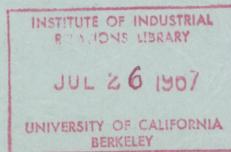


Occupations  
(1966)

INTERRELATIONS BETWEEN INDUSTRIAL  
AND OCCUPATIONAL CHANGES IN MANPOWER,  
UNITED STATES, 1950-1960

by

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- No. 6—K. S. Gnanasekaran, INTERRELATIONS BETWEEN INDUSTRIAL AND OCCUPATIONAL CHANGES IN MANPOWER, UNITED STATES, 1950-1960. June, 1966. Pp. vi + 31.

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University of Pennsylvania  
Population Studies Center  
Philadelphia, Pennsylvania

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## PREFACE

In this exploratory paper, K.S. Gnanasekaran resumes a line of research undertaken some years ago in another University of Pennsylvania study.\* Among the problems essential to proper study of the determinants of occupational change, that of the interrelation between industry and occupation changes is a central one - one which, as Dr. Gnanasekaran ably demonstrates, lends itself readily to analysis by traditional demographic techniques. The present paper updates and in part reformulates the earlier study. As such, it provides a new point of departure for further investigation of the many analytical and methodological possibilities opened up by the approach.

In preparing this study, Dr. Gnanasekaran was fortunate in having the first-hand advice of one of the authors of the earlier study, Dr. Ann Ratner Miller, a senior member of the staff of the Center. Gratitude is also expressed to the staff of the Center, especially Miss Bette Neeld, Mrs. Lydia F. Christaldi, and Mrs. Anna Mae Barbera.

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Richard A. Easterlin  
Professor of Economics

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\*See reference in footnote 1, page 12.

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LIST OF MAJOR OCCUPATION AND INDUSTRY GROUPS

<u>Major Occupation Group</u>	<u>Abbreviation Used</u>
Professional, technical and kindred workers	Prof. wkrs.
Farmers and farm managers	Farmers
Managers, officials and proprietors excluding farm	Managers, etc.
Clerical and kindred workers	Clerical wkrs.
Sales workers	Sales wkrs.
Craftsmen, foremen and kindred workers	Craftsmen
Operatives and kindred workers	Operatives
Service workers including private household workers	Service wkrs.
Laborers including farm laborers and foremen	Laborers

. . . . .

<u>Major Industry Group</u>	<u>Abbreviation Used</u>
Agriculture, forestry and fisheries	Agriculture
Mining	Mining
Construction	Construction
Manufacturing	Manufacturing
Transportation, communication and other public utilities	Transport, etc.
Wholesale and retail trade	Trade
Finance, insurance and real estate	Finance, etc.
Business and repair services	Business serv.
Personal services	Personal serv.
Entertainment and recreation services	Entertainment
Professional and related services	Prof. serv.
Public administration	Public admn.

## I. INTRODUCTION

One of the striking features of industrialization has been the great increase in the variety of jobs that accompany it, and the changing composition of these occupations in the course of further development. The factors responsible for such variations in occupational structure, their direction and magnitude need systematic investigation with a view to aid manpower planning. Under the circumstances of rising shortage of certain critical occupations in almost all countries, the study of occupational dynamics has come to the forefront in recent years. Further, high rates of employment in occupations that are either declining or not growing fast enough has underscored the need for knowledge about occupational trends in manpower so as to formulate effective full employment targets. Closely related to the task of ensuring balanced supply of different categories of manpower and avoidance of unemployment, is the educational and vocational training of people which perforce depends mainly on prospective occupational changes in the economy. Interest, therefore, of the educational planners in the present and future occupational trends has given an added impetus and urgency to occupational analyses and forecasts.

In this context, the present paper aims to analyze the occupational shifts that took place in the United States during the intercensal period 1950-1960. The emphasis throughout our study is on the relative gain or loss in various occupations and how it is related to changes in the industrial structure of employment, and to changes in the occupational composition of employment in each industry. Our analyses are confined to the first digit level of major occupational group and industry division as defined and adopted in the United States Census. Caution may here be added that

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The author is Research Associate at the Department of Economics, University of Pennsylvania. He is indebted to Professor Richard A. Easterlin for advice on this project and to Professors John D. Durand, Dorothy S. Thomas and Ann R. Miller for comments on a preliminary draft of this paper. Acknowledgement is also made to Professor Vincent H. Whitney for all help.

these two national classification systems differ considerably from the International Standard Classification of Occupations (ISCO), and the International Standard Classification of Economic Activities (ISCE) recommended by the International Labor Office and the United Nations respectively.

Basically, the occupational and industrial classification schemes used in 1950 and 1960 differ only slightly in respect of the title and content of certain occupations/industries. The 1950 data were adjusted in this study in regard to the content of major occupation/industry divisions so as to correspond to the 1960 schemes. This meant, for example, the transfer of employed persons in accounting, auditing and bookkeeping under the major division of Business and Repair Services in 1950 Census to the Professional and Related Services.

Another adjustment effected in the industry and occupation statistics related to the category of 'unknown' or persons not reporting their industry/occupation status. This category numbered 3,368 thousand in 1960 and 999 thousand in 1950, and was proportionately distributed among the different cells of occupation by industry cross-classification in the respective census. Finally, it may also be pointed out that the scope of our analyses extended to only the currently employed civilian workers and excluded both the unemployed and armed forces.

## II. GROWTH AND STRUCTURE OF OCCUPATIONS

Table 1 provides information regarding the growth and changes in occupational structure of employment during 1950-1960. Excepting the occupations of farmers, farm laborers and laborers which showed absolute declines in this period, the rest grew at varying rates from 10.5 percent to 52.6 percent in ten years. Just five categories of occupations, namely, professional, clerical, service, sales, craftsmen and kindred workers, representing slightly more than one half of the total employment in 1950 had relatively gained in this period while the remainder had lost correspondingly. The loss in the case of managers, officials and proprietors (excluding farm), and operatives and kindred workers resulted from not a negative but less than the average rate of growth of all occupations at 14.5 percent per decade.

