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ABSTRACT

Analysis of census data indicates major population, industrial, and occupational changes occurred in many of Texas' 254 counties from 1960 to 1980. While 103 counties experienced rapid population growth by both natural and migration, patterns of change were dissimilar. Population grew steadily in metropolitan counties over the two decades. Counties contiguous to metropolitan areas generally experienced consistent growth, while others grew primarily in the 1970's, or continued to lose population, thus supporting the "population turn-around." Absolute numbers of employed workers increased for metropolitan and decreased for urban- and rural-nonmetropolitan counties from 1960-1970, but from 1970-1980, increases were observed for all three county types (53.5%, 51.0%, and 38.8%, respectively.) Over the period, decreases in employment occurred for operative and farmer/farm worker occupations, while professional/technical/kindred, manager/administrator, and sales and clerical occupational employment increased. Farmer/farm workers decreased 54.1% in metropolitan counties, 64.2% in urban-nonmetropolitan counties, and 57% in rural-nonmetropolitan counties. The largest increase in occupational structure was for the sales category, up 35.1% in metropolitan counties, 61.2% in urban-nonmetropolitan counties, and 93.6% in rural-nonmetropolitan counties. These changes suggest the gradual evolution from agrarian dependent to multi-dimensional occupation structures associated with increased industrial diversification. A short list of references concludes the report. (NEC)

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AN ANALYSIS OF INDUSTRIAL AND OCCUPATIONAL STRUCTURE OF NON-METROPOLITAN COUNTIES IN TEXAS, 1960-1980

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AN ANALYSIS OF INDUSTRIAL AND OCCUPATIONAL STRUCTURE OF NON-METROPOLITAN COUNTIES IN TEXAS, 1960-1980

In recent years, demographers and others have given much attention to two major trends involving the redistribution of population in the U.S. The first of these trends has been the interregional migration that has occurred from popularly termed "frost-belt" states in the north and northeast to "sun-belt" states in the south and southwest (Rones, 1980; and Naisbitt, 1982). The second trend has been the gradual migration turnaround (Morrison, 1976; Fuguitt and Beale, 1976; Berry and Dahmann, 1977; Zuiches and Brown, 1978; Shin, 1979; Fitzsimmons et al., 1980; and Wardwell, 1982) and its associated growth in rural and nonmetropolitan areas (Summers et al., 1976; Lonsdale and Seyler, 1979; Summers and Selvik, 1979; Schwarzweller, 1979; and Dillman and Hobbs, 1982)[1]

One of the states that has benefited most from such trends is Texas, which has experienced a 48.5 percent population increase snce 1960. Almost 35 percent of this increase was attributed to immigration during the past two decades (Bowles et al., 1975).[2] One might expect that such trends in population increase and redistribution would be associated in some manner with changes in the human ecological system of various geographic and demographic divisions in Texas.

While some research has been conducted on intradecade migration patterns and socioeconomic characteristics of persons migrating to and within Texas (Murdock, 1978), little information has been reported about the corresponding changes and structural redistribution of the Texas labor force in particular types of counties.

The purpose of this paper is to examine industrial and occupational

changes that have accompanied population growth in the State. Specifically:

(1) to review and abstract the results of an earlier, research effort regarding population and industrial and occupational structural change in Texas, and

(2) to extend results of the statewide study through correlation analysis, focusing on changes in nonmetropolitan counties of Texas.

Important to our understanding of population and employment changes is a comparison of their contexts. In our examination, we use definitions from the 1960 U.S. Census to identify three types of counties--metropolitan, urban-nonmetropolitan, and rural-nonmetropolitan--that provide the context for change. Generally, a metropolitan county is defined as any county which has or is contiguous to a county having at least one city of 50,000 or more residents. Thus, metropolitan counties were those counties located in the 1960 standard metropolitan statistical areas of Texas. An urban-nonmetropolitan county has at least one city with a population of more than 2,500 but less than 50,000. Finally, a rural-nonmetropolitan county is one which has no town with 2,500 or more population. The importance of examining changes in industrial and occupational structures and their contexts has been demonstrated in recent literature regarding human ecological theory and research (Hawley, 1968; Frisbie and Poston, 1975; Sly and Tayman, 1977; Poindexter and Clifford, 1983).

