AN ECONOMIC STUDY OF FACTORS AFFECTING LOCATION OF COTTON TEXTILE INDUSTRY IN TUCSON, ARIZONA

by

Bushra Miggally Abdel-Sayed

A Thesis

submitted to the faculty of the

Department of Agricultural Economics

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in the Graduate College, University of Arizona

1950

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TABLE OF CONTENTS

Chapter		Page
I.	INTRODUCTION	1
	The Problem	3
	Objectives and Scope	3
	Procedure and Plan of Study	5
II.	RAW COTTON TO FINISHED PRODUCT: STAGES IN PROCESSING	7
	Ginning	7
	Spinning	8
	Weaving	10
	Finishing	10
III.	LOCATION AND MOVEMENT OF THE COTTON TEXTILE INDUSTRY IN THE UNITED STATES	12
	Growth of the Textile Industry	12
	Movement of Cotton Textile Industry from the New England States to the South	14
	History of the Movement	14
	Reasons for Shift of Cotton Textile Industry	20
	Labor	20
	Taxes	23
	Nearness to Raw Material	23
	Miscellaneous Factors	23
	Technological Advantages	24
IV.	LOCATIONAL STUDIES AND THEORIES	25
	Economic Factors	26
	Cost of Production	26
	Cost of Production and Size of Plant	27
	Other Economic Factors	28
	Technological Improvements	30
	Geographic and Physical Factors	30
	Social Factors	32
	Personal Preference	32
	The Community	34
	Community Attitude	37
	Miscellaneous	38

Chapter Page

IV. (CONT.)
Change of Location of Industries 39

V. IMPORTANT FACTORS AFFECTING THE LOCATION OF A COTTON TEXTILE INDUSTRY IN TUCSON . . . 42

Labor 42
General Characteristics 42
Labor Force 43
Labor Skills 45
Cost of Labor 49
Labor Laws and Legislation 51
Labor Organization 56
The Market 56
Markets and the Location of Industry . . 57
Marketing of Cotton Textiles 57
Arizona and West Coast Markets 60
Transportation 67
Transportation and Location of Industries 67
Cost of Transport 71
Raw Material 79
Taxes 90
Federal 91
State and Local 91
Income and Property Taxes 91
General Property Tax 92
Cotton Processing Tax 93
Taxes in Tucson 93
Power 97
Types of Power 98
Cost of Power and Location 100
Power in Tucson 101
Climate 102
Climate and Its Effect on Location . . . 102

VI. SUMMARY AND CONCLUSIONS 106

Labor 106
Markets 107
Transportation 108
Raw Materials 109
Taxes 110
Power 112
Climate 112
Outlook for Tucson as a Site 112

BIBLIOGRAPHY 114

LIST OF TABLES

Number		Page
I.	VALUE OF PRODUCTS PRODUCED BY LEADING MANUFACTURING INDUSTRIES IN THE UNITED STATES, 1949	15
II.	TEXTILE FIBER CONSUMPTION IN THE UNITED STATES 1939 AND 1945	16
III.	ANALYSIS OF MANUFACTURING COST OF 5.75 SHEETING IN NEW ENGLAND 1926, AND ADJUSTED FOR SOUTHERN CONDITIONS	21
IV.	AVERAGE HOURLY EARNINGS IN COTTON GOODS MANUFACTURING IN NEW ENGLAND AND SOUTH ATLANTIC STATES FOR CERTAIN SELECTED OCCUPATIONS	22
V.	LABOR REQUIRED FOR PROPOSED COTTON MILL OF 60,000 SPINDLES AND 1,400 LOOMS	46
VI.	DAILY WAGE RATES FOR AGRICULTURAL LABOR	52
VII.	LABOR LAWS IN SELECTED STATES	55
VIII.	MARKET POTENTIAL FOR OUTPUT OF A TUCSON COTTON TEXTILE PLANT	63
IX.	FIRST CLASS FREIGHT RATES	64
X.	COST PER HUNDREDWEIGHT OF SHIPPING COTTON GREY GOODS FROM TUCSON TO VARIOUS OTHER CITIES	73
XI.	RATES PER HUNDREDWEIGHT OF RAW COTTON	76
XII.	TRUCK RATES PER HUNDREDWEIGHT OF COTTON	80
XIII.	ANNUAL PRODUCTION OF RAW COTTON IN ARIZONA, 1940-1949	81
XIV.	PRODUCTION OF RAW COTTON IN ARIZONA BY COUNTIES, 1948 AND 1949	81

Number Page

XV. PERCENTAGE DISTRIBUTION OF ARIZONA COTTON PRODUCTION ACCORDING TO STAPLE LENGTH AND COLOR 84

XVI. PERCENTAGE DISTRIBUTION OF ARIZONA COTTON PRODUCTION ACCORDING TO GRADES AND COLOR . 86

XVII. CHARACTERISTICS OF SOME COTTON VARIETIES . . 88

XVIII. ESTIMATED 1949 PROPERTY TAXES ON MANUFACTURING IN AND NEAR SELECTED CITIES 94

XIX. COMPARATIVE PRICES OF ELECTRICITY 101

XX. CLIMATIC CONDITIONS IN SELECTED CITIES . . . 105

LIST OF FIGURES

Number		Page
1.	Diagram of Processes and Products of the Cotton Industry	9
2.	Active and Inactive Spindles, by Regions	19
3.	Classification of the United States as to Transportation Territory	65
4.	Gradients of Procurement Cost, Distribution Costs, and Total Transfer Costs per Unit of Production for Processing Locations Along a Route between a Source of Material and a Market	69
5.	Transport Cost-Distance Relationships and Freight Rate Progressions	69
6.	Arizona Upland Cotton Acreage Allotment by Counties, 1950	82
7.	Percentage Distribution of Arizona Cotton Production by Staple Length and Color, 1940-44, 1945-48, 1949	85
8.	Percentage Distribution of Arizona Cotton Production by Grade and Color, 1940-44, 1945-48, 1959	87

CHAPTER I

INTRODUCTION

In a modern economy a certain pattern of agricultural and industrial production and exchange relationships develop. There are many characteristics and ramifications associated with such development. One of the more obvious is the tendency for certain industries or groups of industries to be established in certain well-defined areas or locations.

One can well ask as to the nature of the causes. Why is an enterprise (a cotton textile mill, foundry, creamery, etc.) located at a specific site and not somewhere else? Is the location of productive enterprises the result of chance and caprice, or is there some logic to it?

In agriculture the production of specific commodities tends to be concentrated in areas having particular characteristics. So it is in the case of choosing a site for a cotton textile manufacturing plant. A site such as Tucson would have to possess certain characteristics to be economically feasible as a location for a textile mill. Could Tucson become the site of a cotton manufacturing plant? Could the plant operate here at lower costs or at the same costs as the southeastern or New England mills? These are questions asked by those interested in improving the status

of Arizona by bringing industry to the state to provide increased employment opportunity. The need for industry is felt by the many thousands who need more adequate or stable employment and who would like to find means of earning a living wage. The business man and the banker are also interested because the coming of industry would boost the economy of the city, increase business and the disposal income of residents, and hence bring more money into circulation. The farmer is also interested in seeing his products processed and manufactured locally and the demand for them increased.

The new cotton manufacturing industries would add demand for material, land, labor, transfer and various other local services. By adding directly and indirectly to community income, they would bring a rise in demand for consumer goods and services.

The location of a new cotton manufacturing industry in the community is likely to have the following favorable effects: increased payrolls through greater employment; an enlarged local demand for all consumer goods and services; a local consuming market for Arizona cotton; and a cheaper and more plentiful local supply of the products of that industry.

The only adverse effects will be felt by other industries through increased competition for materials, labor, markets, or desirable sites. On the whole, the adverse effects are of minor significance.

The Problem

The problem of analyzing the possibility of locating a cotton manufacturing plant in Tucson is both technical and economic. The selection of a plant location requires the careful weighting and investigation of a number of interrelated factors. The problem is basically the study of location of industries generally. The economic factors as applied to Tucson which affect the location of cotton textile industry are as follows: (1) labor and prevailing labor laws and restrictions, (2) transportation, (3) raw materials, (4) nature, location, and extent of the market, (5) power, and (6) taxes.

Other factors important in the solution of the problem are the social factors such as human preferences, size and facilities of the community, and community attitude. Geographic factors such as climate also have a peculiar bearing on the problem.

Objectives and Scope

The primary aim of a private cotton textile industrialist in locating a plant is to select the location which will enable him to assemble materials, process them, and deliver the product to his customers at minimum cost. The objective of this study is to find out if it is economically feasible to establish a cotton manufacturing plant in Tucson, and to determine the best way to correct any weaknesses that might

hinder the establishment of such an industry.

The size of the plant is assumed to be 15,000 spindles and 400 looms with provisions for future expansion to 60,000 spindles and 1,400 looms. This would require a supply of 8,000-30,000 bales of cotton annually. The plan is to start a mill on comparatively simple weaves and to work into finer-quality fabrics and more difficult weaves as the operators become sufficiently skilled and as the market develops. Simple twills and denims satisfy these requirements and the same equipment can be adapted later to more elaborate construction of twills, drills, gabardines, poplins, striped seersuckers, and other fabrics for which there may be demand from time to time.

This study is limited to a consideration of a plant that will spin raw cotton into grey goods, and it does not go into the finishing and dying phases of textile manufacture.[1]

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1. Economically speaking, it is impractical to finish the grey goods that would be produced in Tucson. The most important reason is that a plant of the specified size would need a million gallons of soft water that would not exceed 60 ppm. An analysis of Tucson water, obtained from Dr. H.V. Smith of the Agricultural Chemistry and Soils Department of the University of Arizona, shows that it is very hard and unsuitable for textile bleaching; the hardness ranges all the way from 2 to 98.2 grains of soluble salts per gallon, and most wells in this area have an average of 170 ppm of salts (ppm = grains per gallon x 17.13). It is not economically feasible for the mill to precipitate those soluble salts out of the water, since such an operation is likely to be rather costly.

Procedure and Plan of Study

The procedure followed in this investigation was to study the location and development of the cotton textile industry in the United States, and the reasons for its shift from New England to the South to provide a background for the study. Then the theory of industrial location, the factors affecting the establishment of a cotton textile industry in Tucson, and the weighing of these factors as to their importance were considered in detail. The study brings out the favorable and unfavorable factors of Tucson as a probable site for a cotton textile mill, and suggests ways by which those conditions that hinder the movement of industry to Tucson could be corrected or eliminated.

Since this subject has never been studied in detail with Tucson as a possible manufacturing site, there were few scientific documents and statistics available. Since much of the material compiled by the Chamber of Commerce and the Sunshine Climate Club must be considered biased, most of the data used in the analysis of this problem were obtained through searching of library sources and by writing to public authorities, county assessors, bureaus of business research, and experimental stations in several states such as Georgia, California, South Carolina, Texas, and Arizona. Considerable information also was obtained through interviews with local residents and authorities on such subjects as taxes,

labor laws, power, transportation rates, general community attitude, and so forth.

While the material in the following chapters may not entirely decide the question of whether or not Tucson is a suitable location for the establishment of a cotton manufacturing industry, it is hoped that the information presented may be of value to those persons interested in the subject.

CHAPTER II

RAW COTTON TO FINISHED PRODUCT: STAGES IN PROCESSING

This chapter is designed to acquaint the reader with the several stages and processes to which raw cotton is subjected before it is ready for consumption. Because of the varied processes, each step may involve a different processing site. The processes to be discussed are ginning, spinning, weaving, and finishing.

Ginning, the first process to prepare cotton for the market and spinning, is carried on near the site of raw cotton production. Spinning and then weaving, the second and third stages, could be carried on at sites such as Tucson, New England, or the southeastern states. Finishing, the last process, could be carried on at the same site as the previous processes, or at some more suitable location.

The stages through which cotton passes from raw material to finished product are shown in Figure 1.

Ginning

After being harvested, the raw cotton is first ginned and baled, usually at plants in the local producing areas. Although a small amount of the crop then moves directly to cotton mills, virtually all ginned cotton goes through a

complex marketing system before reaching the mills. Baled cotton is classified as to grade, staple, and character at various concentration points; from these points it moves to domestic mills for the beginning of the manufacturing process, or to ports for export.

Spinning

The first step in manufacturing is to convert the cotton fiber into yarn. Mills and spinners buy cotton of a specific grade and staple length through merchants, commission brokers, or their own representatives in the market. Combed yarn is made from long-staple, high-quality cotton, the short fibers having been "combed" out. Carded yarns are made from shorter-staple cotton, and tend to be coarser than combed yarns although recent improvement in methods has minimized the difference.

Yarn manufacture is integrated to a large extent with further manufacturing processes. Only 15 per cent of the output in 1948 was classified as sales yarn, which is bought principally by:

1. Knitted underwear, outerwear, and hosiery trade
2. Weaving mills producing convertible fabrics which buy odd-size or novelty yarns, or yarn to be dyed
3. Insulated wire manufacturers
4. Carpet manufacturers taking heavy-ply cotton yarns
5. Upholstery and drapery fabric manufacturers

DIAGRAM OF PROCESSES AND PRODUCTS OF THE COTTON INDUSTRY

SOURCE: U.S. DEPARTMENT OF AGRICULTURE

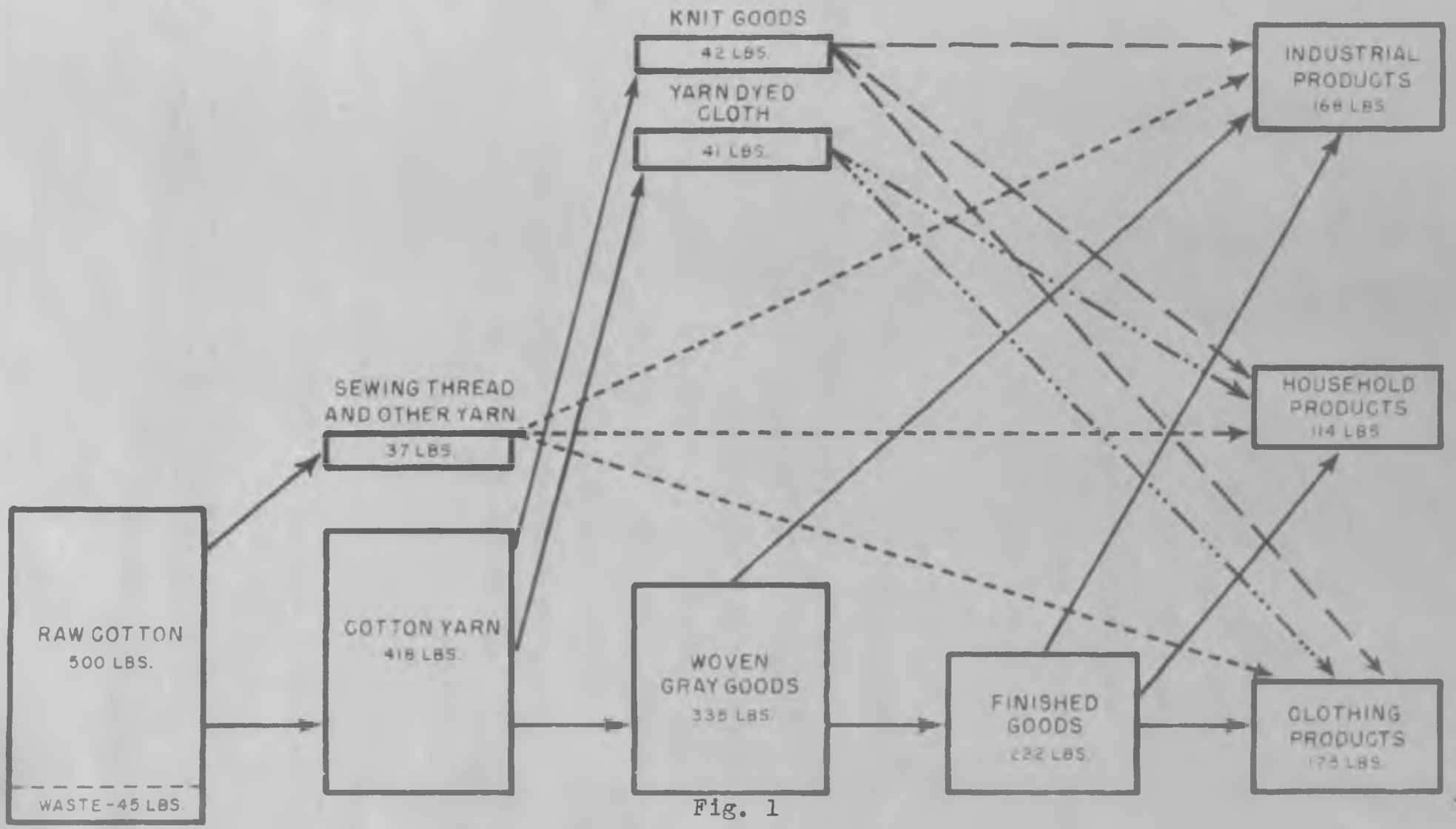

Fig. 1

6. Narrow fabric manufacturers
7. Thread mills
8. Lace curtain manufacturers
9. Crochet yarn producers.

Most sales yarn is the end product of small spinning establishments which have no looms, although integrated mills may sell surplus yarn and/or buy yarn needed in excess of spinning capacity.[1]

Weaving

The yarn is next woven into grey goods or finished goods. Weaving and knitting mills characteristically produce grey goods from uncolored yarns in standard products such as print cloth, sheeting, and duck to be sold in the unfinished state. Some weaving mills, however, make colored goods composed largely of colored yarns. In this case the cloth which comes off the loom is ready for delivery to consumers after being washed and calendered by the weaving mill.

