FACTORS INFLUENCING POPULATION CHANGE IN
RURAL SETTLEMENTS OF NORTH CENTRAL KANSAS

by

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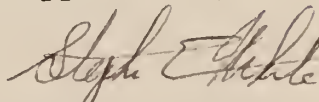
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter One

INTRODUCTION

"The study of small towns has both practical and
   theoretical implications for the understanding of
   rural population dynamics and general population
   change. Central to this understanding is a knowledge
   of the factors affecting small town population
   change..."
(Butler & Fuguitt 1970, pp.397)

Decades of centralization have shifted population and
business activities away from villages and small towns,
toward urban centers (Johansen & Fuguitt 1984), leading to
the notion that small rural settlements are becoming
obsolete and anachronistic in the modern urban orientated
society of today. However, while most American people live
in cities, villages and small towns are considerably more
numerous, and do play an important role in the settlement
system. In the relatively short history of settlements in
the United States, particularly in the Midwest, rural
settlements have developed rapidly from their initial
beginnings and associated growth, through stages of

fluctuation, stagnation and decline. This is in contrast
with other regions of the world, where villages have been
the basic unit of settlement throughout history.

One of the results of this ongoing process of
centralization and urbanization has been a general
stagnation and decline of rural areas resulting in an
increasingly subservient demographic position for rural
settlements in the urban hierarchy. The familiar image of
rural small towns today is one of a dead Main street, with
empty stores and dilapidated buildings, where the grain
elevator appears to be one of the few functioning
activities remaining in the place. Urbanization and the
associated growth of automobile ownership has led to a
reduction in the number of services and functions performed
in individual rural places (Hart et al. 1968).

Associated with this general dearth in small towns has
been a transformation of the rural economy and also a
change in the technology and methods of farming in many
areas. There are indeed many processes that affect
population change in rural settlements, as settlements
change in response to changes in the external economy in
which they are entrenched. Rural farm population has
fallen as a result of changed farming practices, such as
mechanization and increasing farm size, while urban
population has grown because of the ongoing trend of

2

centralization. The function of settlements also change in association with external developments. The loss of central place functions has been one of the major results of population loss in rural areas. However, some places have gained new functions, such as recreation in association with their rurality, or residential functions as a result of commuter activity.

Historically, settlements formed self perpetuating, independent units, serving and providing for people in and around the settlements. Villages originally developed and grew in response to changes in their hinterlands, and the demands placed on them to provide necessary functions. As these demands have changed over time, so the role and function of the settlement has changed. Until about the mid 1960's the overwhelming rural settlement response to external change was demographic and economic decline. Rural settlements have experienced considerable population loss and retail and service provision decline throughout much of the twentieth century. However, since the late 1960's there appears to have been a slowing of this trend, and indeed rural settlements have been declining much less rapidly, and many places have actually grown during the past couple of decades (Hart 1986; Bunce 1982). What had been accepted as conventional wisdom on rural decline has been somewhat swept away with the occurrence of this more recent rural

regeneration. Some rural areas in all parts of the country
appear to have been affected by a widespread population in-
migration to non-metropolitan areas.

The most common perspective on this population
redistribution is concerned mainly with the process of
urbanization and metropolitan concentration (Ballard and
Fuguitt, 1985). Drawing on central place theory and other
perspectives of the urban hierarchy, many writers have seen
the spatial organization of the United States as dominated
by a system of cities, differentiated by size and economic
function, with areas of urban influence surrounding each
city in the system (e.g. Berry and Kasarda 1977; Duncan et
al, 1960; Hawley, 1950). With increasing flow of
information and goods between regions and between cities,
population centers are becoming less parochial and locally
orientated and more specialized and interdependent, with
the hinterlands less tied to a specific central place, as
has been the case in the past. The result of this has been
that smaller places at the lower end of the urban
hierarchy, which in previous decades had been victims of
metropolitan concentration and the national economy, were
now more able to develop independent resource bases.
However, the preliminary evidence that is available for the
1980's reveals that this is no longer the case, and rural
areas appear to be again declining as a result of nation

wide economic trends.

Efforts to incorporate the new demographic trends into theories have been based upon a view about technological development, with the 1970's identified as part of a "post industrial", "slow growth" epoch, or the "diffuse stage of urbanization" (Hawley 1978; Morrill 1979, 1980; Philips and Brunn 1978). This equilibrium approach (Wardwell 1977, 1980), emphasises the declining metropolitan non-metropolitan socio-economic differentiation and changing residential preferences along with transportation and communication improvements. However, others have criticized these equilibrium models, pointing to the disequilibriating effects that occur when individual decisions are aggregated over space and may consider underlying changes in the spatial composition of capitalism as more fundamental (Gordon 1977; Harvey 1973).

As processes, both growth and decline tend to be self perpetuating, and it is indeed difficult to distinguish between the symptoms and causes. Symptoms have effects which generate further symptoms (Bunce 1982, pp.99). For example, when population declines in a place the result is a lowered potential market for the business and retail services of that place. This will eventually lead to the closure of some establishments and thus further reduce the functions and services provided in that place. This in turn

will then encourage further population loss, and so the process goes on. This circularity has been widely recognized in rural areas, where it has been likened to the "vicious circle of poverty", and is seen to be particularly problematic. The direct results of downward spiral are decay in physical structures, depopulation and loss of services and functions. However, this downward spiral of stagnation and decline is rather selective in the rural settlements that it affects. Stagnation and decline in certain elements of the settlement structure, are not always accompanied by depopulation and general economic decay. For example, rural services may contract while the population remains because residents can obtain retail needs elsewhere, usually in a larger town or city.

Thus far, the term "rural" has been used generously, and it may be useful to consider briefly what exactly is meant by "rural" here. Rurality is indeed a concept that, within a largely positivist framework, various branches of social science have sought to define and systematize. The simplest, and most common criterion used to define rurality are those relating to population size, density, and the land use of the hinterlands. Settlement are comprised of entities reflecting a continuum of sizes, from large urban conurbations to remote rural hamlets, and it is difficult to determine exact cut off points within this continuum.

Bunce (1982) suggests that the distinctiveness of rural settlements is based upon the land-use of the regions in which they are situated, and the absolute size of the settlement. The size of rural settlements is an inherent feature which restricts diversification of the economy and limits the functional role of the settlement. The smallness of rural settlements, and therefore high dependence on a few functions, makes them more vulnerable to change in response to external situations, than is the case for larger places.

It is important to identify and understand the processes that are operating to influence settlement patterns and dynamics, and to attempt to determine the mode and magnitude of change that is taking place in rural areas at the present time. Increased awareness of what is happening in rural areas will enable more informed decisions to be made concerning rural settlements and enable more understanding of the population trends that are occurring in these places. It is to this end that this thesis will consider the population change in North Central Kansas, and attempt to explain this change in the light of several selected variables related to settlement accessibility, service and retail provision in the settlements, and the size and age structure of the incorporated places of the study area.

STUDY REGION.

The study region includes 10 counties in North Central
Kansas, shown in figure 1.1. These counties have been
classified according to the dominant type of economic
activity performed in the county in table 1.1.

The region is one dominated by small rural
settlements, outside the immediate influence of any major
urban area. The largest city in the region is Concordia,
with a population of 6,847 (U.S. Census, 1980), and the
average settlement has a population of 719. There is
evidence that a rural regeneration or population turnaround
occurred during the 1970's in the region, as also has
occurred throughout much of the country. However, this
trend appears to have reverted back to one of significant
decline since 1980. These population trends coupled with
the overwhelming dominance of small towns in the region
make it an interesting area to study.

HISTORICAL BACKGROUND OF SETTLEMENT IN KANSAS.

The main thrust of settlement in Kansas took place
during the later half of the 19th century as a result of
the Homestead Act of 1862 (Self and White, 1986) and the
Land Development schemes of associated with the growth and
extension of railroads. Indeed, railroads were crucial in

Figure 1.1

Location of study area in Kansas
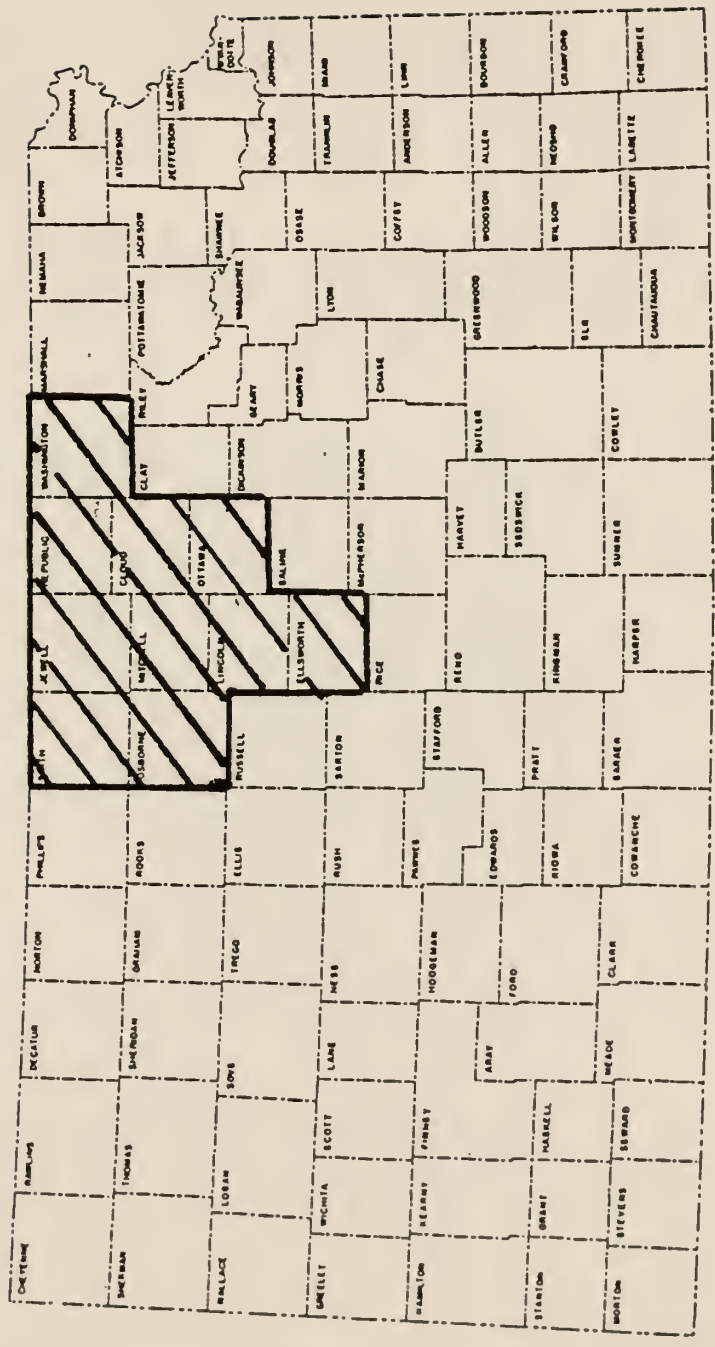
represents study area.

9

Table 1.1
COUNTIES CLASSIFIED BY DOMINANT ECONOMIC ACTIVITY.

wheat-livestock	corn-belt	manufacturing	service
Lincoln	Jewell	Ellsworth	Cloud
Osborne	Republic		
Smith	Washington		
Mitchell			
Ottowa			

Note: Farming dependent counties are defined as those in which at least 20 percent of the personal income came from farming for the period 1975 to 1979, or in which 25 percent of the labor was employed in agriculture according to the 1980 census.

Manufacturing counties are defined as those with at least 15 percent of the labor force engaged in manufacturing activity.

Service center counties are those which in 1980 had at least 50 percent of the labor force employed in the service sector, retail and public administration combined.

[This classification was devised on the basis of 1980 census information]

(source: Flora and Flora et al. 1986)

early settlement, providing the major transport and communication arteries between the dispersed settlements. Though the possession of a railroad was essential to early trade center survival, the location of a town on a rail line did not necessarily insure its growth. Nevertheless, the smaller centers which grew most rapidly during this early phase tended to have rail access, and often were not located near a major trade center (Kale 1975, pp. 30).