Parallel to the differential rates of increase of occupations was observed a varying degree of shift in the relative share of each occupation at the end of the decade. In order to assess the total shift in the occupational structure during this period, the index of redistribution or concentration widely used in regional science and ecology, has been adopted here. This measure is obtained as shown in the last column of Table 1, by computing the change, positive or negative, in the percentage share of each occupational category at succeeding censuses and then adding together all positive or negative differences. The index can be converted into the equivalent number of jobs by applying the percentage for the period to the employment total at the end of the decade.

According to our calculations, the aggregate change in the occupational structure during 1950-1960 amounted to 7.84 percentage points. That is to say, for every 10,000 employed there were 784 additional workers in 1960 belonging to the gaining occupational groups as compared to the situation in 1950. Put differently, the remaining four occupational categories lost in this period at the rate of 784 persons per 10,000 .

employed in 1960. The gains occurred principally in professional occupations at the rate of 293 persons per 10,000 employed, followed by clerical and services occupations at the rate of 271 persons and 154 persons, respectively; while the losses were mainly in the ranks of farmers and laborers, including farm, at the rate of 376 persons and 311 persons per 10,000 employed workers.

TABLE 1. - GROWTH AND CHANGE IN OCCUPATIONAL STRUCTURE  
OF EMPLOYMENT, UNITED STATES, 1950-1960

(Number in thousands)

Major Occupation Group	Number Employed		Net Increase or Decrease		Percent of Total Employed		Shift in Occupational Structure During 1950-1960 (% Points)
	1950	1960	Number	%	1950	1960	
<b>A. <u>Gaining Occupations</u></b>							
(as percent of total manpower)							
	29,702	39,091	9,389	31.51	52.63	60.47	7.84
Prof. wkrs.	4,987	7,609	2,622	52.58	8.84	11.77	2.93
Clerical wkrs.	7,047	9,824	2,777	39.41	12.49	15.20	2.71
Service wkrs.	5,784	7,623	1,839	31.79	10.25	11.79	1.54
Sales wkrs.	3,959	4,875	916	23.14	7.01	7.54	0.53
Craftsmen	7,925	9,160	1,235	15.58	14.04	14.17	0.13
<b>B. <u>Losing Occupations</u></b>							
(as percent of total manpower)							
	26,732	25,547	-1,185	-4.44	47.37	39.53	-7.84
Farmers	4,368	2,570	-1,798	-41.16	7.74	3.98	-3.76
Laborers	5,931	4,782	-1,149	-19.37	10.51	7.40	-3.11
Operatives	11,329	12,523	1,194	10.54	20.08	19.38	-0.70
Managers	5,104	5,672	568	11.13	9.04	8.77	-0.27
All Occupations	56,435	64,639	8,204	14.54	100.00	100.00	..

Source: U.S. Census of Population, 1960, General Social and Economic Characteristics, U.S. Summary, Final Report PC(1)-1C, Table 89, p. 219.

### III. COMPONENTS OF OCCUPATIONAL CHANGE

It may be conceived that the trends in various categories of jobs are determined in three ways. First, there could take place a proportional increase in all industries and all occupations corresponding to the growth of employment in the country. The resulting expansion may be described as the growth effect ( $\Delta G$ ), and to be sure there would, in this situation, be just an absolute increase in numbers but no change in the relative occupational distribution of employment. Second, a disproportionate rate of increase could occur in industries which, combined with differing job patterns in them, would affect to varying extent the trends in different occupations. This type of influence may be called here the industry effect ( $\Delta I$ ). Third, new production processes, automation, modern management, etc. could be introduced so that the same industry would in the course of time require different categories of workers in proportions other than those obtained at the beginning of the period. Such influence may, for want of an appropriate term, be referred to as the occupation mix effect ( $\Delta M$ ) in this paper. Since the first has no effect on the relative occupational structure of manpower, our analyses will mainly be concerned with the second and the third processes of occupational change.

Before proceeding to examine the role of industry and occupation mix effects upon the occupational trends in the United States, it may be advantageous at this point to have some background knowledge about a) the job pattern within each industry, which lies at the bottom of all occupational changes, and b) the changing pattern of industrial activity during this period. This descriptive information, it is thought, will in itself provide leading clues as to the direction, though not the magnitude, of changes to be expected in different occupations. It is the aim of this paper to quantify and aggregate these effects in a subsequent section.

Job Pattern by Industry: From Appendix Tables 1 and 2, it is evident that the occupational patterns of specific industries differed from one another and from census to census. It is noteworthy that some industries are characteristically composed of one or two occupations, while the others contain a sizeable share of most occupations. In 1950, for example, the job pattern in agriculture was comprised of 62 percent farmers and farm managers and 36 percent laborers; similarly, the occupational pattern of mining industry included 69 percent operatives and 17 percent craftsmen, and that of the professional and related services industry contained 61 percent professional and technical workers and 17 percent service workers. On the other hand, the wholesale and retail trade, for instance, featured a diffused pattern staffing 28 percent sales workers, 23 percent proprietors and managers, 14 percent service workers, 11 percent clerical workers, and so on (see Appendix Table 1).

Based on the description of above pattern in different industries, the inference could be drawn that the expansion of a particular industry will lead to more gains in certain occupations rather than the others. Further, Table 2 reveals that these job patterns had since 1950 changed in all industries, and the changes were not uniform. That is to say, each of the gaining occupations did not improve its share in each industry nor did each of the declining occupations suffer reduction of its share in each industry. For example, the share of professional workers increased in eight industries and declined in four, the decline being in the gaining industries of wholesale and retail trade, personal services, and professional and related services as well as in the contracting industries of entertainment and recreation services. In general, the share of gaining occupations increased in a greater number of industries than did that of the losing occupations. Thus, the share of clerical occupation rose in ten industries, of service workers in nine industries, and of sales workers and craftsmen in seven industries. In contrast, the share of laborers increased in but three industries and of operatives in four industries only. An exception, however, was the managerial group whose share increased in a majority of eight industries.