Data and Procedures

Data utilized in the analysis was comprised of population, net

migration rates and employment by industries and occupation. Population and employment data for the years 1960, 1970 and 1980 were obtained from the U.S. Bureau of Census and inter-decade migration rates for 1960-1970 and 1970-1980 were obtained from Bowles and Hwang, respectively. It should be noted that major changes in Census Bureau classifications of ocupations occurred in 1980. To adjust for these changes in classification, employment in the 1980 occupational groupings were traced backward to the 1960 classifications utilizing detailed standard industrial classification codes. While this accounted for the majority of differences between 1960 and 1980, some minor discrepancies may still exist.

Each of the 254 Texas counties was grouped according to size as metropolitan, urban-nonmetropolitan or rural-nonmetropolitan and the migration rate and industrial and occupational employment for each county was assigned. Unlike previous studies, which used multiple indicators of primarily industrial sustenance organization, we used the single indicator percent employed to identify industrial and occupational sustenance organizations. Research has consistently demonstrated level of employment to be among the most significant variables in factor analyses of organizational components (Frisbie and Poston, 1976; Poindexter and Clifford, 1983). We improved the specificity of the industrial organization indicator by adding the categories of business-related services, public administration, education and health (Singelman and Browning, 198; Tienda and Englert, 1982). In addition to six industrial groups we also examined nine occupational groups identified by the U.S. Census Bureau: professional and technical; managerial and administrative;

sales; clerical; services; crafts; operative; farmer and farm worker; and general labor.

Industrial and Occupational Sustenance Organization

Change in industrial and occupational sustenance organizations was measured primarily from 1960 to 1980 for the three types of counties; metropolitan, nonmetropolitan, and rural-nonmetropolitan counties. We selected 1960 as the base year and designated counties for the twenty year period. By standardizing county status to 1960, we made the status year and base year for calculating changes in industrial and occupational employment coincide. Change for each industry and occupation sector was calculated in several ways. "Employment change" was the percentage difference between levels of 1960 and 1980 employment. The "percent point change" was calculated next by taking the difference between the percents employed in 1960 and 1980 for a given industry (occupation). This was followed by dividing each "percent point change" by its corresponding 1960 employment percentage. This measured "percent structural change." By comparing percents of structural changes, we were able to show how one industry (occupation) changed relative to the others in terms of total employment increase or decrease during the twenty year period.

Measurement of Sustenance Differentiation

The concept of sustenance differentiation has two components. "Structural differentiation" is the number and types of industries (occupations) in a county. "Distributive differentiation" is the distribution of the employed population among the categories of industries (occupations). Minimum structural differentiation occurs when

there is a single source of industrial employment in a county, such as the case in counties which are extremely dependent on agriculture. Maximum distributive differentiation occurs when equal numbers of a county's working population are employed in its industries (occupations).

Sustenance differentiation values were calculated for the industrial and occupational orgainization of each county in the three censal years. While many such measures exist (Clemente, 1972; and Frisbie and Poston, 1978), we used the formula:

$$SD = 1 - [\Sigma X^2/(\Sigma X)^2]$$

where X was the number of individuals employed in any one industry (occupation). This SD measure reflected both structural and distributive differentiation while all but one of the other measures did not (Gibbs and Poston, 1975). Also, it was interpretable. A minimum value of zero indicated little distribution and few categories. Maximum values depended upon the number of industries (occupations) in a county (Poston, 1980; Gibbs and Poston, 1975; and Clemente, 1972). The possible maximum values were .923 for industrial differentiation and .889 for occupational diffentiation for any given year.[3] Counties with no employment in some industries (occupations) had fewer categories resulting in lower possible maximum values. Comparisons of the SD values were conducted to determine levels of variation and homogeneity.

