improved acres farmed has an effect on the growth of farm firms in the same direction.

The correlation coefficient between the growth of farm firms and change in improved acreage from the beginning of 1962 to the end of 1966 is .745 which is statistically significant at the .01 level of probability. The regression coefficient is found to be 33.246, it infers that increase (decrease) in improved area by one acre raises (reduces) farm growth by \$33.246. This regression coefficient is significant at the one per cent level. Therefore, the above hypothesis is accepted and it is concluded that the change in improved acreage affects the growth of farms in the same direction.

The tests of the above sub-hypotheses of hypothesis #2 indicate that the change in resources is one of the factors causing growth of farm firms in the same direction.

Hypothesis #3 The high growth of farm firms is due to their large size of business in the base year and

¹²To avoid redundancy the statement of null hypothesis is omitted for the remaining tests.

low or negative growth is due to small size of farm business in the base year.

Sub-hypothesis #3.1 The growth of farm firms varies directly with the value of farm production in the initial year.

The correlation coefficient between the 1962 value of farm production and growth of the farm firms is .142 which is not statistically significant at the .05 level of probability. Thus the data do not support the above proposition.

Sub-hypothesis #3.2 The larger (smaller) the total farm capital in the base year, the greater (smaller) is the growth of farm firms.

The correlation coefficient between the 1962 total farm capital of the firms and their growth is .182 which is not statistically significant at the 5 per cent level. The regression coefficient is .081 which is also not significant. Therefore, it is concluded that the total farm capital in the base year does not affect the growth of farm firms.

Sub-hypothesis #3.3 The larger (smaller) the number of improved acres farmed in the base year, the greater (smaller) is the growth of farm firms.

The correlation coefficient between number of improved acres farmed in the beginning of 1962 and growth of the farm

firms, is .029 which is statistically non-significant. The regression coefficient which is 1.214 and which is also not significant at the 5 per cent level. Thus it can be concluded that the number of improved acres farmed in the base year does not affect the growth of farm firms.

It is concluded from the tests of the three above sub-hypotheses that the scale of operation in the base year does not affect the growth of farm firms.

Hypothesis #4 The change in farm liabilities has a positive effect on the growth of farm firms, i.e., the larger the increase in farm liabilities from 1962 to 1966, the higher is the growth and, conversely, the smaller the increase in farm liabilities, the lower is the growth.

The correlation coefficient between growth of farm firms and change in farm liabilities from the beginning of 1962 to the end of 1966 amounts to .436 which is significant at the .01 level of probability. The regression coefficient is .261 which is statistically significant at the one per cent level. Therefore, the above hypothesis is verified and it is inferred that the change in farm liabilities affects the growth of farms in the same direction.

Hypothesis #5 The change in fertilizer expenses leads to the same directional effect on the growth of farm firms, i.e., the larger the increase in

fertilizer expenses from 1962 to 1966, the higher is the growth and, conversely, the smaller the increase in fertilizer expenses, the lower is the growth.

The correlation coefficient between the growth of farm firms and the change in fertilizer expenses during 1962-66 is .523 and which is statistically significant at the .01 level of probability. The regression coefficient is 5.548 which is significant. This coefficient tells that one dollar increase (decrease) in fertilizer expenses results an increase (decrease) of \$5.548 in farm growth. The above hypothesis is accepted and a conclusion is drawn that the use of fertilizer affects positively the growth of farm firms.

Hypothesis #6 Farmers' relative capacity to adjust with new opportunities (specified in the following three sub-hypotheses) affects the growth of their farm firms.

Sub-hypothesis #6.1 As the ratio of change in summer fallow acreage to the change in total improved acreage increases, the growth of farm firms decreases and, conversely, when the ratio decreases, the growth increases.

The correlation coefficient between the growth of farm firms and the ratio of change in summer fallow acreage and change in total improved acreage is found to be -.001, which is not significant at the .05 level of probability.

The regression coefficient is -2.931 which is also not significant. Therefore, the above hypothesis is not supported on statistical grounds.

Sub-hypothesis #6.2 The higher the ratio of proportionate change in wheat acreage over proportionate change in total improved acreage, the larger is the growth of farm firms, and, conversely, the lower the ratio, the smaller is the growth.

The correlation coefficient between the growth of farm firms and the ratio of proportionate change in wheat acreage over proportionate change in total improved acreage

$$\frac{1962-66 \text{ change in wheat acreage}}{1962 \text{ wheat acreage}} / \frac{1962-66 \text{ change in improved acreage}}{1962 \text{ improved acreage}}$$

is .056 and which is statistically not significant at the .05 level of probability. The regression coefficient amounts to 22.973 and which is also not significant. Therefore, it is concluded that the adjustment in favour of wheat acreage did not result growth of farm firms.

Sub-hypothesis #6.3 A change in value of cattle (primarily beef) has a negative effect on the growth of farm firms, i.e., the larger the increase in value of cattle, the lower is the growth and, conversely, the smaller the increase in value of cattle, the higher is the growth.

The correlation coefficient between the growth of farm firms and change in value of cattle from the beginning of 1962 to the end of 1966 is found to be -0.222 which is significant at the $.05$ level of probability. The regression coefficient is $-.339$, and significant at the $.05$ level. Therefore, the reduction in the cattle (beef) inventory appears to be a significant factor resulting growth of farm firms.