Finishing

Much of the grey goods is purchased by converters who

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1. Jules Backman and M.R. Gainsbrugh, Economics of the Cotton Textile Industry (New York: National Industrial Conference Board, 1946), p. 12.

bleach, dye, print, or otherwise finish the cloth. Converting may be integrated within a mill, but for the most part it is independent. Industrial users are the second largest buyers of grey goods; they use the cloth as is, or apply a special finish suitable for industrial consumption.

The finished goods made from the grey cloth reach the consumer in four distinct forms:

1. Fabricated articles ready for use
2. Piece goods for fabrication in the home
3. Non-textile articles such as shoes or automobile upholstery
4. As part of the production cost of a great many industrial and agricultural products.[2]

This brief outline of the various stages of cotton processing indicates the complexity of the industry, and shows that at each stage several alternative uses for the product are possible. In some cases, two or more of the above operations are carried on within the same plant or by the same organization.

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2. Ibid., pp. 12-14.

CHAPTER III

LOCATION AND MOVEMENT OF THE COTTON TEXTILE INDUSTRY IN THE UNITED STATES

The purpose of this chapter is to acquaint the reader with the early establishment, development, location, and importance of the cotton textile industry in the national economy, and to develop the economic reasons that resulted in the change of location of the industry from New England to the southeastern states. This material is important in that it will throw some light on how the industry started and the reasons for its changing location; this paves the way to the discussion of the theory of location, and the effect of the factors of location on establishing a cotton textile mill in Tucson, Arizona.

Growth of the Textile Industry

It was not until 1790 that the first cotton mill was established in the United States as a result of the efforts of Samuel Slater, a young English textile mechanic. Slater had been attracted to this country by prizes offered for information concerning English textile machinery. In that year he established a mill at Pawtucket, Rhode Island, equipped with machinery built entirely from memory. During

the following twenty years, a number of new mills were built. Though these mills were small and the yarn of a rather inferior grade, from this point on the development of the American cotton manufacturing industry was rapid.[1] Although the number of mills increased from 956 in 1870 to 1,603 in 1922, the total activity in the industry expanded much more substantially because of the larger average size of each mill. Thus, the number of spindles increased from slightly more than seven million in 1870 to almost thirty-eight million in 1925, or more than fourfold, but decreased to about twenty-three million by 1949. Since 1925 more than one-third of the spindles have been retired and the number of broad looms has decreased greatly. In 1927 about two and a half times as many workers were employed in the industry as there were in 1870. Total wages were approximately ten times as great, and the total value of the product was nine times as large.[2]

The cotton textile industry normally is one of the largest providers of employment in the country. With more than 409,000 workers in 1939, the industry provided more jobs than any other industry. In that year, one manufacturing wage earner out of every twenty worked in the cotton

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1. H.E. Michl, The Textile Industries (Washington: The Textile Foundation, 1938), pp. 67-68.

2. Jules Backman and M.R. Gainsbrugh, Economics of the Cotton Textile Industry (New York: National Industrial Conference Board, 1946), p. 12.

manufacturing industry. By 1945, the relative importance of this industry in terms of the number of jobs declined so that it accounted for only one job out of every thirty-seven in manufacturing. In industry generally, one worker out of four was female; in the cotton textile industry the proportion was two out of five.[3]

An examination of the 446 industry subgroups reported by the Bureau of Census shows that in 1939 only five had a larger value of product than cotton textiles (see Table I).

The predominant importance of cotton as a leading textile fiber is shown in Table II. In 1939, cotton accounted for 71.5 per cent of the 5.1 billion pounds of textile fibers consumed in the United States; in 1945, the ratio was moderately lower. The relative importance of cotton has declined somewhat in recent years as rayon and nylon have increased in popularity and use.

Movement of Cotton Textile Industry from the New England States to the South

History of the Movement: It was only natural that the cotton textile industry in this country should begin in New England. Not only was this section settled early, but it also possessed a large part of the nation's capital and water power, then essential to the development of a factory

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3. Ibid., pp. 8-9.

TABLE I

VALUE OF PRODUCTS PRODUCED BY LEADING MANUFACTURING INDUSTRIES IN THE UNITED STATES, 1949

Industry	Value of products (millions)	Per cent of total value
Motor vehicles, motor vehicle bodies, parts and accessories	$4,040	7.1
Steel works and rolling mills	2,720	4.8
Meat packing, wholesale	2,648	4.7
Petroleum refining	2,461	4.3
Bread and other bakery products (except biscuits, crackers and pretzels)	1,211	2.1
Cotton manufactures (including narrow, yarn and thread)	1,168	2.1

Source: U.S. Census of Manufactures, 1949 (Washington: Govt. Printing Office, 1949), Vol. 1, pp. 22-26.

TABLE II

TEXTILE FIBER CONSUMPTION IN THE UNITED STATES 1939 and 1945

Textile fiber	1939		1945	
	Millions of pounds	Per cent of total	Millions of pounds	Per cent of total
Cotton	3,630	71.5	4,508	69.7
Rayon	459	9.0	767	11.9
Wool	397	7.8	648	10.0
Silk	47	0.9	--	--
Jute	546	10.8	547	8.5
Total	5,049	100.0	6,471	100.0

Source: Backman and Gainsbrugh, op. cit., p. 9.

system. Also, cheaper produce coming from the Ohio Valley tended to make farming in New England unprofitable so that there was a labor supply available for industry. In 1875, Massachusetts was unquestionably the leading textile manufacturing center in the country. Half a century later, with spindleage and population tripled, it stood at the apex of its development.[4]

In the meantime certain changes were taking place in the South, which had remained almost exclusively agricultural until the middle of the nineteenth century. By that time, however, the error of one-crop farming and total dependence on agriculture was realized. In 1850, competition from the textile industry of the Southeast began to make itself felt, and by 1855 much the same fears were expressed for New England's future as are heard today. But the Civil War destroyed this first industrial development in the South and gave New England another forty years of security.

The year 1880 marks the real beginning of modern textile manufacturing in the South. Such persons as William Gregg, pioneer cotton manufacturer in South Carolina, and General C.T. James, who had built one of the early steam cotton mills at Newburyport, had been staunch advocates of

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4. Chas. J.R. Grossmann, The Possibilities of Cotton Manufacturing in Texas (Austin: Bureau of Business Research Monograph No. 1, University of Texas Bulletin No. 2832, August 22, 1948), p. 12.

industrialization in the ante-bellum South.

The Republican victory in the national election of 1880 convinced many Southern leaders it was hopeless to seek Southern regeneration merely through national politics, and there was a noticeable quickening of interest in mill promotion. Evidence of the South's advance is found in the Census of Manufactures for 1889 which shows total value of Southern production to be a quarter of New England's. As would be expected in a newly-industrialized area, the South concentrated on the coarser fabrics such as sheeting, shirting, drills, duck, gingham, and yarn.[5]

Between 1889 and 1909 the trend in both New England and the South was upward, but the much more rapid rate of increase in the South added to its relative importance, and by 1909 it produced 36 per cent of the national total.[6] During the succeeding decade production in the South increased while that of New England decreased, particularly after 1923 (see Figure 2). By 1929, over 89 per cent of the print cloth was produced in the South, and this percentage increased slightly during the 1930's. The transformation was complete, and the regional relationships of 1889 had been virtually reversed. After 1926-27 New England continued to lose approximately

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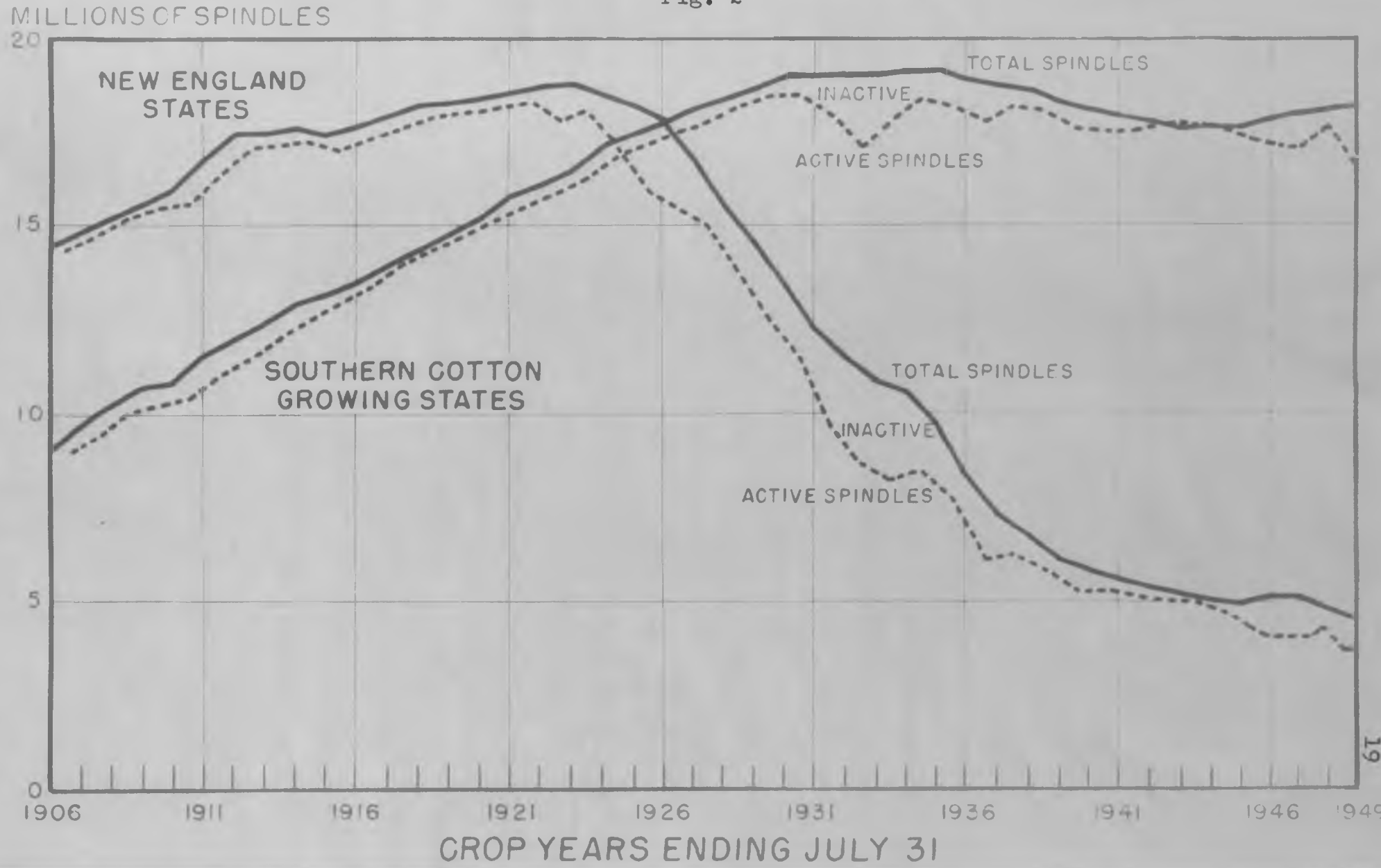
5. Thomas R. Smith, The Cotton Textile Industry of Fall River, Massachusetts (New York: King's Crown Press, 1944), pp. 80-81.

6. Ibid., p. 83.

ACTIVE AND INACTIVE SPINDLES, BY REGIONS

SOURCE: U.S. BUREAU OF THE CENSUS

Fig. 2



a million spindles per year. The cotton-growing states, on the other hand, continued to expand industrially and by 1933 had over nineteen million spindles or about 63 per cent of the total spindles in the United States.[7] By 1950, the South had eighteen million spindles, or 78 per cent of the total.[8]

Reasons for Shift of Cotton Textile Industry

The reasons for the recession of activity in New England are varied, although some are not so important as others. Trade opinion is still very much divided, and it is obvious that the importance of the several factors varies for individual cases. However, if the analysis of manufacturing cost items given in Table III is considered, it should not be difficult to assign to each of these factors its true value.

Labor: The most important reason for the shift was the lower labor cost in the South (see Table IV). Labor there was plentiful without any industrial traditions or union organization. Wages were lower because living conditions and standards were much lower. Also, Southern manufacturers had to compete with such industries as agriculture which had a low wage rate, while in New England competition was with

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7. Michl, op. cit., p. 144.

8. U.S. Department of Commerce, Bureau of Census, Facts for Industry, May 1950 (Washington: Govt. Printing Office, June 16, 1950).

TABLE III

ANALYSIS OF MANUFACTURING COST OF 5.75 SHEETING IN NEW ENGLAND 1926, AND ADJUSTED FOR SOUTHERN CONDITIONS

Cost factor	Per cent of total costs		New England	South
1. Cotton, including transportation of raw material and woven goods			45.0	53.0
2. Labor			34.0	27.3
3. Power			5.0	4.0
4. Supplies			2.0	2.4
5. Fixed charges				
Average depreciation	3.1	2.9		
Taxes	2.0	2.0		
All insurance	0.6	0.6		
Repairs and maintenance	2.5	1.8		
Administration and sales	5.8	6.0		
			14.0	13.3
			100.0	100.0

Source: C.T. Main and L.E. Gunby, The Cotton Textile Industry (New York: Prentice-Hall, 1942), p. 999.

TABLE IV

AVERAGE HOURLY EARNINGS IN COTTON GOODS MANUFACTURING IN NEW ENGLAND AND SOUTH ATLANTIC STATES FOR CERTAIN SELECTED OCCUPATIONS

Occupation	Ave. hourly earnings (in cents) 1924	1930	1933	1934	1949
			New England		
Males					
Loom fixers	69.1	58.5	46.3	64.9	158.0
Weavers	53.8	46.2	29.9	44.2	129.0
Slubber tenders	55.5	46.6	30.8	49.1	127.0
Speeder tenders	51.4	45.2	29.6	45.5	137.0
Card tenders	46.5	40.2	28.8	41.7	113.0
Doffers	45.3	38.6	27.0	43.8	124.0
Females					
Weavers	48.6	42.6	28.0	43.5	126.0
Drawers-in, hand	44.5	40.6	33.6	43.1	108.0
Speeder tenders	44.2	36.2	24.9	40.4	118.0
Spinners, frame	42.5	34.9	23.6	37.8	110.0
Spooler tenders	39.0	29.2	22.3	38.0	117.0
Trimmers or inspectors	31.9	27.9	21.4	33.5	--
			South Atlantic and Alabama		
Males					
Loom fixers	41.6	42.0	32.3	50.7	--
Weavers	35.9	34.9	23.8	40.3	120.0
Card tenders	26.8	26.4	19.1	32.5	98.0
Doffers	28.4	28.7	19.6	35.0	112.0
Females					
Weavers	31.3	31.9	21.5	38.4	119.0
Drawers-in, hand	28.1	29.8	23.0	39.4	98.0
Speeder tenders	29.6	28.3	19.6	35.3	102.0
Spinners, frame	23.4	22.5	16.2	32.0	102.0
Spooler tenders	22.1	22.7	16.1	33.3	99.0
Trimmers or inspectors	20.3	20.9	15.9	31.0	--

Source: Monthly Labor Review, May 1935 and April 1949.

other manufacturing industries which paid higher wages.

Taxes: Other reasons for the shift were lower taxes and the encouragement given by the South to the development of manufacturing by granting free land for the construction of new mills, or the exemption of new industries from taxation for a number of years and, in a few instances, providing buildings at a nominal sum.

Nearness to Raw Material: Another reason was nearness of the southern mill to the source of the raw material, which was thought to bring about a large saving in transportation costs. Actually, this was not the case because savings on raw materials were of little importance in the total cost of production. Distribution costs of the finished products of the New England states were much lower than those of the Southern states because of nearness to the centers of population.

Miscellaneous Factors: Climate and power are of little significance in explaining the movement of the textile industry from New England to the South. But since social and labor legislation in the South was less stringent, if existant at all, and in view of the lower living standards the Southern manufacturer had considerable advantage over his New England counterpart.[9]

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9. Not one Southern state has an 8-hour day, 48-hour week for women, the best provisions being in Arkansas, Louisiana, Texas where the 9-hour day, 54-hour week is found. H.M. Douty, Wage and Hour Legislation for the South, p. 7.

Technological Advantages: The last reason for the shift was the technological advances of the Southern mills over the Northern ones. The development of the automatic loom, placed on the market in 1895, was of great importance to the expansion of the cotton processing industry in the South. The development of the Northrop automatic loom and the high-speed weaving rings was of great significance in saving a large share of labor costs. Heavy investments in mill machinery acted as a deterrent to the adoption of these improvements by New England factories, thus making it increasingly difficult for them to compete with the more modern Southern mills.

CHAPTER IV

LOCATIONAL STUDIES AND THEORIES

Investigations designed to examine the specific influences affecting the location of industries have been relatively few through the years, although there is a wealth of material on such related problems as population movements, decentralization of industry, and general treatments of location and associated social problems. One of the best known and earliest attempts to explain the location of economic activity was that of Johann Heinrich von Thunen in his treatise Der Isolirte Staat, first published in Rastock, Germany in 1826.

Locational theory deals largely with the economic and geographic adjustment of factors of production other than land to land itself. This is true because productive factors other than land always possess some degree of mobility. The location of a cotton textile manufacturing industry falls in the category where a number of forces operate to affect location. These are: (1) economic, (2) social and rational personal feelings, and (3) geographic or physical.