Pearson Product-Movement Correlations

Finally industrial and occupational sustenance differentiation were correlated with size of population for each decade and percentage net migration rates between decades. According to human ecological theory,

when changes occur in the way a population has organized itself, the population must change its size. "Migration is the principal agent for effecting this change in population size; it may be viewed a demographic response to the population size and organization (Poston, 1980: 421). As the level of sustenance differentiation in a population increases, more employment opportunities are created, which stimulates an increase in size of population through an increase in net migration. Consequently, in the correlation analysis, a positive relationship is hypothesized between the meansures of sustenance of differentiation and net migration. This is of particular interest in rural nonmetropolitan counties. For example, during the 1960's there were limited employment opportunities in many rural counties. Population decline was experienced subsequently with an out-migration of population. In the "turnaround decade," employment opportunities increased in many rural counties. This led in turn to increases in population from 1970 to 1980.

Previous Research

As mentioned earlier, one objective of this paper is to review and abstract a 1983 study by Thomas and Goodwin. The following sections represent a summary of their findings.

Changes in Population

Population Growth was pervasive in Texas counties. Metropolitan counties experienced the largest percentage of growth with 57 percent during the twenty year period. Urban-nonmetropolitan and rural-nonmetropolitan counties had 35 and 25 percent growth, respectively. Significant changes in size of population were attributed in part to

changes in net migration.[4] From 1960 to 1970, metropolitan counties had an increase in population due to in-migration; both urban- and rural-nonmetropolitan counties decreased according to their average number of net migrants and their migration rates. From 1970 to 1980, population growth greatly increased with significant turnarounds in migration. Rural-nonmetropolitan counties had the highest average rate of 13.1, followed by metropolitan counties with 12.5 and urban-nonmetropolitan counties with 10.0 per 100 people.

Overall, 103 counties increased their populations in both decades. Metropolitan counties were much more likely to have experienced continuous growth than other counties. Among urban-nonmetropolitan counties, 38 percent had increased their size of population, while 12 percent continued to decline from 1960 levels. Rural non-metropolitan counties displayed similar patterns. According to these data, then, the touted population turnaround occurred in 54 rather than 100 of all 225 nonmetropolitan counties when 1960 was used as the base year for comparison.

Changes in the Structure of Industrial Organization

An important measure of sustenance organization is the industrial distribution of the employed labor force within a county's economy. Most dramatic of changes during the period 1960-1980 were decreases in extractive (primarily in agriculture) and personal service industries and increases in market and public services. During the 20-year period, employment distribution in extractive industries declined from 12.4 to 6.3 percent, while personal services employment declined from 8.9 to 4.1 percent.

Absolute numbers of employed workers increased for metropolitan and decreased for urban- and rural-nonmetropolitan counties in the period 1960-1970, corresponding directly with the proportional changes in work force. However, for the period 1970-1980, substantial increases in absolute work force were observed for all three county types (53.5, 51.0 and 38.8 percent, respectively).

Metropolitan Counties. Generally, metropolitan counties established the trends for Texas. Employment in extractive industries decreased by 29.6 percent from 1960 to 1980. Personal services employment decreased 54.3 percent over the same period. Market services employment increased 9.5 percent with the largest changes in the sub-categories business/repair services and finance/insurance real estate. Professional services employment increased by 27.8 percent with substantial increases in education and health care employment.

Urban-Nonmetropolitan Counties. Employment decreased both absolutely and relatively for the extractive and personal services sectors from 1960 to 1980. Industrial structure changes indicate a 51.8 percent decline for extractive industries and a 54.0 percent decline for personal services.

Industries experiencing increasing shares in the industrial structure were production, market services, and professional services. Professional services experienced an increase of 56.8 percent, being influenced primarily by a 220 percent increse in health services. Business/repair services and finance/insurance/real estate increased 66.6 and 70.8 percent, respectively. The increase in production was due largely to the 33.8 percent change in total manufacturing employment, in contrast to a 5.6 percent decline in this same category for metropolitan counties. This

provides some support for the general trend of industrial relocation to nonmetropolitan areas (Summers and Selvik, 1979, and Summers, et al., 1976).