TABLE 2. - CHANGES IN THE OCCUPATIONAL DISTRIBUTION OF EMPLOYMENT  
IN EACH INDUSTRY, UNITED STATES, 1950-1960

(In Percentage Points)									
Major Industry Group	GAINING OCCUPATIONS					LOSING OCCUPATIONS			
	Prof. Wkrs.	Cler. Wkrs.	Service Wkrs.	Sales Wkrs.	Craftsmen	Farmers	Laborers	Opera- tives	Mgrs., etc.
<b>A. Expanding Industries</b>									
Prof. serv.	-4.39	1.96	2.91	-0.01	0.18	..	-0.27	-0.51	0.13
Manufacturing	2.82	1.17	-0.22	0.88	0.31	..	-2.78	-2.49	0.31
Finance, etc.	0.02	4.94	-3.19	-1.12	-0.46	..	-0.44	-0.26	0.51
Public admn.	2.01	-1.23	0.85	-0.12	0.34	..	-1.41	-1.25	0.81
Business serv.	3.56	7.26	2.77	0.22	-13.71	..	-0.02	1.65	-1.73
Personal serv.	-0.61	0.69	5.36	-0.13	-0.65	..	-0.33	-3.62	-0.71
Trade	-0.08	2.55	0.43	-0.22	1.25	..	0.56	-0.29	-4.20
<b>B. Contracting Industries</b>									
Agriculture	0.64	0.48	0.12	0.14	0.38	-4.37	0.39	1.65	0.56
Transport, etc.	0.94	0.89	-0.59	0.39	0.41	..	-3.46	0.85	0.57
Mining	3.89	2.96	0.27	0.23	5.23	..	-0.21	-14.18	1.81
Entertainment	-2.03	-0.40	5.03	0.02	-0.68	..	0.65	-0.16	-2.43
Construction	0.91	1.32	0	0.06	-2.91	..	-1.93	1.22	1.33

Source: Based on Appendix Tables 1 and 2.

In the second place, the magnitude of mix change was not the same in all industries. The largest variation was observed in Table 2 to have taken place in respect of the operatives and kindred workers in mining industry. In precise terms, the operatives, who formed 69.20 percent of the total employed in mining industry in 1950, declined in strength to figure 55.02 percent in 1960, i.e., a drop of 14.18 percentage points. Other striking shifts in the occupation mix of specific industries were the following: the share of professional workers increased in mining, business, and manufacturing, and declined in professional services; the share of clerical workers gained in business and finance; the share of private household and service workers rose in personal, and entertainment and recreation services; the share of craftsmen declined in business, and of laborers, in transport.

Inference so far on the basis of the initial level and magnitude of change in job pattern in various industries leads to useful but vague notions about the emerging occupational picture. Though the initial pattern may indicate roughly the types of occupation likely to expand, the picture becomes complicated when the varying magnitude and direction of changes in job pattern are taken into account, pending an analysis of industry change in this period.

Changes in Industry Structure: Following the same procedure used to describe the occupational shifts in Table 1, the decennial changes in the industrial structure of manpower are as in Table 3 classified into a) the expanding industries, and b) the contracting industries. The former group of industries had relative gains, while the latter group had relative losses in this decade. The total shift in industry amounted to 7.22 percentage points as compared to almost about the same shift of 7.84 percentage points in occupations. More than half of the shift among the expanding industries occurred in the professional and related services (3.66 percentage points). This was followed by sizeable increases in manufacturing (1.75 percentage points), finance, insurance and real estate (0.90 percentage point), public administration (0.64 percentage point). The remaining three industries, namely, business and repair services,

TABLE 3. - GROWTH AND CHANGE IN INDUSTRIAL STRUCTURE  
OF EMPLOYMENT, UNITED STATES, 1950-1960

(Number in Thousands)							
Major Industry Group	Number Employed		Net Increase or Decrease		Percent of Total Employed		Shift in Industrial Structure During 1950-1960 (% Points)
	1950	1960	Number	%	1950	1960	
<b>A. Expanding Industries</b>							
(as percent of total manpower)							
	39,851	50,315	10,464	26.26	70.62	77.84	7.22
Prof. serv.	4,872	7,947	3,075	63.12	8.63	12.29	3.66
Manufacturing	14,854	18,157	3,303	22.24	26.34	28.09	1.75
Finance, etc.	1,952	2,817	865	44.31	3.46	4.36	0.90
Public admn.	2,539	3,320	781	30.76	4.50	5.14	0.64
Business serv.	1,340	1,679	339	25.30	2.37	2.60	0.23
Personal serv.	3,558	4,091	533	14.98	6.30	6.33	0.03
Trade	10,736	12,304	1,568	14.60	19.02	19.03	0.01
<b>B. Contracting Industries</b>							
(as percent of total manpower)							
	16,585	14,323	-2,262	-13.64	29.38	22.16	-7.22
Agriculture	7,108	4,485	-2,623	-36.90	12.59	6.94	-5.65
Transport, etc.	4,519	4,642	123	2.72	8.01	7.18	-0.83
Mining	945	680	-265	-28.04	1.67	1.05	-0.62
Entertainment	501	521	20	3.99	0.89	0.81	-0.08
Construction	3,512	3,995	483	13.75	6.22	6.18	-0.04
All Industries	56,435	64,639	8,204	14.54	100.00	100.00	..

Source: U.S. Census of Population, 1960, General Social and Economic Characteristics, U.S. Summary, Final Report PC(1)-1C, Table 92, p. 221.

personal services, and wholesale and retail trade recorded percentage gains of less than one half of a percent.

In the case of contracting industries, the picture was rather different and the loss was heavily concentrated in the single industry of agriculture, forestry and fishing. The relative decline of this industry was 5.65 percentage points during 1950-1960. The other notable contracting industries in this period were transport (0.83 percentage point) and mining (0.62 percentage point).