Since the tests of all the three sub-hypotheses of hypothesis #6 do not provide significant coefficients, it is concluded that the data do not support the proposition - the farmers' relative capacity to adjust with new opportunities and situations affects the growth of their farm firms.

Hypothesis #7 The operators' rational value orientation influences the growth of farm firms.

Sub-hypothesis #7.1 The score on operators' attitude to risk taking affects the growth of farm firms in the same direction, i.e., the higher the score, the bigger is the growth and, conversely, the lower the score, the smaller is the growth.

The estimated correlation coefficient between the growth of farm firms and the score on their operators' attitude to risk taking is found to be $.107$ which is not statistically significant at the $.05$ level of probability.

The regression coefficient comes to be 95.428 which is also not significant. Therefore, the data do not support the above proposition.

Sub-hypothesis #7.2 The score on farmers' aspiration to higher levels of income affects the growth of farm firms in the same direction.

The correlation coefficient of the growth of farm firms and score on farmers' aspiration to higher levels of income is .352 that is statistically significant at the .01 level of probability. In the same way the regression coefficient which is 1091.38, is statistically significant. Therefore, the above hypothesis is verified and it is concluded that farmers' aspiration to higher levels of income affects the growth of farm firms positively.

Of the two sub-hypotheses tested the data supported one at a statistically significant level, whereas, the other one was not supported by the data although the regression coefficient was in the hypothesized direction and approached statistical significance. Therefore, from these data the hypothesis #7 is judged to be accepted. Thus the operators' rational value orientation adds to the growth of farm firms.

Hypothesis #8 The level of education of the individual farm operator had a positive effect on the growth of their farm firms.

The correlation and regression coefficients between the growth of farm firms and years of education of their operators are found to be .252 and 1239.71 respectively, which are significant at the 5 per cent level. The regression coefficient depicts that a year of education of farm operator raises farm growth \$1239.71. Therefore, it is concluded that education of farm operators contributes to the growth of farm firms.

Hypothesis #9 The growth of the farm firm has a functional relationship with the age of the farm operator. The relationship between these two variables is inverse.

The correlation and regression coefficients between the growth of farm firms and the age of their operators in 1961 are $-.087$ and -100.76 respectively, which are not significant at the 5 per cent level. Therefore, the above hypothesis is refuted.

Hypothesis #10 The growth of the farm firm has a functional relationship with the number of years of experience of the farm operator. The relationship between these two variables is positive.

The correlation coefficient between the growth of farm firms and number of years of experience of their farm operators in 1961 is estimated to be $.026$. The regression

coefficient is 40.46. Neither is statistically significant at the .05 level of probability. Therefore, the data do not support the hypothesis.

The above analyses and tests verify some hypotheses and refute others. The following appear to be significant factors causing growth of farm firms:

1. Change in farm capital resources.
2. Change in farm liabilities.
3. Change in fertilizer expenses.
4. Farmers' aspiration to higher levels of income.
5. The level of education of farm operators.

C. ADJUSTMENTS ON FARM FIRMS AND THEIR IMPACT
ON ECONOMIC GROWTH

Magnitude of Proposed Adjustments

The required adjustments for the individual farm firms have been budgeted out in the lights of the three goals (i.e., competitive level of living, growth and efficiency of firms) and an assumption (that the changes in technology and prices during few years succeeding the study period (1962-66) will not disturb the relative advantages of different enterprises. As stated in Chapter III, farms who met norms

of all the goals have not been budgeted out and no improvements will be suggested for them. In the following pages the magnitude of proposed adjustments for farms¹³ who did not meet all tests but met at least one test (Farms Requiring Minor Adjustments) and farms who did not meet any test (Farms Requiring Major Adjustments) are discussed in this order: (1) Adjustments in Farm Resources; (2) Adjustments in Enterprises; (3) The Outcome-Income, Costs and Margin for Growth.

Adjustments in Farm Resources

To satisfy the goals specified above, it is proposed that out of 22 farms of group A, 17 farms on an average should have had an increase in their 1966 capital stock by an amount of \$14,861. This amounts to an increase of 22 per cent of the 1966 capital stock of the group (Table 5.11). Fifteen farms out of the 20 in group B should have added an average of \$10,722 of farm capital to their 1966 stock (Table 5.11). Hence an additional \$413,467 of capital should have been acquired by groups A and B, or an increase of 10.3 per cent of total capital for the 59 study farms.

¹³The following letters have been assigned to different adjustments classes:

Farms Requiring Major Adjustments	=	A
Farms Requiring Minor Adjustments	=	B
Farms Requiring No Adjustments	=	C

TABLE 5.11
 PER FARM MAGNITUDE OF PROPOSED ADJUSTMENTS IN
 FARM RESOURCES

Items	Major Adjust- ments (Group A)	Minor Adjust- ments (Group B)	No Adjust- ments Requiring Group (C)
No. of farms	22	20	17
Total farm capital in beginning of 1962	\$ 43040	45094	43341
Net Δ in total capital 1962-66	15142	22074	38995
Total farm capital in end of 1966	58182	67168	82336
Additional capital required	14861	10722	0
	(17)	(15)	
Total farm acreage in beginning of 1962	776	770	599
Total farm acreage in end of 1966	756	835	916
Total improved acreage in beginning of 1962	502	487	414
Δ in improved acreage (62-66)	-6	69	259
Addl. land for improve- ments in 1966 with the same total farm land	78	106	0
	(7)	(4)	