Economic Factors

Cost of Production: Before competition in manufacturing was as keen as it is today and when price was a less important factor in securing markets, it made relatively little difference where a cotton textile plant was located. Efficiently managed, manufacturing was profitable almost anywhere, but this is not true today.

The economic reasoning applied to an economy of free enterprise in which the incentive principle of a competitive society tends to make individuals react as "economic men," i.e., to adjust their thinking and actions along those lines which will provide the largest net income, logically leads one to expect that cotton textile production will be carried on at the point of greatest economic advantage. The process of arriving at this point of greatest advantage provides the solution to the locational problem for the cotton manufacturer. Many rational economic factors enter into the thinking of the entrepreneur in arriving at this solution, all of which turn on the matter of relative cost. These include such matters as the availability of the raw cotton needed; the transportation facilities available and their costs; the nature, extent and nearness of market areas; the availability and cost of power, labor, fuel; and the inherent characteristics of the raw material and the finished goods.

All these factors with their effect on location will be discussed in the next chapter. It is also to be remembered that total production costs depend on two things: (1) the prices of the factors of production, and (2) the amounts of those factors used. Production costs per unit, in turn, depend on the scale of production.

To minimize the cotton processing costs, the individual enterpriser seeks a location conducive to high utilization of the productive capacity of factors and the scale of output appropriate to that location. Naturally, more intensive utilization of any one factor is necessary where its price is high. If labor, for instance, is particularly expensive, it must be used more intensively by economizing on labor and substituting more land and capital. There is no such thing as a "most efficient" combination without regard to the relative prices of the factors used.[1]

Cost of Production and Size of Plant: Another important consideration is the relation of cotton textile costs to the size of the plant and the firm. Three basic principles work to reduce costs in a plant with a large output: (1) indivisibility, (2) massing of reserves, and (3) bulk transactions. The first of these rests on the imperfect divisibility of units of equipment and labor; i.e., a machine has a certain

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1. Ideal economic proportioning of factors requires that each kind of input should be increased up to the point where any further addition would add just as much to total costs as to total returns.

rate of output, and it is impossible to design another machine which will perform the same operation at a lesser rate without substantially increasing the cost per unit. It is evident that the larger the scale of output, the more nearly will it be possible to have each operation performed by a fully-utilized and efficient-sized unit adapted to that operation alone and unencumbered by the necessity of shifting from one operation to another.

Massing of reserves is another basis of economy in larger-sized cotton textile plants. Any plant must have in reserve a certain amount of materials and equipment to provide for accidents, interruption of supply, or sudden variation in demand. The larger operating unit has a smaller percentage of its resources tied up in this way.

The third principle abetting large-scale cotton textile production, bulk transactions, makes possible smaller unit cost of materials, supplies and services purchased. This is illustrated in the graduated rates given by gas and electric utilities for increasing consumption.

Other Economic Factors: The economic limits of manufacturing are raw cotton at its source on the one hand, and potential demand for the finished goods on the other. Cotton manufacturing is impossible without raw cotton, and useless without markets.[2]

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2. Other things being equal, industry naturally locates near the market it serves since it must, necessarily, be the result either of a demand from the market or of an

From the standpoint of the market in considering any one location, the producer wants to know the demand schedule for his output, the size, nature, and nearness of the market. It is necessary to know what types of cotton goods are desired in the potential market and in what quantities. The producer must determine if he can put a product on the market that will meet market needs and yet be competitive both in price and quality. All of these various aspects are important to a producer in deciding where to locate a manufacturing plant.

From the standpoint of procuring raw cotton, the advantages of a location are measured by the relative prices at which the quantities of the required cotton can be bought there or secured elsewhere and shipped in. The one feature that distribution and procurement costs have in common is that they usually depend on the transportation of products or materials. Consequently, and also because it is more difficult to buy and sell at a distance, the distribution and procurement advantages of sites vary rather generally with

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2. (cont.) effort to create such a demand. The location of the supply of raw material has usually a modifying influence, however; and the result often is a compromise which is also affected greatly by the question of transportation. Clearly there is no economy in shipping bulky material great distances if the larger part of it becomes waste in the manufacturing process. If transportation charges are small, then either labor or power or both may be predominating factors since both raw material and finished product may be transported economically. It is a rare instance, however, when the influence of any one of these causes fixes definitely the geographical location of an industry.

distance from customers and suppliers. It will be best to discuss distribution and procurement together in the section on transportation in the next chapter.

Technological Improvements: Changes in processing methods also have affected locational patterns of cotton manufacturing through differences in transfer costs, labor requirements, material requirements, and energy costs. Cheaper transfer has enlarged market and supply areas; within a rather broad area this allows further concentration of industries while also encouraging a loosening of the structure of metropolitan communities. Each new transfer medium has had a different effect on location, reflecting its own characteristic of cost structure.

Atomic energy development, as now foreseen, is unlikely to produce radical locational changes, except for strategic reasons. It can lower electricity costs in areas where they are now high, but probably cannot compete with the best hydroelectric sites. The lowest cost atomic power is likely to be available only in areas of fairly concentrated demand, and its location and development may be dictated primarily ty strategic and political considerations.

Geographic and Physical Factors

The geographic structure of industrial activity has been derived basically from the location of natural resources and from historical and physical factors directing the course

of population settlement, including the geographic and physical features which determine transportation routes.[3] The physical environment has exercised an important influence on the location of manufacturing. About one-third of the United States is so mountainous as to be comparatively unfavorable for the development of any considerable volume of manufacturing. Waterways, on the contrary, have attracted industry to such a degree that the great majority of our large industrial cities grew up along the two coasts, the Great Lakes, or the principal rivers.

Although climate may favor or discourage the establishment of certain processes and also may affect the productivity of workers, its influence on location is far less in industry than in agriculture. In some places processing costs would be much higher than elsewhere, even though the prices of these factors were the same. For example, a dairy in a warm climate needs more cooling equipment than one in a cool climate; and textile mills in dry climates require more

3. Direct relations to natural resources, however, do not take us far in accounting for most locations. They give no satisfactory explanation for concentration of the automobile industry in Michigan or of woolen manufacturing in Massachusetts. The reason is that economic interrelations between different industries and firms have an important role in shaping the pattern of location as a whole. Even if natural resources were evenly distributed over the globe, there would still be patterns of specialization and concentration due to economic, social and political principles. For example, a locality with an early start in some industry has a firm competitive advantage.

humidification than those in damp climates. The effect of climate on efficiency of labor alone can reduce both the man-hours and the capital investment needed per unit of output. Climate and its effect on location will be discussed in the next chapter.

Social Factors

Personal Preference: Everyone has some preference as to "consumer location," where he would like to live and spend his income; but for all except a small minority, there is also the question of "producer location," the best place to earn an income. As consumers, people like to settle where living is secure, cheap and agreeable. As producers, they seek to settle where earnings will be large and assured under pleasant working conditions.[4]

Producers' motives are much more significant than consumers' motives in shaping the over-all distribution of activities. Geographic differentials in wage rates or the profit prospects of particular occupations are larger and better known than are differentials in living costs or conditions. Producer motives are more compelling; he who ignores them risks unemployment or bankruptcy rather than a mere

4. Some can resolve the conflict by producing in one place and consuming in another. Some workers leave their families for considerable periods to work elsewhere, lured generally by higher wages. Daily commutation to and from work at present is limited to relatively short distances.

diminution of the joy of life. Moreover, the less tangible consumer motives are strongly shaped by habit and past associations. Finally, there seems to be less frequent and fundamental change in the geographic patterns that determine consumer preferences than in the patterns determining producer preferences. Differences in climate, for instance, are practically permanent whereas the optimum location for a certain line of production is subject to sudden and frequent shifts. This is an important point, since most practical problems involving location arise in connection with adjustment to such changes.

In all cases, however, the ultimate basis of producer preference for locations is the rate of earnings obtainable at different places. Regularity and security of earnings are important. Other things being equal, a community with a stable economy is a better place to get a job or establish a business than one whose main livelihood depends on season or cyclically-affected industries. In choosing a job or a business location, the producer should take into account not only the initial rate of return, but also the prospects for improvement.

Proper evaluation of these factors of stability, security, and future prospects calls for more information and ability than the average person possesses. One of the objectives of locational guidance is a fuller and more accurate evaluation of these factors.

The Community: Cotton textile plant location is often influenced to some degree by the attractiveness of the community, by the promotional effort of interested local business and governmental groups,[5] and by the availability of information concerning local resources. There are advantages for the cotton manufacturer in both large and small communities, and he must decide which locality is better for his concern. The advantages of a large city are those of concentration. One is the size of the market, whether that market be individual consumers or other industries. Another is the presence of a large labor supply; a number of cotton textile industries of the same kind in one locality keep one another supplied with labor of varying degrees of experience. The flexibility of a cotton manufacturing business depends largely upon its ability to secure help on short notice and to discharge labor without further obligation. Also, cities have certain benefits in transportation facilities. If a shipment misses one dispatch, another soon follows; freight car service is of the highest order; established airlines reach even relatively distant markets in a matter of hours; a variety of motor truck service is available.

5. Governmental groups can exert a great influence over the amount, kind and location of cotton textile industries and over the way in which locational selections and adjustments are carried out. Government coordination and support of financial and statistical functions have increased the mobility of capital, and various types of subsidy have been used to attract private business investment.

Other conditions favoring cotton textile industries in a large city include: (1) abundant amusements and educational facilities for employees, as well as housing; (2) specialists such as advertising, engineering, and accounting firms as well as expert legal assistance; (3) for the manufacturer requiring quantities or a variety of semi-finished materials, a concentrated supply tends to reduce the risk and uncertainty of shortage; (4) police and fire protection are effective and readily available.

But if cities have benefits, they also have drawbacks. Property values, building costs, taxes, insurance rates, rent and living expenses are generally higher than in smaller communities. Unions are stronger, which sometimes works to the disadvantage of the manufacturer. The congestion of population, business and industry frequently makes necessary rigid zoning ordinances and exacting factory codes; some enterprises have been hampered by smoke abatement and anti-fume ordinances, or unnecessary restrictions regarding waste disposal.

The small community, like the metropolis, has its advantages and handicaps for a cotton textile industry. In general, property values, taxes, rents, and wages are lower. Turnover among employees tends to be low, and they are likely to take a more personal interest in their work so that labor troubles appear less frequently. Often the physical plant can be spread out, thus gaining the advantages of production

on one floor. Both the owner and his workers have more prominent places as individuals, and can help influence regulations governing their plant. Homes are closer to place of employment, and the general atmosphere and living conditions of a small city make for greater personal contentment.

On the other hand, an adequate and satisfactory supply of labor may not be available. Where workers are recruited from the farm or small agricultural centers, it is frequently found that they tire of the confinement and discipline necessary in cotton textile factories. American labor resents being exploited, hence the cotton manufacturer must not plan on cutting production costs drastically through "cheap labor."

Also, in small towns there is not the number of specialists in various fields available; each plant must supply its own. There is the possibility too that the plant will have to be more responsible for its own police and fire protection, as well as for solving personal problems of its employees.

It is concluded that

> the city location, in general, offers greatest attractions to the small plant ... and the country offers the greatest attraction and fewest disadvantages to the very large plant, provided an adequate supply of labor can be obtained.[6]

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6. W. Gerald Holmes, Plant Location (New York: McGraw-Hill Book Co., 1930), pp. 75-76.

Community Attitude: The choice of a suitable location for a cotton manufacturing industry may spell the difference between business success and failure. But the entrepreneur is not the only one interested in knowing what constitutes a good location. Banks, utility companies, transportation companies, and community leaders also have a stake in a cotton textile plant and should have an understanding of site requirements.

While one cotton textile industry can dominate in some localities, in other districts it may be regarded with distrust. The attitude of legislators toward industry is subject to great variation. Some states have taxed the cotton manufacturer lightly, and others have levied heavily on his property and income. Laws affecting working conditions, factory operation, and construction in general evidence varying public policies which concern the business man.

Certain parts of the country, such as the southeastern states, have been very active in soliciting new cotton textile industries by offering special inducements. These sometimes run into substantial value and often ease an otherwise difficult financial situation. Many cities and towns have erected buildings to rent at nominal prices for factory purposes. Others have raised substantial amounts of money either to loan on favorable terms or to invest in the stock of new industries.

The attitude expressed by such organizations as the

Tucson Chamber of Commerce is not always the true attitude of the community. Often the real truth lies hidden. Unfavorable conditions are seldom mentioned in chamber of commerce reports; they are to be learned only by careful investigation. The cotton manufacturer must be sure of his ground; otherwise he may run into trouble.

Tax assessors have a record of changing their minds about values after they have had a plant on their books for a few years. Zoning commissions sometimes make trouble. Water boards likewise have been known to deprive factories of water essential to their operation when no justifying emergency exists. It is also said that in order to maintain the attractiveness of a town such as Tucson as a tourist center, no industries are wanted with their attendant smoke nuisance and dirty-looking laborers going about the streets. Real danger may be found, too, in aspiring politicians who, though not in power, may eventually get control of public affairs and bear down on industry.

Many times the apparent attitude of a community toward industry is one thing, and its true attitude another. This is one of the reasons why more and more cotton manufacturing concerns are making location investigations secretly.

Miscellaneous: Regardless of size of community, there are several factors any cotton textile manufacturer must give serious consideration. It may often be wise for him to be active in local politics, both to prevent restrictive

industrial ordinances and to obtain fair and honest government for his community. Too, he should remember that there may be a time when he will need the help of a strong and cooperative financial institution.

Another important matter is the growth trend of any area, both in population and business importance. While a boom town is not ideal, neither is one that is stagnant. The locality which has had a moderate but steady growth is best. Its people are well established, its public facilities are most likely to be adequate and dependable, its government stable, its taxes fixed, and its financial institutions sound. It probably has no housing shortage, and generally will be able to supply labor for a new plant of size and proportion to population.

Change of Location of Industries

Some of the main causes of locational shift are seasonal variations in weather; cyclical fluctuations in investment, income distribution, factor utilization, and relative prices; decrease of population or depletion of exhaustible resources; and development of new resources and techniques. The fact that some new location may have greater income potentialities does not mean that a cotton textile plant will move to the new location. Obstacles to a change of location are: the producer may not know of the superior possibilities of some other location; moving would involve great expense, and

probably disruption of established trade contacts; there may be undesirable restraints or zoning laws.

It is therefore not surprising that the actual migration of cotton manufacturers is slow. Those who erroneously chose a poor location, or are in an area that has lost its original advantages, are likely to remain there as long as they can stay in business at all.

Migration of a cotton textile industry of course does not necessarily mean movement of all the productive factors involved. The well-known shift of a share of the American textile industry to the South involved some movement of capital and even considerable shipment of material goods such as spindles and other machinery. But on the whole the southern mills used a new labor supply.

Finally it is to be said that locational equilibrium of cotton textile industries is never attained, and many serious problems are due to difficulties in the process of adjustment. The locational histories of individual industries generally show an early stage of increasing concentration, followed by a later stage of redispersion. When a cotton textile industry is young and its problems unfamiliar, it prospers best in those few places which provide the combination of appropriate basic skills with experienced managers, some venturesome enterprisers and financial backers. The product is then perfected and standardized, the best methods of large-scale production are worked out, and the economies

of mass output and geographical concentration are experienced.

Ultimately the cotton textile industry and its chief production center mature in the sense that growth of market has slackened, the questions of product design have been settled, and the specialized machinery has been devised. Often the dispersion stage then sets in. Or, when technicalities of production and problems of marketing are solved to where other locations may successfully cope with them, independent outside competition may arise. Even before this, labor requirements may have been so reduced that established firms are free to consider branch plants in areas of lower labor cost or in areas closer to markets or raw cotton.

CHAPTER V

IMPORTANT FACTORS AFFECTING THE LOCATION OF A COTTON TEXTILE INDUSTRY IN TUCSON

Having discussed the importance and reasons for change of location of the cotton textile industry, and having presented the principles that determine the location of industry, it is proper that these various factors be applied to Tucson as a possible site for a cotton textile manufacturing plant. This chapter is the heart of the study because it discusses the feasibility of Tucson as a location from the standpoint of labor, markets, transportation, raw material, taxes, power, and climate.

Labor

General Characteristics: The labor force, unlike other production requirements, is distributed geographically in rough proportion to the population and therefore in much the same manner as the ultimate consumer markets. Because of this, what appears to be a labor-oriented industry (one in which the availability of labor and geographic differences in labor cost and efficiency are the primary locational determinants) may actually be market-oriented, and vice versa. Most of the industries that are distributed widely throughout the population are likely to be market-oriented.

A further characteristic of the labor force is the adaptability of the worker to a wide range of occupations and tasks. While some skills and abilities are highly specialized, the bulk of the labor force can be rather readily transferred from one type of work to another, even though some retraining may be involved. Even the highly specialized worker is adaptable to some new occupation, and may retain the benefit of a good part of his skill even when transferred to quite different occupations. This intra-industry mobility and adaptability gives a further element of locational freedom even to an industry dependent on relatively skilled labor.

Like land, labor varies greatly in productivity from place to place, and the quality of a local labor force is subject to improvement or deterioration with use or disuse. Unlike land, however, labor is both mobile and reproductive so that differences in labor cost rest partly on migration responses and on geographical differences in rates of production.