The Homestead act provided a specific amount of land for those early settlers who would cultivate it. The size of these parcels varied from 80 to 160 acres, and this is what accounts for some of the spatial regularity of homesteads on the landscape. This provision of land significantly encouraged rural settlement where it might not otherwise have evolved. This, coupled with the relative newness of the settlements in the region, many being only around 100 years old, may be some of the reasons why these places are experiencing higher decline than is typical of other areas in Kansas, and indeed, the United States as a whole. Population in the state of Kansas is growing at an annual rate of 5.1 percent between 1970 to 1980, while in North Central Kansas the annual rate of decline is minus 6.34 percent, (U.S. Census of Population 1980).

As automobiles became more available, and the quality
of roads improved, rural residents found themselves freed
from the dependency on their local center, and were thus
able to travel greater distances in order to gain some of
the services that had previously been available in the
local center. Consequently, towns did not need to be as
closely spaced as before. Mechanization of farming allowed
for larger farm units, which led to the movement of
population from the land. During the Depression of the
1930's the interrelationships between these processes
heightened, and the Midwest lost population, and many small
trade centers were lost at this time due to population loss
(Kale, 1975). High rates of out migration from the region
as a whole have been widespread even throughout recent
decades, and many small towns and hamlets established near
the turn of the century have completely disappeared from
the landscape.

PROBLEM STATEMENT.

This thesis analyzes the demographic trends that have
occurred in the incorporated places of North Central
Kansas. The population change from 1890 until the present
time will be discussed, initially in a general way in order
to describe the overall trends in the region. Then the
period from 1970 to 1987 will be considered in more detail

in an attempt to explain or account for the population change that has occurred during that time, in the light of several selected variables. These variables fall into three general categories - (i) the geographical accessibility of settlements, (ii) service and retail provision in the settlements, and (iii) demographic characteristics of the settlement. It is hypothesized that these variables will significantly influence, and aid in the explanation of, population change in North Central Kansas.

Four variables are selected to assess accessibility: (i) distance to nearest place with a population greater than 2,500, (ii) distance to nearest place with a population greater than 25,000, (iii) distance to the nearest U.S. highway, (iv) a site index, representing the quality of road on which the settlement is located.

A service provision index is calculated, by measuring the change in the businesses and services between 1970 and 1987. This enables consideration of the change of functions that have occurred in a town.

The demographic variables considered are: (i) the actual population size in 1970, (ii) the population size in 1987, (iii) the population change from 1970 to 1987, and (iv) the average age of the population living in that place.

Correlation coefficients are computed to assess the degree of association between the variables, and most importantly the degree of association between the independent variables and the dependent variable population change in the region 1970 to 1987. Then using a multiple regression format, the overall explanatory nature of all of the variables taken together and individually, is assessed. This will provide some insight into what is influencing population change in the region.

PLAN OF STUDY.

To summarize, this chapter has set forth the issue of population change in rural settlements, and has stated the purpose of the study in its theoretical and historical context. The proceeding chapter will review some of the relevant literature on population change and rural settlements, in order to get a picture of what the present study seeks to show in relation to previous work of others. Chapter Three consists of a description and discussion of the methodology and procedure employed in the study, explaining the variables used in attempting to understand the demographic patterns of the region. The results of the analysis will be considered and discussed in chapter Four, and chapter Five concludes the study by summarizing the main points and making some brief comments about possible

directions for further research in this field.

Chapter Two

LITERATURE REVIEW

The study of rural settlements is by no means a new area of research. Indeed, small towns have been at the center of academic interest and research for centuries (Gomme 1890, Fletcher 1895, Evans 1915 etc.). However, in recent years there has been evidence of an increase in concern and study of rural settlements and their associated forms and functions. This chapter is an attempt to review a diversity of literature on the topic of rural settlements, and to consider the development of this sub-discipline within social science research.

Historical studies on rural settlements will be discussed initially, and then in movement through time, the development of various aspects of rural studies will be traced, to include the development of theories to explain certain patterns of settlement that are visible, and the many empirically based studies that have attempted to test these theories. The changing focus of rural studies will be considered, and also how the literature has responded to the settlement dynamics that have occurred over time. Particular emphasis will be given to studies of population

change in rural areas.

HISTORICAL SETTING.

Early studies of rural settlements were made probably because of the dominance of agriculture and the rural economy at that time, and the rural settlement played an important role within this system. Historically some studies have tended to consider the settlement form and physical morphology. The structure of a village is often derived from a certain historical function that the village was first developed to serve, be it agriculture, fishing, or mining etc. Work by Dion (1934) on the relationship between the evolving field system and rural settlements in France, Lefevre's (1926) work on rural Belgium, and Seebohm (1883) in his studies of rural English communities as a part of the evolving agrarian system, are works illustrative of this type of approach. The settlements were thus seen as being either directly or indirectly, responsive to the surrounding environment.

THEORETICAL DEVELOPMENTS.

From these works have been attempts to examine rural settlements in relation to other settlements, and fit them into a hierarchical structure, determined by size and function. Studies that have considered the rural settlement

17

in its relation to other places include works by Demangeon
(1927), Hudson (1969), Christaller (1966) and Bylund
(1960). These studies, and many others attempt to analyze
the relative location of place in an empirical and
theoretical manner, to determine if there is a well defined
locational hierarchy of settlements on the landscape.

The work of Walter Christaller and August Losch have
provided a framework for much subsequent research where the
focus is a theoretical approach to the spatial
configuration of rural settlements. A classic study by
Berry and Garrison focuses on this issue of whether places
can be differentiated into classes intuitively identified
as hamlet, village, town, city, metropolis, (Berry and
Garrison, 1958). In this study a hierarchy of settlements
is identified, based on size of service area, size of
place, and economic functions provided by places. To a
large extent, the validity of Central Place theory as
suggested by Christaller in the 1920's has been supported.

The issue of the spatial setting of settlements
illustrates the regional emphasis of geographic enquiry at
this time. However, while being regional in origin, albeit
with strong economic overtones, much of the subsequent
analysis that was based upon the early studies was
extremely methodological and quantitative in focus. This is
indicative of the particular time period, and its influence

on academic enquiry.

In geography, the core of both historical geography
and contemporary study, up to the mid 1950's, was
unquestionably centered on the rural area, as a region
(Cloke, 1985). This was partly due to the dominance of
agriculture within the economic sector, and partly because
of the regional bias of geographical study. However, with
the demise of regionalism during the 1960's in favor, first
of systematic study and then of "applied" and "relevant"
study, rural areas and small towns therein, began to be
studied in a more quantitative methodological manner, with
much of the emphasis placed on statistics and the seeking
of theories to explain the trends that were occurring
(Thomas, 1960; Bohrnstedt, 1969; Fuguitt, 1965b; Golledge
and Ruston, 1966).

THE URBAN INFLUENCE.

The relationship of small towns with larger cities or
the open country, and their demographic changes especially,
are topics that have pervaded much of geographic research.
However, different emphases have been placed on these
issues at different periods of time. For example, in the
1930's, work on small towns seemed to be focused on
functional issues relating to the retail trade and services
which they were providing for their hinterlands (Hoffer,

1931, 1935, 1936; Lively, 1931). During the 1960's, one major focus of study was population change, and the associated influence of urban areas on the rural settlements (Hart and Salisbury, 1965; Fuguitt, 1965; Mattingly, 1963; Zelinsky, 1962, 1963). However, throughout this time other aspects of the rural settlement were being considered, though apparently with less intensity. Rural settlements cannot be viewed in isolation, and must be seen as part of the continuum of urban places. Rurality, by nature, is relative and thus it is logical to study it in relation to the whole settlement system, which is dominated overwhelmingly by metropolitan areas. The very title of Bunces' book, "Rural Settlements in an Urban World", (Bunce 1982), is indicative of the focus of research during the last decade in particular. In this thorough and interesting study of rural settlement, Bunce tackles the broad issue of settlements at the lower end of the urban continuum. This issue has been the focus of many other writings and research represented in the work of Fielding (1982), Hart et al. (1968), and Hugo and Smailes (1985).

INTERDISCIPLINARY RESEARCH.

     Within the literature on small towns, there are two major sub-fields of study that can be recognized: 1) The relationship between economic functions of rural areas and

their population dynamics, and the geographic location of
that place, and 2) The social characteristics of the
village as a community. The latter focus has been pursued
predominantly by rural sociologists and political
scientists, while the geographer and economist have
traditionally concentrated on the economic activity and
location of the small town.

The work of Christaller in the 1920s pioneered the
study of trade center functions and the size and
configuration of settlements, representing the birth of
central place theory. This work has proved to be a
fundamental and classic work upon which many other studies
have been built. One of the early geographical studies on
this topic was Trewartha's study of Wisconsin hamlets in
1943 (Trewartha, 1943). While fairly broad in scope, the
article had several sections dealing with the internal
spatial arrangement of buildings and the types of
commercial activities present in the hamlet. Trewartha
noted that particular types of businesses (gas stations,
general stores, and taverns, i.e. low order tertiary
economic activities) were characteristic of hamlets, and
that as a place increased in size, the number and types of
businesses increased.

In 1953, Brush published a study of small towns in
Wisconsin that was primarily concerned with the spatial

distribution of various functional categories (Brush, 1953). He, like Trewartha, noted the retail activity in centers of various sizes. Based on the number of internal economic functions he found in trade centers, he postulated three levels of small places: hamlets, villages and towns. He also noted that the population size of a place did not provide an adequate criterion for classifying the economic activity in small towns, although Brush did find a general association between population size and number of economic functions present in a place. Thomas, in a study of Iowa villages empirically correlated small town population size with the internal economic activity. He determined the number of economic functions and functional units and establishments for 42 settlements and compared this to the population size of the settlements. He found a positive relationship to exist between population size and these variables (Thomas, 1960). Stafford (1963) conducted a similar investigation of Illinois towns and compared his findings to those of Thomas, and also to a study done by Berry and Garrison in 1958. Stafford's results turned out to be similar to those of earlier studies showing strong positive relationships between population size and the numbers of functions and functional units and establishments.

Johansen and Fuguitt (1973), analyzing the changing

retail patterns in Wisconsin villages, found that although the demand for certain retail goods and services has changed over time, the functional role of villages remained essentially the same, i.e., to provide goods and services to a surrounding hinterland. They also found that economic changes were unrelated to changes in population, and in conclusion stated that other factors such as nearness to urban centers, had a greater impact on the population change than did changing commercial activities.

Many studies of rural villages have been directed towards isolating measurable variables associated with population change in attempts to predict change. Such things as settlement size, distance of settlements from a larger urban center, economic conditions of the surrounding area, manufacturing activity in the town, and occupational structure, have been suggested and studied as being related to village population change.

A study in 1957 by Hassinger, has been the basis upon which much subsequent work has been done. Hassinger (1957) reported that small places in proximity to larger cities exhibited decline and that villages located farther from urban centers showed mixed growth and decline. Hassinger however, could only predict approximately 18% of the population change using size and distance as the independent variables.

Most of the studies cited above have viewed small towns with the idea that they are all responsive to one set of influences. In reality, this may not be the case, since some village populations may be responding to one set of influences, such as size and distance, while in other towns, size and distance may be important, but the regional economy may be the primary influence on its population dynamics. As early as 1936, Clark and Roberts asserted that regional economic conditions in eastern and western Kansas outweighed the purely local factors in their effect on small town population dynamics, (Clark and Roberts, 1936). Hart and Salisbury (1965) have also done some interesting analyses of mid-western villages using size and distance as explanatory variables. However, they conclude that the change of population phenomena in small towns is too complex to accept one, or even several variables as "final" in an explanation of the trends that are occurring.