TABLE 5.11 (continued)

Items	Major Adjust- ments (Group A)	Minor Adjust- ments (Group B)	No adjust- ments Requiring Group (C)
Money required to do above improve- ments	4234 (7)	6260 (4)	0
Buy additional farm land (ac.)	191	145	0
Money needed to buy	18615 (15)	14545 (14)	0
Value of machinery and equipment in beginning of 1962	12714	13531	10724
Net Δ in value of machinery and equipment (62-66)	5331	5454	8484
Value of machinery and equipment in end of 1966	18045	18985	19208
Value of additional machinery needed	6033 (6)	3383 (5)	0
Value of machinery to be cut	6190 (4)	5500 (2)	0

N.B.: Number of farms involved in taking average has been given in parentheses. The non-existence of parenthesis implies all farms in the group have been used in the average.

The amount of additional land needed to introduce the proposed adjustments for the achievements of the specified goals by each farmer is substantial. Seven farms of group A are required to increase their per farm improved area by 78 acres with no increase in their total farm acreage. But fifteen farm firms should have increased their farm land by an average of 191 acres over their 1966 farm acreage (Table 5.11). Four farms of group B should increase their improved land by 106 acres with the same 1966 farm land. But fourteen farms of the group need to increase farm land by 145 acres per farm to attain all three goals (Table 5.11). In this way farms of group A and B are required to increase farm land by 4,875 acres. The 59 study farms of the area had 48,897 acres in 1966. Therefore, the requirements of additional land amounts to roughly 10 per cent of the total land base of the study farms.

The value of machinery and equipment needs to increase to attain the three goals. Six farms of group A should increase their machinery by \$6,033 per farm. But four farms of the group had surplus machinery. They should reduce this item by an average of \$6,190 per farm (Table 5.11). In group B two farms had more machinery than required. Therefore, they should reduce it by an average of \$5,500. But five farms in this group should increase the value of machinery and equipment by \$3,383 per farm. In aggregate

machinery and equipment need to increase by 4.3 per cent of the 1966 value of machinery and equipment for the 59 study farms.

Thirteen farms of group A should increase their fertilizer expenditures by \$508 per farm (Table 5.12). Ten farms of group B should have increased the use of fertilizer per farm by \$412. The proposed fertilizer increase for groups

TABLE 5.12
PER FARM USE OF FERTILIZERS AND THEIR
ADDITIONAL REQUIREMENTS

Items	Major Adjust- ments (Group A)	Minor Adjust- ments (Group B)	No Adjust- ments Requiring (Group C)
Fertilizer expenses in 1962	\$ 514	358	448
	(17)	(16)	(14)
in fertilizer expenses during 1962-66	\$ 628	1030	979
	(22)	(20)	(17)
Fertilizer expenses in 1966	\$ 1025	1316	1348
Additional requirement of fertilizer	\$ 508	412	0
	(13)	(10)	

N.B.: Number of farms involved in taking average has been given in parentheses. The non-existence of parenthesis implies all farms in the group have been used in the average.

A and B should be 14.9 per cent greater than the 1966 fertilizer expense of the 59 study farms.

Adjustments in Farm Enterprises

Three farms in group A should reduce the cost of cattle production by an average of \$913 per farm. Six farms should have replaced cattle completely by crops and two should have reduced the per farm cattle inventory by \$2,900 (Table 5.13). One farm in group B should have cut the cost of cattle production by \$800. Four are required to substitute crops for cattle and one is required to substitute hogs for cattle. Two farms should have reduced cattle inventory by \$7,000 per farm (Table 5.13).

No doubt the averages of proportions of improved acreage in summer fallow for the farms of groups A and B were not above the "norm" level in 1966, but an analysis of individual cases indicates that eleven farms of group A and six farms of group B should have decreased their 1966 summer fallow acreage by 7 and 8.7 per cent respectively (Table 5.14).

Table 5.14 indicates that yield improvements are needed for different numbers of farms in both group A and B.

TABLE 5.13

PER FARM PROPOSED ADJUSTMENTS IN LIVESTOCK ENTERPRISES

Items	Major Adjust- ment (Group A)	Minor Adjust- ment (Group B)	No Adjust- ments Requiring Group (C)
Value of livestock in beginning of 1962 \$	9450	9345	7766
in livestock inventory during 1962-66 \$	-718	548	640
Livestock inventory in end of 1966 \$	8732	9893	8406
Reduce cost of cattle production by \$	913 (3)	800 (1)	0
No. of farms to replace cattle completely by crops	6	4	0
No. of farms to replace cattle completely by hogs	0	1	0
Reduce cattle inventory by \$	2900 (2)	7000 (2)	0 0

N. B.: Number of farms involved in taking average has been given in parentheses. The non-existence of parenthesis implies all farms in the group have been used in the average.