Labor Force: From an economic standpoint, the most important segment of the population is the labor force, employed workers and those actively seeking work. Not only is this group the most productive in the population, its per-capita consumption is also high. The production and consumption of an area are influenced by the ratio of its labor force to total population, and by the proportion of workers gainfully employed.

Labor in New England is composed largely of relatively recent immigrants. They are as yet ill-assimilated and "class conscious." Their national origin is highly diverse, social and economic life has been different, so that understanding between employers and employees has been difficult. The more skilled operators have taken great pride in their technique and are slow to accept labor-saving methods.

The major part of a labor force required for a Tucson plant would come from a pool of under-employed people. Unlike labor in New England, the southeastern states, or California, they are not burdened by industrial traditions and are willing to adopt new and more efficient methods. Also, their spirit of individualism would make them slow to respond to group action. The large Negro, Mexican, and Spanish population, though virtually untapped for manufacturing, would provide a potential reserve of labor.

In the Pacific Southwest states, continuing population growth automatically increased the labor force during the last census decade, but the gain in workers in relation to population increase was smaller than in the nation. In March, 1949 the labor force in Pima County was 41,100 which was 1,100 more than in June, 1948.

The labor force in Arizona expands or contracts both with changes in size and composition of the population and in economic conditions. During depressions it shrinks, while

during good times and periods of war it expands, being augmented by youngsters leaving school, housewives, retired persons, part-time workers, and those ordinarily dependent upon others for support.

During 1930-1950 an important population shift greatly enlarged the state's labor force. The per cent increase in persons in the working period of life (fourteen years and over) was nearly twice that of total population growth. Until the first World War, Arizona had received large annual immigrations of Easterners whose fertility increased the birth rates between 1915 and 1935, causing a wave of young persons to become of employable age during 1930-1950.

In July, 1949 there were 3,818 persons looking for jobs in Tucson; of these 1,151 were skilled and 763 were rated semi-skilled.[1] It is obvious that a labor force of 327 persons required to run a plant of 60,000 spindles and 1,400 looms would be easily obtained in Tucson. The number and kind of labor required for such a plant are shown in Table V.

Labor Skills: Cotton textile industries requiring specialized or highly-trained labor generally have a concentrated and rather stable pattern, clustering at points where such a labor supply has developed. Eventually the processes of the industry become routinized through technical and

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1. Information obtained from the Tucson office of the Arizona State Employment Service.

TABLE V

LABOR REQUIRED FOR PROPOSED COTTON MILL OF 60,000 SPINDLES AND 1,400 LOOMS

Department and labor required	Department total
CARDING DEPARTMENT	61
1 overseer	
1 second hand	
Opener room	
1 man on openers	
1 waste man	
1 oiler	
Card room	
2 card grinders	
4 card tenders	
2 card strippers	
2 fly frame fixers	
4 slubber tenders	
6 intermediate tenders	
14 fine frame tenders	
Picker room	
2 picker tenders	
1 picker fixer	
4 doff hands	
1 drawing fixer	
7 drawing tenders	
2 oilers	
1 sweeper	
2 roving men	
2 scrubbers	
SPINNING DEPARTMENT	79
1 overseer	
8 filling doffers	
4 section men	
4 oilers and banders	
1 winder hand	
4 sweepers	
2 scrubbers	
2 second hands	
6 warp doffers	
42 spinners	
1 twister hand	
3 roving men	
1 timekeeper	
SPOOLING AND WARPING DEPARTMENT	16
1 second hand	
1 beam man	
2 yarn men	
1 Creel hand	
2 warper tenders	
8 spooler hands	
1 elevator man	
WEAVING DEPARTMENT	109
1 overseer	
20 battery hands	
16 loom fixers	
4 pick-out hands	
2 filling men	
6 quill men	
3 sweepers	
1 timekeeper and cloth checker	
35 weavers	
2 second hands	
4 smash hands	
2 oilers	
5 cloth haulers	
3 scrubbers	
2 loom cleaners	
3 blow-off men	

TABLE V (cont.)

Department and labor required		Department total
SLASHING AND DRAWING-IN DEPARTMENT		10
1 foreman	3 slasher tenders	
2 tie-in machine operator	1 size and beam man	
1 draw-in " "	1 harness cleaner	
	1 drop wire stringer	
CLOTH ROOM		18
1 overseer	1 second checker	
1 press man	2 folder men	
2 head graders	4 graders	
6 inspectors		
SHOP AND YARD		28
1 master mechanic	1 second hand	
1 electrician	1 motor man	
1 oiler	1 humidifier man	
2 roller coverers	5 machinists	
2 carpenters	1 fireman	
1 coal passer	1 laborer	
2 night watchmen	1 day watchman	
1 supply clerk	6 yard hands	
OFFICE		6
1 superintendent	1 paymaster	
	4 clerks	
GRAND TOTAL		327

Source: W. Gerald Holmes, Plant Location (New York: McGraw-Hill Book Co., 1930), pp. 167-168.

managerial improvement so that ordinary labor without special training can be used. The normal result is that the industry spreads or moves to other areas. Its dispersion from the original centers is hastened by the relatively high wages and inflexible conditions established there by the skilled elite.

Industries such as cotton spinning, which demand relatively little skill and capable of quickly training help, are free to locate almost anywhere so far as labor supply is concerned. Country people, Mexicans and Indians of Arizona are quick to leave the tilling of the soil and seek factory work near their homes. In general they are ambitious, steady and thrifty, and often make highly satisfactory employees; though it should be noted that many of them, not used to confinement and close application, fail at factory work. The need for highly skilled personnel could be filled by encouraging them to migrate to Arizona; this might be accomplished by direct subsidies, though in many cases results may not justify the costs involved.

Another inducement to labor movement to Tucson is the fine climate; this is partly offset by residence and seniority requirements for eligibility to relief assistance or [illegible] work, which would help discourage labor migration to Arizona. When a change of residence automatically involves loss of claim to relief and seniority status, potential migrants might well hang back, even with better jobs in sight elsewhere.

Cost of Labor: Cotton textile manufacturers have become accustomed to looking for savings in labor cost more than in other factors of production. Labor is constantly urging higher wages and, as a rule, labor accounts for a large part of total production cost.

One characteristic of a Tucson local labor force which might influence production costs, independently of skills, is the size of the group within reasonable distance. The principle of "massing of reserves" (being able to get extra help from Phoenix on short notice) can be applied to the economy of the local labor market.

In localities dominated by one industry, that industry tends to set wages. In order to get labor, other manufacturers are compelled to adopt similar scales for comparable skill. For example, textile manufacturers in California would compete for labor not only with each other, but also with all other types of manufacturers. No person who is able and willing to shift from one industry to another will work for a low wage in textiles if he can obtain more in another line. Therefore, California textile manufacturers must pay a wage which approximates that paid for comparable work in other industries in that section, many of which are quite profitable and able to pay high wages.

The Tucson manufacturer also would have to obtain his labor supply by competing with other employers, but this competition arises chiefly from agriculture. This is the

source of the Arizona manufacturer's advantage. To attract sufficient workers he needs only pay a wage as high as, or slightly above, that received from farm work. That is to say, California textile wages would tend to be high because wages in other industries are high; Arizona textile wages would tend to be low because agricultural wages are low.

Locations with high wage rates do not necessarily attract job seekers or repel employers. The employer is interested essentially in low processing costs, which depend on labor productivity and also on good utilization of fixed investments, and on how the local labor supply lends itself to improvements in production techniques. Employees, on the other hand, should be and usually are interested in the long-run living standard that their annual earnings will buy. This involves, in addition to wage rates, living costs, stability of employment, agreeable working and living conditions, and opportunities for advancement.

Tucson has one outstanding drawing card, its climate; on the other hand, the general opinion is that the cost of living in Tucson is higher than the United States average.[2] In view of this, assuming it to be true, labor would desire more wages to compensate for higher living costs.

It is impossible to compare wages for cotton textile

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2. There are no available statistical data on cost of living in Tucson as compared with various other cities of the nation.

workers here with those in the South, since there is not a single cotton-processing plant in Arizona. However, a comparison of wage rates for farm labor in Arizona, Texas and California with those in South Carolina, Georgia, Alabama, and Mississippi is given in Table VI. This table shows that as you go West, wages tend to become higher. This variation might be done away with by the introduction of the federal minimum wage law, which would put the southern states on the same level as the Southwest. It is true that government action has helped to further geographic equalization of labor standards and costs.

Labor Laws and Legislation: The labor laws and other regulations of a community or of a state determine to a great extent the amount of freedom a manufacturer might have and the amount of a day's work and number of days a week for a laborer. Fifty years ago industry was practically unrestricted by laws which differed from state to state.[3] Long hours were considered an opportunity rather than a hardship, and little had been thought of workmen's compensation.

Twelve states now have laws making workmen's compensation compulsory: Arizona, California, Idaho, Illinois, Maryland, New York, North Dakota, Ohio, Oklahoma, Utah,

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3. Labor relations and working conditions for a great part of industrial labor are subject to state control. Specific laws within a state can greatly affect these conditions in a very distinct manner, whereas federal law is concerned with the broader aspects of the problem.

TABLE VI

DAILY WAGE RATES FOR AGRICULTURAL LABOR

State	1941	1944	1947	1949	1950
South Carolina, Georgia, Alabama, Mississippi	$ .92	$1.97	$3.06	$3.49	$3.95
Texas	1.36	3.30	4.35	4.75	4.55
Arizona	2.05	4.45	5.70	6.10	5.80
California	2.85	6.90	8.30	8.10	6.90

Source: Bureau of Agricultural Economics, U.S.D.A., Farm Labor (Washington: Govt. Printing Office), January 10, 1950 and earlier issues.

Washington, Wyoming. Arkansas, Florida, Mississipi, South Carolina and the District of Columbia have no legislation on the subject. All other states have laws making it optional with the employer.

Massachusetts mill men have long regarded the advanced labor legislation in their state as a burden which made competition with other states more difficult. Most of the Southern states have lower standards and in some instances no legislation at all. "Not one Southern state has an 8-hour day, 48-hour week law for women, the best provisions being in Arkansas, Louisiana and Texas where the 9-hour day, 54-hour week is found."[4]

In 1936, South Carolina passed a law providing for a 40-hour week, 8-hour day covering all persons employed in cotton, silk or woolen mills; but the law becomes effective only when Georgia and North Carolina adopt the same standards. Until 1933, Massachusetts limited women's work to forty-eight daytime hours per week. This law was recently relaxed under the pressure of competition from the South to permit women to work in the textile industry until ten P.M. Until the law was changed, Northern mills could not operate all departments the same number of hours per day because the cost of employing men for all night work was too high.

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4. H.M. Douty, Wage and Hour Legislation for the South, p. 4.

Restrictions on the use of child labor are also greater in New England than in the South. Standards in other social legislation such as workmen's compensation laws are lower in the South.

Labor laws in Arizona, California, South Carolina, North Carolina, and Texas are summarized in Table VII. California heads the list in unfavorable labor laws and legislation for the manufacturer, followed by Texas, Arizona, South Carolina, and North Carolina. The most favorable laws in these five states prevail in North Carolina. Texas, Arizona, and California have minimum wage laws for minors and women, and special legislation that limits the type and number of hours they can work.

The following quotation from Topical Law Reports, All States shows some of the prevailing labor laws in Arizona.[5]

> Women's and Minors' Minimum Wage Law: It is against public policy for any employer to employ any woman or minor in an occupation in this state at any oppressive and unreasonable wage, and any contract agreement or understanding for or in relation to such employment shall be null and void.
>
> Maximum Hours for Women: Females cannot be employed, except in domestic work, over 8 hours a day, or more than 48 hours a week, the 8 hours to be performed within 13 consecutive hours.
>
> Maximum Hours for Minors: No child under

5. For further information on Arizona labor laws see LABOR LAWS OF THE STATE OF ARIZONA, published by The Industrial Commission of Arizona, Phoenix, Arizona, 1947.

TABLE VII

LABOR LAWS IN SELECTED STATES

Law	Ariz.	Calif.	Texas	S.Car.	N.Car.
Right to organize and bargain	no*	yes*	yes	no	no
Strikes	yes	"	"	"	"
Interference with employment	no	"	"	yes	"
Picketing and boycotting	yes	yes	"	no	"
Sabotage, destruction	no	"	no	"	"
Obstruction of transportation	"	"	yes	"	"
Sunday labor	"	no	"	yes	"
Right to sue or to be sued	yes	no	"	"	"
Liability for damages	no	"	"	"	"
Applicability of anti-trust laws	"	"	"	yes	"
Blacklisting or otherwise hindering employment	yes	yes	no	no	yes
Strike breaking	no	"	yes	yes	no
Walk-outs	"	no	no	no	"
Minors under 21	yes	"	"	yes	yes
Bribery of union officials	no	"	"	no	no
Establishment of minimum wage rates by order	yes	yes	no	no	no
Equal pay for women	no	"	"	"	"
Minimum pay for male employees	"	no	"	"	"
Legal day's work	"	yes	"	"	"
Minors under 18	yes	"	yes	"	yes
Minors under 14	"	no	no	"	no
Day's work	8	8	9	10	10
Hours per week	48	48	54	55	56

*The word "no" indicates that there are no constitutional or statutory provisions in the law of that state relating to the particular topic. The word "yes" indicates that there are such constitutional or statutory provisions.

Source: Topical Law Reports, All States

> 14 shall be employed in any occupation at night, or for more than 8 hours in any day. Nor shall a child under 14 be employed in any gainful occupation at any time during the hours in which the public schools of the district in which the child resides are in session.
>
> No boy under 16 and no girl under 18 shall be employed or suffered to work at any gainful occupation other than domestic service or work on a farm, more than 48 hours in any one week, nor more than 8 hours in any one day; or before 7 A.M. or after 7 P.M.

Labor Organization: Labor organization is not peculiar to any part of the country; it is widespread in all lines of cotton manufacturing. Typically it appears to follow labor discontent rather than to create it. While many plants have been relocated to get away from its influence, most manufacturers consider it no disadvantage under ordinary conditions. It is an admitted fact, however, that organized labor is an effective force tending to raise wages, to reduce work load, and to sponsor the passage of labor legislation. Because Tucson is not well developed industrially, it does not have as much labor organization as is found in the East or in California.

The Market

In this section an endeavor will be made to analyze the marketing of cotton textiles and determine its effect on plant location in Tucson. Since market analysis is properly a subject by itself, affording almost unlimited possibilities for study and research, it can be dealt with but briefly here.

Markets and the Location of Industry: Locational patterns of cotton textile industries strongly reflect the influence of the flow of commodities through the marketing system. Each stage in the distribution process involves new markets. Some are ultimate consumers, and others are intermediary organizations that handle the commodities either for ultimate consumer use or for further processing and distribution. The organization of marketing may help to determine the best location for a cotton manufacturing plant. Reduction of a number of middlemen, for example, would have a profound effect as would also a change in the type of middlemen. Cotton textile manufacturing and other economic activities are continually readjusting themselves to market demands. These markets in turn reflect the influence of such factors as general marketing organizations and practices, nature of the finished product, location of the immediate consumers, regional levels of income, consumer tastes and habits, and trade barriers at home and abroad. A discussion of markets as a locational determinant for cotton textile plants accordingly must resolve itself into a study of the ways in which these factors mold market structure and so influence the choice of a location for the individual concern.

Marketing of Cotton Textiles: To handle the products of textile mills, a system of brokers, converters and selling agents has become established. Brokers operate on

commission, selling cloth or yarn for mills or securing supplies for purchasers. Converters make their own contacts with the wholesale and garment-manufacturing trade, and buy goods for finishing to their own specifications by independent finishing companies. Converters are the merchandisers of the industry; they determine consumer demands and transmit those demands to the mills through the prices they bid for various types of grey goods. On occasion, converters have commissioned mills to produce certain products and have financed the purchase of necessary machinery.

The relationship between selling agent and mill is more permanent, since he usually handles all the sales of the mill for which he is agent. He does not confine himself to one establishment or a group of mills, but usually has a number of clients from whom he receives a commission based on volume of goods sold. The selling agent is in much closer touch with the market than the mill and frequently dictates the type of production, particularly if financial assistance is extended the mill. Some agents sell entirely to converters, while some sell direct to industrial users and others.

The use of the selling agent dates back to the beginning of the cotton processing industry when such men often furnished capital for the new mills. The use of agents continued, partly because of tradition and partly because of the financial assistance received. Other advantages are the small expense of agency selling as contrasted with company

selling, and the wider knowledge these agents possess of the marketing problems of the industry. The financial support of the selling agents has been of such importance that many have assumed a large degree of responsibility for operation of the plants. In fact, because the agent's principal interest is in volume of sales, mills have often been encouraged to expand when restricted operation would have been wiser.

For the larger mills, the factor is another influence in marketing. He performs no selling function except of an advisory nature but he extends financial assistance by discounting sales, eliminates credit risks by assuming any losses and making advances on merchandise. For these services he receives a commission of from 1 per cent to 3 per cent on total sales volume, plus 6 per cent interest on advances.[6]

In 1939, 29.3 per cent of cotton broad woven goods was sold to converters, 25.6 per cent to industrial users, and another 24.1 per cent to independent wholesalers and jobbers. About 10 per cent was distributed through the manufacturers' own wholesale offices, and an equal proportion to retailers. When these over-all figures for broad woven goods are broken down into grey goods, finished goods, and fabricated products

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6. Deane W. Malott and Boyce F. Martin, The Agricultural Industries (New York: McGraw-Hill Book Co., 1939), pp. 193-194.

a somewhat different picture is seen. Thus almost half the grey goods was sold to converters, while less than 2 per cent was sold directly to or through retailers. For fabricated products the situation was reversed, with more than one-third sold to retailers. For cotton narrow fabrics and cotton yarns, direct sale to industrial users constitutes more than three-fifths of the total sales. The use of other channels is relatively insignificant.