Based on the examination of occupation mix and industry changes in the preceding paragraphs, some preliminary conclusions can be drawn regarding the trends in, say, the characteristic occupations. Thus, for instance, the observed expansion of professional and related services may be expected to give rise largely to professional and technical workers. Likewise, the decline of agriculture may be anticipated to cause reduction in farmers and farm laborers. But, in a majority of cases including the occupations of clerical, service, sales, craftsmen, operatives, laborers and managers, the net outcome of industry and occupation mix changes, which are favorable in some industries and unfavorable in others, is difficult to comprehend. In either case, however, no quantitative judgement can be formed regarding the influence of industry and occupation mix effect on changes in different occupations.

#### IV. QUANTITATIVE EVALUATION OF COMPONENTS

To arrive, therefore, at the net effect of the complex influences on specific and overall occupational structure change, it is imperative to quantify and aggregate the effects of industry and occupation mix changes. Given the above framework; namely,

$$\Delta O = \Delta G + \Delta I + \Delta M$$

where  $\Delta O$  denotes change in occupation,  $\Delta G$ ,  $\Delta I$  and  $\Delta M$  are changes due to the growth effect, the industry effect and the occupation mix effect discussed before, the three components can, using the method by Gladys L. Palmer and Ann R. Miller<sup>1</sup>, be obtained in quantitative terms. The actual steps of calculation are described below with the help of Table 4.

In Table 4, columns 1 and 2 show the number employed in different occupations at the time of two censuses and are therefore the same as in Table 1. Column 3 is obtained simply by inflating the figures in column 1 by the factor  $k = 1.14537$  (i.e.,  $64,639 \div 56,435$ ) according to the assumption that there was no structural change of any kind either in respect of industry or occupation mix during the period. The differences between column 3 and column 1 that are shown in column 6 would therefore imply changes in occupation due to employment growth. Column 4 was calculated by distributing the total employment in each industry in 1960 according to the industry-specific occupation mix as of the base year 1950, and cumulating thereafter the figures in industry cell for each occupational category. These cumulated values represent the expected size of each occupation group under the assumption of an industry structure change such as took place during 1950-1960, but at the same time with no change within industry. In column 7, where column 3 is subtracted from column 4,

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<sup>1</sup>Gladys L. Palmer and Ann Ratner Miller, Industrial and Occupational Trends in National Employment, Industrial Research Department, Wharton School of Finance and Commerce, University of Pennsylvania, 1949, p. 24.

TABLE 4. - COMPONENTS OF OCCUPATIONAL CHANGES IN  
EMPLOYMENT, UNITED STATES, 1950-1960

(Number in thousands. Figures in parentheses denote percentage points of change.)

Major Occupational Group	Number Employed		1960 Total Weighted by 1950 Industry & Occupation Patterns	1960 Total Industry Weighted by 1950 Occupation Pattern	Changes Due To			
	1950	1960			All Factors	Employ- ment Growth	Industry Effect	Occupation Mix Effect
	1	2	3	4	5=2-1	6=3-1	7=4-3	8=2-4
<b>A. <u>Gaining Occu- pations</u></b>	29,702	39,091	34,019	37,149	9,389	4,317	3,130 (4.83)	1,942 (3.01)
Prof. wkrs.	4,987	7,609	5,712	7,228	2,622	725	1,516 (2.34)	381 (0.59)
Cler. wkrs.	7,047	9,824	8,071	8,759	2,777	1,024	688 (1.06)	1,065 (1.65)
Serv. wkrs.	5,784	7,623	6,625	7,170	1,839	841	545 (0.84)	453 (0.70)
Sales wkrs.	3,959	4,875	4,534	4,751	916	575	217 (0.34)	124 (0.19)
Craftsmen	7,925	9,160	9,077	9,241	1,235	1,152	164 (0.25)	-81 (-0.12)
<b>B. <u>Losing Occu- pations</u></b>	26,732	25,547	30,618	27,483	-1,185	3,886	-3,135 (-4.83)	-1,936 (-3.01)
Farmers	4,368	2,570	5,003	2,765	-1,798	635	-2,238 (-3.46)	-195 (-0.30)
Laborers	5,931	4,782	6,793	5,529	-1,149	862	-1,264 (-1.95)	-747 (-1.16)
Operatives	11,329	12,523	12,976	13,157	1,194	1,647	181 (0.28)	-634 (-0.98)
Managers, etc.	5,104	5,672	5,846	6,032	568	742	186 (0.29)	-360 (-0.56)
All Occu- pations	56,435	64,639	64,639	64,639	8,204	8,204	..	..

Note: The figures in parentheses refer to change in the proportion of each occupation to the total employment, i.e.  $4.83 = \frac{3,130}{64,639} \times 100$ .

Source: Computed from Tables 1 and 3 and Appendix Tables 1 and 2.

the effect of industry structure change on occupational trends was obtained for the decade. Likewise, column 2, that resulted from the influences of both industry structure and occupation mix changes, minus column 4, indicates the effect of varying job pattern in industries during 1950-1960.

As noted in Section III, the growth effect brings about no change in the occupational structure of employment. The change is indeed the result of industry and occupation mix effects, and therefore, Table 5 is calculated here to highlight the pattern and magnitude of influence by these two factors. According to the calculations in Table 5, three-fifths of the total occupational structure change during the period 1950-1960 resulted from the changing industrial composition of economic activity and the remaining two-fifths from variations in job pattern within industries. Excepting the craftsmen, operatives, and managerial workers, each occupation, gaining or losing, also showed this reinforcing pattern of change, wherein the industry and occupation mix effect operated in the same direction, the former usually exerting the greater impact. Of course, the exact magnitude of industry effect and occupation mix effect varied from one occupation to another as shown in Table 5.