Rural-Nonmetropolitan Counties. As was the case for metropolitan and urban-nonmetropolitan counties, employment in extractive and personal services industries decreased and employment in production, market and professional services increased during the period. Employment in the extractive and personal services industries declined by 48.3 and 48.7 percent, respectively, with most of the decline in agricultural employment. These two sectors accounted for 42.8 percent of the employed labor force in 1960 and only 22.1 percent in 1980.

Within the production sector, total manufacturing and construction increased 57.8 and 36.1 percent, respectively. Finance/insurance/real estate made up the majority of the change in market services, increasing 127.8 percent. In 1960, 1.1 percent of the total employed labor force was involved in health service; by 1980, it had increased to 4.2 percent.

Changes in the Occupational Distribution of Employed Labor

The second measure of sustenance organization presented in this paper is the occupational distribution of the employed labor force. Distribution of the nine occupational groups follows closely the pattern of industrial distribution over the 20-year period, with decreases in operative and farmer/farm worker occupations and increases in the professional/technical/kindred, manager/administrator , sales and clerical occupations.

Metropolitan Counties. Major decreases were experienced in the operative (26.4%), labor (16.3%), farmer/farm worker (54.1%) and services

(14.0%) occupations during the study period. The seemingly large structural decline in farmers/farm workers of 54.1 percent should not be considered as significant since the base employment in 1960 made up only 2.4 percent of the employed work force.

Occupations experiencing substantial increases in their share of the employed labor force were clerical, professional/technical/kindred and sales. The largest single increase in occupational structure was for the sales category, up 35.1 percent. Professional/technical/kindred occupations and clerical occupations increased by 21.2 percent and 10.6 percent, respectively.

Urban Nonmetropolitan Counties. Decreases were experienced in the operative, labor, and farmer/farm worker occupations and increases were found in the sales, crafts, clerical and professional/technical/kindred occupations. Noteworthy of the occupational decreases was the 64.2 percent decline among farmers and farm workers. In 1960, almost 18 percent of the total work force was directly involved in farming, compared to only 6.4 percent in 1980. Operative and laborer occupations experienced absolute increases in total workers but declined in their structural share, due largely to the 64 percent increase in total urban-nonmetropolitan work force and major increases in other occupational groups.

The greatest increase in occupational employment structure was seen in the sales category, 61.2 percent. Clerical occupations increased by 47.8 percent, professional/technical/kindred by 40.0 percent, and the crafts-related occupations by a 30.7 percent increase.

Rural-Nonmetropolitan Counties

The occupational distribution of the employed labor force indicates trends in occupational structure much like those in urban-nonmetropolitan counties. Decreases since 1960 among farmers/farm workers (57% labor [illegible]s (18.2%), and managers/administrators (14%). Large increases occurred in the sales (93.5%) and clerical (74.2%) occupations increased [illegible] and 36.4 percent, respectively.

It can be inferred that much of structural change in occupational organization has resulted from a combination of job changing among rural residents and job creation for inmigrating individuals. Almost 30 percent of those employed in 1960 were involved in farming compared to almost 14 percent in 1980. Part of this structural change was [illegible]butable to a 32.3 percent increase in total employed labor.

Empirical Results

Results of the analysis for the three groups of counties are reported below. For the industrial and occupational sustenance differentiation analysis, results are reported in terms of Texas and each of the three county groups. However, due to the focus of this paper, the correlation analysis results reported here are only for the urban-nonmetropolitian and rural-nonmentropolitan counties.