It is clear that producers make practically no sales directly to consumers at retail. This is not surprising in view of the relatively small value of most textile products and the attending inconvenience of direct selling to consumers. Except for sales to industrial users, distribution at later stages of processing is primarily through wholesalers and jobbers, with many producers of fabricated products and narrow thread having their own wholesale offices.[7]

Arizona and West Coast Markets: In Arizona the demand normally parallels the trend of industrial production. The major factor influencing the total demand for cotton textile products here is the level of income of consumers. Demand for cotton textiles increases as income expands, but not at

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7. Jules Backman and M.R. Gainsbrugh, Economics of the Cotton Textile Industry (New York: National Industrial Conference Board, 1946), p. 73.

quite the same rate.[8]

The potential market for a consumer's commodity is most commonly estimated from some of the following indexes, either singly or in combination, selected and correlated to fit the particular conditions as nearly as possible:

Population factors
- Total number of individuals
- Number of families

Wealth factors
- Value added by manufacture
- Value of crops
- Bank deposits

Standard of living factors
- Income tax returns
- Home tenure
- Number of residence telephones
- Total population with electricity available
- Number of domestic customers using gas and electricity
- Number of new passenger automobile sales
- Magazine circulation

Market outlets
- Number of wholesale outlets
- Number of retail outlets[9]

8. Demand for dresses illustrates changes which occur. According to a survey by the Cost of Living Division, Bureau of Labor Statistics, women in the lowest income group ($500 a year) bought six dresses in four years. In the group with incomes of $1,000 women bought ten dresses in four years. In both cases, half the purchases probably were cotton house dresses. It was estimated that "With another doubling of family income ... to about $2,000 there is a trebling of the average expenditures on dresses. Most of the increase goes for silk, rayon and wool dresses. But the expenditures per capita for women's cotton dresses doubles, and the number of cotton dresses purchased increases by about two-fifths." Ibid., p. 51.

9. W. Gerald Holmes, Plant Location (New York: McGraw-Hill Book Co., 1930), pp. 21-22.

For the purposes of this study, population will be used as a basis for estimating the market for cotton textiles produced at Tucson. This can be done by multiplying the population by the pounds of cotton consumed per capita annually to get estimated consumption in total pounds. Then this figure is converted to bales of cotton by dividing the estimated pounds by 500, the average weight of American cotton bales.

Although the states of Arizona, Nevada, Utah, Montana and New Mexico comprise a relatively large area, the population is quite small. The states of Arizona, California, Oregon and Washington are considered as offering the greatest potential market because of their population. The total market potential in this entire area and in each of these states is shown in Table VIII. On the basis of this estimate, this area would furnish a potential market for products processed from 629,120 bales of cotton annually.

A cotton manufacturing plant in Arizona should not attempt to compete in the Eastern or Mid-Western markets, but should concentrate on the Western states mentioned above. Table IX and Figure 3 show that cotton goods manufactured in the New England or Southeast states would be distributed and transported to their markets at a lower rate per ton-mile (these states fall in the Southern and Official territories) than cotton goods of a Tucson plant, which would move to market under rates for the Western territory. Freight

TABLE VIII

MARKET POTENTIAL FOR OUTPUT OF A TUCSON COTTON TEXTILE PLANT

State	Population	Per capita consumption of raw cotton per year*	Total estimated consumption Pounds	Total estimated consumption 500# bales
Washington	2,582,000	20 lbs.	51,640,000	103,280
Oregon	1,736,000	"	34,720,000	69,440
California	10,665,000	"	213,300,000	426,600
Arizona	745,000	"	14,900,000	29,800
Total	15,728,000		314,560,000	629,120

*U.S. average for 1931-35; the figure for 1949 was 22.6 pounds. With an increasing tendency toward the use of synthetic fibers, it appears that 20 pounds would not be an unreasonable figure to use.

Source: Population estimates for July, 1949 from Bureau of Census; per capita consumption of raw cotton from Rayon Organon (New York: Textile Economics Bureau, Inc., March, 1950), p. 43.

TABLE IX

FIRST CLASS FREIGHT RATES
(in cents per hundred pounds)

Miles	Territory		
	Official	Southern	Southwest
100	62	79	90
150	73	96	107
200	80	112	123
250	90	125	135
300	96	134	147
400	109	156	172
500	122	173	196
600	135	189	220
700	149	206	244
800	160	222	263
900	171	235	282
1000	182	249	300

Source: Earl C. Hedlund, "The Transportation Economics of the Soybean Processing Industry," unpublished Ph.D. thesis, University of Illinois, 1948, p. 220.

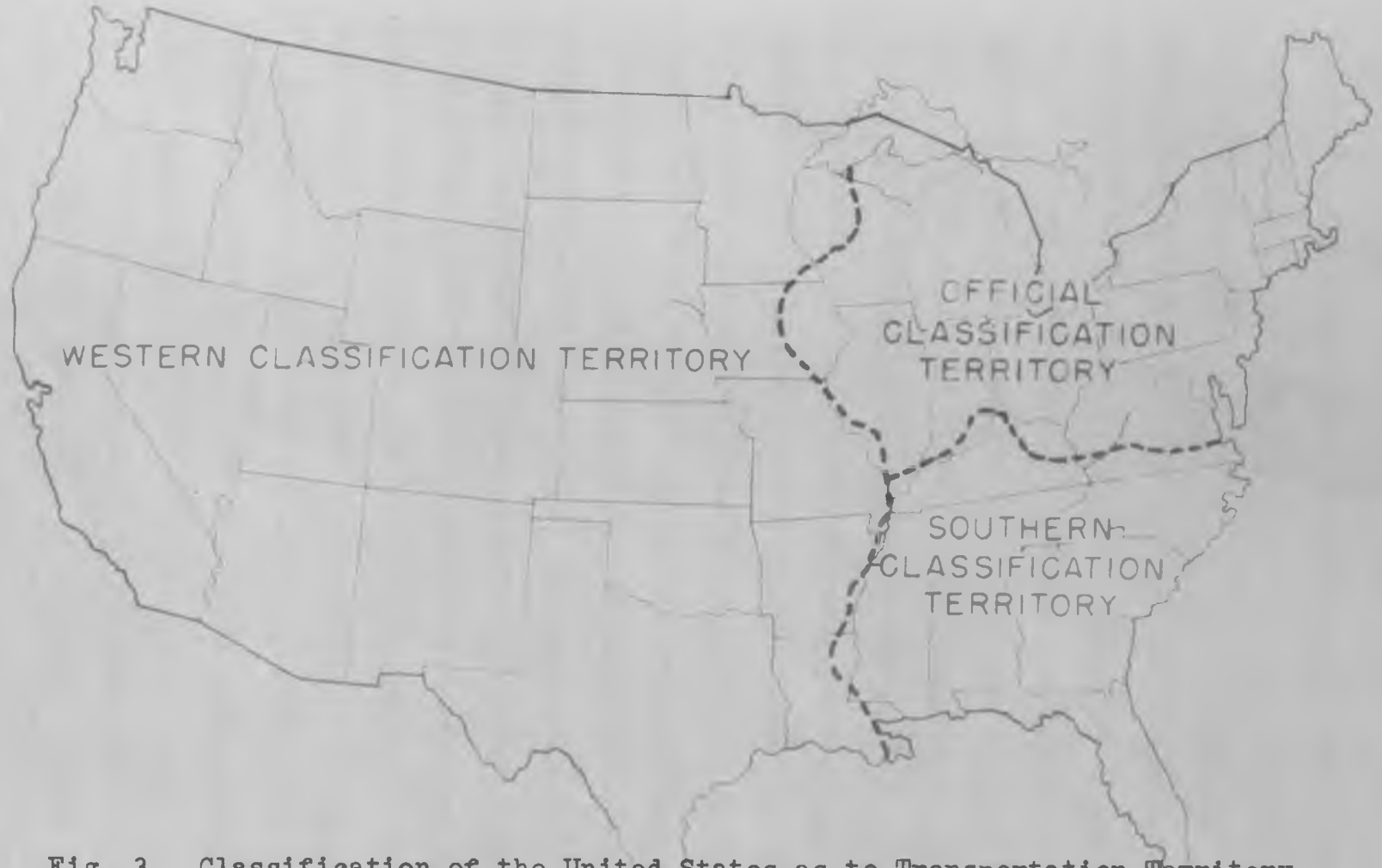

Fig. 3. Classification of the United States as to Transportation Territory

Source: Earl C. Hedlund, "The Transportation Economics of the Soybean Processing Industry," unpublished Ph.D. thesis, University of Illinois, 1948, p. 225.

rates are given detailed consideration in the section on transportation.

The population in Arizona is classed as the low-income group, since average individual income is much lower than that of the United States as a whole.[10] Also, a large percentage of the people are of Indian, Spanish and Mexican descent who would not be good potential customers for cotton textile products. As to exporting manufactured goods to Mexico, this is practically impossible because of political trade barriers such as the rate of money exchange and other import limitations imposed by the Mexican Government.

A study made by the Chamber of Commerce, Kern County, California, in 1948 of the kind of fabrics for which there is a market in California and the Pacific Southwest states showed that twenty-five items[11] were in demand but the greatest demand was for sheeting, print cloth, and duck. Most of these items could be manufactured from Arizona cotton, Acala 44 being best adapted for these purposes. The three above-mentioned items consist of a number of different cloth constructions within the same classification, but they are generally within the classes of staple fabrics which are

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10. Arizona Progress, October, 1949.

11. The following items were listed: Sport denim, broadcloth, duck, Madras, marquisette, sateen, gabardine, osnaburg, sheeting, muslin, gingham, flannels, percale, seersucker, batiste, twills, drills, corduroy, collar cloth, lawn, pique, poplin, paintcloth, terrycloth.

sold on a highly competitive basis. The sheeting item consists mostly of narrow sheeting used for other than household purposes. Corduroy is in great demand both for work clothing and for sportswear, but its production in Tucson would not be logical since it requires special equipment and experience, both in the weaving and finishing.

Transportation

Transportation and Location of Industries: With the potential market for a cotton manufacturing enterprise analyzed, the problem of locating a cotton textile plant in Tucson turns naturally to a study of transportation costs and facilities and the ways in which they may be utilized to the greatest advantage. Transportation facilities constitute the potential means by which raw materials may be assembled and finished goods distributed. Transportation charges for grey goods and raw cotton determine in what ways and to what extent existing facilities may be used, and indicate whether a Tucson plant would be at a disadvantage compared with other plants in California, the Southeast, and New England. Today more than ever before the costs of getting raw materials to the factory and of shipping finished goods to the consumer merit analysis and study in the choice of a plant location.

The procurement costs of raw cotton can be lessened by moving closer to the point of production, whereas distribution

costs of the finished cloth can be lessened by moving closer to the consuming markets. These two considerations are quite likely to lead in different directions, so the producer must strike a balance of relative advantages in order to decide where best to locate along the route connecting his materials source with his market.

The best location is that involving the smallest total transfer cost. In Figure 4 the topmost gradient represents total transfer cost for the various possible processing locations. For the case shown, it is clear that transfer costs are less at the source of the material. Closer examination shows this is true because the gradient of procurement cost as drawn here is much less steep than at any other point in the distribution and very low relative to the gradient of distribution costs. Thus, supposing that three tons of cotton are required for each ton of finished product, the appropriate gradients to compare are those showing the costs of moving three tons of raw material and one ton of product.

It is evident that a process entailing a larger volume of materials than of products is likely to be more influenced by considerations of nearness to materials sources. Hence in processes where there is a considerable loss of weight through combustion or waste of part of the material, the industry is likely to be located close to the source of the material. Cotton manufacture should be located near the market (all other factors of production being constant),

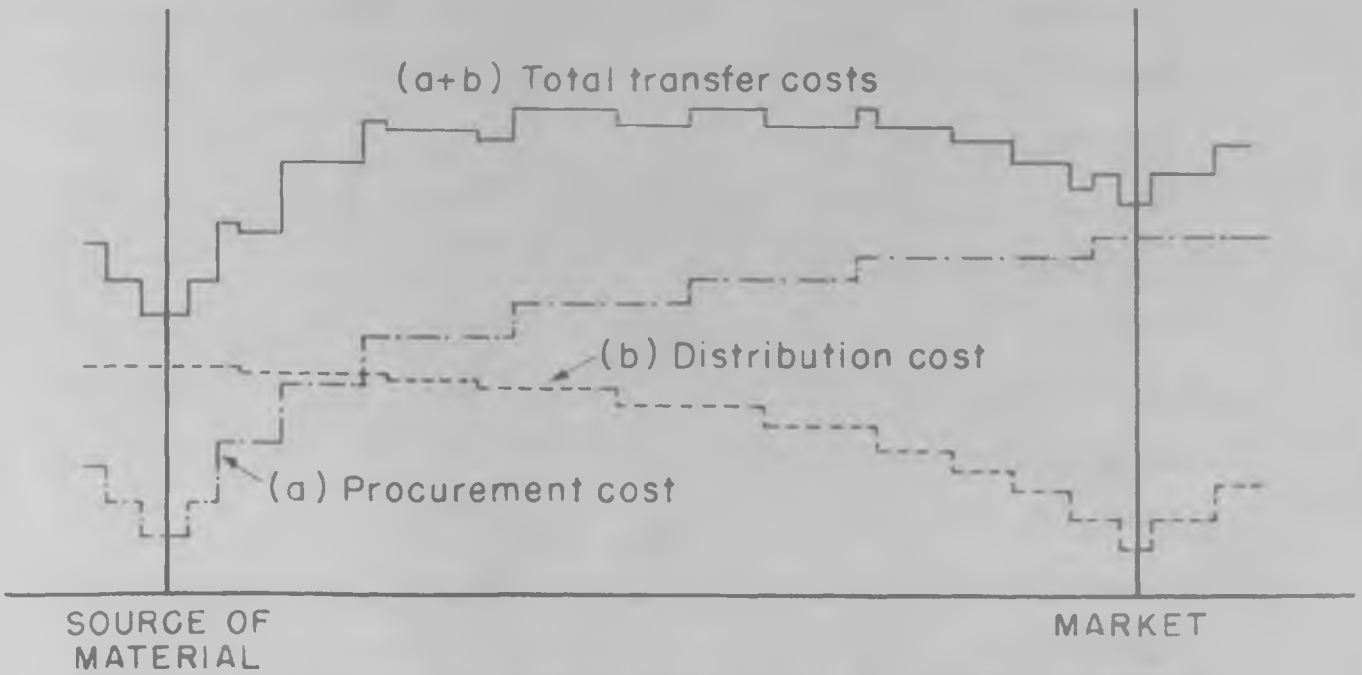

Fig. 4. Gradients of Procurement Cost, Distribution Costs, and Total Transfer Costs per Unit of Production for Processing Locations along a Route Between a Source of Material and a Market

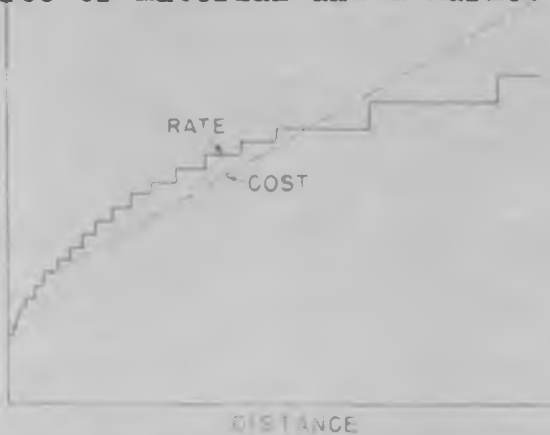

Fig. 5. Transport Cost-Distance Relationships and Freight Rate Progressions. (This sketch is drawn up on the assumption that the competition of alternative means of transport requires rates to be low in relation to costs for the shortest and the longest haul, as seems to be the case with carload rail traffic.)

Source: Edgar M. Hoover, The Location of Economic Activity (New York: McGraw-Hill Book Co., 1948), p. 30 for Fig. 4 and p. 21 for Fig. 5.

as the net loss in cotton is only 9 per cent of its weight, and such a waste does not warrant the industry's locating near the source of raw material because it costs much more to ship 91 pounds of grey goods than to ship 100 pounds of raw cotton. This is true because rates are based quite largely on the "ability to pay" or the "charge what the traffic will bear" principle. Also, the value of services is generally higher because of the need for more careful handling of the grey goods than of cotton bales.

Orientation to materials is also found when the relative weights of materials and product are roughly equal, but procurement costs per ton-mile are for some reason greater than distribution costs. An example is the ginning and baling of cotton. Since seed cotton is hauled from the farm to the gin, there is no weight loss; but after ginning the cotton is compressed into more compact bales, which take a lower freight rate. Cotton gins are thus more economically located near their materials, which means they are scattered at fairly short intervals throughout the cotton belt. Orientation to markets may be based either on a "weight gain" in the process or on higher transfer costs per ton-mile on finished products than on raw materials. In reaching the Pacific Coast market, distribution costs are higher per ton of finished product than procurement costs per ton of raw cotton because of the differential distances involved in market and production location relative to processing location. This means a tendency

toward greater market orientation of the industry.[12]

Improvements of processing methods in cotton manufacturing have altered the balance of advantage between market and material orientation in specific lines of production. The locational effect of a technical change increasing the yield of products relative to materials is, of course, generally an enhanced attraction toward markets.