These studies of commercial activities view the small town as a functioning economic unit, rather than a place of residence. A different approach to the internal structure of villages has been taken by other researchers, mainly sociologists, studying the rural settlement as a community, or residential center. These studies have focused on the social and demographic aspects of the community in an attempt to better understand the operations and dynamism of

small town populations.

Rural sociologists have long been interested in rural "communities", and a considerable amount of work has been done in this area. The agricultural village was generally the center of these social areas, and while economic ties were considered to be important, some writers proposed that social identification was the primary function performed by villages (Davies, 1943; Christiansen, 1957). These rural community studies fostered the idea that social and demographic characteristics may vary from one small town to another, leading to research on the difference between villages (e.g. Smith, 1941; Duncan and Reiss, 1956; Vidich and Bensman,1960; Barkeley, 1962).

A sociological study done by Mogey (1976) discusses the demographic changes that have taken place in rural communities in the recent decades, and note the racial and ethnic make up of these places, concluding that the more rural the area, the greater the population loss, and in general the lower the average income of the residents of that area. Such conclusions are by no means new, but tend to reflect a phenomenon that has been detected by many researchers from a multitude of disciplines.

A number of studies have compared village demographic characteristics among different sizes of towns and among growing, stable, and declining village populations. Fuguitt

and Field (1972) reported that larger places (population greater than 750) had a higher percentage of non agricultural laborers and generally higher socio-economic status than smaller places. They also found that growing places had younger populations, higher average incomes, and a higher percentage of people in manufacturing occupations. In another study by Fuguitt (1972), he found that there were more old people living in smaller and declining towns.

RURAL RENAISSANCE ?

The role and function of many small towns changed significantly during the decades of the 1960's and 1970's, resulting in an economic and demographic rejuvenation of rural settlements. This was especially so in villages within commuting distance to a larger urban area. The theme of counter-urbanisation, is one that has gained much attention, especially from geographers. There is a definite trend in the more recent literature to consider this so called "population turnaround", a process whereby small towns, which had in previous decades shown a population decrease, are now exhibiting a population increase or revival, especially those small places located relatively close to an urban area (Johansen and Fuguitt, 1979, 1984; Browne and Hadwiger, 1982).

This dramatic demographic turnaround inspired many

studies on the influence of metropolitan areas on its rural
hinterland, and the associated rural communities thereof.
In relation to this population turnaround, Johansen and
Fuguitt (1984) state that even in settlements with the most
deserted main street one often finds nearly complete
occupancy of houses, albeit with fewer and perhaps older
people in each, than before. Indeed, as Robert and Randolf
(1983) have stated, "...the last vestiges of rural
depopulation seems now to be disappearing". This statement
was made with regards to the counter-urbanization trends
that were occurring in England at the time, but are also
true of the rural situation in the United States. Several
works by Hart, clearly show how there has indeed been quite
an unusually rapid growth in small towns, his work notably
focusing on the region of the Great Plains in the United
States (Hart and Salisbury 1965; Hart, Salisbury, and
Everett 1968; Hart 1986). There has been a significant
amount of research done on this topic outside of the United
States, notably in Britain about these changing rural
demographic trends (Blacksell and Gilg, 1981; Cloke, 1980,
1985; Lewis, 1979) and in Australia and New Zealand,
(Smailes and Hugo, 1985; Hugo and Smailes, 1985; Le Heron
and Roche, 1985).

Increased transportation and automobile ownership has
been most influential in changing the role and functions of

villages and small towns. Work done by Schwarzweller (1979) is indicative of this recently occurring demographic trend. The more recent work done by Cloke (1985) also illustrates the increasing trend of rural regeneration, as the cumulative result of population redistribution trends today. Much work has been done on small towns and villages changing function to becoming dormitory settlements, and how this is often associated with a decline in the retail and service functions, and increase of residential functions, especially by British geographers and planners.

Many writers have recognized the change of function of small rural places, and some scholars have attempted to make predictions on the new roles and the future of these places. In a study of small towns in Nebraska, Anderson and Miller (1953) suggested that while economic functions would decline, the small town would remain important for "community" functions. Studies on the continued viability of the more remote small towns have come to varied conclusions, some optimistic, and some pessimistic. The number of optimistic studies are few. Brunner (1936) has concluded that the number and sizes of villages were increasing, and would continue to do so in the future. Smith (1942) has suggested that rural villages would survive as "community nuclei".

Daniels and Lapping (1987) have proposed a triage

approach to this issue of small town survival in the Midwest. They suggest that the very smallest of settlements will eventually disappear as a result of continued population loss. The larger rural settlements are most likely to survive, and maintain a fairly healthy existence because of their larger and more diverse resource base. The settlements in the middle group are those that require the most aid and planning in order to maintain buoyancy. These places do have some potential for growth, but this needs to be developed to enable them to withstand the negative economic competition that is causing their decline.

Many other studies have exhibited pessimistic conclusions on the revival of the more remote rural settlements. Stewart (1958) has stated that due to the reduced economic base of the smaller central places on the lower end of the Christaller central place hierarchy, "...eventually the lowest order practically disappears." This is certainly the situation that is evident in both the United States and the United Kingdom, where many service villages and small towns have lost their economic functions and services, and remain, at best, only as a cluster of residential units. Other authors who see little future for the rural village include, Barkely, 1962; Nesmith, 1963; Clawson, 1966, 1972; Pickersgill, 1961; and others. A

number of other observers have suggested that small towns
are declining, and in doing so, are simply becoming
unattractive places to live. Rikkinen summarizes this
point of view as follows:

> "Although the small villages have kept a
> portion of their primacy functions, their
> residential attractiveness has decreased to such
> a point that their population is decreasing more
> rapidly than their surrounding area."
> (Rikkenen, 1968 pp. 324-5)

Rural areas in all parts of the world face a somewhat
uncertain future. In developed areas, the traditional
wisdom of depopulation has been swept away as counter
urbanization trends have become apparent. There is
certainly, as yet, no broad consensus as to what post
industrial society has in store for rural areas, either
socio-economically for the communities concerned, or
spatially in terms of their future pattern on the
landscape.

There is an increasing trend for rural studies to take
a more multi-disciplinary approach than has previously been
the case. Pacione (1984) recognizes rural geography as a
multifaceted areas of study, which interrelates with a host
of other disciplines and sub-disciplines, including

economics, sociology, anthropology, politics, and planning. A further indication of the growth of multi-disciplinary studies of rural areas is found in the stated aims of the recent mainstream texts written within specific disciplines. A revealing example is afforded by Carlson et al's. (1981) text on American rural society which is firmly sociological in parentage, yet seeks to widen the debate to include the dynamics of the environmental and economic setting within the rural context. Johansen and Fuguitt (1984) provide another example of this inter-disciplinary approach in their book entitled "The Changing Rural Village in America". This tackles a broad scope of topics, including the historical setting, the social characteristics of the villages and their community structure, the economic functions performed and associated with the place, and the associated demographic trends, and concludes by looking at the future of the American village. The future of rural settlements is indeed difficult to determine, and much of it depends on the prevailing economic and social trends of the time.

SUMMARY AND CONCLUSIONS.

From this brief review of some of the more salient literature on rural settlements, it is clear that this is an area of study that has been, and indeed still is, of

considerable interest to scholars in several disciplines.
The small town provides an interesting unit of study, and
is particularly interesting at the present time because of
the demographic and social transition that is occurring
within it.

In summary, it is evident from this review that there
are certain factors and conditions that have a potential
influence on population change in rural areas. The major
influences that have been studied can be grouped into three
main areas as follows:

(i) Those studies relating to the rural settlement in its
regional context dealing with the nature of its hinterland
and the regional economy in general, settlement
accessibility and distance from other places;

(ii) Those dealing with the physical and economic structure
of the settlement specifying such things as the function of
the place, its retail and service provision, and its
commercial activity; and,

(iii) Those dealing with the demographic characteristic of
a place, its population size, population change, the age
structure of the population and the community of rural
settlements.

This then provides a framework for the present study
which considers various factors within these three
categories, and their independent and cummulative influence

on population change in North Central Kansas.

Chapter Three

METHODOLOGY

This chapter provides an explanation of the methodology and procedure used to analyze population change. Several variables have been identified as being influential to population change in rural settlements, and these will be explained in more detail here. Using correlation and step-wise multiple regression analysis, the variables are considered in their relative influence on each other, and the dependent variable, population change.

POPULATION CHANGE.

The study focuses on incorporated places in North Central Kansas, a region that consists of ten counties, with a total population of 70,626 (U.S. Census of Population 1980). Fifty six settlements, with a total population of 39,550 are used in the study. These are shown in figures 3.1 and 3.2. Some cities were omitted due to the unavailability of necessary data. This region of North Central Kansas was chosen because it appears to be experiencing somewhat different demographic trends than other areas of Kansas. This is shown in figure 3.3 which

Figure 3.1

SETTLEMENTS IN THE NORTH CENTRAL KANSAS STUDY AREA.

Figure 3.2
POPULATION OF SETTLEMENTS IN NORTH CENTRAL KANSAS, 1987.