Industrial Sustenance Differentiation. Sustenance differentiation values for industrial employment are reported for each group of counties in Table 1. The means indicate the average level of industrial diversity based on employment, the standard deviations indicate the amounts of variation or dispersion among counties within each group and the minimum and maximum

values indicate the least and most diversity reported by counties, respectively. Overall, growth in industrial differentiation was prevalent in each group of counties. As expected, industrial differentiation was greatest among metropolitan counties and least among rural-nonmetropolitan counties for each of the three census years. Metropolitan counties were the most homogeneous group having the least variation in industrial differentiation. In comparison, rural-nonmetropolitan counties had the most variation, widest range of differentiation values, and greatest growth in differentiation (determined by taking the difference between 1960 and 1980 means). On closer examination rural-nonmetropolitan counties had a high degree of differentiation peaking in 1980. These counties were contiguous to metropolitan areas and appeared to have benefitted from industrial growth emanating from such areas. Counties with the least diversity in employment were located mostly in West Texas.

In summary, extractive and personal services sectors experienced a general decline in the industrial structure of all Texas counties while market and professional services increased. Particularly interesting to note was the greater increase in both production and health care services in urban-nonmetropolitan and rural-nonmetropolitan counties relative to metropolitan counties. Such changes were indicated also by industrial differentiation values as they increased from 1960 to 1980 representing greater diversity of industrial employment.

Occupational Sustenance Differentiation

Values for occupational sustenance differentiation are presented in Table 2. Findings paralleled patterns observed for industrial differentiation. Metropolitan counties were most alike one another in

their occupational structures, while urban-nonmetropolitan and rural-nonmetropolitan counties varied more. Secondly, the variability among differentiation values tended to decrease over time as county occupational structures became more similar within each group of counties. Thirdly, rural-nonmetroplitan counties experienced the greatest increase, occuring largely after 1970. Finally, several urban-nonmetropolitan and rural-nonmotropolitan counties had highly diversified occupational structures because of their proximity to metropolitan counties and increases in industrialization and population.

A difference of note was observed between the finding for industrial and occupational differentiation. Unlike their increase in industrial differentiation, metropolitan counties experienced a slight downturn and constriction in the diversification of their occupational employment. As seen previously, this resulted from decreases in operative and labor occupations, and increases in professional and technical employment.

To summarize, changes in occupational organization were closely related to the previously noted changes in industrial organization. Changes in urban-nonmetropolitan and rural-nonmetropolitan counties were more pronounced in their occupational structures than were changes in metropolitan counties, with major decreases in farmers/farm worker and operative occupational categories and increases in sales, clerical, crafts and professional/technical/kindred occupations. These changes suggest the gradual evolution from an agrarian dependent, or emphasis on a single dimension of sustenance organization in urban- and rural-nonmetropolitan counties, to multi-dimensional occupational structures associated with increased industrial diversification.

Population and Sustenance Organization: A Correlation Analysis

To examine the relationships between population and sustenance organization, zero-order correlations were calculated for both urban-nonmetropolitan and rural-nonmetropolitan counties over the twenty-year study period. As stated previously, ecological migration theory explains changes in size of population as a response (by counties) to changes in migration rates that are influenced by changes in sustenance organization. While these relationships are often reciprocal in the actual sequence of events, they are positively correlated. Findings are presented in Table 3.

Urban-Nonmetropolitan Counties. Derived correlation coefficients this grouping of Texas counties were positive and all but six were statistically significant at the .05 level or better. Migration rates for each decade were highly correlated with the succeeding decennial population size, indicating that for most urban-nonmetropolitan counties a pattern of growth-growth or decline-decline prevailed from 1960 to 1980. In addition, migration rates were somewhat highly correlated with industrial organization (SDI) and to a lesser degree with occupational organization (SDO). This suggests that while the number of in-migrants to these counties may have been associated with diversifying industrial structures, they had occupations much like those which currently existed in the counties. Further support for this is given by the correlation between SDI in 1970 and the migration rate for the period 1970-1980.