Cost of Transport: The importance of freight-rate structures in the problem of locating a cotton plant could scarcely be overstated. There are times when a distance of a few miles makes a prohibitive difference in transportation charges. At the other extreme of conditions, there are times when a plant may be located anywhere within an area of hundreds of square miles and enjoy the same advantages in most of its shipping as though it were situated at the point apparently most favorable, geography only considered.

Rate schedules are commonly simplified by grouping the points of origin or destination in blocks or zones, so that a uniform rate applies over a considerable range of distance. Thus the progression of rates from any one point to successive points along a route resembles a flight of steps (see Figure 5, page 69) rather than a smooth ramp, but is somewhat irregular and becomes less and less steep as it ascends. Not infrequently there is a differential in transfer costs

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12. Hoover, op. cit., pp. 17-36.

and rates according to the direction of travel over a given route. In the direction of lighter traffic flow, a relatively low rate may be quoted, since it costs little more to run with a load than empty. An example of this is shown in Table X. It costs only two and one-half times as much to ship 100 pounds of grey goods from Tucson to Los Angeles as it costs from Tucson to Phoenix, although the distance to Los Angeles is four and one-half times that from Tucson to Phoenix.[13]

On any given type of transfer agency, costs generally increase less rapidly than in proportion to distance. This

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13. Trucking has reduced rate differentials between fabricated products and raw materials, and thus has tended to lessen the pull of the market on manufacturing. Highway transportation has diminished the ability of railroads to manipulate rates so as to influence the location of light industry, and the truck has added generally to industry's locational freedom by making non-railway points accessible.

On less-than-carload shipments the truck has a substantial advantage in that less careful packing of goods is required. Added to this are convenience of loading and discharge, time economy, and flexibility arising from the fact that factory-owned trucks may be started on their way at any hour of the day or night. Also, whenever the manufacture of a product is separated into two parts, the former of which brings the joint process relatively near completion, motor trucking of the semi-finished merchandise is a possible economy.

As cities increase in congestion and the advantages of out-of-town factory locations are intensified, motor trucking will come more and more to function non-competitively with the railroads. Many industries build their plants in cities in order to be near their principal market. The modern motor vehicle enables them to retain this advantage and at the same time to seek cheaper land, lower taxes, better living conditions for their employees, and less commuting for their managers.

TABLE X

COST PER HUNDREDWEIGHT OF SHIPPING COTTON GREY GOODS FROM TUCSON TO VARIOUS OTHER CITIES

Destination	Cost	Destination	Cost
Boston	$6.80	Minneapolis	$5.77
Chicago	5.77	New York	6.80
Cleveland	6.31	Philadelphia	6.80
Dallas	4.30	Phoenix	.75
Denver	3.55	Portland, Ore.	4.25
Fall River, Mass.	6.80	San Antonio	4.30
Ft. Worth	4.30	St. Paul	5.77
Houston	4.30	St. Louis	5.21
Los Angeles	1.77	San Francisco	2.42

Source: Mr. Rife, Southern Pacific freight office, Tucson, Arizona.

is primarily because terminal costs and some other expenses are independent of the length of haul.

The amount of grey goods a Tucson plant ships would be small compared with the large volume of raw cotton shipped or large amounts of finished cloth that the big plants in New England or the Southeast send out. All elements of transfer cost per pound are reduced when shipments are larger. Terminal handling costs as well as administrative and sales overhead are hardly any greater for a large shipment than for a small one; larger consignments may even reduce the line-haul costs per ton by permitting fuller stowage or speedier and more direct routing. Especially important is the saving of time and trouble when a whole vehicle can be loaded at one point and unloaded at a single destination. Bulky goods cost more per ton to carry than compact or easily stowed goods, and that is one of the reasons 100 pounds of compact, raw cotton is cheaper than ninety-two pounds of bulky grey goods.

To summarize the theory of transfer costs, it may be said that costs and rates generally are less than proportionately greater for longer hauls on one route, lower in the direction of lighter traffic flow, graduated discontinuously upward with increasing distance, lower for large shipments and large shippers, and lower for compact and easily handled goods and goods of low value in proportion to weight. Transfer costs usually can be reduced by bringing

the seller and buyer closer together on the transport and communication network.

The fact that mills in New England and the southeastern states have to transport cotton to their warehouses from production points while an Arizona factory would "find it at its door" is probably the most commonly heard reason for advocating the establishment of cotton manufacturing here. Arizonans talk much about the saving in transportation costs on raw materials that would be enjoyed by textile mills in this state. The cry, "Bring the mills to the cotton fields" has become a slogan, yet actual facts do not support this picture.

Cotton shipped from Arizona points to Tucson enjoys a half-cent a pound saving over shipping cost to Los Angeles, and one and one-half cents over that to New England. But this advantage of nearness to raw materials is easily offset by the cost and necessity of shipping grey cloth to finishing centers elsewhere. About 90 per cent of such finishing plants are located in New England, with the remainder in the Southeast and in California.

A textile manufacturing plant in Los Angeles or New England would have a considerable advantage in transportation rates on finished cloth over a plant in Tucson. For instance, Table X (page 73) shows that it would cost a Tucson mill $1.77 per hundredweight to ship grey cloth to Los Angeles and $6.80 to New England, while it costs from

TABLE XI

COST PER HUNDREDWEIGHT OF SHIPPING COTTON GOODS FROM NEW ENGLAND STATES AND THE SOUTHEAST

To	From New England	From Southeast
Tucson	$6.20	$5.84
Los Angeles	6.20	5.84
San Francisco	6.20	5.84

Source: Southern Pacific Tariff 160H, Frebruary 15, 1949.

65-93¢ per hundredweight to ship raw cotton to Los Angeles and $1.81 to New England.[14] Although a mill in Arizona would have the advantage of a half cent a pound on raw material over a mill in Los Angeles and one and a half cents over a mill in New England (assuming that Arizona cotton would be used at these points), the Los Angeles mill and the New England mill would have an advantage of one cent and five cents a pound, respectively, on grey goods marketed in their areas over the Tucson firm marketing goods at these points. Thus nearness to raw material in this instance is of no real significance.

But this comparative situation of a Tucson plant could be greatly improved if the grey goods that are made in Tucson could be finished and dyed in Los Angeles and sold there. One might say that a textile mill in Los Angeles would have an advantage over the one in Tucson, as it would save the transportation of grey goods from Tucson to Los Angeles. But it could be that grey goods are not as economically manufactured in Los Angeles as in Tucson because of such factors as labor costs. It is also to be remembered that if this grey cloth could be sold in Arizona or finished and cut in

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14. Mr. Rife of the Southern Pacific Railroad who provided these data commented that the rates are higher than if the industry were here.

It is to be remembered that in the spinning process, raw cotton does not lose much weight. Only under unusual conditions would any article of manufacture move at a lower freight rate than the material from which it is made.

Tucson, there would be less transportation problem. The manufacturing plant would be in the midst of raw material and market, so procurement and distribution costs would be decreased to a minimum. Thus it is clear that, from the transportation point of view, there is no justification for a Tucson plant to manufacture the raw cotton into grey goods and send it to the New England or southeastern states to be finished.

Should a hundredweight of cotton be shipped from Tucson to New England for processing, the cost would be $1.81, and the cost of shipping a hundredweight of the finished goods from New England back to western markets such as Tucson, Los Angeles or San Francisco would be $6.20, or a total cost of $8.01 for the entire process. Comparable figures for the Southeast are $1.59 on raw cotton, $5.84 on the finished goods, or a total of $7.43.

What would the costs be if Arizona cotton was processed in Tucson, shipped to Los Angeles or San Francisco for finishing, and then distributed to various West Coast markets? To assemble Arizona cotton in Tucson for processing would cost about $.30 per hundredweight. Cost of shipping a hundredweight of grey goods from Tucson to Los Angeles is $1.77 and to San Francisco $2.42. If the finished goods is consumed in Los Angeles and San Francisco areas, the total cost of the process for each point would be $2.07 and $2.72, respectively. If the finished goods was shipped back to

Tucson for consumption, the total cost would be $3.84. From this analysis it is clear that grey goods produced in Tucson, finished in Los Angeles or San Francisco, and marketed in the West Coast area would have a transportation advantage of 4.5-5¢ a pound.

Raw Material

The effect of raw material on location has been discussed in connection with transportation and location of industry. This section is devoted to the analysis of the production of cotton in Arizona, the kind and varieties grown, and the spinning quality of the cotton.

Cotton production for the years 1940-49 is shown in Table XIII. The 1950 upland cotton acreage allotment in Arizona was 247,000 acres which will produce an estimated 255,000 bales.[15] Cotton produced in this state increased from 190,194 bales in 1940 to 549,399 in 1949. The yield per acre has increased from an average of 459 pounds in 1940-44 to 518 in 1945-49. In 1949, production in Maricopa and Pinal Counties was 217,765 and 251,287 bales, respectively, accounting for about three-fourths of the crop (see Table XIV).

The grade and staple distribution of the Arizona cotton

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15. Information obtained from Production and Marketing Administration, U.S.D.A., Phoenix.

TABLE XII

TRUCK RATES PER HUNDREDWEIGHT OF COTTON
(low density bales)

From gin point	To Tucson	To Phoenix
Sahuarita	23¢	45¢
Marana	23	41
Casa Grande	26	29
Coolidge	26	29
Safford	48	70
Willcox	41	59
El Frida	62	90
Peoria	57	19
Litchfield Park	48	18
Buckeye	52	22
Chandler	41	22
Eloy	26	29

Radius of points listed	
1-5 miles	3¢
5-10 "	6
10-15 "	7
15-20 "	8

Source: Figures supplied by Arizona Express, Inc., Tucson.

TABLE XIII

ANNUAL PRODUCTION OF RAW COTTON IN ARIZONA,
1940-1949
(running bales)

Year	No. bales	Year	No. bales
1940	190,194	1945	116,046
1941	178,337	1946	155,123
1942	187,703	1947	234,674
1943	128,539	1948	331,415
1944	132,357	1949	549,399

TABLE XIV

PRODUCTION OF RAW COTTON IN ARIZONA
BY COUNTIES, 1948 AND 1949

County	No. of bales	
	1948	1949
Graham	22,203	32,442
Maricopa	119,753	217,765
Pima	19,565	30,768
Pinal	159,505	251,287
Others	10,969	16,981

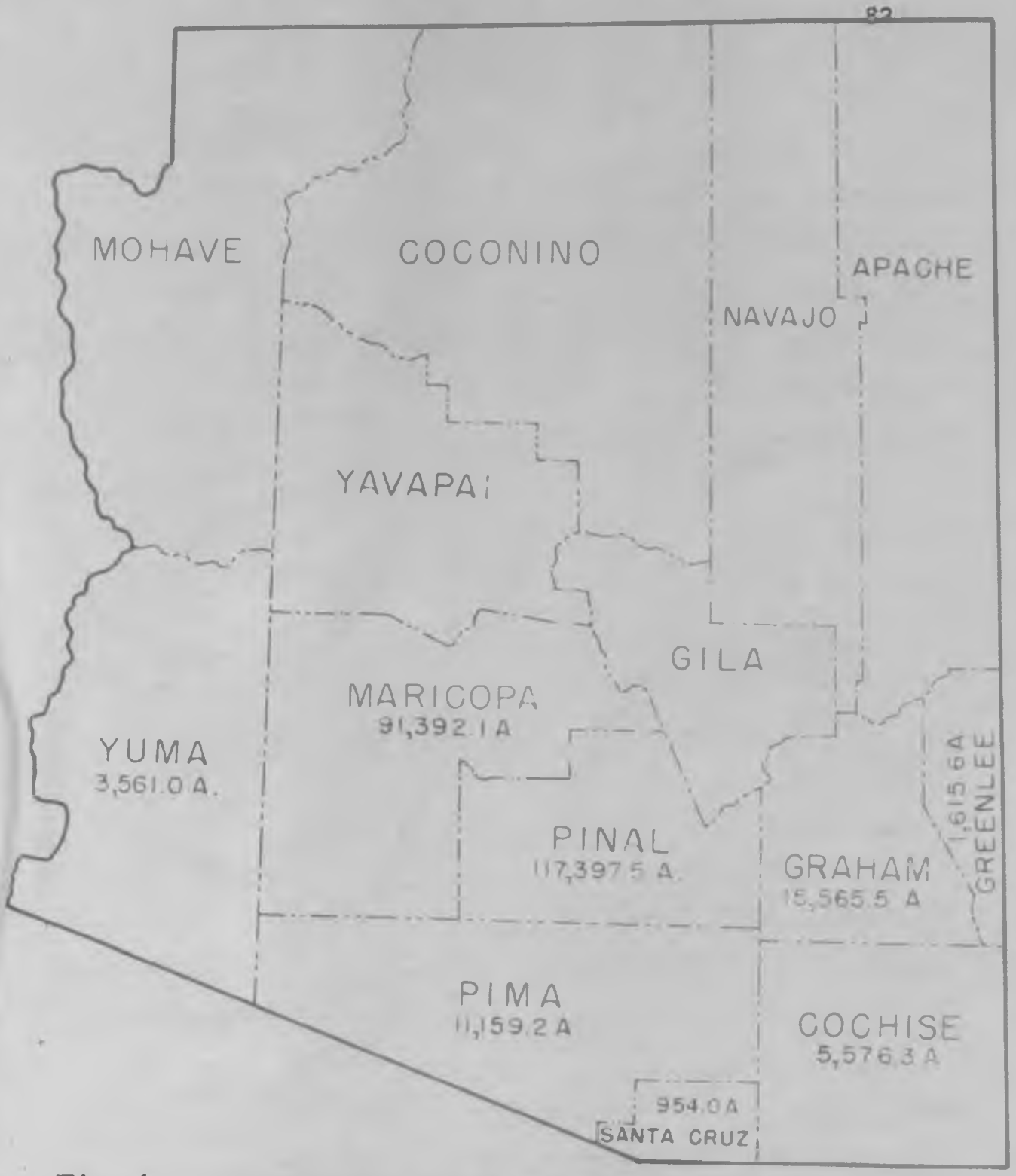

Fig. 6. Arizona Upland Cotton Acreage Allotment by Counties, 1950.

Source: Production and Marketing Administration, U.S.D.A., Phoenix, Ariz.

crop is shown in Tables XV and XVI and Figures 7 and 8. In 1940-44, 35 per cent of the crop was middling compared with 41 per cent in 1945-48 and 43 per cent in 1949. The percentage of good middling decreased from 3 per cent in 1940-44 to 0.6 in 1949. During this same period the percentage of low middling declined from 16 to 6.6 per cent. In 1949, 92 per cent of the crop was distributed in the strict low middling through strict middling grade range.

The staple distribution of Arizona cotton production is concentrated in the 1 through 1 1/16-inch staple range. In 1940-44, 1945-48 and 1949, the percentage of the crop stapling 1 through 1 1/16 inches was 79, 86, and 94 per cent, respectively. In each time period the modal staple length was 1 1/32 inches.

Preliminary data indicate that the modal staple length for Arizona's new Acala 44 cotton will be 1 1/16 inches, or a full 1/32 of an inch longer than the variety produced during the past ten years. Grade distribution on this cotton should be similar to that of the past five years.

Several different strains of the Acala are grown. Over the years this variety has outyielded all other cotton varieties grown in Arizona. Santan and Shafter strains of Acala are highly productive, big bolled, 1 1/32-inch cottons with a high ginning percentage. The characteristics of a number of cotton varieties are listed in Table XVII(page 88). These data have been condensed from the results of many variety

TABLE XV

PERCENTAGE DISTRIBUTION OF ARIZONA COTTON PRODUCTION ACCORDING TO STAPLE LENGTH AND COLOR

Staple length	White	Spotted	Other	Total
	1940-44			
Shorter than 1"	7.7	3.73	.37	11.80
1"	11.43	4.7	.79	16.92
1 1/32"	23.38	9.45	1.15	33.98
1 1/16"	22.86	5.03	.44	28.27
1 3/32"	5.9	.75	.02	6.67
1 1/8" and up	2.01	.26	.03	2.30
	1945-48			
Shorter than 1"	3.08	6.4	2.21	11.69
1"	8.38	9.55	.5	18.44
1 1/32"	38.83	19.35	.02	53.58
1 1/16"	12.44	1.59	-	14.05
1 3/32"	1.6	.07	0	1.67
1 1/8" and up	.56	.02	-	.58
	1949*			
Shorter than 1"				4.4
1"				16.6
1 1/32"				63.8
1 1/16"				13.3
1 3/32"				1.3
1 1/8" and up				.6

*Color classification data for 1949 production not available

Source: Production and Marketing Administration, U.S.D.A., Phoenix, Arizona.

