Project Outline

I. Title: An Analysis of Structural Changes in the Texas High
            Plains Cotton Ginning Industry

II. Identification:

    A. Personnel: Dr. Don E. Ethridge - Project Leader
                    and Faculty Advisor
    B. Date of Initiation: September 1, 1980
    C. Expected Date of Completion: December 31, 1981

III. Statement of Problem:

The U.S. cotton industry has seen many significant changes during
the last three decades. Total acreage planted in cotton has declined from
27.4 million acres in 1949 to 13.8 million acres in 1979, while during the
same years the average yield has increased from 282 to 548 pounds per
acre (3). There has also been a major shift in cotton production within
the regions, from the Delta and Southeast to the Southwest and West regions.
In 1948, concentration of production was: Delta 42%, Southeast 24%, South-
west 24%, and West 10%. By 1977, cotton production had shifted to the
following: Delta 26.6%, Southeast 3.6%, Southwest 41.2%, and West 28.6%
(4).

The Texas High Plains, which may be represented as a 23-county
area (see Figure 1), is in the Southwest U.S. production region. In
1979 these counties grew 18.7% of the total U.S. cotton production.
With the High Plains area's economy being highly dependent on agricul-
ture, it is also dependent on its major crop, cotton. In 1979, this
area's cotton production was valued at approximately $725,449,080, which
accounted for 33.41% of the High Plains total agriculture productive
value (2). So as one can surmise, with the study area playing such a
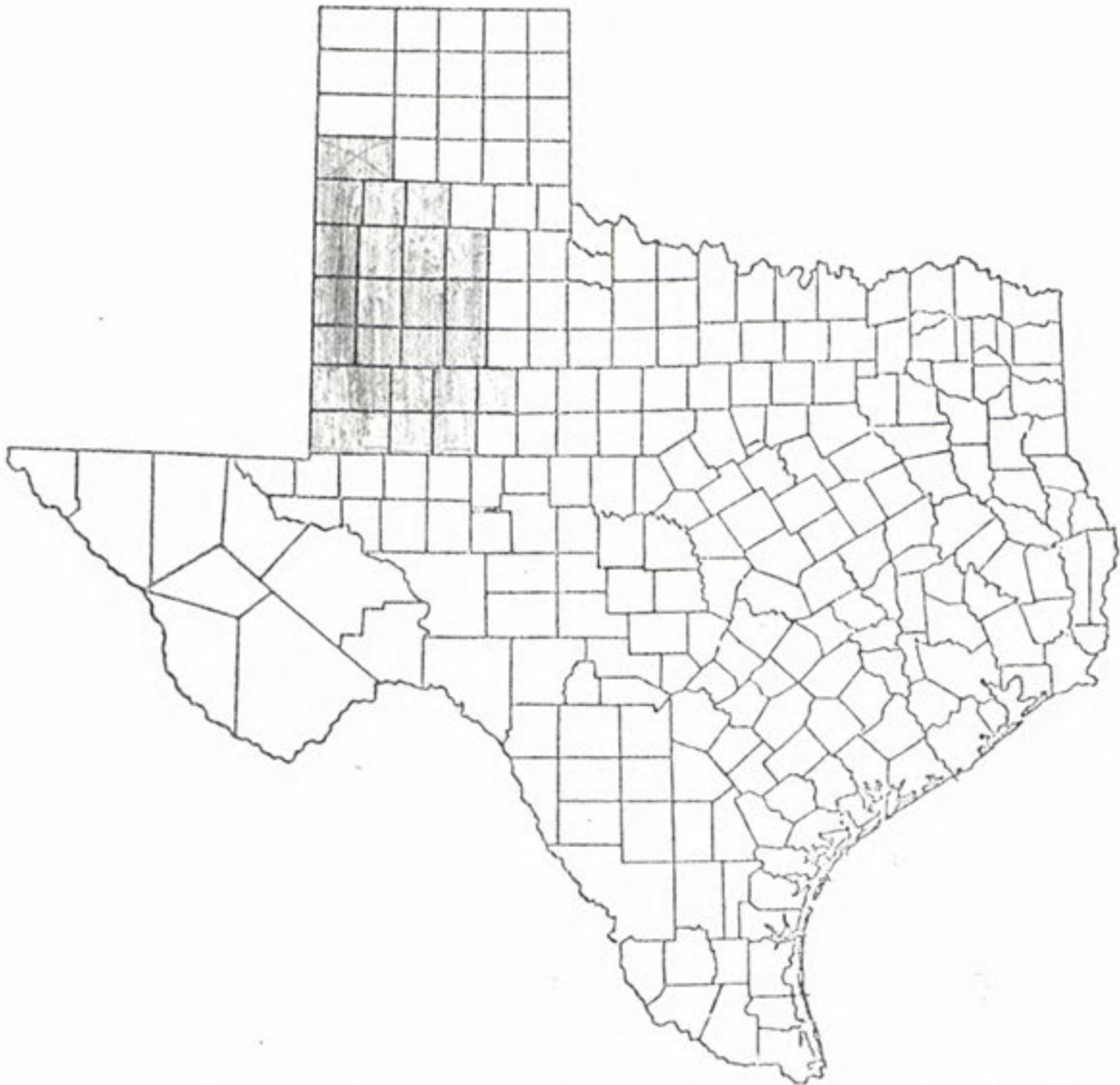
STUDY AREA

Figure 1: A map concerning the location of the 23 counties in
the Texas High Plains which make up the study area.

large role in the U.S. cotton industry, almost anything affecting changes in the U.S. industry, will also reflect on the High Plains industry and economy.