TABLE 5.14
SUMMER FALLOW AND YIELD OF CROPS

Items	Major Adjust- ments Group (A)	Minor Adjust- ments Group (B)	No Adjust- ment Requiring Group (C)
% improved area under summer fallow 1962	27.9	34.9	30.7
% improved area under summer fallow 1966	25.0	22.3	28.1
Required reduction in summer fallow (%)	7.0 (11)	8.7 (6)	0
Wheat yield in 1966 (Bu. per acre)	26.5	27.5	30.3
Recommended increase in yield (Bu./acre)	6.0 (16)	7.0 (11)	0
Oat yield in 1966	51.3 (16)	49.9 (16)	49.1 (14)
Recommended increase in yield	11.2 (7)	16.9 (7)	0
Barley yield in 1966	41.1 (19)	42.3 (19)	43.0 (14)
Recommended increase in yield	11.2 (10)	6.8 (7)	0
Hay yield in 1966	1.3 (16)	1.1 (13)	1.6 (12)
Recommended increase in yield	.5 (10)	.6 (10)	0

N.B.: Number of farms involved in taking average has been given in parentheses. The non-existence of parenthesis implies all farms in the group have been used in the average.

The Outcome-Income, Costs and Margin for Growth

The above adjustments would be expected to raise the total value of farm production from the actual level of \$13,598 in 1966 to \$19,906 per farm in farm group A, an increase of 63.7 per cent. In the case of group B farms, the total value of farm production would be expected to increase from \$19,511 in 1966 to \$25,255, an increase of 29.4 per cent (Table 5.15). The value of farm production for the 59 study farms would be expected to increase by 22 per cent.

In spite of an increase in the cost of production, the net farm income of group A might increase from an actual level of \$3,918 to \$7,730 per farm. This amounts to an increase of 97.8 per cent. In the case of group B the net income per farm would be expected to increase from \$8,379 to \$9,873, or 17.8 per cent (Table 5.15). In aggregate the net farm income of 59 study farms is expected to increase by 22.8 per cent.

On the basis of the same norm for living expenses in 1966 and in the proposed plan, the per cent margin for growth would increase from .2 in 1966 to 5.7 for the group A farms and from 6.5 in 1966 to 8.0 in the proposed plan for the group B farms (Table 5.15).

The above adjustments and budgets indicate that the study farms require substantial adjustments in total farm

TABLE 5.15

INCOME, COSTS AND MARGIN FOR GROWTH

Items	Major Adjustments Group (A)	Minor Adjustments Group (B)	No Adjustment Requiring Group (C)
Total value of farm production of all farms in 1966	299,166	390,226	464,876
Total expected production:			
crops	374,304	388,416	
livestock	63,634	116,685	
Total	437,938	505,101	
Increase due to budgeting	6,308	5,744	
Per cent increase	63.7	29.4	
Per farm value of farm production in 1966	13,598	19,511	27,346
Per farm expected value of farm production in 1966	19,906	25,255	
Total cost of production in 1966	212,967	222,635	220,137
Total expected cost of production of all farms	267,869	289,640	
Total net farm income of all farms in 1966	86,199	167,591	244,739
Total expected net farm income	170,069	197,461	

TABLE 5.15 (continued)

Items	Major Adjustments Group (A)	Minor Adjustments Group (B)	No Adjustment Requiring Group (C)
Per cent increase	97.8	17.8	
1966 per farm net income	3,918	8,379	14,396
Per farm expected net income	7,730	9,873	
Total cash living expenses	84,000	80,000	84,000
1966 margin for growth	2,199	87,591	160,739
Per cent for growth	.2	6.5	11.5
Expected margin for growth	86,069	117,461	
Expected per cent for growth	5.7	8.0	

capital, farm land, machinery, livestock, fertilizer and crop yields. These adjustments would be expected to raise farm production and margin for growth.

D. ADJUSTMENTS IN THE ENTIRE AREA AND THEIR CONSEQUENCES FOR ECONOMIC GROWTH

The findings for the economic development of the study farms can be generalized for the entire Newdale area. The adjustments on the study farms involve 10 per cent additional farm capital over the 1966 total capital stock. If the group of the 59 study farms were considered a representative sample (it was obvious in Chapter IV while looking into the classification of the area farms and the study farms according to farm capital, that the study farms are not truly representative of the area) of the Newdale area, the total farm capital of the area would also need to increase by 10 per cent, which amounts to more than 25 million dollars to attain the same level of adjustments and the same goals.

The problems of the adjustments appear to be critical in the case of land resource where its supply is inelastic for the area. The proposed adjustments for the study farms require 4,875 acres of farm land which is 9.8 per cent of the 1966 total farm acreage. Since the supply of the farm land

for the study farms is assumed to be inelastic, some stagnating and inefficient farmers need to be persuaded to leave farming so that the adjustments could be achieved. Six farmers or the operators of roughly ten per cent of the 59 farms under study should outmigrate. For the entire Newdale area more than 10 per cent of the 1966 total farm land (309,600 acres) would be required. Therefore, more than 10 per cent of the land contained in the farms of the area needs to be transferred to the other farm firms.

The value of machinery and equipment of the area would be required to increase by probably more than 4 per cent and fertilizer expenditure by more than 15 per cent. Yield of most of the crops needs to be improved. Acreage under summer fallow should be reduced and cattle enterprises should be fully or partially substituted by crops and hogs.

These adjustments would increase 1966 value of agricultural products sold by 22 per cent for the area, as revealed by analysis of the study farms. This would lead to an increase in net farm income of over 20 per cent for the entire area. Thus most of the farm firms would be able to increase family living expenses and their margins for growth.

CHAPTER VI

ECONOMIC IMPLICATIONS AND CONCLUSIONS

The agricultural sector of the Newdale area had prodigious economic growth during 1961-66. The total value of agricultural products sold in 1966 increased by 56 per cent over that of 1961. The average value of agricultural products sold per farm amounted to \$4211 in 1961 and \$7228 in 1966. The factors advancing growth of the area during 1961-66 provide some insight about the factors essential for faster development of the area.