Both professional and technical workers, and farmers and farm managers were predominantly governed by the industry changes in this period. Thus, 80 percent of the increase in professional workers and 92 percent of the decrease in farmers and farm managers were, as shown in Table 5, due to the industry effect. But, the changes in service, clerical, and sales workers were jointly governed by the industry and occupation mix effects. Specifically, the gain in service workers was due 55 percent to the industry change and 45 percent to the variation in job patterns, whereas the influences of these two components on sales workers were 64 percent and 36 percent respectively. Also, among the losing occupations, the laborers were subject to the joint influence of industry and occupation mix effects, the former amounting to 63 percent and the latter to 37 percent. The clerical group was,

TABLE 5. - INDUSTRY AND OCCUPATION MIX EFFECTS ON EMPLOYMENT  
IN SPECIFIC OCCUPATIONS, UNITED STATES, 1950-1960

Major Occupation Group	Absolute Values of Components (000's)			Relative Proportions of Components (%)	
	Total of Structural Components	Industry Effect	Occupation Mix Effect	Share of Industry Effect	Share of Occupation Mix Effect
	(1)	(2)	(3)	(4)=(2)÷(1)	(5)=(3)÷(1)
<b>A. <u>Gaining Occupations</u></b>	5,072	3,130	1,942	61.71	38.29
Prof. wkrs.	1,897	1,516	381	79.92	20.08
Clerical wkrs.	1,753	688	1,065	39.25	60.75
Service wkrs.	998	545	453	54.61	45.39
Sales wkrs.	341	217	124	63.64	36.36
Craftsmen	83	164	-81	197.59	-97.59
<b>B. <u>Losing Occupations</u></b>	-5,071	-3,135	-1,936	61.82	38.18
Farmers	-2,433	-2,238	-195	91.99	8.01
Laborers	-2,011	-1,264	-747	62.85	37.15
Operatives	-453	181	-634	-39.96	139.96
Managers, etc.	-174	186	-360	-106.90	206.90

Source: Column 1 was obtained by subtracting Column 6 from Column 5 in Table 4.  
Columns 2 and 3 are respectively Columns 7 and 8 in Table 4.

however, a striking exception in the sense that the occupation mix rather than the industry effect had greater influence and accounted for 61 percent of the change vis-a-vis 39 percent by the industry change.

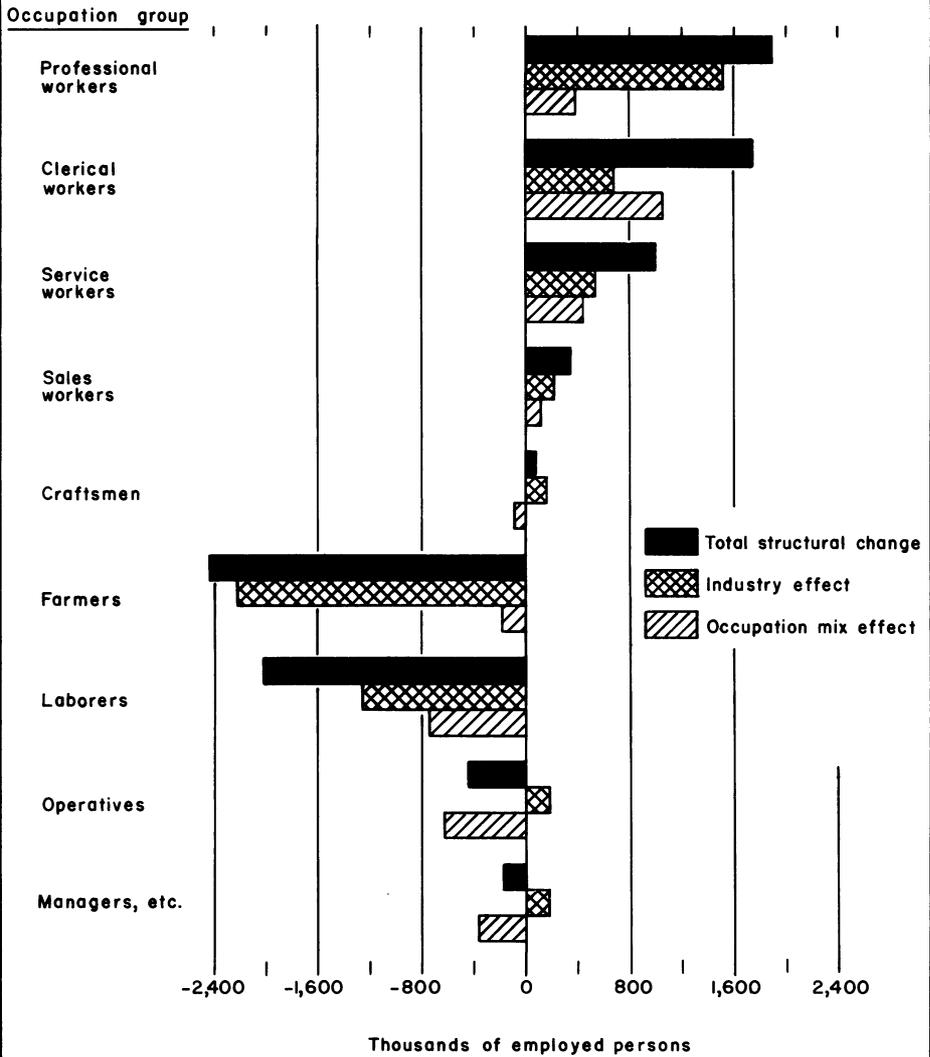
The remaining three categories of occupations, namely, a) craftsmen, b) operatives and c) proprietors, officials and managers were found in Figure 1 subject to an offsetting pattern of industry and occupation mix effects under which these two components worked in the opposite direction. In the case of craftsmen, as seen in Table 5, the industry effect was large enough to more than offset the negative occupation mix effect and to give rise to but slight gains in this occupational group during 1950-1960. More striking, however, was the influence of occupation mix effect on operatives, and proprietors, officials and managers which exceeded that of the industry effect and led to the decline of these two occupations.