Ginning is an extension of the farm production process, so changes in the ginning industry have occurred along with changes in production. Since 1900, gin numbers have declined from almost 30,000 to nearly 2,200 by 1980 (5), while average gin size has increased. Many of the changes can be seen in the Texas High Plains cotton ginning industry. The number of cotton gins has also declined steadily, from 377 in 1967 to 330 in 1979 (1), with the tendency of active gins being to increase their capacity levels. The tendency mentioned is especially evident in the "super-gin" category (ginning capacity of 32.1 bales per hour or more) where, over the same time period, gin numbers have increased from 8 to 20 for a 150% increase. Also this is evident in the small-gin category (less than 9.0 bales per hour) where the number has decreased by 45%, which reflects both an increase in the gin size and the drop-out rate.

While past trends in the ginning industry are clear, future changes are uncertain. This is true for the U.S. as a whole and for the High Plains in particular. Even though it is possible to observe what has been happening, with the information presently available, one cannot adequately explain why. Thus it is the lack of information and knowledge about the past, present, and future structure of the Texas High Plains cotton ginning industry that is the problem.

IV. Objectives:

The general research objectives are to explain the major economic factors affecting gin industry stucture and provide conditional projec-

tions on the Texas High Plains ginning industry.

Specific objectives are to:

1) Construct data sets concerning the High Plains ginning industry with respect to individual ginning capacities, volumes, and related information with emphasis on:

    a) changes in cotton gin numbers

    b) changes in individual gin size.

2) Identify factors which affect changes in the High Plains gin numbers and size.

3) Develop procedures for conditional prediction of numbers and sizes of gins in the High Plains.

4) Analyze the effects of changes in explanatory variables on the industry structure.

This study can be used by many people, within as well as out of the industry, and for different purposes. Cotton gin managers may see the need for investment in new technology and thus re-evaluate decisions concerning number and type of labor employed. Changes such as these may also affect changes in gin operating hours, among other things. Cotton gin equipment manufacturers may find the study useful in better anticipating future demand for certain gin machinery. Policy makers and others may use this study as a view of what the future economic impacts could be if certain situations were to occur.

V. Procedures:

Objective 1 will be accomplished with the aid of the U.S. government cotton classing office records and the Texas Cotton Ginners Associa-

tion publication, the <u>Ginners' Red Book</u>. The classing office gin equipment schedules will be used to note individual equipment changes, such as changes in the number or type of gin stands that might affect gin capacity. Volume data will also be gathered from this source. The <u>Ginners' Red Book</u> will be generally used in gin identification through time.

Objective 2 will be accomplished through application of economic theory as well as through other knowledge of the gin industry to indicate types of variables which are expected to affect gin numbers and size in the High Plains.

Objective 3 will be accomplished by applying Markov Chain Analysis with both stationary and non-stationary transitional probabilities. The Markov Chain model will be used to note measurement of gin numbers and size throughout the incorporation of transitions from one year to the next. This method allows us to view actual gin numbers as well as transitional probabilities of movement from one size category to another. The size cateogires will be developed by separating gins according to their capacity levels. In order to incorporate the stationary assumption, the transitional probabilities must be averaged over time for each possible category transition. These averages will be assumed as constant or stationary probabilities and multiplied by the gin numbers. These gin movements converge to an equilibrium situation, which will indicate where the gin industry is headed, ceteris paribus.

When assuming the non-stationary Markov procedure, one relaxes the constant transition probability assumption. Once the causal variables affecting changes in the gin industry structure are identified, a non-

stationary model can be formulated with the purpose of conditionally predicting future gin size and number. The model will be formulated with the use of contrained linear regression in which the relationship between the tranistional probabilities and the causal variables will be defined. Once these relationships and parameters are estimated, the model will be used as a predictive tool in evaluating the effects of changes in these variables on the gin industry.

Objective 4 will be accomplished by incorporating an if . . . then . . . approach to predict the effects certain occurrences can have on the transitional probabilities and thus on the industry structure. The model will be manipulated so that one variable will be changed at a time, holding the others constant. In this manner, the effect of different variables on gin numbers and size will be determined.

1. Texas Cotton Ginners Association, Ginners' Red Book, various editions, Dallas, Texas.

2. Texas Department of Agriculture, 1980 Texas Field Crop Statistics, Austin, Texas.

3. U.S. Department of Agriculture, Agriculture Statistics, 1980, Washington, D.C.

4. U.S. Department of Agriculture, Statistics on Cotton, Economic Research Service, 1920-78, Washington, D.C.

5. U.S. Department of Commerce, Cotton Ginnings in the U.S., Crop of 1980, Washington, D.C.