The average size of farms increased during 1961-66 mainly due to a reduction in the number of farms. The farm land was concentrated into the hands of bigger farmers (Chapter V). In the same way the total capital per farm increased and the proportion of farms with high capital stock rose during 1961-66. The value of machinery and equipment, number of motor trucks, tractors and grain combines have increased in the area, despite decline in farm numbers during the period. As discussed in Chapter V, these increases in farm resources and their concentration with big farm firms appear to be growth advancing factors because resources were transferred to more efficient hands, greater economies to scale were realized and better technology was introduced.

The improvement in the place of wheat enterprise in the area during 1961-66 (as evident from increase in the number of wheat specializing farms, the increase in the proportion of total value of agricultural products sold from wheat and increase in proportion of total improved land under wheat) was a growth promoting factor because wheat was one of the most lucrative enterprises due to ease in its market during the period (Chapter V). In the same way the number of poultry and dairy specialized farms declined and the contribution of these enterprises to the total value of agricultural products sold were reduced because they were "no profit" enterprises during this period. The proportion of total improved land under summer fallow declined (Chapter V). These reductions might be considered as growth advancing factors. No clear evidence has been found about the effect of age of farm operators on the growth of the area. After having a crude idea about variables influencing growth of the area, a detailed analysis was performed to determine the significant variables in the growth of individual farm firms.

The findings of the analyses of the 59 member farm firms of the WMFBA indicates that the initial resources in the hands of farmers were not effective constraints in their growth (Chapter V) because additional resources could be borrowed (or rented). This is apparent by a .65 correlation coefficient (which is significant at the .01 level) between change in farm

liabilities from the beginning of 1962 to end of 1966 and net change in total farm capital during the period.

The change in farm capital resources, including total farm capital, improved acreage and machinery and equipment significantly affected the growth of farm firms (Chapter V). An increase in the farm resources advanced growth because a farmer could introduce new technology, could undertake more profitable but risky enterprises and could realize economies to scale through an increase in the resources.

Fertilizer expenses were another growth influencing factor. The greater use of fertilizer increased crop yields, thereby promoting farm growth.

The 1961-66 increase in cattle inventory was a significant factor inhibiting growth of farm firms during the period. The proportionate increase in wheat acreage was not a significant factor advancing growth. The increase in the proportion of summer fallow was hypothesized as a growth retarding factor, but the results of the correlation and regression coefficients estimates indicate that it was non-significant. This could perhaps be explained by the fact that the farmers of the Newdale area generally keep newly bought land as fallow for a year or two to clean up weeds. So the farmers who bought more land, had kept its big proportion under summer fallow. This is verified by a statistically significant correlation coefficient of .22 between the

change in improved acreage and the proportionate change in summer fallow. The farmers who had higher growth, increased their improved acreage significantly. Therefore, the farmers with higher growth had a higher proportion of farm acreage under summer fallow and the coefficients, as specified above, between the variables came out non-significant and negative.

In this study (Chapter I) the farmers' capacity to adjust with new opportunities and situations have been measured as; a decline in cattle inventory, proportionate increase in wheat acreage and a reduction in the proportion of summer fallow during 1962-66. Since two of these three measures are not significant, the farmers' capacity to adjust with new situations can not be considered as a significant factor affecting growth.

There are some attitudinal and psychological variables which create differences in the magnitude of the above physical and economic factors associated with individual farm firms and thereby create variations in their growth. The farmers' aspiration to higher levels of income and their education were significant variables (Chapter V) which explained the growth of farm firms in this manner. Though the operators' attitude to risk taking had a positive regression coefficient it did not appear as a significant factor affecting growth. There may have been some errors in the measurement of risk taking attitudes, however.

The age of farm operators was not a significant factor in the growth of farm firms. This may be due to a low frequency of older farmers among the study group. Experience in farming did not turn out to be a significant factor in farm growth. Two reasons may be advanced for these results. Firstly, experience is generally associated with age as is borne out by the correlation of .82 between age and experience for the 55 farm operators of the WMFBA. Since age is negatively correlated (insignificant) with growth, experience would be expected to be uncorrelated with growth. Secondly, farmers having extensive experience in farming have less education (since they attended school at a time when people received less formal schooling). The correlation coefficient of $-.30$ between these two variables supports this observation. Educational level is positively correlated with growth. Therefore, experience is found to be uncorrelated with the growth of farm firms.

It can be thus concluded that the increase in farm resources especially land, machinery and equipment (which were financed by borrowings) and the increase in fertilizer use are the significant factors promoting economic growth. The operators' aspiration to higher levels of income and their education are important non-economic variables advancing growth of farm firms.

The businesses of those farmers who did not meet the

three assumed norms of growth, efficiency and family living expenses (Chapter IV), were individually budgeted out in the light of the significant factors affecting growth and efficiency of farm firms. The total farm capital of the 59 study farms of the Newdale area for the year 1966 would need to increase by 10.3 per cent to introduce the proposed adjustments for the attainments of the above three goals (Chapter V).

The proposed adjustments further suggest a 9.8 per cent increase in the total farm land of the study farms in 1966. This amounts to 4,875 acres of total farm land. Since the supply of land is assumed to be inelastic for the study farms, 6 farms need to be outmigrated for the development of the others.