#### A. Gaining Occupations by Specific Industry

Table 6 reveals that the industry and occupation mix effects are usually concentrated in one or two important industries depending on the occupational category. To consider first the professional and technical workers, it is seen that more than three-fourths of the relative increase in this occupation was due to the expansion of professional and related services industry in the last decade. The other principal development favoring professional workers was the occupational mix change within manufacturing, which accounted for about 27 percent of the above average increase in professional manpower. It is interesting to note that the occupation mix effect was negative in the professional and related services, suggesting perhaps the shortage of professional personnel relative to the 1950 position.

The clerical occupations were seen earlier to differ from the usual pattern of change in that the occupation mix effect played a more important role than the industry effect, though of course both made a positive contribution to the total change. Changes in job pattern in favor of the clerical occupations took place chiefly in

**FIGURE I.— STRUCTURAL COMPONENTS OF OCCUPATIONAL CHANGE  
UNITED STATES, 1950-1960**



Source: Table 5.

TABLE 6. - CONTRIBUTIONS OF INDUSTRY AND OCCUPATION MIX EFFECTS TO CHANGES IN OCCUPATIONAL COMPOSITION OF EMPLOYMENT, GAINING OCCUPATIONS, UNITED STATES, 1950-1960

(In Percentage)								
Major Occupation Group	All Industries	Expanding Industries						
		Total	Prof. Serv.	Manu- facturing	Finance, etc.	Public Admn.	Business Serv.	
<u>Industry and Occupation Mix Effects ( <math>\Delta I + \Delta M</math> )</u>								
<u>All Gaining Occupations</u>	(7.84)	100.0	105.2	45.1	27.2	9.5	7.7	2.0
Prof. wkrs.	(2.93)	37.4	36.3	21.8	11.2	0.4	2.3	1.3
Clerical wkrs.	(2.71)	34.9	35.5	9.1	6.6	7.6	2.7	2.7
Service wkrs.	(1.54)	19.5	20.2	12.7	-0.4	-0.7	2.0	1.0
Sales wkrs.	(0.53)	6.8	6.4	0.1	4.5	2.2	-0.1	0.2
Craftsmen	(0.13)	1.5	6.8	1.4	5.3	a/	0.8	-3.2
<u>Industry Effect ( <math>\Delta I</math> )</u>								
<u>All Gaining Occupations</u>	(4.83)	61.7	71.7	44.0	9.4	9.4	6.5	2.0
Prof. wkrs.	(2.34)	29.9	31.3	28.7	1.1	0.4	1.0	0.1
Clerical wkrs.	(1.06)	13.8	17.0	6.0	2.4	4.8	3.5	0.3
Service wkrs.	(0.84)	10.6	11.4	8.1	0.4	1.1	1.4	0.1
Sales wkrs.	(0.34)	4.3	4.4	0.1	1.3	2.8	a/	0.1
Craftsmen	(0.25)	3.2	7.6	1.1	4.2	0.3	0.6	1.4
<u>Occupation Mix Effect ( <math>\Delta M</math> )</u>								
<u>All Gaining Occupations</u>	(3.01)	38.3	33.5	1.1	17.8	0.1	1.2	a/
Prof. wkrs.	(0.59)	7.5	5.0	-6.9	10.1	a/	1.3	1.2
Clerical wkrs.	(1.65)	21.1	18.5	3.1	4.2	2.8	-0.8	2.4
Service wkrs.	(0.70)	8.9	8.8	4.6	-0.8	-1.8	0.6	0.9
Sales wkrs.	(0.19)	2.5	2.0	a/	3.2	-0.6	-0.1	0.1
Craftsmen	(-0.12)	-1.7	-0.8	0.3	1.1	-0.3	0.2	-4.6

TABLE 6. - (Continued)

Major Occupation Group	Contracting Industries							
	Personal Serv.	Trade	Total	Agriculture	Transport, etc.	Mining	Entertainment	Construction
<u>Industry and Occupation Mix Effects ( <math>\Delta I + \Delta M</math> )</u>								
<u>All Gaining Occupations</u>	4.1	9.6	-5.1	0.5	-3.5	-0.6	-0.5	-1.0
Prof. wkrs.	-0.5	-0.2	1.1	0.1	0.5	0.2	-0.4	0.7
Clerical wkrs.	0.6	6.2	-0.6	0.2	-1.7	a/	-0.1	1.0
Service wkrs.	4.6	1.0	-0.7	a/	-0.8	-0.1	0.2	a/
Sales wkrs.	-0.1	-0.4	0.4	a/	0.4	a/	a/	a/
Craftsmen	-0.5	3.0	-5.3	0.2	-1.9	-0.7	-0.2	-2.7
<u>Industry Effect ( <math>\Delta I</math> )</u>								
<u>All Gaining Occupations</u>	0.3	0.1	-9.9	-1.1	-5.5	-2.2	-0.7	-0.4
Prof. wkrs.	a/	a/	-1.4	-0.5	-0.4	-0.3	-0.2	-a/
Clerical wkrs.	a/	a/	-3.2	-0.2	-2.5	-0.4	-0.1	-a/
Service wkrs.	0.3	a/	-0.8	-0.1	-0.3	-0.1	-0.3	-a/
Sales wkrs.	a/	0.1	-0.1	-0.1	-a/	-a/	-a/	-a/
Craftsmen	a/	a/	-4.4	-0.2	-2.3	-1.4	-0.1	-0.4
<u>Occupation Mix Effect ( <math>\Delta M</math> )</u>								
<u>All Gaining Occupations</u>	3.8	9.5	4.8	1.6	2.0	1.6	0.2	-0.6
Prof. wkrs.	-0.5	-0.2	2.5	0.6	0.9	0.5	-0.2	0.7
Clerical wkrs.	0.6	6.2	2.6	0.4	0.8	0.4	-a/	1.0
Service wkrs.	4.3	1.0	0.1	0.1	-0.5	a/	0.5	a/
Sales wkrs.	-0.1	-0.5	0.5	0.1	0.4	a/	a/	a/
Craftsmen	-0.5	3.0	-0.9	0.4	0.4	0.7	-0.1	-2.3

a/ Value below the level of rounding

Note: Figures in parentheses denote the change in the share of each occupation as a percentage of total employment in all industries. (See Table 1 and Table 4)

Source: Computed from Tables 1 and 3 and Appendix Tables 1 and 2.

the wholesale and retail trade, manufacturing, and business and repair services where indeed the occupation mix influence was greater than the industry effect. Also, the occupation mix turned favorable in professional services, and finance, insurance and real estate industry. Barring the wholesale and retail trade, the above industries, as well as public administration, had through their industry change positively influenced the trend in the clerical occupation in this period.