N

POPULATION OF SETTLEMENTS

less than 500

500 - 1,000

1,001 - 2,500

more than 2,500

MILES

5   0   5   10
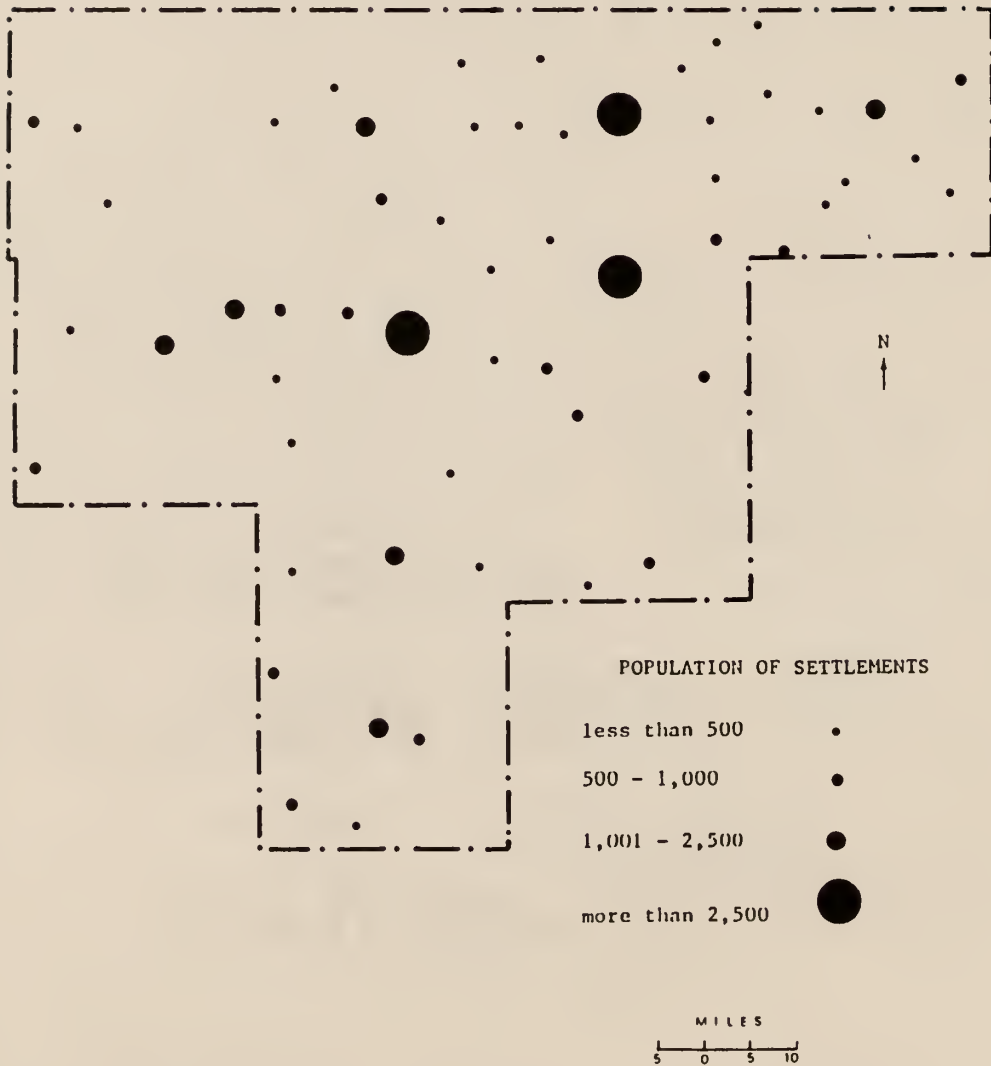
Figure 3.3
Percentage population change in Kansas, 1890-1980.
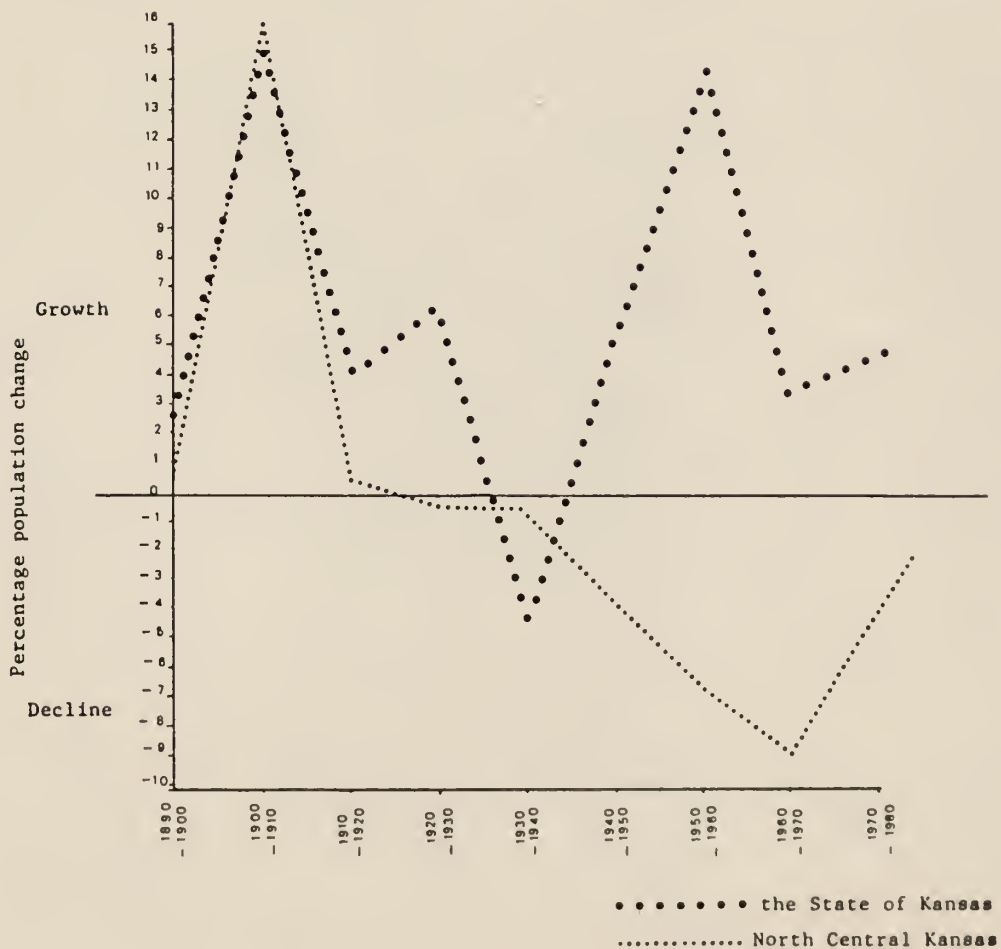
compares the population change that has occurred in the State of Kansas as a whole, with the trends that have occurred in North Central Kansas.[1] The settlements in North Central Kansas appear to be declining more rapidly than other regions. Small towns are also more prevalent in North Central Kansas than in other places, making the survival of small towns an important and relevant issue here.

There are no major urban centers in the region, and also because of the high number of small family farms, the population has fallen rather dramatically (Socolofsky & Self, 1972). The agricultural systems of the region are diversified, unlike other regions of the state that tend to be dominated by a particular type of farming, such as irrigated cropping in the northwest, or beef production in the southwest of Kansas.

HISTORICAL OVERVIEW.

An examination of the population change in settlements from the late 19th century until the present provides an overall view of the demographic trends that have occurred in the region as a whole. The population grew in the later part of the 19th century and early 20th century, this being the major period of population growth for the region, when places were still gaining new settlers, and the state as a

whole was growing. Since then, however, the population has declined fairly rapidly, with the exception of the decade 1970-80, where the rate of decline decreased considerably. This decade of reduced rates of population decline coincides with the well documented "population turnaround" or "rural renaissance", that has been taking place in many areas of the Country (Johansen and Fuguitt 1979, 1984).

The trend in North Central Kansas, however, appears to have reverted back to one of more rapid decline during the eighties. However, census data for the eighties is not yet available, and the 1987 data used is from the Directory of Kansas Public Officials.[2] These figures are deemed to be fairly accurate by the state officials and others, as they are updated annually by local city officials and the same criteria for making the estimates are used in every place. Their comparability, therefore, with census data is good, however, it must be noted that they are not official U.S. Census figures, and as such must be treated with caution, making it difficult to make any definite statements about population trends for the eighties. The data does however, provide a good estimate of the way population has changed over the first three quarters of the decade, and it is for this reason that it is used.

In order to see if the rate of population growth or decline over time is at all related to settlement size,

the settlements were divided up into three size categories, those less than 500, those with populations between 500 and 1000, and those with populations larger than 1,000. This information is graphed with percentage population change per ten years, and is displayed in figure 3.4 and in table 3.1. From these graphs it is evident that there is some variation in demographic trends according to the size of the settlement. All sizes of settlements grew in the later part of the 19th century and the beginning of the 20th century, and thereafter experienced significant decline. It is interesting to note that the smallest places have declined most dramatically, especially during the period 1910-20 and 1940-60. Small towns do, however, show a considerably reduced rate of decline between 1960 and 1980, more of a trend reversal than in the larger size categories of settlements. All sizes of settlements do appear to have declined at roughly similar rates since 1980. From these initial considerations therefore, it is evident that the size of settlement may have a bearing on the rate of growth or decline of that place.

RECENT POPULATION CHANGE.

In order to consider in more detail what is actually influencing the more recent population change in the region, the period 1970 to 1987 is focused on. The

Figure 3.4

Average percentage population change, 1890-1987, in cities categorized by size.
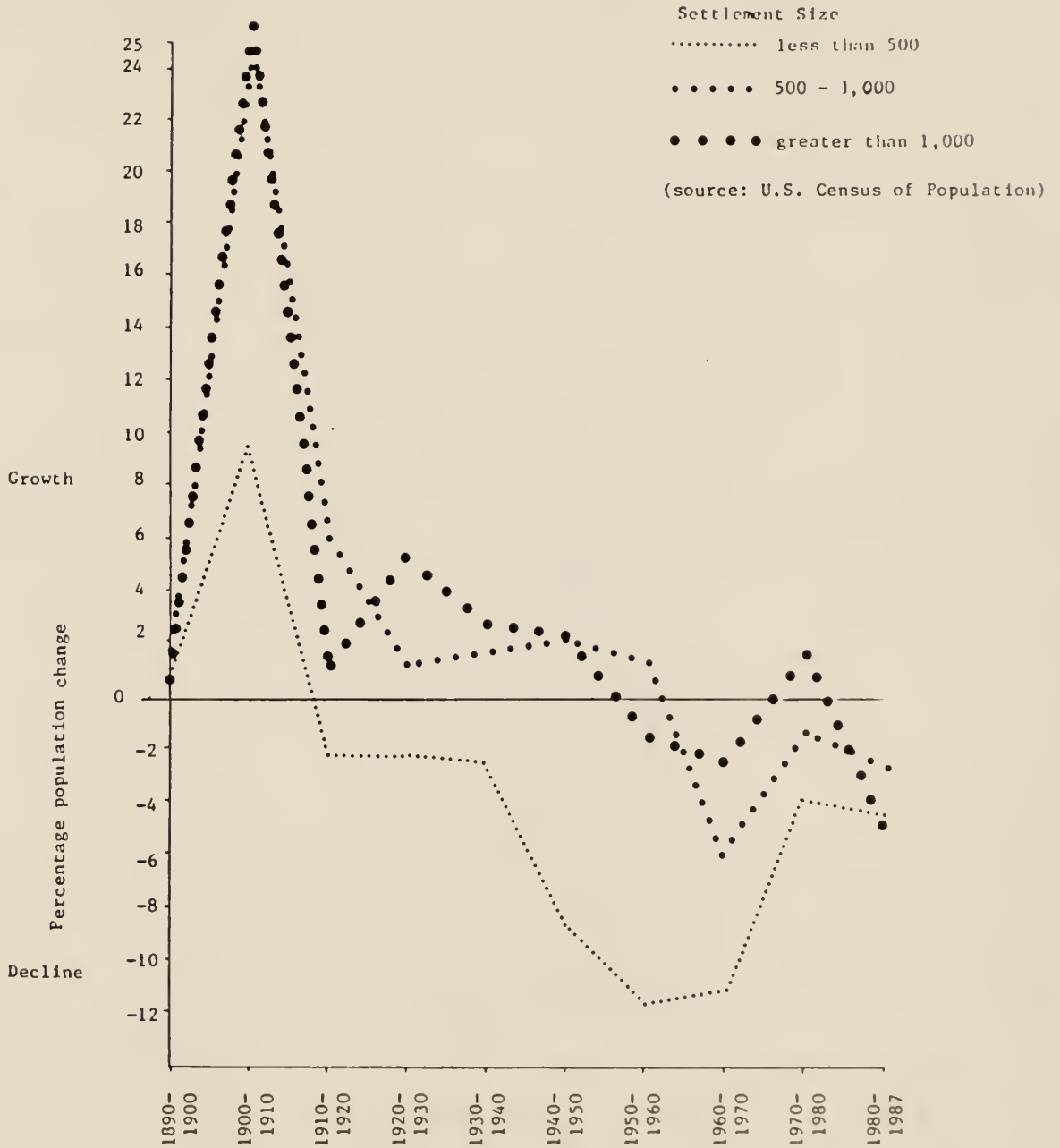
Table 3.1

Population change in North Central Kansas: 1890-1987 by city size.

TIME	SIZE OF CITY		
	less than 500	500-1000	greater than 1000
1890-1900	13	25	2
1900-1910	319	349	229
1910-1920	-69	88	10
1920-1930	-69	13	50
1930-1940	-72	23	26
1940-1950	-281	32	22
1950-1960	-381	22	-12
1960-1970	-365	-84	-23
1970-1980	-123	-17	15
1980-1987	-209	-35	-43

population data for this period is summarized in table 3.2. Not all cities have experienced the same trend of population change throughout the period, some places have grown while others have declined. Figure 3.5 is a map of the area indicating the rates of growth or decline in the settlements between 1970 -1980, providing an overall view of the spatial pattern of the population change in the region.

Population change is the dependent variable in the subsequent analysis. This is measured in absolute terms, taking the difference in population from 1970 to 1987. This particular measure of change was chosen instead of percentage change because such relative measures of change do not take into account the actual size of the settlement.

Three basic sets of variables were selected in an attempt to provide an explanation for the population change that occurred in the region between 1970 to 1987:

(i) Physical accessibility of the settlement,

(ii) Service and retail provision of the settlement

(iii) Demographic characteristics of the settlement.

It is acknowledged that each of these sets of variables are inherently interrelated with each other, however, a useful set of explanatory variables may be derived from them. Each set of variables is discussed in more detail below.

43

Table 3.2
SUMMARY OF SETTLEMENT POPULATION DATA.