The total 1966 value of machinery and equipment of the study farms would need to increase by 4.3 per cent for the improvement in farm business and achievement of the specified goals. Six farms had excess machinery and equipment in 1966, however, inter-farm adjustments in this regard are unlikely.

The findings of the farm budgets indicate that fertilizer expenditures be increased by 14.9 per cent over the 1966 level for the study farms (Chapter V). The yields of most of the crops would be expected to increase and the area under summer fallow to be reduced for farm growth. On 15 farms out of 59, cattle enterprises need to be substituted completely or

partially by either hogs or crops.

The above adjustments would lead to a 22 per cent increase in the total value of farm production of the study farms for 1966 (Chapter V). The net farm income would be expected to increase by 22.8 per cent. On the basis of the same norm for living expenses in 1966 and in the proposed plan, the per cent margin for growth would increase from 6.2 in 1966 to 8.3 per cent in the proposed plan. The 59 farms under study could attain a substantial growth through the type of adjustments proposed above.

The proposed adjustments for the growth of individual farm firms and the aggregate of those adjustments for the growth of all the study farms should be generalized for the Newdale area with caution. The author considers, on a propri basis, that the per cent adjustments will be more for the area than for the study farms to achieve the above goals because the 59 study farms are not truly representative but they are above average in many respects (Chapter IV). Still, the above findings can be generalized for the area recognizing that they are conservative and minimum estimates of needed adjustments.

The analysis of the study farms revealed a required increase of farm capital of 10.3 per cent. Hence, the 1966 capital of the area would be required to increase by probably more than 10 per cent, or approximately 25 million

dollars for the attainment of the same goals as for the study farms. This heavy demand for capital would create additional pressure on the existing credit system. Hence, credit programs and institutions would need to be examined and evaluated, and policies devised to improve their effectiveness, if they were less than optimum, so that they do not become bottlenecks in the economic development of the area.

Since the analysis of the study farms suggested an increase of 9.8 per cent in total farm land for the study farms, the 1966 total farm land of the area would need to be increased by probably more than 10 per cent for the development of the area. The supply of farm land is assumed inelastic for the area. It is likely that more than 10 per cent of the farm firms need to be outmigrated. The alternate opportunities for employment in the area and in urban centres need to be appraised and policies should be devised to create suitable employment opportunities, if they do not exist to the limit of meeting the need. Since 32.5 per cent of farm operators of the area were older than 55 years in 1966 (Chapter V), the majority of them will be no worse off, economically, by quitting farming and procuring the income they had while farming through renting their farms and taking pension. This would not generate pressure on gainful employment opportunities.

The growth of the area would generate an additional demand for machinery and equipment, of probably more than

4.3 per cent greater than the 1966 value for the area. This amounts to an aggregative increase of 2.5 million dollars over the 1966 level. The supplying and servicing facilities of machinery and equipment would need to be evaluated and policies should be adapted to develop them, if not developed, in the area, to meet such needs.

The use of fertilizer would be increased by probably more than 15 per cent over the 1966 level, as concluded from the analysis of the study farms. The supplying agencies such as co-ops, dealers, etc., need to be developed, if not developed to meet the requirements.

Yield of most of the crops would be improved, cattle enterprises should be substituted completely or partially by either hogs or crops on many farms. The acreage under summer fallow of the Newdale area would need to be cut to attain the same goals as for the study farms.

The above adjustments would lead to probably more than a 22 per cent growth (more than 22 per cent increase of total value of agricultural products sold in 1966) in the area, since the analysis of individual farm firms results in a growth of this amount. The marketing system needs to be evaluated and to be improved in the light of the need.

The total net farm income of the area would increase by more than 22.8 per cent. The living expenses would also increase for the majority of farm families.

The above economic and physical adjustments toward the economic development of the Newdale area do not require elimination of only institutional bottlenecks, as discussed above, but also a transformation of the attitude and psychology of individual farm operators of the area. It was found that the operators' aspiration to higher levels of income was a significant factor affecting growth of the study farms and other psychological and associated variables were found to have the hypothesized signs for the regression and correlation coefficients. The education of farm operators was a significant factor advancing the growth of the study farm firms. Therefore, policies should be devised for the proper education of the farm population which would contribute to the development of the area through development of individual farms and through creating a favourable attitude for the outmigration of others. Policies and programs, such as extension tours, conferences, etc., should be developed to make the values and attitudes conducive to development.

The agriculture-oriented export base industries of the area should be appraised in the light of demand of their products. The possibilities of expanding the existing and of establishing the new export industries would need to be examined. Further, the multiplier effects of inflow of income generated through the expansion and establishment of such

industries need to be predicted. The policies should be formulated to develop those export industries, if already not developed, which generate economic growth of the area.

The hospital and recreational facilities need to be examined and improved, if they are not optimum, for the development of the area.

Future Research

A study of economic development of the Newdale area would be more operational if it involved a complete enumeration of all farm firms rather than a selection of few sample farms. Each farm of the area needs to be investigated and information collected on their economic conditions such as farm assets, resource and enterprise combinations, costs, income and on their non-economic characteristics - values, attitudes, age, education and experience. Their growth requirements should be determined. Plans for individual firms should be developed to estimate the magnitude and combination of different resources, the level and combination of different enterprises necessary for the attainment of the required growth. The farm plan should be based on age, education and attitudes, of the operator, especially age because it influences attitudinal and psychological factors. The proposed plan should further indicate the amount of resources which need to be released from the farming sector.