It was shown earlier for urban-nonmetropolitan counties that both industrial and occupational structures diversified from 1960 to 1980. In the case of industry, there was a gradual, steady change in structure

toward diversification as reflected by highly correlated for SDI60-SDI70 and SDI70-SID80, but less correlation for SDI60-SDI80. Occupational structure also changed over the period, with SD060 and SD070 being highly correlated; however, the correlation between 1970 and 1980 was of greater magnitude These findings indicate that the major change in occupational structure occurred during the decade of the sixties.

Relationships between industrial and occupational structures within and between years varied. For both 1960 and 1970, industrial and occupational structures were highly correlated. A deviation from the previous years appears in 1980 with respect to SDI and SDO. Correlation coefficients for industrial and occupational structures were high in 1960 (.749) and 1970 (.751), but in 1980 the magnitude of the coefficient declined (.533), indicating a relative dissimilarity had developed in the two during the 1970's. Given that both industrial and occupational classifications were held constant across the period, this result suggests that indeed a structural change had taken place.

Slightly weaker relationships existed between industrial structure in 1960 and 1970 and occupational structure in subsequent years 1970 and 1980, respectively. The same is true of the relationships for the occupational structure in 1960 and 1970 and industrial structure in subsequent years 1970 and 1980.

Although the exact cause of structural change has not been identified, adequate information exists to make some assertations regarding it. Population change and migration rates indicate that there was generally consistent growth from 1960 to 1980, as industrial and occupational employment incresed (Thomas and Goodwin). Population size

and migration were slightly associated with employment structures, particularly industrial structures. As discussed previously, large decreases in the extractive industries and increases in professional services accounted for major changes in the 1960's. Although these changes continued during the 1970's, they were less pronounced as percentages of total employment. Among occupational structures, change appeared as major shifts from agriculture to professional and service occupations in 1960's and to sales, clerical, crafts occupations in the 1970's.

Rural-Nonmetropolitan Counties. Results of the correlation analysis for rural-nonmetropolitan Texas counties reveal that all coefficients were positive and all but two were statistically significant at the .05level or greater. Migration rates were only moderately correlated with succeeding decennial population size pointing a lesser degree of in-migration for these counties. Population size and migration rates were moderately correlated with the industrial and occupational structures, more so here than for nonmetropolitan counties. Their association was stronger in the sixties than in the seventies.

An evaluation of SDI and SDO for rural counties indicates industrial structures gradually diversified, but remained very similar during the twenty-year period, as shown by highly correlated values for SDI60-SDI70 and SDI70-SDI80. Occupations changed over the period as well, with the major shift appearing between 1960 and 1970. Nevertheless, 1980 occupational structure was moderately similar to that in 1960, differing from the finding for urban-nonmetropolitan counties.

Also, unlike other findings for urban-nonmetropolitan counties,

relationships between SDI and SDO both within and between study decades were well defined for rural-nonmetropolitan counties. For all three periods, industrial and occupational structures were highly correlated at each decade showing a tendency toward greater association in 1980 than in previous years. Inter-structural correlations across decades indicated much similarity between current industrial and past occupational structures, and vice-versa.

Overall, it appears that while both industrial and occupational diversification occurred in rural-nonmetropolitan counties from 1960-1980, the two became more highly correlated over the period. From this finding and background information presented in Thomas and Goodwin, an inference as to the relative stability of rural-nonmetropolitan counties can be made. Contrary to the urban-nonmetropolitan counties, rural non-metropolitan counties, while becoming more diverse within and more homogeneous between themselves, appeared to diversify as a result of migration and not occupational changes by original residents.

Summary and Discussion

Major population, industrial and occupational changes have occurred in many Texas counties. Although it is difficult to causally specify such changes, they appear to be associated. Since 1960, Texas has experienced rapid population growth by both natural increases and in-migration. Patterns of population change, however, were dissimilar among Texas counties. Populations grew steadily during the past 20 years in metropolitan counties. In the nonmetropolitan counties patterns varied more. Counties contiguous to metropolitan areas generally experienced consistent growth while others grew primarily in the 1970's or continued

to lose population. Thus, some support was given to the touted "population turn-around" identified by demographers to have occurred in the nonmetropolitan areas; but more importantly a large proportion of these counties never experienced population decline during the study period.