Like the professional group, the changes in service workers depended most on the industry effect of the professional and related services industry that was responsible for more than two-fifths of the rise in this occupation. The occupation mix effect was scattered in different industries, the important ones being the professional and personal services industries. Increase in sales workers was largely due to two factors: a) the occupation mix effect in the manufacturing industry that accounted for 47 percent of the total change, and b) the expansion of finance, insurance and real estate industry that contributed 41 percent of the gains. In the latter industry, however, the occupation mix effect was negative during this period and hence, on aggregating the industry and occupation mix effects for these two industries respectively, manufacturing industry turns out as the major determinant of increase in sales workers, i.e., about 66 percent as compared to 32 percent contributed by the finance, insurance and real estate industry.

Craftsmen, foremen, and kindred workers was a major occupation subject to the least structural change in the decade 1950-1960. This slight change paralleled, as indicated earlier, a distinct pattern of influence by the two components; namely, that the occupation mix effect had offset the industry effect considerably for this occupation group. More specifically, manufacturing, which had affected all other gaining occupations by a greater occupation mix effect rather than the industry effect, exerted quite the opposite pattern of influence on this group. The expansion in this industry contributed about four times as much as the occupation mix effect to the

change in craftsmen and kindred workers. The adverse influence on craftsmen was imparted principally by the changes in the job pattern within business and repair services, and construction industries. However, a considerable job change in favor of craftsmen took place in the wholesale and retail trade, which along with the industry effects in professional and business services, accounted on balance for a slight increase in this occupational category.

#### B. Losing Occupations by Specific Industry

Needless to say, the downward trend in farmers and farm managers was due to the decline of agriculture. The decrease in laborers took place as a result of changes both in industry structure and job patterns of several industries, the most important being manufacturing, transport and construction. The major share of the decrease would, however, appear in Table 7 to be in the category of farm laborers due to the contraction of agriculture. The wholesale and retail trade was one industry that had sizeable occupation mix effect in favor of laborers during the decade.

The operatives and kindred workers were seen earlier to be governed by the industry and occupation mix effects operating in the opposite directions. The occupation mix effect was, however, greater and negative that led to the relative decline of this occupation during the last decade. The adverse mix effect took place in all expanding industries excepting business and repair services. The expansion of manufacturing, as in the case of craftsmen, exerted great influence on the operatives and kindred workers; but, an adverse occupational change within this industry almost nullified the gains due to the industry effect. Further, mining and transport, among the contracting industries, contributed considerably to the decline of this occupation.

The last relatively losing occupation was the proprietors, officials and managers in the nonagricultural sector. In view of the crucial importance of this group, along with the professional and technical manpower, it is imperative to understand fully the mechanics of change in this occupational group by specific industry. In the expanding industries, the managerial group actually increased owing chiefly to

TABLE 7. - CONTRIBUTIONS OF INDUSTRY AND OCCUPATION MIX EFFECTS TO CHANGES IN  
OCCUPATIONAL COMPOSITION OF EMPLOYMENT, LOSING OCCUPATIONS  
UNITED STATES, 1950-1960

Major Occupation Group	(In Percentage)							
	All Industries	Expanding Industries						Public Admn.
Total		Prof. Serv.	Manu- facturing	Finance, etc.				
<u>Industry and Occupation Mix Effects (<math>\Delta I + \Delta M</math>)</u>								
<u>All Losing Occupations</u>	(-7.84)	100.0	13.1	-1.6	4.6	-2.2	-0.3	-0.7
Farmers	(-3.76)	47.9	..	..	..	..	..	..
Laborers	(-3.11)	39.5	7.4	a/	8.1	a/	0.5	-0.1
Operatives	(-0.70)	8.8	1.3	-0.2	-1.7	a/	0.4	-0.8
Managers, etc.	(-0.27)	4.0	4.4	-1.4	-1.8	-2.2	-1.2	0.2
<u>Industry Effect (<math>\Delta I</math>)</u>								
<u>All Losing Occupations</u>	(-4.83)	61.8	-20.3	-2.6	-13.2	-2.2	-1.5	-0.8
Farmers	(-3.46)	44.1	..	..	..	..	..	..
Laborers	(-1.95)	24.9	3.0	-0.4	-1.9	-0.2	-0.4	-0.1
Operatives	(0.28)	-3.5	-12.4	-1.0	-10.6	-0.1	-0.4	-0.3
Managers, etc.	(0.29)	-3.4	-4.9	-1.2	-0.7	-1.9	-0.7	-0.4
<u>Occupation Mix Effect (<math>\Delta M</math>)</u>								
<u>All Losing Occupations</u>	(-3.01)	38.2	33.4	1.0	17.8	a/	1.2	0.1
Farmers	(-0.30)	3.8	..	..	..	..	..	..
Laborers	(-1.16)	14.6	10.4	0.4	10.0	0.2	0.9	a/
Operatives	(-0.98)	12.3	13.7	0.8	8.9	0.1	0.8	-0.5
Managers, etc.	(-0.56)	7.4	9.3	-0.2	-1.1	-0.3	-0.5	0.6

TABLE 7. - (Continued)