To determine the adjustments needed for the development of the area, the proposed adjustments for individual farms should be aggregated. It would specify the magnitude and type of resources which need to be added to and the resources which need to be released from the present farm resource base to attain the required growth of the area. This study would further determine the number of farmers who would be financially better off by renting out their farms, collecting old age pension and/or taking some job instead of farming inefficiently. Thus it would indicate the number of people who would leave farming. Non-farming employment opportunities should be examined and tapped to accommodate these outmigrants. In addition to this, the training required for such employment should be evaluated and provided. In order for the proposed adjustments to take place, the existing economic institutions need to be evaluated and improved. In the same way, sources of developing human resources such as formal or informal educational and recreational facilities should be examined and developed.

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APPENDIX

APPENDIX I

Intercorrelation coefficients between different variables

Variables	Y	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20
Y	1.000																				
X1	.029	1.000																			
X2	.182	.617	1.000																		
X3	.142	.530	.538	1.000																	
X4	.745	-.154	.045	.119	1.000																
X5	.568	.068	-.147	.067	.565	1.000															
X6	.493	.064	-.176	.010	.620	.873	1.000														
X7	.429	.242	.167	.184	.557	.460	.485	1.000													
X8	.545	.116	-.106	.061	.702	.860	.967	.666	1.000												
X9	-.222	-.149	-.140	-.147	-.280	.083	-.155	-.251	-.205	1.000											
X10	.436	.093	-.039	.024	.492	.648	.718	.547	.760	-.125	1.000										
X11	.523	.433	.506	.440	.494	.522	.415	.452	.479	.037	.430	1.000									
X12	.175	-.005	.143	.135	.166	-.014	-.032	.142	.026	.168	.078	.125	1.000								
X13	-.116	.028	.002	.157	.038	-.067	-.035	-.042	-.042	-.049	-.119	-.028	.215	1.000							
X14	.056	-.011	.131	.122	-.039	-.007	-.077	.073	-.042	.012	-.131	-.092	-.058	-.091	1.000						
X15	-.001	-.195	-.140	-.213	.220	.194	.324	.007	.274	-.024	.374	-.005	.045	-.139	-.183	1.000					
X16	-.087	.048	.187	-.166	-.134	-.251	-.238	-.146	-.253	.068	-.320	-.188	.208	-.044	.172	-.189	1.000				
ax17	.252	.147	-.040	.043	.216	.179	.206	.336	.269	-.176	.134	.196	.171	.080	.032	-.059	-.273	1.000			
ax18	.026	.045	.287	.079	-.096	-.275	-.365	-.261	-.373	-.035	-.352	-.107	.069	.027	.130	-.227	.816	-.313	1.000		
ax19	.107	.350	.244	.434	.093	.158	.153	.251	.200	-.198	.302	.407	.079	.082	-.121	-.060	.312	.247	-.350	1.000	
ax20	.352	.493	.554	.631	.105	.116	.101	.236	.153	-.347	.109	.389	.105	-.126	-.096	-.240	-.017	.128	.008	.374	1.000

a = Data of only 55 farms were used in the analysis of these variables due to lack of pertaining data for the remaining four farms.

Correlation coefficient of .216 or greater required for significance at .05 level.

Correlation coefficient of .303 or greater required for significance at .01 level.

Where:

- Y = Growth of farm firm (change in value of farm production from 1962 to 1966).
- X₁ = Improved farm acreage in the beginning of 1962.
- X₂ = Total farm capital in the beginning of 1962.
- X₃ = Value of farm production in 1962.
- X₄ = Change in improved acreage from the beginning of 1962 to end of 1966.
- X₅ = Net change in total farm capital from the beginning of 1962 to end of 1966.
- X₆ = Net change in value of farm land from the beginning of 1962 to end of 1966.
- X₇ = Net change in value of machinery and equipment from the beginning of 1962 to end of 1966.
- X₈ = Sum of variables X₆ and X₇.
- X₉ = Change in value of farm cattle from the beginning of 1962 to end of 1966.
- X₁₀ = Change in farm liabilities from the beginning of 1962 to end of 1966.
- X₁₁ = Change in fertilizer expenses from 1962 to 1966.
- X₁₂ = (X_4/X_5) = (Change in improved acreage from the beginning of 1962 to end of 1966)/Net change in total farm capital from the beginning of 1962 to end of 1966.)
- X₁₃ = (X_7/X_5) = Net change in value of machinery and equipment during 1962-66/Net change in total farm capital during 1962-66.
- X₁₄ = (Change in wheat acreage during 1962-66.)/Wheat acreage in 1962.
-
- (Change in improved acreage from the beginning of 1962 to end of 1966.)/Improved acreage in the beginning of 1962.

- X_{15} = (Change in summer fallow acreage during 1962-66) /
(Change in improved acreage from the beginning of
1962 to end of 1966.)
- X_{16} = Age of farm operator in 1961.
- X_{17} = Number of years of education of farm operator.
- X_{18} = Number of years of experience of farm operator in
1961.
- X_{19} = Score on operator's attitude to risk taking.
- X_{20} = Score on farmer's aspiration to his level of
income.