	Range	Mean	Stand. Deviation
1970 population	46 - 7221	714	1132
1987 population	54 - 6779	676	1087

44

Figure 3.5
POPULATION CHANGE 1970-1987, IN NORTH CENTRAL KANSAS.
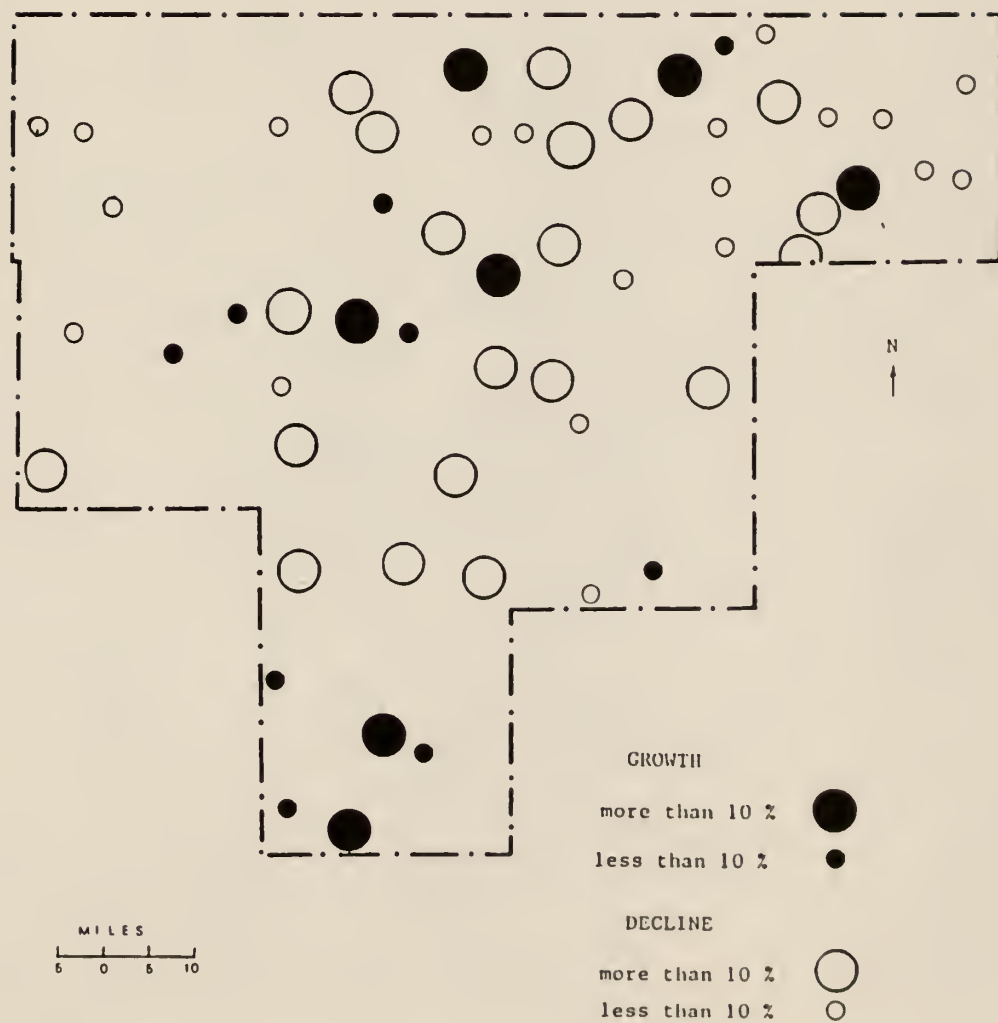
Accessibility: It is assumed that the less accessible a place is, the more likely it will be declining, due to long distances that need to be travelled in order to gain even basic necessities, such as groceries or education. Also, as accessibility decreases it is less likely that population will come to that place to purchase its retail goods or services. On the other hand, if a place is highly accessible, this may be a benefit as it may be able to attract passing trade, and thus increase the functional status of the place, and hence have more ability to maintain its population. In a study of the impact of location on population in Kansas, Dotzauer (1980) has pointed out that accessibility of a place is important in explaining the population change that occurs in that place.

Four separate measures are used to determine the importance of accessibility in explaining the population change in settlements. The first of these measures is distance to the nearest U.S. Highway, measured in actual road mileage. Cities that are located on, or near to, a major highway are more accessible than those places located far away from a major transport artery. Being accessible to a major transport artery is thought to be important for several reasons, (i) reduced travel time to other places allowing people to commute (ii) high volume of passing traffic, generating employment in such things as gas

stations, eating places, or motel services etc. (iii) good
road access enabling large trucks to bring goods to the
settlement. These are just a few examples of why increased
highway accessibility may reduce population decline, or
encourage growth in the settlement.

A second measure of accessibility is distance,
measured in road miles, to the nearest place with a
population of 2,500 or greater. Cities with a population of
2,500 or above are the smallest places that the U.S. census
recognizes as being "urban". Nearness to such a place may
either have a positive or negative effect on surrounding
smaller places. On the one hand, being close to a city with
a population of 2,500 or above could be beneficial in so
far as goods and services are available within commuting
distance, thus enabling the smaller settlement to remain
viable. On the other hand, being close to such a place
could prove to be negative competition and encourage
population to leave the smaller settlement and migrate to
nearby larger place, where services such as education,
medical, retail and entertainment are more available.

Hassinger (1957) found that bigger and smaller centers
had different effects on village population change. Thus to
compare the effects of different sized settlements on
population change in North Central Kansas, a third
accessibility index was developed, - distance to the

nearest urban center of population 25,000 or greater.
Places located close to a large urban area may be more
inclined to grow in population because these villages are
used as commuter settlements, where people can enjoy the
benefits of rural life, and yet at the same time be close
enough to the urban area to enjoy some aspects of urban
life, such as employment, shopping, or business. Thus it is
expected that the closer a place is to a large urban area,
the more likely it will be to grow.

A final accessibility index considered is a site
variable, measured on the quality of the road that
immediately leads to the settlement, a gravel road being
assigned a quality score of 1, a state highway, or general
paved road a score of 2, and a U.S. highway a score of 3.
The logic behind this variable being that lower the quality
of road, the more inaccessible, and thus more susceptible
to decline.

A summary of the expected results of these
accessibility variables could be, the higher the
accessibility measures, i.e. the more remote the
settlement, the more likely it is to declining.

Service and Retail Provision: The level of service and
retail provision in a place may determine the ability of
that settlement to maintain its population, those places

with a high level of service and retail provision will not only provide more services for its resident population, but also more employment opportunities.

Information on service and retail provision was gathered for all the settlements in the study area for 1970 and 1987, and the change over time noted. The data was gathered using telephone directory listings, and then categorized into certain types of business and service activity, based upon those determined by the Kansas department of Labor and Economic Division. These functional categories are listed in table 3.3.

Each category of business activity is assigned a point score determined by the frequency of that activity in 1970, the most frequent categories being assigned a score of one, up to the least frequent group of activities being given a score of five. These point scores were assigned according to natural breaks or grouping of the data, each group with a certain point score are more clustered with itself than with any other group. The specific frequencies and point scores assigned are summarized in table 3.4.

A service index can thus be calculated for every settlement for 1970 and 1987, on the basis of the number and type of services or business activities in that place. For example, if a city had two gas stations, point score 1, and one restaurant, point score 2, and a liquor store,

Table 3.3
FUNCTIONAL CATEGORIES OF RETAIL AND SERVICE PROVISION IN NORTH CENTRAL KANSAS.

Retail and service Categories	Total # of establishments 1970	1987	Point score
Gas station/ auto repair & dealers	418	358	1
Agricultural services	326	290	1
Financial & Legal services (incl. Real Estate)	156	186	2
Small business activity (eg. plumming & heating)	140	195	2
Construction/ building contracting	139	148	2
Restaurant/ eating place	132	143	2
Medical / health services	122	124	2
Household furniture/ appliances	106	88	3
Educational services	98	76	3
Apparal/ accessory retail	84	60	3
Wholesale trading	80	42	3
Banking/ credit facilities	69	67	4
Variety/ general merchant	66	93	4
Entertainment & recreation	66	80	4
Hardware store	64	35	4
Manufacturing	51	47	4
Drug store	28	17	5
Liquor store	25	30	5

Table 3.4
POINT SCORES ASSIGNED ON THE BASIS OF FREQUENCY.

```
----------------------------
      Assigned
Frequency        point score
----------------------------
 < 50                5
50-74                4
75-120               3
121-200              2
 > 200               1
----------------------------
```

point score 5, then the total service index of that place would be calculated as follows: [(2x1)+(1x2)+(1x5)] = 9. The service index of this place is therefore nine. This enables comparison of functional status of settlements between 1970 and 1987, which can then be used as a variable to explain the population change over that time period. Change in the functional status of a settlement is indicated by a measurement of absolute change in the service index of a place from 1970 to 1987, and thus enables comparison with the population change over the same time period. The service and retail provision variables are threefold;

    (i) functional status in the settlement in 1970,

    (ii) functional status in the settlements in 1987, and

    (iii) the change in functional status of the

    settlements

between 1970 till 1987.

The relationship of these variables with population change is somewhat of a vicious circle, because as population declines it results in a decreased market for the functions provided by that place, which causes a reduction in those functions provided, which in turn results in further population decline. It is indeed difficult to separate the cause and effect of growth and decline, but it is proposed here that reduced functional

status is related to population decline in a settlement.

Demographic Variables: As noted earlier, population change does vary for settlements of different sizes. Looking at the historical trends of population change in the region, small settlements do appear to be more volatile than larger places. Certainly, because of the small resource base that exists in little towns, they are more vulnerable, or susceptible to change. A larger place would be assumed to have a stronger and more diverse economic resource base, and therefore be less prone to rapid decline. Thus two size variables are incorporated into the analysis, (i) population size of settlements in 1970, and (ii) population size of settlement in 1987.

The actual age composition of the population may also play a role in influencing the population change of that place. Previous research has shown that age structure is an important factor in explaining population change of a place, (Groop 1970, Johansen and Fuguitt 1984). Again, this variable has somewhat of a cause and effect influence on population change. Young people have the highest propensity to migrate, and thus leaving behind a community that becomes increasingly older, and hence increasing the rate of decline in the place. Mean age of settlement population was selected as the variable to measure these influences.

The mean age was calculated from the 1980 census File Tape summaries by multiplying the number of people in each category by the middle value of the category, summing and dividing the results by the total number of population in that settlement in 1980. The 1980 census information is used because it is the most recent data available on the age structure of the settlements. It is assumed that mean age and population change are negatively related, places with older populations are assumed to be growing less than those with a young population.

SUMMARY OF SELECTED VARIABLES.

In an attempt to seek explanation for the population change that has occurred in North Central Kansas between 1970 and 1987, ten independent variables are selected as being important in influencing this population change. These are summarized below.

Accessibility:

(i) Distance, in actual road miles to the nearest U.S. Highway from each settlement.

(ii) Distance, in actual road miles to the nearest city with a population of 2,500 or above.

(iii) Distance in actual road miles to the nearest city with population of 25,000 or above.

(iv) Site factor

Functional status:

(v) Functional status of the settlement in 1970.

(vi) Functional status of the settlement in 1987.

(vii) Change in functional status of settlement from 1970 to 1987.

Demographic:

(viii) Population size of settlement in 1970.

(ix) Population size of settlement in 1987.

(x) Mean age of the population in the settlement

The degree of correlation between each of these variables and the dependent variable, population change, is analyzed. A correlation coefficient matrix is also be produced to show the interrelationship between the independent variables. In order to gain an understanding of each factor's relative influence on the dependent variable, and to find out how much of the change in the dependent variable can be explained by the cummulative effect of all of these independent variables, a stepwise multiple regression analysis is performed. The form of the equation, coefficient of determination, Beta weights and residuals are discussed.

The results of these analysis are noted and discused in the following chapter.

Footnotes:
1. Population change is calculated for every decade from 1890, the earliest year that complete census data was available, to the present, with the most recent year's population being calculated as a percentage of the earlier years population.