Coinciding with thse changes in population were changes in the industrial and occupational organization within Texas counties. Two major trends characterized the study period. One was continued decline in agricultural employment. While this decline was pervasive in all counties, its consequences were more pronounced in urban- and rural-nonmetropolitan counties where agriculture has been traditionally the primary industry and the cultural and social backbone of small communities. As populations grew and agriculture declined, the second trend emerged in which many counties developed a broader economic spectrum of industries and jobs. Growth in production, market, and service-based industries were particularly observed with increases in professional, sales, and clerical occupations.

That these changes have occurred in the population size and sustenance organization of counties has several implications for community planning and development and especially for Texas agriculture. Regarding population change Rogers (1982:148) points out,

> Rapid growth overburdens existing facilities and programs, creates new expectations from in-migrants, and produces a lag between new service demands and the new tax base needed to pay for expansion

Moreover, growth affects patterns and participants in resource utilization (land, water, etc.), housing, decision-making, and social mobility (Dillman and Hobbs, 1982). Conversely, population loss involves typical

patterns in which "youth leave, the average age rises, the birth rate falls, and income declines" (Rogers, 1982:149, see also Beale, 1974). In turn, these patterns impose constrictions on the structural configuration of social and economic organization of affected counties and their communities.

Populaton change withstanding, Texas agriculture continues its downturn in farm and ranch employment in most counties. Ladewig and Albrecht (1982:40) account for several reasons for such decline:

> ...the growth of new and more extensive energy development; increased use of rural residences for part-time farming, recreation and retirement uses [of land and water resources]; and relocation of industries to rural areas are creating increased and often conflicting demands for the land, water, and other natural resources critical to agricultural production.

They continue to state that while growth in other economic sectors may help small farmers to remain in agriculture by providing off-farm employment, it negatively affects the level of full-time farming and employment. For such people, farming has evolved to a secondary or avocational occupation. According to the Census of Agriculture (U.S. Bureau of the Census, 1978) 53 percent of all Texas farm operators were employed off the farm 100 or more days in 1978 compared to 44 percent for the Nation. As such changes occur, researchers have begun to raise questions and identify influences on and consequences of off-farm employment on family farm organization and operation (Rodefeld, 1982, and Albrecht and Ladewig, 1983).

To sum, changes not only have occurred in the industrial and occupational structural organization of Texas counties during the past twenty years but they have partly contributed to changes within specific industrial sectors such as agriculture (Rodefeld, 1982, and Ladewig and Albrecht, 1983). In this and past studies, the human ecological perspective has facilitated reearchers' grappling with complex and interdependent conditions of change. However, the use of this perspective in empirical research is not widespread and methodically articulated for varying levels and areas of social organization (Sly and Tayman, 1977, and Micklin, 1983). Clearly, more elaborated applications exist for examining structural and processual conditions in agriculture, health, and business services in urban-nonmetropolitan and rural-nonmetropolitan counties of Texas.

Notes

1. See also Heaton and Fuguitt (1980), Chalmers and Greenwood (1980), Poston (1980), and Williams and McMillen (1980).

2. Estimates by the Texas Department of Health (1980) indicated that inmigration of individuals accounted for 40 percent (n = 1,818,031) of population growth.

3. Maximum SD value can be determined by the formula:

$$MAX = 1 - 1/nc$$

where nc equals the number of industrial (occupational) categories in a county. There were a total of 13 industries and 9 occupations used.

4. Net migration estimates were calculated by Bowles et al. (1975) who used the census/survival rations forward method with age-sex-race data for each county. Rates for 1980 were calculated similarly by the State Data Center at Texas A&M University. These rates were then averaged for each group of counties.