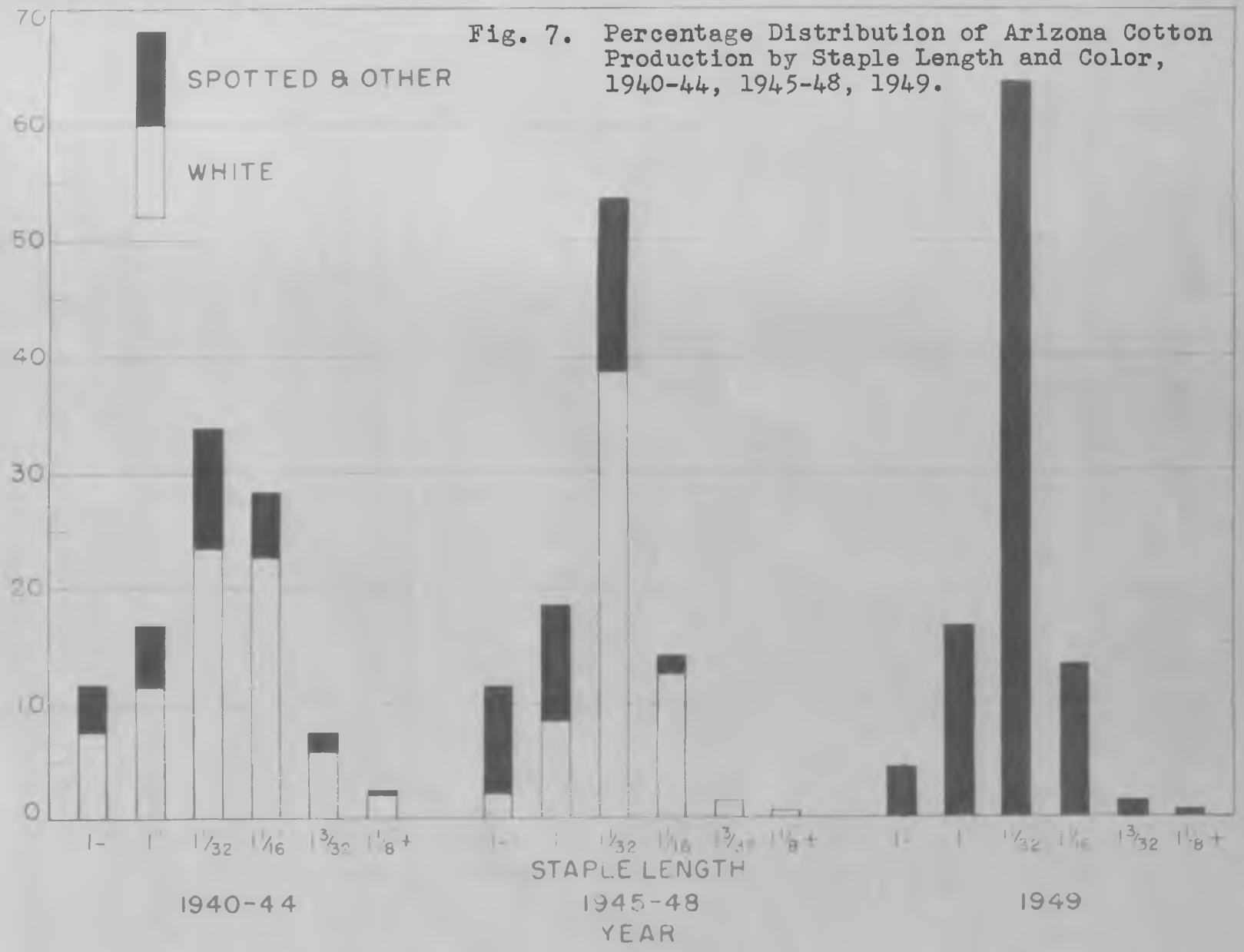

Fig. 7. Percentage Distribution of Arizona Cotton Production by Staple Length and Color, 1940-44, 1945-48, 1949.

Color classification data not available for 1949.

TABLE XVI

PERCENTAGE DISTRIBUTION OF ARIZONA COTTON PRODUCTION ACCORDING TO GRADES AND COLOR

Grade	White	Spotted	Other	Total
		1940-44		
GM or better	.71	2.2	.08	2.99
SM	16.58	9.52	.84	26.94
M	26.75	6.67	1.7	35.11
SLM	14.59	3.55	.13	18.27
LM and lower	14.66	1.98	.04	16.68
		1945-48		
GM or better	.36	1.3	.01	1.67
SM	16.46	10.9	.36	27.72
M	28.18	12.08	.91	41.17
SLM	12.76	5.28	.77	18.81
LM and lower	7.13	2.42	1.08	10.63
		1949		
GM or better	0	.6		.6
SM	4.0	10.6		14.6
M	36.8	6.3		43.1
SLM	32.6	2.2		34.8
LM	4.9	1.7		6.6

Source: Production and Marketing Administration, U.S.D.A., Phoenix, Arizona.

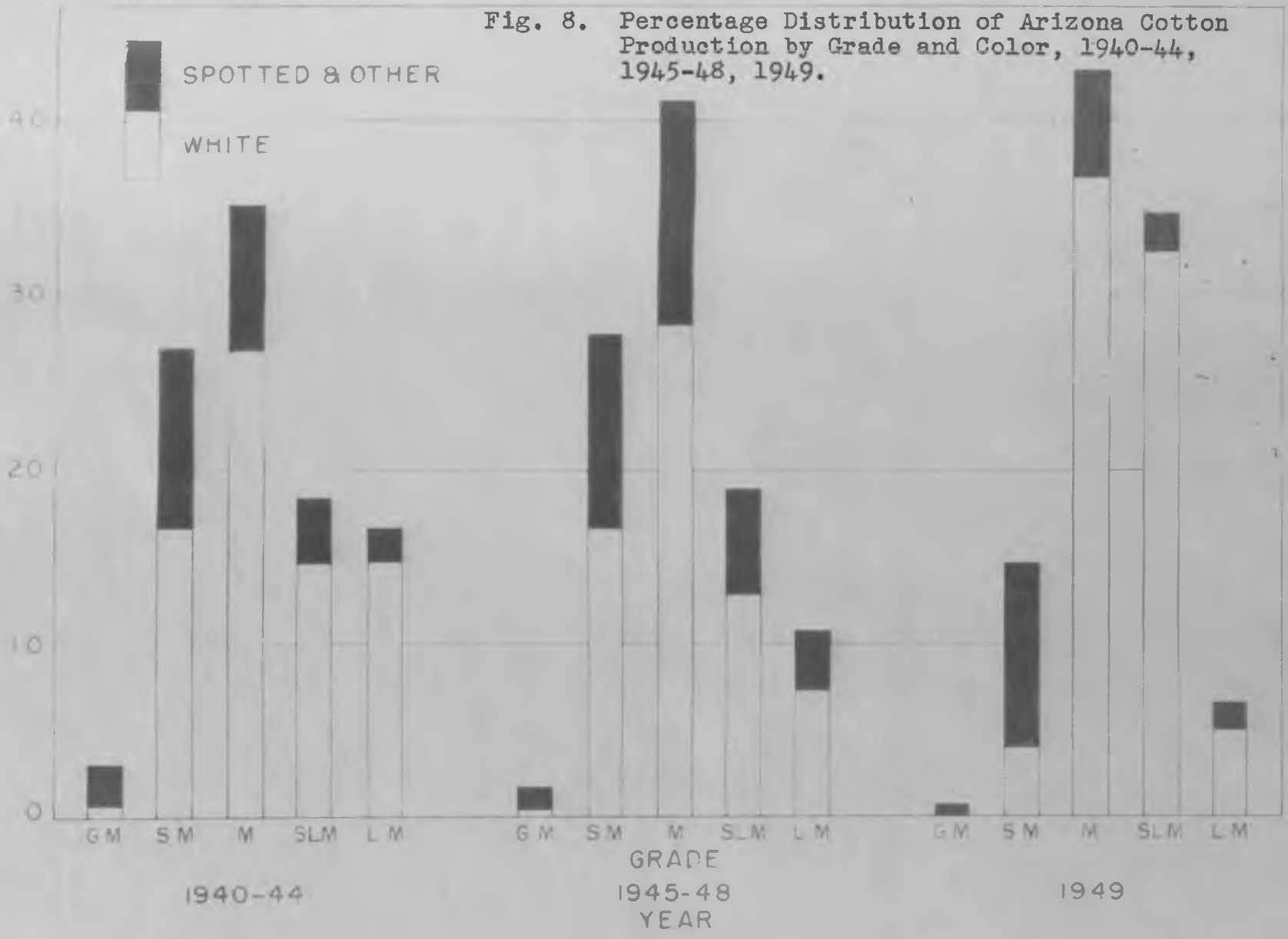

Fig. 8. Percentage Distribution of Arizona Cotton Production by Grade and Color, 1940-44, 1945-48, 1949.

TABLE XVII

CHARACTERISTICS OF SOME COTTON VARIETIES

Variety	Ave. yield, good land	Ginning percentage	Staple (inches)	Boll size	Remarks
Acala Santan	1 bale	High, 39%	Medium, 1 1/32	Extra large	Good for central Ariz.
Acala Shafter	"	"	"	Large	" "
Acala 1517	"	Medium, 35%	Long, 1 1/8	Medium	Extra fiber quality
Acala W 29	"	"	"	"	Wilt resistant
Ewings 1 1/5	1¼ bale	" ,33%	Medium, 1 1/16	Small	Late, hard to pick, yields more seed cotton
Coker-Wilds	½-3/4 bale	Low, 30%	Extra long, 1 1/4	Medium	Must arrange for selling at a special price before growing
Paula C	1 bale	38%	Medium, 1 1/32	Large	Very early
Delta Pineland	"	Very high, 40%	"	Small	Early, but bolls are small
Stoneville a-B	"	35%	"	Large	Early, but yields less than Acala
Arizona 44	"	38%	" , 1 1/16	"	Medium maturing, good for central Arizona

Source: W.I. Thomas, Upland Cotton Production in Arizona (Tucson: University of Arizona, Agricultural Experiment Station Bulletin 214, March 1948), p. 5.

tests.

Before World War II about half of the cotton produced in the southwestern irrigated areas was sold for export to Japan. Though that market was lost, the demand for cotton was so great during the war years that the loss was not felt. Continuing government loans on cotton have been another factor providing a market for southwestern cotton. It is not good economy for such an extensive industry as cotton to be dependent for markets on foreign sources, which generally have declined at high rates in recent years, or on such artificial means as government controls.

Much of the cotton from Arizona and other southwestern states has sold at a discount in relation to other cottons of the same grade and staple. The discount is caused by the poor spinning quality of the cotton, whether real or imaginary. The main complaints against irrigated cottons have been neppiness, rough appearance of the final yarn produced, excessive waste, poor dyeing properties, excessive fly, and lack of strength.

Lack of fiber strength has been corrected in certain areas following the discovery of New Mexico 1517, California 4-42, and Arizona Acala 44 as commercial varieties. Other criticisms of irrigated cotton have been largely corrected in Acala 4-42 and 44, except for neps and dyeing properties.

> Although the nep content of these new cottons is lower than that of the old California Acala, it is still higher than that of the Memphis territory

> cottons. Both manufacturing waste and the "general running" of these new strains compare very favorably with Memphis territory cotton. A very common statement voiced by a number of mill buyers was, "California 4-42 is fine except for the neps. Lick the nep problem and you would really have something."[16]

The kinds of cloth that could be made from such cottons as Acala 44 are print cloth, sheetings, broadcloth, cordage, and others. The final selection of a group of fabrics to be made by a mill is influenced by manufacturing limitations as well as by the market demand for various constructions. It is necessary to give the mill the longest possible runs, and at the same time provide enough variety to supply the demands of the market. To comply with these requirements, the range of yarn numbers must be kept within reasonable limits to prevent undue reduction in spinning capacity, and width of fabrics must be fairly uniform so that loom capacity will not be wasted by weaving narrow fabrics on wide looms or by having the looms too narrow to weave what the market demands.

Taxes

The tax burden of cotton mills consists of federal, state and local taxes which become part of the cost of doing business.

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16. Scott Hathorn, Jr., Spinner Opinions of Irrigated Cotton, (Tucson: University of Arizona, Dept. of Agric. Econ., Agric. Expt. Sta. Report No. 99, June 1950), p. 7.

Federal: There are no excise taxes for cotton textile manufacturers, but there is a corporation income tax, as follows:

Income of $50,000 and over	38%
$25,000-$50,000	35
20,000- 25,000	25
5,000- 20,000	23
0- 5,000	21[17]

If the cotton textile plant is not incorporated (which is unlikely), then it would have to pay personal income tax.

State and Local: Besides the state tax, which is the same for all parts of the state, there are county and city taxes for plants inside the city limits; plants outside city limits are exempt from city tax. There is also a city school tax, which usually is higher than school district taxes outside city limits. Some states such as California and Arizona have personal income taxes in addition to those of the Federal Government. Also to be remembered are the sales and general property taxes, which vary among states.

Although federal taxes apply to all mills, the tax cost of state and local levies varies among states and among different localities within a state.

Income and Property Taxes: A tax that becomes a fixed cost regardless of output, such as the general property tax, has about the same effect as a higher interest rate. It

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17. Information furnished by Dr. P.G. Hudson, Assoc. Professor of Economics, University of Arizona.

penalizes localities where plant and equipment are less fully utilized, and may lead the producer to seek a location where less capital investment is required per unit of output. Thus a combination of tight restrictions on overtime work, night work and speed-up procedures, with a large degree of reliance on general property taxes for local revenues may be doubly burdensome to industry. General property taxes may also be a threat to solvency in periods of poor business, and may contribute to weakening a producer's competitive position.

The desirability of a cotton manufacturing location as affected by taxes depends not only on the rate, but also on the form of the tax. The general property tax in practice is based largely on decisions to maintain or develop structures and other improvements, and high rates will discourage such maintenance and development. An income tax is not usually considered a cost in quite the same way as a property or license tax, yet it cuts into returns and can affect the location of business ventures if the state rates are high.

General Property Tax: The general property tax in a number of states would have been larger had the income tax not been adopted; and the income tax probably relieved taxation on personal property and intangibles more than on real property. These matters should be weighed carefully by those responsible for locating a cotton textile plant, which is likely to pay either a large property tax or a large income tax.

Cotton Processing Tax: In addition to income and property taxes, there is a federal cotton-processing tax levied on all cotton mills of 4.2¢ a pound upon the first domestic processing. It has been charged, on the one hand, that this tax by being pyramided from stage to stage in the process of manufacture and sale is unduly burdensome upon the consumer. On the other hand, it is argued that the industry has been unable to pass the tax on to the consumer and therefore is placed in a serious predicament.[18]

Taxes in Tucson: The amount of taxes, both inside and outside city limits, of six southwestern and one southeastern city of about the same size are shown in Table XVIII. From these figures it is clear that Phoenix holds a very poor comparative position, while Tucson stands highest in the amount of taxes levied on manufacturing industries. It is probable that if the cotton textile industry did consider moving to the Southwest, it would go to such cities as El Paso, Albuquerque or San Diego rather than to Arizona cities, and especially Tucson whose taxes are almost three times as high as any of the other cities listed.

A Tucson booster might argue that taxes in Greenville, South Carolina are almost as high as ours. But if he will examine Table XVIII closely, he will find that the percentage

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18. Senate Document No. 126, p. 137.

TABLE XVIII

ESTIMATED 1949 PROPERTY TAXES ON MANUFACTURING IN AND NEAR SELECTED CITIES

City	Land & bldgs.	Mach. & eqpt.	Inventories (all kinds)
A. Estimated percentages of assessed value to 1949 price or cost:			
Albuquerque, N.M.	50%	50%	50%
El Paso (state & county)	30	33 1/3	33 1/3
El Paso (city)	65	85	85
Phoenix (state & county)	33 1/3	80	60
Phoenix (city, after November 8, 1949)	70	30	0
San Bernardino	30	30	30
San Diego	35	35	35
Tucson	33 1/3	60	60
Greenville, S.C.	10	42	42

B. 1950 tax rates (per $100 assessed valuation)

	Inside city limits				
	State	County	City	City School	Total
Albuquerque	$0.575	$1.192	$1.2121	$0.5073	$3.4864
El Paso	0.72	1.05	1.75	1.35	3.12+1.75
Phoenix	0.65	0.80	1.14	4.24	5.69+1.14
San Bernardino	*	1.85	1.314	3.06	6.224
San Diego	*	2.16	2.15	1.95	6.26
Tucson	0.65	0.9662	4.0116	6.3392	11.9670
Greenville	*	2.40	5.80	2.80	11.00

	Outside city limits			
	State	County	School district	Total
Albuquerque	$0.575	$1.192	$0.5073	$2.2743
El Paso	0.72	1.05	1.25	3.02
Phoenix	0.65	0.80	3.31	4.76
San Bernardino	*	1.85	3.06+.06 (Riverside)	4.97
San Diego	*	2.16	2.32	4.48
Tucson	0.65	0.9662	1.3732 (Laguna Dist. #4)	2.9894
Greenville	*	2.4	1.3	3.7

TABLE XVIII (cont.)

C. Depreciation methods

Albuquerque	Revalue every four years
El Paso	No information given
Phoenix	Machinery and equipment, 20 per cent per year until 50 per cent of cost is reached
San Bernardino	No information given
San Diego	No depreciation on buildings since 1945; machinery and equipment, varying tables used
Tucson	Machinery and equipment 10 per cent per year until 33 1/3 per cent of cost is reached. Buildings, 2 per cent per year on substantial buildings until 30 per cent of original assessed value is reached

*No available data

Source: County assessors concerned.

of assessed value in Greenville is less than one-third that in Tucson; moreover, in the Southern city all industries valued at over $25,000 are exempt from all taxes for the first five years.