2. The Directory of Kansas Public Officials is a publication produced every two years for the League of Kansas Municipalities, by Kansas Government Journal in Topeka, Kansas.

Chapter Four

RESULTS.

This chapter is a presentation and discussion of
results derived from the analysis described in the
previous chapter. The degree of correlation between each of
the ten independent variables, and the dependent variable,
population change 1970-1987 is computed, and the degree of
inter-correlation between each of the variables noted. A
summary of the variables is provided in Table 4.1.

RELATIONSHIP OF SELECTED VARIABLES WITH THE DEPENDENT
VARIABLE.

One of the aims of this thesis is to discover what
percentage of the population change between 1970 and 1987
in North Central Kansas can be explained using the
variables listed above. Table 4.2 shows the individual
correlations between population change and each of the
other variables. The first column of table 4.2 is the most
important because it displays the correlation of the
dependent variable, population change, with the other ten
independent variables. None of the selected variables show
a high degree of correlation with the dependent variable.

Table 4.2
CORRELATION MATRIX OF VARIABLES.

	ABPCH	POP70	POP87	ACC1	ACC2	ACC3	ACC4	SV70	SV87	ABSCH	AGE
ABPCH	1.00	-0.46*	-0.38*	0.08	0.29*	-0.10	-0.05	-0.41*	-0.39*	0.20	-0.09
POP70	-0.46*	1.00	0.99*	-0.31*	-0.41*	0.54*	-0.14	0.98*	0.98*	-0.39*	-0.10
POP87	-0.38*	0.99*	1.00	-0.32*	-0.40*	0.56*	-0.15	0.98*	0.98*	-0.38*	-0.11
ACC1	0.08	-0.31*	-0.32*	1.00	0.21	-0.30*	-0.21	-0.30*	-0.30*	0.09	0.14
ACC2	0.29*	-0.41*	-0.40*	0.21	1.00	-0.13	0.19	-0.36*	-0.35*	0.21	0.08
ACC3	-0.10	0.54*	0.56*	-0.30*	-0.13	1.00	0.00	0.58*	0.58*	-0.20	-0.12
ACC4	-0.05	-0.14	-0.15	-0.21	0.19	0.00	1.00	-0.18	-0.19	-0.02	0.29*
SV70	-0.41*	0.98*	0.98*	-0.30*	-0.36*	0.58*	-0.18	1.00	0.99*	-0.43*	-0.11
SV87	-0.39*	0.98*	0.98*	-0.30*	-0.35*	0.58*	-0.19	0.99*	1.00	-0.32*	-0.13
ABSCH	0.20	-0.39*	-0.38*	0.09	0.21	-0.20	-0.02	-0.43	-0.32	1.00	-0.08
AGE	-0.09	-0.10	-0.11	0.14	0.08	-0.12	0.29*	-0.12	-0.13	-0.08	1.00

* denotes those correlations that are significant at 95% level of confidence.

Table 4.1
SUMMARY OF VARIABLES SELECTED FOR POPULATION CHANGE ANALYSIS,
1970-1987 IN NORTH CENTRAL KANSAS.

Variable	Symbol	Range	Mean	Standard Dev.
Miles to U.S.Highway	ACC1	0-25	6	6.5
Miles to city > 2500	ACC2	0-40	21	9.1
Site factor	ACC3	1-3	2	0.5
Miles to city > 25000	ACC4	14-130	71	25.5
Funct. status 1970	SV70	3-701	86	118.3
Funct. status 1987	SV87	0-660	78	111.5
Functional change	ABSCH	-60-24	-7	17.2
Population 1970	POP70	46-7221	746	1153.8
Population 1987	POP87	54-6779	707	1107.8
Mean age	AGE	31-59	43	33.5
Pop. change 1970-87	ABPCH	-463-300	-37	108.1

However, several of the variables do show significant associations with the dependent variable at a 95 percent level of confidence, specifically POP70, POP87, ACC2, SV70, and SV87. Population size in 1970 shows the strongest relationship with population change, with a (correlation coefficient -0.46). From this it seems evident that the absolute growth and decline in a place is somewhat determined by its size, larger places losing more people than smaller places, which is what would be expected since the change is measured in absolute terms.

The significant negative correlations between population change and the functional status, or service and retail provision in the settlements are worth noting. Service provision in 1970 has a correlation coefficient of -0.41 with population change 1970-1987, and 1987 service provision is similarly correlated with a coefficient of -0.39 when compared with population change. This seems to indicate that places with a high level of service provision are inclined to be growing less, or indeed declining more rapidly, than those places with a low level of service provision. This relationship may be such because the strong relationship between size of settlement and the number of services provided has not been controlled. However, this association between service provision and population change is significant, as it shows that the two

variables are related. Larger places have a higher
functional status and thus have more capacity to lose
service and retail establishments than do smaller places,
with a lower functional status.

The absolute service change 1970-1987 reveals a rather
weak, insignificant, positive correlation with population
change (correlation coefficient 0.20). This is surprising
considering that actual population size, and actual service
provision are so highly correlated. This would seem to
indicate that different processes are causing growth or
decline of services and growth or decline in population.
Settlements that are growing in population are not
necessarily those that are increasing in their service
provision, and vice verse. This is unexpected as it would
be assumed that as a population declines, for instance, so
the level of retail and service provision in that place
would decline.

The only accessibility index that showed a significant
correlation with population change is ACC2, the distance
from each settlement to the nearest city of 2,500 or more
population, although even this correlation is fairly weak
(correlation coefficient 0.29). However, this does show
that location relative to other places is influential in
determining population change of a settlement. The more
isolated a place is, i.e. the further away it is from a

larger place, the more inclined it is to be declining.

Because population change is measured in absolute terms, the actual size of a place influences the population change that occurs. It is therefore difficult to isolate exactly what is causing or influencing the population "change" more so than the actual size of the settlement, without using a multi-variate approach.

The variable AGE, the mean age of the settlement population, surprisingly showed a very low, insignificant correlation with the dependent variable (correlation coefficient -0.09). This seems to indicate that there is very little relationship between the average age of a population, and the size of that place, its rate of growth or decline, the services provided in that place, or its relative isolation or accessibility. This is contradictory to what was expected, and also disagrees with what has been found by other studies (e.g. Groop 1976).

CORRELATIONS AMONG INDEPENDENT VARIABLES.

From the correlation matrix shown in table 4.2 it is evident that other variables, apart from the dependent variable, reveal some significant associations that are worth noting, and may aid in the overall explanation of what is influencing population change in rural areas. The variables that maintain the strongest associations with the

other selected variables is population size. Population
size in 1970 is very highly correlated with the population
size in 1987 (correlation coefficient 0.99), thus
indicating that the size of a place in 1970 is a good
predictor of its relative size in 1987. The relative size
differences among the settlements hardly changed between
1970 and 1987 indicating that there has been little change
in the actual hierarchy of settlements in the region, the
smallest places in 1970, remaining the smallest places in
1987. Thus, the size of a place in 1970 would appear to be
most crucial in determining its size in 1987.

The service provision in a place is also strongly
related to the size of place, both in 1970 and in 1987.
This indicates a rather expected relationship that larger
places have higher service provision than smaller places,
showing that the service provision of a place is a direct
relationship to the population of that place. The fact that
service provision in 1970 is strongly correlated with
service provision in 1987 (correlation coefficient 0.99),
also indicates that there is some consistency in the
hierarchy of service provision in settlements through time
as there is with settlement size. This high correlation
also confirms the comparability of the two service data
sets used for 1970 and 1987, which was initially
questioned.

The accessibility of a place also appears to have a significant relationship with the size of place. The most highly correlated accessibility index with population size is that of the site factor (correlation coefficient 0.56 with 1987 population figure). This site factor is determined by the quality of road that the settlement lies on, a U.S. or State highway having a score of 3, a paved county road a score of 2, and an unpaved or gravel road a score of 1. It would appear from the correlation coefficient that in general, smaller places are located on poorer quality roads than are larger places. This is what generally would be expected, as it would be unusual to find a large place located on a gravel road, for instance. Indeed, it is interesting that the correlation coefficient is not any stronger than it is, but this could be because of the nature of this accessibility data, only having three categories.

The variable ACC2, distance to the nearest place of 2,500 or more shows the next strongest association with population size (correlation coefficient -0.40). This negative relationship shows that as distance from a place of 2,500 increases, then settlements population would be expected to decrease. Residents of isolated places have to travel further in order to obtain even basic goods and services, and this may be a factor limiting their growth,

and hence a reason why they have remained small.

The variable, ACC1 shows a weak, but significant association with population size (correlation coefficient -0.31), indicating an association between the size of the city and its relative accessibility to Highways. This reiterates the idea of isolation as being important in determining the size of a settlement, with smaller places tending to be located farther from major transportation arteries.

The least significant of the accessibility indexes is ACC4, distance to nearest place with a population of 25,000 or above. This reveals a insignificant relationship with the population size of a settlement (correlation coefficient -0.14), and also with population change (correlation coefficient -0.05). These findings seem to contradict what would have been expected, that smaller declining places are more inclined to be located far from major urban centers, i.e. in the more isolated places. This is assuming the a large urban center is a positive influence on a surrounding smaller settlement, which may in fact not be the case, as has been discussed earlier in chapter two. However, since the region as a whole is fairly isolated from the influence of large cities, this variable may not prove to be very important in determining individual differences between the settlements of North

Central Kansas.

From this discussion of the interrelationships, among the independent variables, it appears that accessibility may be more important than service status in explaining population change. The main question at hand, however, remains what relationship these independent variables have with the dependent variable, population change, while controlling for the influence of variable interrelationships. It is to this end that a multiple regression analysis is calculated.

MULTIPLE REGRESSION ANALYSIS.

The explanatory power of the independent variables together, rather than the relationship between the dependent variable and the independent variables each taken separately, is expressed in the multiple correlation coefficient (a measure of the goodness of fit of the least squares surface to the data). Using population change as the dependent variable, and the ten variables, listed in table 4.1 as independent variables, a stepwise multiple regression analysis is computed.

The regression equation that results from this analysis is as follows:

$$X_0 = -40 + (-0.158X_1) + (1.103X_2) + (-1.003X_3) + (0.237X_4) +$$
$$(0.067X_5) + (27.842X_6) + (-0.539X_7) + (-6.697X_8).$$

where X_0 is the dependent variable, population change 1970-1987 and,

X_1 = POP70

X_2 = SV87

X_3 = AGE

X_4 = ACC2

X_5 = ACC4

X_6 = ACC3

X_7 = ABSCH

X_8 = ACC1

the constant value = -40.

It should be noted that only eight of the ten independent variables were entered into the regression equation. The variables POP87 and SV70 were not entered into the equation due to the problem of high

Table 4.3
SUMMARY OF RESULTS OF STEPWISE MULTIPLE REGRESSION.

Step	Variable entered into regression	Multiple correlation with population change	
		R	R^2
1	POP70	0.458	0.209
2	SV87	0.540	0.292
3	AGE		
4	ACC2		
5	ACC4		
6	ACC3		
7	ABSCH		
8	ACC1	0.600	0.360

autocorrelation of these variables. POP87 explains
basically the same as POP70, and SV70 explains the same as
SV87, and for this reason they are not considered in the
actual regression analysis.

A summary of the results of the regression is shown in
table 4.3. The first row of the table shows the variable
(POP70) that correlates most highly with the dependent
variable, population change. The correlation coefficient
appears in column 3 (0.458) and the coefficient of
determination in column 4 (0.209). The second row of the
table gives the results of adding a second variable to the
regression, with a cummulative effect on the R and R^2 . The
variable in row 2 (SV87) explains more of the remaining
variation in population change than any of the other
variables. The same procedure is repeated throughout all
the steps, however only a significant change in the
dependent variable resulted from three variables. The other
five variables resulted in such minimal change in the
dependent variable that the changes in the R^2 values were
not noted.