APPENDIX II

MULTIPLE REGRESSION ANALYSIS OF GROWTH OF INDIVIDUAL FARM FIRMS

Regression Coefficients and Standard Errors for Independent Variables. ^a

X ₂	X ₅	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄	X ₁₅	X ₁₆	X ₁₇	X ₁₈	X ₁₉	X ₂₀
		.224 ^{**} (.068)	-.206 ⁺ (.180)		3.460 [*] (1.559)	56602.741 (63943.558)	-667.373 (703.099)			-167.896 (218.400)	684.196 ⁺ (532.918)	539.323 [*] (299.888)	-83.901 (111.252)	671.141 (394.961)
		.242 ^{**} (.071)	-.218 ⁺ (.184)		3.658 [*] (1.582)	37045.556 (59661.042)		17.833 42.199	-202.712 (266.892)	-195.505 (226.427)	566.344 (552.151)	530.123 (303.385)	-99.412 (112.325)	646.173 (408.016)
	.212 ^{**} (.052)		-.452 ^{**} (.164)		3.181 [*] (1.457)	83696.877 ⁺⁺ (60338.617)	-716.499 ⁺ (668.006)			-47.473 (203.069)	649.335 ⁺ (507.600)	329.561 ⁺ (264.888)	-103.363 (104.896)	533.265 ⁺⁺ (375.435)
	.156 ^{**} (.064)			.123 ⁺⁺ (.090)	2.359 ⁺⁺ (1.537)	39748.676 (67932.663)	-365.700 (737.210)			-58.868 (216.888)	1015.333 [*] (532.582)	446.320 ⁺⁺ (278.662)	-94.654 (112.752)	934.462 (376.724)
	.035 (.079)	.189 ^{**} (.074)		.132 ⁺⁺ (.092)	.868 (1.896)	47441.239 (69910.604)	-473.449 (756.204)			-126.950 (222.516)	970.926 [*] (550.413)	463.945 ⁺⁺ (287.208)	-117.988 (115.221)	635.061 (415.195)
	.206 ^{**} (.054)				2.715 [*] (1.428)									919.554 (353.107)

ables may be found on page 174.

ty, * = .05 level of probability, ++ = .10 level of probability and + = .15 level of probability.

APPENDIX II

MULTIPLE REGRESSION ANALYSIS OF GROWTH OF INDIVIDUAL FARM FIRMS

Regression Coefficients and Standard Errors for Independent Variables. ^a

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄	X ₁₅	X ₁₆	X ₁₇	X ₁₈	X ₁₉	
0.1	-10.308 (5.397)		.224 ^{x*} (.068)						-.206 ⁺ (.180)		3.460 [*] (1.559)	56602.741 (63943.558)	-667.373 (703.099)							
0.0	-10.867 (5.450)		.242 ^{**} (.071)						-.218 ⁺ (.184)		3.658 [*] (1.582)	37045.556 (59661.042)		17.833 42.199	-202.712 (266.892)	-195.505 (226.427)	566.344 (552.151)	530.123 (303.385)	-99.412 (112.325)	
0.9	-8.784 (5.185)				.212 ^{**} (.052)				-.452 ^{**} (.164)		3.181 [*] (1.457)	83696.877 ⁺⁺ (60338.617)	-716.499 ⁺ (668.006)							
0.3	-9.166 (5.506)				.156 ^{**} (.064)					.123 ⁺⁺ (.090)	2.359 ⁺⁺ (1.537)	39748.676 (67932.663)	-365.700 (737.210)							
0.6		-.035 (.079)			.189 ^{**} (.074)					.132 ⁺⁺ (.092)	.868 (1.896)	47441.239 (69910.604)	-473.449 (756.204)							
0.6	-11.120 (5.291)				.206 ^{**} (.054)						2.715 [*] (1.428)									

tion of variables may be found on page 174.

of probability, * = .05 level of probability, ++ = .10 level of probability and + = .15 level of probability.

The results of multiple regression analysis are consistent with the findings of the simple regression analysis of growth of individual farm firms. The latter analysis gave positive but non-significant regression coefficients for farm growth (Y) regressed on size of farm business in the base period total farm capital (X_2) and farm improved acreage (X_1) in the beginning of 1962 . However, the multiple regression analysis provided negative coefficients.

The other variable, net change in total farm capital (X_5) had a positive and highly significant regression coefficient in both the simple and multiple regression analyses. Its components (change in improved acreage and net change in value of machinery and equipment) were highly intercorrelated. Therefore, these variables were transformed. Net change in value of farm land (whose correlation coefficient with change in farm improved acreage was .68) and net change in value of farm machinery and equipment were summed to form one variable, X_8 . This variable had a positive and highly significant coefficient when regressed with the growth of farm firms. Since the correlation coefficient between the variable X_8 and change in total improved acreage was as high as .76, the latter might be considered as a variable having a positive significant regression coefficient with farm growth. In the same way the net change in value of machinery and equipment appeared to have a positive significant "b" value with growth of farm firms because the correlation coefficient, r, between X_8 and the net change in value of machinery and equipment

was as high as .73.

The coefficients of the other variables, X_9 , X_{10} , X_{11} , X_{14} ... X_{18} and X_{20} , were also consistent in both the simple and multiple regression models. In the case of variable X_{19} (score on operator's attitude to risk taking) the regression coefficient was positive but non-significant in the simple regression model. Whereas, in the multiple regression analysis the coefficient came out negative.

Both these models are consistent with each other either in accepting or in refuting the hypotheses outlined in the main body of this thesis.