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Table 1: Levels of Industrial Sustenance Differentiation in Texas Counties, 1960-1980

Sustenance Differentiation by type of County[a]	Mean	Standard Deviation	Minimum Value	Maximum Value
Metropolitan Counties				
SDI60	.861	.026	.754	.883
SDI70	.865	.020	.608	.890
SDI80	.870	.014	.828	.892
Nonmetropolitan Counties				
SDI60	.828	.041	.658	.888
SDI70	.852	.031	.735	.889
SDI80	.862	.022	.748	.901
Rural Counties				
SDI60	.772	.080	.448	.874
SDI70	.812	.072	.556	.902
SDI80	.829	.069	.556	.895
State				
SDI60	.816	.061	.448	.888
SDI70	.842	.049	.556	.902
SDI80	.854	.048	.556	.901

[a]SDI = Sustenance differentiation of industries; 60, 70, 80 represent censal year.

Table 2: Levels of Occupational Sustenance Differentiation in Texas Counties, 1960-1980

Sustenance Differentiation by type of County[a]	Mean	Standard Deviation	Minimum Value	Maximum Value
Metropolitan Counties				
SDO60	.870	.009	.846	.886
SDO70	.862	.008	.843	.882
SDO80	.865	.006	.848	.878
Nonmetropolitan Counties				
SDO60	.855	.026	.734	.886
SDO70	.862	.017	.765	.881
SDO80	.868	.011	.819	.882
Rural Counties				
SDO60	.822	.045	.630	.870
SDO70	.830	.074	.355	.879
SDO80	.850	.040	.682	.881
State				
SDO60	.847	.036	.630	.886
SDO70	.852	.044	.355	.882
SDO80	.863	.024	.682	.883

[a]SDO = Sustenance differentiation of occupations; 60, 70, 80 represent censal year.

Table 3: Zero-Order Correlations Between Size of Population (POP), Migration Rates (MR), and Industrial (SDI) and Occupational (SDO) Sustenance Differentiation for Nonmetropolitan (N = 153) and Rural (N = 72) Counties

Rural \ Nonmetro	POP60	SDI60	SDO60	MR70	POP70	SDI70	SDO70	MR80	POP80	SDI80	SDO80
POP60		.257[b]	.201[a]	.173[a]	.976[d]	.190[a]	.186[a]	.157	.924[d]	.178[a]	.097
SDI60	.422[c]		.838[d]	0459[d]	.298[c]	.703[d]	.543[d]	.361[d]	.278[c]	.448[d]	.248[b]
SDO60	.370[b]	.863[d]		.380[d]	.241[b]	.569[d]	.570[d]	.254[b]	.225[b]	.313[a]	.347[d]
MR70	.310[b]	.452[d]	.326[b]		.319[d]	.375[d]	.207[a]	.663[d]	.386[d]	.337[d]	.903
POP70	.977[d]	.434[d]	.377[b]	.451[d]		.190[a]	.177[a]	.241[b]	.964[d]	.179[a]	.068
SDI70	.486[d]	.873[d]	.702[d]	.464[d]	.484[d]		.749[d]	.375[d]	.197[a]	.751[d]	.515[d]
SDO70	.403[c]	.720[d]	.493[d]	.372[b]	.393[c]	.861[d]		.263[c]	.170[a]	.540[d]	.768[d]
MR80	.268[a]	.459[d]	.413[c]	.533[d]	.345[b]	.413	.227		.417[d]	.374[d]	.140
POP80	.901[d]	.463[d]	.411[c]	.529[d]	.954[d]	.499[d]	.389[c]	.571[d]		.197[a]	.052
SDI80	.482[d]	.833[d]	.610[d]	.473[d]	.472[d]	.903[d]	.836[d]	.363[b]	.467[d]		.533[d]
SDO80	.401[c]	.831[d]	.657[d]	.358[b]	.383[c]	.872[d]	.795[d]	.278[a]	.366[b]	.932[d]	

[a] $p \leq .05$ [b] $p \leq .01$ [c] $p \leq .001$ [d] $p \leq .0001$