The final row of the table indicates that when all of
the independent variables are considered, a correlation
coefficient of 0.600 is obtained, and the coefficient of
determination, the R^2 value, equals 0.360. This means that
36 percent of the variation in the dependent variable,

population change, can be attributed to variation in the selected independent variables.

Thus, as predictors of population change in the settlements of North Central Kansas, the selected variables used in the regression analysis appear to be weak. Being able to explain only 36 percent of the variation in the dependent variable means that there still remains 64 percent of the population change unexplained. However, population change is a very complex variable, and even to be able to explain 36 percent of its variation is worth noting.

BETA WEIGHT ANALYSIS.

A measure of each variables independent direct effect upon population change can be obtained by controlling for the effect of the remaining variables, and isolating that variables relationship with the dependent variable. Beta coefficients represent the amount of standardized change in the dependent variable that can be associated with a change of one standard deviation in one of the independent variables. The formula for calculating the Beta co-oefficients is as follows:

$$B_i = \frac{b_i \cdot S_{x_i}}{S_y}$$

Each regression coefficient (b_i) is standardized by multiplying it by its standard deviation (S_{xi}) and dividing by the standard deviation of the dependent variable (S_y) and thus producing comparable Beta weights. This allows one to compare the relative influence of each of the independent variables on the dependent variable while controlling for the effects of all the other independent variables. Table 4.4 shows the beta weights associated with each of the independent variables.

From these Beta weights, it is evident that the variables POP70 (Beta weight -1.642) and SV (Beta weight -1.111), explain the most variance in the dependent variable. This confirms the conclusions deduced from the correlation matrix, that the size of the settlement and its functional status are associated.

The variable ABSCH also revealed a relatively strong independent influence on population change, with a Beta weight of -0.84. This shows that the absolute change in the service and retail provision of a settlement is important in explaining the population change of a settlement. This relationship did not show up in previous analysis when the effect of the other variables was not controlled for.

Table 4.4
VARIABLE BETA WEIGHTS

Variable	Beta weight
POP70	-1.642
SV87	-1.111
AGE	-0.052
ACC2	0.019
ACC4	0.001
ACC3	0.127
ABSCH	-0.840
ACC1	-0.408

The variable that is next most effective in explaining variance in the dependent variable, is ACC1, which is distance to nearest U.S. Highway from each settlement. While not as important as the first three variables noted, this variable does explain considerably more of the dependent variable than the remainder of the independent variables. However, the sign of the Beta weight suggests that less accessibility to large cities supports a greater opportunity for growth which is contrary to what has been previously been suggested.

ANALYSIS OF RESIDUALS.

Residuals from the regression equation are assigned to each observation indicating how closely the dependent variable was predicted in each case, by the selected independent variables. The values are standardized scores with a mean of zero and a standard deviation of one. The further the residual is from zero, the more under or over predicted is that particular observation. Mapping of residuals can provide clues to the unexplained variance in the dependent variable. Figure 4.1 is a map showing the settlements used in this study as residual values derived from the multiple regression analysis discussed above.

The ten observations with the highest or lowest

73

Figure 4.1

Extreme Residuals Mapped.

top five most over
predicted places

top five most under
predicted places

other settlements

MILES

5 0 5 10
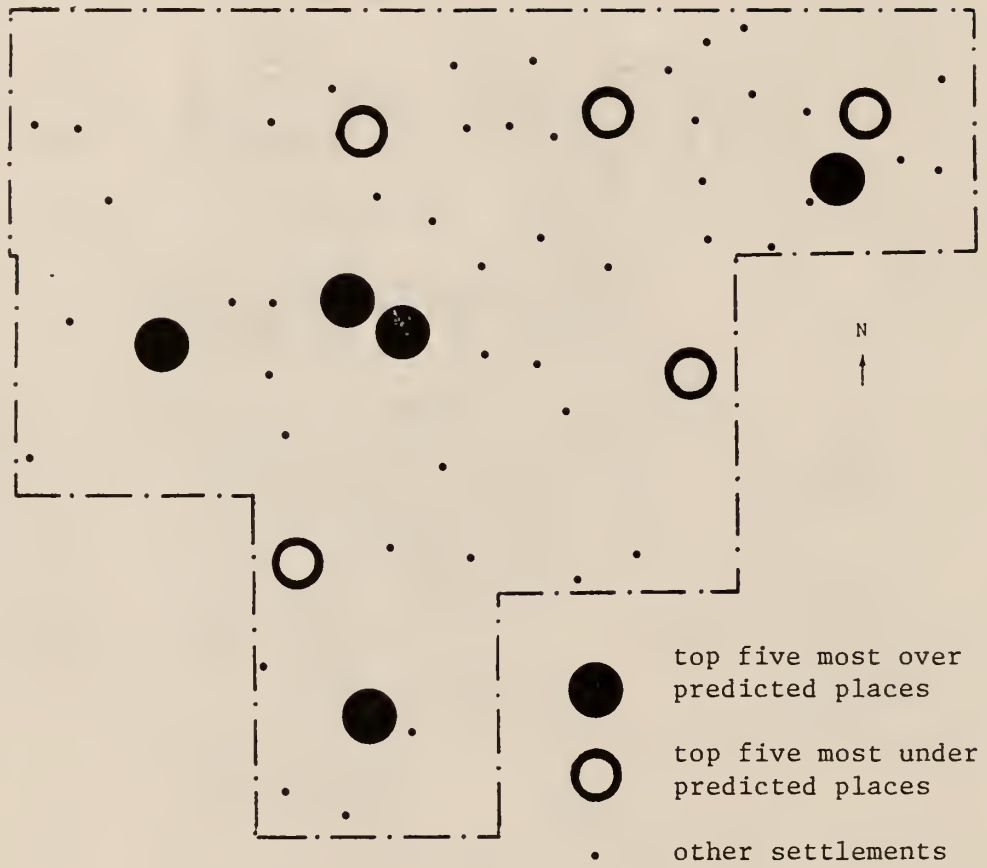
residual values are noted. These are demarcated marked on figure 4.1. In the north of the study area, Mankato, Belleville, and Washington show severe under prediction, i.e. more growth or less decline than expected. These three cities all lie on U.S. Highway 36 and this may be one reason why they are loosing population less rapidly than the other indicators would tend to show.

On the other hand, Beloit, Glen Elder, and Osborne are severely over predicted, and these three cities all lie on U.S. Highway 24. These cities show less population growth, or more decline, than would be expected given the rest of the variables. According to the Traffic Flow Map prepared by the Kansas Department of Transportation, U.S. Highway 24 does have less traffic flow than U.S. Highway 36, and this may account for some of the difference in influence of the state highways on the population change in these settlements. One other thing that does set these over predicted cities apart is that they are all located close to Waconda Lake, which draws some tourism and may, for instance, increase the service provision of these places above what could normally be supported by the resident population. However, there does not appear to be any consistent explanation for the pattern of residuals shown. Individual city's over or under prediction is probably more in response to some stochastic variables peculiar to that

place and thus not allowing any concrete conclusions to be drawn from these patterns of residuals.

SUMMARY OF RESULTS.

In summary, the regression analysis provided some insight into the relative significance of ten selected independent variables in explaining change in population between 1970 and 1987 in North Central Kansas. Together, the selected variables could explain 36 percent of the variation in the dependent variable, population change 1970 -1987. Thus, the explanatory power of the selected variables is somewhat lacking, as it leaves almost two thirds of the variation in the dependent variable unexplained. However, population change is a very complex, and interrelated variable, and the 36 percent explanation that has been achieved is still worth considering and discussing.

The size of the settlement appears to account for the most significant proportion of the variation in the dependent variable. The service provision within a place proved to be important also, in determining population change. The absolute change in the service provision of a settlement also appeared to be associated with the level of population change in that place, and the accessibility of settlements proved to be important also in accounting for

some of the population change in the region. The more
isolated a place is from a major transportation artery, or
from a larger place of 2,500 or more, then the smaller that
place tended to be. The inter-correlations between the
independent variables revealed some interesting results,
the most significant being the importance of the size of
settlement in its influence on the other variables.

The following chapter will discuss these results in
more detail, and note any conclusions that can be drawn
from this study. Consideration will also be given to the
general issue of the possible future of rural settlements,
and how this present study may aid in the understanding of
rural settlement dynamics in general.

Chapter Five

CONCLUSIONS

This study has examined population change in the rural settlements of North Central Kansas. Taking an historical perspective of the region from 1890 until 1987, it was found that all settlements grew rapidly to their peak in the late 19th and early 20th Century. Since then, settlements have tended to decline, with the exception of the decade 1970 to 1980, when a "rural renaissance" was evident. However, from the population figures available for the 1980's, it appears that this renaissance was short lived, and the general trend in the region is now again one of decline.

Factors influencing these population trends in the region between 1970 to 1987 were examined to isolate and analyze the influence of selected variables on population change. Ten independent variables were selected, dealing with the accessibility of a place, its service and retail provision, and its population characteristics. The relative importance of the variables in explaining population change between 1970 and 1987 was tested using Pearson product moment correlations and multiple regression

analysis.

The analysis revealed that the actual size of a
settlement is the most influential variable in determining
its absolute population growth or decline, and closely
related to population size is the functional status of that
place. The accessibility of a place was also found to be
influential in explaining population growth or decline, but
less so than the above mentioned groups of variables.
However, the actual size of a place is obviously inherently
related to the amount of population loss or gain in a place
and thus somewhat confounds this result. After controlling
for size, actual change in service and retail provision,
and the distance to nearest place with a population of
2,500 or greater, appeared to be significant in explaining
the population change that occurred. The average age of a
population appeared to be of no significance in explaining
population change.

It was anticipated that all of the selected variables
would significantly influence population change, and thus
it is interesting that this was not in fact the case, with
only a few of the variables displaying a significant
influence on the dependent variable.

From the multiple regression analysis, the ten
selected independent variables achieved 36 percent
explanation for the population change that occurred in

79

North Central Kansas between 1970 and 1987. This implies
that a further 64 percent of the change in population that
occurred during that time period, remains unexplained.
However, it can be concluded that these ten selected
variables are of some influence in determining population
change, and hence should not to be overlooked.

POPULATION CHANGE IN GENERAL.

The issue of population change is indeed a complex
one. Although settlements are each independent units, they
are also inextricably linked to their surrounding
hinterland and also to the overall system of settlements.
Rural settlements often respond more to local or specific
circumstances than they do to overall generalized
variables, and it is very difficult to pin point individual
local issues and circumstances that may result in
population change in a particular settlement. As Dotzauer
(1980) has noted, a researcher cannot hope to explain all
of the "erratic fluctuations" of population change, such as
those that Hart and Salisbury (1965) mention. Such
fluctuations of populations are responsive to uncontrolable
and immeasurable components of rural settlements that vary
from one place to another.

Rural settlements may also be considered to be
responsive to their rural hinterland and the rural economy

in general, and thus the internal dynamics of a place may be an expression of processes that are at work at large. For example Brozowski et al. (1973) concluded that regional influences were the most important indices associated with population change in small villages, more so than internal characteristics. This notion was upheld by the present study, in so far as the relative ranking of size of place is consistent through time. Undoubtedly, the changing economic situations and particular environments surrounding the settlements will cause variables to fluctuate in importance from place to place. Most small, rural settlements have a very limited economic base in terms of size and diversity, and thus will tend to reflect changing economic conditions more rapidly than larger towns or cities. Indeed, they are much more vulnerable to change than are larger places which have a stronger economic base. The failure of even one business in a small town, may be the trigger for decline in both services and population of that place, while, on the other hand, the success of one particular business or enterprise, may be enough to keep up the momentum of the place and maintain the towns buoyancy. Hart (1986) has stated that the survival of rural settlements depends greatly on achieving small scale manufacturing activity in the place, relating this to individual entrepreneurship within that settlement.