Taxes within city limits of Phoenix are much lower than those within Tucson, but a textile industry outside the city limits of Tucson would have an advantage over one similarly located near Phoenix. As shown by Table XVIII, taxes in the Laguna district outside Tucson city limits are quite low, and if a cotton textile plant ever comes to Tucson it would be a good thing to locate in this district, from the standpoint of taxes. Other outside city limit districts are not as low as Laguna, which is the lowest tax rate district in Tucson. For example, Amphitheater district is two and one-half times that of the Laguna district. Dr. Hudson of the Economics Department, University of Arizona, is of the opinion that wherever a cotton manufacturing industry might locate in Tucson, the site is likely to be considered a school district.

Following is a quotation from the Tucson Chamber of Commerce meeting of September 16, 1949:

> It was pointed out that "nuisance taxes" such as the manufacturers' sales tax and raw materials tax net the state only about $500,000 a year. The income is not at all in proportion to the damage done to the state's $136,000,000 industrial income.
>
> "The income from just one new industry here would increase normal tax income enough to compensate for the small loss in eliminating the

'nuisance taxes' in the state," said Chairman Herbert A. Leggett of the Governor's committee.

"It must be made clear that we're not trying to shift tax loads, or eliminate any great tax income," he said. "These taxes are nuisances only and are preventing industrial development in the state."

The committee recommended that the industrial tax revisions come first in future action for revision of tax structures. However, the matter of merchants' inventories and industrial compensation payments were unfavorably reported as they now stand and in their deterrent effect on bringing in new industries. ....

A graphic example of what is wrong with Arizona's competitive position with other states in the fight for new industry was shown in a Phoenix Chamber of Commerce study.

A hypothetical industry with $1,000,000 in paid-in capital and $1,500,000 in land, buildings, equipment and inventory would pay an annual tax of about $45,960 in Phoenix. The same industry could expect to pay $37,029 in Los Angeles; $29,782 in Albuquerque; $30,295 in Houston; and $26,240 in Salt Lake City.[19]

Local authorities contend these high tax rates should not be considered as inflexible, since concessions might be made to new industries. But what assurance would such firms have, and how great a concession would be made?

Power

Early cotton textile industries were scattered, but when the power machine was introduced, power and fuel became

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19. Tucson Daily Citizen, September 16, 1949.

important factors in the concentration of industries. Today new techniques of energy utilization and transmission still affect the location patterns of at least some industries.

Consumption of various forms of power in production processes has rapidly increased, but energy sources have not necessarily become a more important factor of location. This is because energy has become steadily cheaper and progressively easier to transport.

Types of Power:

Water power.--The most important forms of power used for cotton textile manufacturing are water and electricity. Water power no doubt was important in determining the location of early American manufacturing industries. Falling water, the sole source of mechanical energy in large quantities, was necessarily utilized directly at the site. The geographical structure of New England industry (notably in textiles, shoes, and paper products) still reflects this early influence, although direct waterpower drive of machinery has become relatively unimportant.

Electricity.--The conversion of mechanical energy into electricity (and perhaps even more important, the development of transmission in high-voltage alternating currents) likewise has been important in deciding plant location. When energy transmission in the form of electricity is possible over distances of as much as 300 miles, manufacturing firms do not need to locate near water power and fuel resources. In

the case of water power, this advantage is most important and has restored some of the locational attraction of water-power sites. Hydroelectric power generated at the best sites and used in the immediate vicinity is sold to continuous users at rates less than those for any other form of energy. This type of location consequently has attracted those processes which need the largest amounts of energy relative to other requirements.

The economical methods for the transmission of energy have favored decentralization of industry. Power at reasonable prices became available in suburbs and smaller towns so that manufacturing plants can be established there as well as in metropolitan areas.

One significant locational effect has arisen from the easier transmissibility of energy within industrial plants when electricity is used. The nineteenth century large factory was a structure several stories high, so built to minimize the distance over which power had to be transmitted by belts and shafting from the steam engine or water wheel. This was quite a contrast to large modern factories using electric motors; their structures can be low and extensive, since power travels on wires. This change in plant design has played a part in the choice of more suburban locations for new industrial plants.[20]

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20. Hoover, op. cit., pp. 180-181.

Atomic energy.--It is not yet possible to tell whether atomic energy development will produce radical locational changes. As mentioned previously, it might lower electricity costs in areas where they are now high but probably cannot compete with the best hydroelectric sites. And under present conditions of government control, the development of low-cost atomic power will be dictated by strategic and political rather than by industrial considerations.

Cost of Power and Location: In the average industry, such as a cotton textile plant, power is not one of the most important factors in total delivered-to-customer cost. It is a technical essential but not of prime economic consequence in most cases. Great savings are not to be expected by reason of location where power is cheap.

It should be pointed out that comparative power costs may play a larger role in locational decisions than is warranted by their actual importance. Also, since power rates are a matter of public record and easily ascertainable, cheap power may assume a disproportionately attractive aspect in the eyes of the site-seeking entrepreneur. Another point is that actual power costs are hard to compute because of the complicated structure of quoted rates. Prices which at first appear low may not be when applied to a particular use of power.[21]

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21. Holmes, op. cit., p. 175.

Power in Tucson: In Tucson there are two plants which have a capacity of around 51,000 kilowatts so there is ample power for any cotton industry that might locate here; and if more power is needed, the Bureau of Reclamation would supplement the plants. The city is also supplied with natural gas piped in from Texas. It is therefore evident that from the standpoint of power and fuel, Tucson is well prepared and would be a good site for a cotton textile plant.

Table XIX shows prices of electricity in Tucson compared with the weighted average United States Prices.

TABLE XIX

COMPARATIVE PRICES OF ELECTRICITY

	Tucson	U.S.
12 KW - 1500 KWH/mo.	$35-67	$53-55
30 KW - 6000KWH/mo.	$119.17	$160.80
150 KW - 30,000 KWH/mo.	479.17	582.00
300 KW - 60,000 KWH/mo.	929.17	1,043.00

Source: Federal Power Commission Report, 1950.

Climate

Climate and Its Effect on Location: Climate and climatic conditions in Tucson are significant in two ways: (1) in their effect on the employer and employee, and (2) in their influence on the manufacturing process.

There has always been disagreement as to what constitutes the "ideal" industrial climate. Some argue that sharp changes from season to season promote health, comfort, and productive ability but that a year-round warm-climate section tends to lower the efficiency of labor. Many writers feel that a hot climate retards mental and physical vigor, hence is likely to curtail output per man-hour in cotton textile manufacturing and hence increase labor costs. There are no reliable statistics showing the alleged differences in output of labor between hot and cool climates; but it is probably true that workers employed in a climate to which they are accustomed, whether it be in the East or the Southwest, are equally energetic.

Regardless of human likes and dislikes, in the cotton manufacturing industries control of temperature and humidity is technically necessary. Cotton goods manufacture requires a damp air. This industry started early in Lancashire, England because atmospheric conditions in that section were suitable; and the same is true of New Bedford and Fall River, Massachusetts. In manufacturing processes involving

cotton, less variable temperature and a slightly higher relative humidity provide the best conditions.

Realizing the importance of the proper temperature and humidity conditions, manufacturers early sought to imitate in other climates the natural advantages of Lancashire. Increased evaporation was sought by sprinkling floors or keeping open containers of water throughout the rooms. Another method was to inject steam directly into the room, but this often resulted in unpleasantness and injury to workers' health. As early as 1882 the operatives in Fall River objected to "the use of hot steam in weave rooms, where windows were kept closed in order that warp and filling might be kept damp."[22]

The right moisture conditions aid the cotton manufacturing process in several ways: the amount of frictional electricity is reduced, thus permitting the cotton to run more smoothly, especially during the preparatory processes; elasticity and breaking strength of the fibre are increased, which reduces yarn breakage and stoppages of machinery; there is less "fuzz" created to lodge on machinery and floors; the cotton loses less weight through evaporation of hygroscopic moisture; and the delicate adjustments of machinery are more easily maintained. In short, the result is smoother,

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22. Thomas R. Smith, The Cotton Textile Industry of Fall River, Massachusetts, (New York: King's Crown Press, 1944), p. 59.

uninterrupted operation with consequent lower labor cost and a larger output.

Important also in the entrepreneur's calculations is the effect of climatic conditions on type of building necessary and on the depreciation of both buildings and equipment. Factories located in cold sections naturally must be of a sturdier, better insulated construction than those in areas of constant mildness. Too, with buildings of the proper construction, there is less rapid depreciation of both buildings and machinery in a dry climate.

With the improvement of humidifying and air-conditioning units, however, the necessary climatic requirements can be achieved in any section of the country. Therefore, the hot, dry climate of states such as Arizona does not preclude the possibility of cotton manufacturing. In fact, such a climate has the advantage of attracting manufacturers who personally dislike or cannot endure the cold moistness of New England or the hot mugginess of the Southeast. Hence in many ways, Arizona climate offers ideal conditions for the establishment of cotton processing industries.

Average temperature and humidity for various cities are shown in Table XX.

TABLE XX

CLIMATIC CONDITIONS IN SELECTED CITIES

City	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
Average Relative Humidity													
Tucson	49	44	38	29	21	21	37	47	41	37	38	48	38
Phoenix	48	46	39	31	25	22	35	41	38	38	43	50	38
Boston	68	66	65	65	67	67	68	71	71	68	70	68	68
Houston	75	73	71	72	73	72	74	72	74	70	70	74	72
Los Angeles	57	61	61	65	68	69	67	67	64	61	51	54	62
New Orleans	75	73	71	70	69	70	74	74	72	70	72	75	72
Average Percentage of Possible Sunshine													
Tucson	83	80	78	81	94	91	82	80	86	86	87	83	84
Phoenix	75	77	82	87	92	94	83	83	88	89	83	76	84
Boston	48	56	57	56	60	62	64	63	63	57	48	47	57
Houston	58	50	54	58	65	71	70	70	67	67	57	44	60
Los Angeles	69	68	69	68	64	70	78	79	77	76	79	72	72
New Orleans	49	51	57	63	65	64	58	58	65	69	60	45	59
Average Temperature for Tucson													
	49	52	57	61	69	78	85	85	81	70	58	44	

Source: Chamber of Commerce, Come to the Growing Southwest, to Tucson for Industry and "A Way of Life," (Tucson: Chamber of Commerce), p. 24.

CHAPTER VI

SUMMARY AND CONCLUSIONS

It is evident that Tucson and Arizona in general need manufacturing industries. Cotton manufacturing is one that is greatly needed because of the presence of the raw material and the market demand for cotton textiles. This study has analyzed the disposition of Tucson as a possible location for a cotton manufacturing plant. From the study of theory of location the conclusion reached is that a cotton manufacturing plant would tend to locate at that point where overall costs of processing and delivery will be lowest per unit of product. As seen, many rational economic factors such as the availability of raw cotton; transportation costs; nature, extent and nearness of market areas; availability and cost of power; taxes; labor and labor laws; climate and its effect on labor and on processing have been analyzed. Following is a summary of each of the above factors.

Labor

In connection with the labor force it was shown that Tucson would have an adequate supply of skilled and unskilled labor; and, although it holds a more favorable position than cities in California, it is at a disadvantage in labor costs

as compared with southeastern states. High wage rates are not an insurmountable problem in Tucson because the manufacturer could reduce living costs by providing company houses and other services at prices lower than they could be obtained in the open market and consequently the wages could be decreased. Also, as previously mentioned, the introduction of a federal minimum wage law would place Tucson more on a level with southeastern states.

It is also to be remembered that Tucson has a most attractive climate for healthful living, which would influence a number of engineers and managers who would like to leave the cold damp climate of the New England states or the hot moist climate of the Southeast. As for labor laws and restrictions, Tucson is not at a great disadvantage compared with southeastern states. Although there is some difference in restrictions and laws of the states, they are of little significance.

Markets

It is true that people living in the southwestern states and some of the other western states are of the low-income groups and hence not good potential customers. The reason for this is that these states are principally agricultural, and also the population is relatively sparse. But if manufacturing industries such as textile mills are introduced, the economy of the state of Arizona would be changed from

agriculture to industry, and so the living standard would be higher and people would have more disposal income.

Another factor is that population in the West has been increasing steadily, and that many people would come to Tucson in particular if they could find jobs. California, Washington, Oregon, and Arizona would be one of the most important market areas for products of a new textile plant in the Southwest; it was estimated that this area consumes more than 600,000 bales of cotton annually. As mentioned before, the Southwest and Pacific Coast markets are the only ones that should be considered for products of a Tucson mill. Such an establishment could not possibly compete in Eastern markets with the New England and southeastern mills which are well established and are nearer to the market. Also, most of their distribution would be done under the low-rate Official and Southern classification territories.

Transportation

The problem of transportation is basically one of balancing the transport advantage of nearness to market and to raw material. Will a plant locate in Tucson near the source of raw material, or will it locate in Los Angeles, in the Southeast, or in New England? Since there is a waste of only 9 per cent in spinning cotton or in making grey goods, there is not sufficient weight loss to warrant the industry's locating near the source of raw material.

From the transportation angle it is not economically feasible to send the grey goods to New England or the Southeast to be finished. But it would be feasible to manufacture the grey goods in Tucson, then send them to Los Angeles to be finished, and have the finished goods sold there or returned here. This, of course, is possible if the grey goods could not be manufactured in Los Angeles because of high labor costs or other unfavorable conditions. If the grey goods manufactured in Tucson could be marketed in this immediate vicinity, there would be no transportation problem.

Raw Materials

Cotton production in Arizona increased from 190,194 bales in 1940 to 549,399 in 1949 but it is expected to decrease to an estimated 255,000 bales in 1950. The major part of the crop in quality according to grade is in the strict low middling through the strict middling grade range; and according to staple length the modal length is 1 1/32 inches. Within the next few years the modal staple length will be 1 1/16 inches; this change is because of the introduction of Acala 44, a variety which has a superior spinning value compared with the other older varieties previously grown in Arizona. A Tucson plant could make such products as print cloth, sheeting, broadcloth, and cordage from this cotton. Arizona's cotton production would be more than ample in quantity and quality to supply a cotton spinning mill of the

type envisioned in this report.

Taxes

For a number of years the southern location has been the more popular for cotton mills and other textile plants. Labor has been a large factor in this popularity, but the aggressiveness of southern localities in soliciting new industries and their willingness to abate taxes and otherwise subsidize the manufacturer have also had great influence.

The attitude of the Tucson community toward cotton textile manufacture is highly important. Special local favors would contribute materially to the success of such an industry here. High taxes on industrial property, burdensome ordinances, and inelastic zoning and labor regulations are indicative of an unfavorable community attitude. Tax exemption, cash bonuses, free land or rent, and the existence of industrial foundations or factory funds would indicate a favorable attitude.

Away from the city, good acreage adjoining the railroad usually can be acquired for a reasonable amount. It is not impossible that the Tucson Chamber of Commerce or some other civic organization might donate the land. Frequently a land owner will give part of a tract for a factory site, expecting to benefit from the sale of house lots or store sites near by.

High taxes in Tucson are the most important factor that

would stop a manufacturer from even considering this city as a possible location for his cotton textile plant. It was shown that taxes in Tucson compared with other eastern or western cities of comparable size are much higher. The best way to correct such a situation is to exempt the new and developing industries from city and county taxes for the first five years, and then charge the tax rates (for outside city limits, which are the important ones as a manufacturer would naturally locate outside city limits) on the same basis as charged by low tax cotton-manufacturing southeastern cities. The tax structure should be revised and such nuisance taxes as the sales tax should be repealed. It is logical that a plant would locate on the outskirts of a city in order to avoid city taxes.

Low taxes in the South were one of the inducements that made the textile industry shift from the New England states. It is not right to think that low tax rates would deprive a state of a large portion of income, because if taxes are lowered a great many industries would come in and the amount of total taxes would exceed the present total. A great many more people would be employed directly or indirectly by such industries, from whom the state would collect income, personal property and real property, and sales taxes as well as from the manufacturers themselves.

Power

As a possible site for a textile plant, Tucson is very favorably situated in respect to power. Both relatively cheap natural gas and electric power are available in adequate supply. Electric power rates in Tucson are lower than for the national average, which gives Tucson a decided advantage in respect to power.

Climate

Climate and climatic conditions in Tucson are favorable to cotton textile industries in two important ways: (1) Tucson's climate is mild in the winter and is found to be very pleasing to many people from the colder, more humid areas, and (2) the favorable climate should make it relatively easy to increase labor efficiency. Also, the problem of maintaining relatively stable conditions of temperature and humidity in a factory would probably be less costly under Tucson conditions than in more extreme and humid climates.

Outlook for Tucson as a Site

In conclusion one could say that most of the factors are favorable to the establishment of a textile plant in Tucson with the notable exception of taxes, labor laws, and community attitude. In view of the sources of raw material near Tucson and the Pacific Coast market area, it appears

that a plant in Tucson could compete very favorably with New England and Southern plants. This statement is predicated on the assumption that adequate finishing facilities exist in California to process the grey goods produced in Tucson. From the standpoint of transportation the advantage would be four to five cents a pound of finished product. But if there were no finishing facilities in California or Arizona, it would not be feasible to manufacture the grey goods in Tucson and send them East to be finished. At present there are no finishing plants in Arizona; and up to 1945, according to a Report on Cotton Textile Manufacturing in California, there were not adequate facilities in California for finishing the type of cloth that the market requires.

As it stands now, the unfavorable factors offset the favorable ones, and so Tucson is not suitable for a site of a cotton manufacturing plant, unless the previously mentioned recommendations and adjustments are followed and until the cotton finishing industry in California is more developed to further process the products manufactured in Tucson. The unfavorable factors are mainly high taxes in Tucson and lack of cotton-finishing facilities in the West.

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