One issue that has not been mentioned as yet, is that of ethnicity. Homogeneity of ethnic heritage may be one element is important in a towns survival or demise. Community spirit and community activity has been noted by Johansen and Fuguitt (1984) as being important to rural life. A strong bond among community members may encourage and stimulate growth, or at least reduce the rate of decline in a place, more so than in a settlement where the residents have no special bonding. This variable was not tested as part of the analysis as it is very difficult to quantify, and is perhaps more in the field of the rural sociologist or psychologist, than the geographer, but nevertheless is an interesting issue to consider.

Hart and Salisbury (1965) have concluded that the phenomena of population change in small towns is too complex to accept one or even several variables as "final" as an explanation for observed trends of population change, and this conclusion could definitely be reiterated by this present study. There are many stochastic elements to population change that make it impossible to accept any particular explanation or explanations for its occurrence, and it must be looked at within its local and regional context.

In conclusion, therefore, it can be stated that we have gained some understanding as to what processes are

causing and influencing population change in rural areas from this study, but it has been underscored that complete explanation is impossible when dealing with such a variable as population change. However, the question still begs as to what is the future of rural settlements ?

THE FUTURE OF RURAL SETTLEMENTS...?

It is clear that rural settlements can no longer be referred to as the "capitals" of rural America, as Brunner (1936) and his associates termed them. Johansen and Fuguitt (1984) believe that rural settlements shall continue to exist as differentiated units of settlement, autonomous to a degree, but increasingly integrated with the rest of society. They are expected to continue in about the same numbers, and retain a certain degree of functional differentiation, but are becoming increasingly tied to trends of other nearby units of settlements.

Thus, in thinking about the future of rural settlements, the issue must be considered within the context of possible future societal transitions, which are very difficult to predict. The village has proven to be a resilient form of settlement in the United States throughout time. Their resurgence and growth during the 1970's indicates that rural settlements still do maintain a very viable position in the hierarchy of settlements.

However, the downturn and return to decline that is revealed from preliminary evidence of the 1980's, seems to paint a more gloomy picture of their potential future. It is argued, however, that rural settlements are by no means an obsolete or anachronistic form of settlement at the present time, or for the near future.

From the present study, it is apparent that the rural settlement structure, in North Central Kansas at least, is remaining quite stable, and despite trends of stagnation and decline, the overall pattern is one of stability. Those places that were the smallest in 1970 remained the smallest in 1987, no particular group or order of settlements has declined at exceptionally rapid rates, as have no particular group of settlements grown more rapidly than the rest of the region. This stability is also expressed in the level of service and retail provision that is present in the settlements of the region, which has also remained stable through time.

From this study it may be concluded that rural settlements are not threatened in the immediate future, with perhaps only the very smallest places dying out. The more distant future depends much upon society and the economy at large, and the transitions that occur there will be reflected in the role and function of rural settlements as they respond to these external dynamics.

CRITIQUE OF THE METHODOLOGICAL PROCEDURES.

While the methodology used in this study provided interesting results, there are several areas where possible improvements could be made. Firstly is the issue of using a non census year as an end point for the study. While the data that was used is deemed to be fairly accurate, more reliable results may have been achieved by using census years alone. However, due to time framework of the present study, and the desire to analyze the population trends of the 1980's, the non census year population data was used.

Secondly, not all the data used is normally distributed. This is true particularly for the population data. Some form of data transformations may have provided more satisfactory results, and increased the R^2 value. However, the relative importance of each of the independent variables would remain the same, and thus even without data transformations the significance of the selected variables can be considered.

Another problem was the lack of complete information on the service and retail provision in some of the towns in the region, and for this reason some places were omitted from the study making the sample of settlements in the region less than complete. The study region itself is rather small with only 56 settlements used in the analysis.

Perhaps more meaningful results would have been achieved if the study region had been larger, perhaps even the whole of the State used. The conclusions and generalizations that can be drawn from the present study only really apply to North Central Kansas, which in many ways is a pretty homogeneous region.

FURTHER RESEARCH.

Still, very much more work needs to be done on rural settlements in order to understand their dynamics, and to enable wise planning decisions and policies to be made. If smaller rural places are deemed to die, then to attempt to stimulate growth in such a place would perhaps be a misallocation of resources. As Daniels and Lapping (1987) point out, small stagnant and dying towns seeking to revitalize themselves must struggle against a vicious circle. They do not have enough people to attract new retail and service establishments, nor having enough financial capacity or backing to construct the necessary infrastructure to attract potential manufacturing activity. The difficult policy question that therefore arises is "which towns should be helped, and how ?".

Concentration of effort in a few settlements that maintain more prospect of survival, may achieve longer lasting and better results. Key settlements is a policy

that has been implemented in rural areas of Britain, with a fair degree of success, and this may be a possible planning approach to deal with the problem of rural decline in the American Mid-West. However, in Britain the density of settlements is relatively high, and thus rural residents do not have very long distances to travel in order to obtain necessary services. In the Midwest though, the density of rural settlements is much lower, and a regional center or "key" settlement may be too distant from the smaller places to adequately serve their needs. However, this growth center policy may be the only way to maintain the viability of rural settlements.

It is essential that regional and local planners and officials know the general population dynamics of rural areas in order to plan efficiently, for instance whether to build a bigger school, or close the small local hospital, etc. There are indeed many policy issues that affect rural settlements, and this necessitates the need to continue in a search for explanation and understanding of rural settlement dynamics.

This study has sought to achieve a deeper understanding of the factors influencing population change in a specific rural area, although it is hoped that the results will provide an insight into the issue of rural survival in general. Future research, using larger study

areas, a wider set of variable, and more powerful statistical analysis, will prove beneficial to this long term issue of the survival or demise of settlements in rural areas for the future.

Appendix 1

Summary of Data Used in Study.

CITY		POP70	POP87	ACC1	ACC2	ACC3	ACC4	SV70	SV87	ABPCH	ABSCH	AGE
AGENDA	I	107	101	9.0	18	2	77	18	6	- 6	-12	52
ALTON	I	214	117	0.0	40	2	118	20	19	-97	- 1	55
ATHOL	I	108	87	0.0	22	2	126	9	16	-21	7	38
BARNARD	I	190	168	21.0	23	2	46	38	27	-22	-11	45
BARNES	I	209	204	7.0	21	2	50	24	27	- 5	3	38
BELLEV.	I	3063	2600	0.0	0	3	70	333	309	-463	-24	46
BELOIT	I	4121	4221	0.0	0	3	65	407	389	100	-18	39
BENNINGT.	I	516	582	4.0	18	3	14	69	89	66	20	37
BEVERLY	I	193	146	11.0	30	2	30	19	24	-47	5	44
BURR OAK	I	426	342	6.0	36	2	105	33	20	-84	-13	41
CAWKER C.	I	726	642	0.0	21	3	86	74	72	-84	-2	36
CLIFTON	I	718	642	13.0	21	2	61	96	75	-76	-21	43
CLYDE	I	946	905	15.0	15	3	66	101	89	-41	-12	45
CONCORD.	I	7221	6779	0.0	0	3	52	701	660	-442	-41	40
COURTLAND	I	403	373	1.0	15	2	78	53	46	-30	-7	46
CUBA	I	290	267	0.0	10	2	89	28	19	-23	-9	45
CULVER	I	148	137	6.0	17	2	17	10	4	-11	-6	26
DELPHOS	I	599	554	5.0	25	2	36	68	41	-45	-27	47
DOWNS	I	1268	1278	0.0	27	3	92	121	131	19	10	44
ELLSWTH.	I	2080	2380	0.0	28	3	37	298	238	300	-15	42
ESBON	I	206	190	2.0	40	2	105	34	19	16	-15	42
FORMOSO	I	180	166	1.0	14	1	84	15	8	-14	-7	45
GAYLORD	I	211	198	3.0	31	2	115	39	34	-13	-5	42
GLASCO	I	767	661	0.0	18	2	50	111	87	-106	24	44
GLENELD.	I	422	514	0.0	10	2	75	56	47	92	-9	45
GREENLF.	I	448	410	6.0	25	2	58	86	70	-38	-16	47
HADDAM	I	289	220	3.0	22	2	83	26	16	-69	-10	45
HANOVER	I	793	728	4.0	16	2	64	88	98	-65	10	41
HOLYROOD	I	593	638	0.0	27	2	50	78	69	45	-9	43
HUNTER	I	150	129	25.0	29	2	66	24	24	-21	0	51
JAMESTOWN	I	470	388	12.0	12	2	65	45	35	-82	-10	49
JEWELL	I	569	598	8.0	16	3	81	41	54	29	-13	44
KANAPOLIS	I	626	653	3.0	26	2	34	52	50	27	-2	34
KENSINGTN	I	653	627	0.0	17	3	130	66	38	-26	-28	43
LINCOLN	I	1582	1417	18.0	31	2	43	194	176	-168	-18	46
LINN	I	388	469	11.0	22	2	63	49	66	81	17	48
LORRAINE	I	153	172	18.0	20	2	50	78	18	19	-60	37
MAHASKA	I	122	110	14.0	25	2	93	9	8	-12	-1	59
MANKATO	I	1287	1107	0.0	25	3	91	162	165	-180	3	42
MILTNVL.	I	718	533	1.0	18	2	51	75	83	-185	8	42

Appendix 1 continued.

MORRWVL.	201	198	2.0	25	2	75	15	19	-3	4	43
MUNDEN	123	164	5.0	12	2	81	17	25	41	8	38
NARKA	130	142	12.0	21	2	89	6	7	12	1	59
NATOMA	603	520	11.0	26	3	93	73	53	-83	20	42
OSBORNE	1980	2005	0.0	36	3	105	226	190	25	-36	45
PALMER	166	135	14.0	21	2	58	20	26	-31	6	43
RANDALL	195	127	10.0	20	2	76	15	13	-65	-2	47
REPUBLIC	243	181	12.0	19	1	90	27	16	-62	-11	40
SCANDIA	567	413	0.0	8	2	80	54	28	-154	-26	48
SCOTTSVL.	46	54	12.0	12	2	65	3	0	8	-3	36
SIMPSON	131	108	2.0	14	2	57	21	8	-23	-13	48
SYLVAN G.	403	350	11.0	39	2	57	54	78	-53	24	41
TIPTON	315	301	14.0	29	2	77	58	75	-14	17	31
WASHINGT.	1584	15458	0.0	23	3	67	213	156	-126	-57	45
WEBBER	49	54	13.0	33	2	95	10	7	5	-3	44
WILSON	870	896	2.0	24	3	49	176	164	26	-12	39

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FACTORS INFLUENCING POPULATION CHANGE IN
RURAL SETTLEMENTS OF NORTH CENTRAL KANSAS

by

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ABSTRACT

    This study analyzes population change in 56
incorporated places of North Central Kansas. Population
change is examined from 1890 to 1987 to determine the
general trends within the ten county region. The period
1970 to 1987 is focused on in more detail to identify the
factors responsible for population change. Ten factors are
identified as independent variables: (i) population size in
1970, (ii) population size in 1987, (iii) distance to a
U.S. Highway, (iv) distance to nearest city with a
population of 2,500 or above, (v) distance to nearest city
with population of 25,000 or above, (vi) quality of road
that the settlement lies upon, (vii) service and retail
provision in 1970, (viii) service and retail provision in
1987, (ix) change in service and retail provision, and (x)
the mean age of the settlements population. The dependent
variable in the analysis is absolute population change
between 1970 and 1987. The relative influence of each of
the independent variables on absolute population change is
tested using correlation and step-wise multiple regression
analysis.

    The independent variables explain 36 percent of the
variance in population change. Size of place appeared to be
the most important variable in explaining population
change. The accessibility indices also help explain some

population change, particularly distance to a settlement with population of 2,500 or above and distance to the nearest U.S. Highway. A relationship between the change in service and retail provision between 1970 and 1987 and population change over the same period also proved significant based on an analysis of the Beta weights. However, the population change within the region shows an overall uniformity from 1970 to 1987, as does the service and retail provision of the settlements, suggesting that factors of change at the macro scale may be as important as those at the micro scale. It is concluded that no one set of variables can fully explain all the population change that occurs in a region.