Major Occupation Group	Contracting Industries							
	Personal Serv.	Trade	Total	Agriculture	Transport, etc.	Mining	Entertainment	Construction
<u>Industry and Occupation Mix Effects (<math>\Delta I + \Delta M</math>)</u>								
<u>All Losing Occupations</u>	3.8	9.5	87.1	72.7	6.9	7.3	0.5	-0.3
Farmers	..	..	47.9	47.9	..	..	..	..
Laborers	0.3	-1.4	32.1	25.9	4.6	..	a/	1.6
Operatives	2.9	0.7	7.5	-0.9	2.0	7.4	a/	-1.0
Managers, etc.	0.6	10.2	-0.4	-0.2	0.3	-0.1	0.5	-0.9
<u>Industry Effect (<math>\Delta I</math>)</u>								
<u>All Losing Occupations</u>	-a/	-a/	82.4	71.3	5.0	5.6	0.3	0.2
Farmers	..	..	44.1	44.1	..	..	..	..
Laborers	-a/	-a/	27.9	26.3	1.4	..	0.1	0.1
Operatives	-a/	-a/	8.9	0.6	2.8	5.5	a/	a/
Managers, etc.	-a/	-a/	1.5	0.3	0.8	0.1	0.2	0.1
<u>Occupation Mix Effect (<math>\Delta M</math>)</u>								
<u>All Losing Occupations</u>	3.8	9.5	4.7	1.4	1.9	1.7	0.2	-0.5
Farmers	..	..	3.8	3.8	..	..	..	..
Laborers	0.3	-1.4	4.2	-0.4	3.2	..	-0.1	1.5
Operatives	2.9	0.7	-1.4	-1.5	-0.8	1.9	a/	-1.0
Managers, etc.	0.6	10.2	-1.9	-0.5	-0.5	-0.2	0.3	-1.0

a/ Value below the level of rounding

.. Magnitude zero

Note: Figures in parentheses denote the change in the share of each occupation as a percentage of total employment in all industries. (See Table 1 and Table 4.)

Source: Computed from Tables 1 and 3 and Appendix Tables 1 and 2.

the industry effect, but partly also to the occupation mix effect. The principal industry accounting for large gains in the managerial group was finance, insurance and real estate followed by the professional and related services, manufacturing, and public administration. However, it was a single industry, namely, wholesale and retail trade, which in this period experienced adverse occupation mix changes that brought relative decline of this occupation group. To be sure that no misleading inference be drawn out of the discussions in this paragraph, it must be added at once that the treatment of managers, officials, and proprietors together as a single group might not be entirely satisfactory here. Assuming that the occupation mix effect in the wholesale and retail trade pertained to the proprietors, it would follow that the managers and officials had, in fact, increased in the light of the positive occupation mix changes in the contracting industries, construction, mining, transport, etc., and of the overall increase from the industry and occupation mix effects in the expanding industries.

### C. Total Occupational Structure Change

So far the role of industry and occupation mix effects on specific occupation changes and their distribution among different industries was examined in detail. Although industry and/or occupation mix effect in a specific industry could be overwhelmingly important for a particular occupation, its relative impact on the total change in occupational structure might not be so significant. Attention is therefore focussed in this section on the relative contribution of industry and/or occupation mix effect of various industries to the total change in occupational structure. It was noted previously in Table 1 that the total change in occupational structure was the outcome of gains chiefly in the three groups of professional, clerical, and service workers at the loss of farmers and laborers. From Table 6, it is further evident that the three occupations were in turn governed by the changes-- industry or occupation mix- in the industries of a) professional and related services, b) finance, insurance, and real estate, and c) public administration. Likewise, the decline of

farmers and laborers was mainly due to the industry and/or occupation mix effect in agriculture and transport. Although manufacturing was a major expanding industry in this period, it tended to affect favorably the declining occupations more than the gaining occupations.

In more precise terms, the gains in professional workers due to the industry effect of professional and related services industry (28.7 percent) and the occupation mix effect of the manufacturing industry (10.1 percent) together accounted for roughly two-fifths of the total change in occupational structure in this period. In addition, the industry effect of professional and related services industry on service and clerical occupations was responsible for 8.1 percent and 6.0 percent respectively of the total occupational shift. Of significance to note was also the occupation mix effect of professional and related services industry on the professional workers, and of the wholesale and retail trade industry on the clerical workers that explained respectively -6.9 percent and 6.2 percent of the total occupational change. The rest of the change was due to scattered industry and/or occupation mix effect of different industries detailed in Table 6.

With regard to losing occupations, the factors affecting total change were even fewer compared to the gaining occupations. The industry effect of agriculture on farmers and farm managers (44.1 percent) and on laborers (26.3 percent) together accounted for the bulk of the total change in the occupational structure. Besides, the occupation mix effect of manufacturing on laborers affected the total change by 10.0 percent. The other important factors influencing total change were the industry effect (-10.6 percent) and the occupation mix effect (8.9 percent) of manufacturing on the operatives, and the occupation mix effect (10.2 percent) of wholesale and retail trade on the managerial group (see Table 7).

TABLE 8. - MAJOR COMPONENTS OF CHANGE IN OCCUPATIONAL STRUCTURE,  
UNITED STATES, 1950-1960

Major Occupation Group	Industry Effect	Occupation Mix Effect
<b>A. <u>Gaining Occupations</u></b>		
Professional workers	Professional and related services	Manufacturing, professional and related services
Clerical workers	Professional and related services, finance, insurance & real estate, and public administration	Wholesale & retail trade, manufacturing, professional and related services, finance, insurance and real estate
Service workers	Professional and related services	Professional and related services, and personal services
Sales workers	Finance, insurance and real estate	Manufacturing
Craftsmen	Manufacturing	Business and repair services, and wholesale and retail trade
<b>B. <u>Losing Occupations</u></b>		
Farmers	Agriculture, forestry and fisheries	Agriculture, forestry and fisheries
Laborers	Agriculture, forestry and fisheries	Manufacturing and transportation, communication and other public utilities
Operatives	Manufacturing, mining and transport, etc.	Manufacturing and personal services
Managers, etc.	..	Wholesale and retail trade

Source: Based on Tables 6 and 7.

## V. SUMMARY AND CONCLUSION

Briefly, the relative shift in the occupational structure of manpower in the United States was of the order of eight percentage points in the decade 1950-1960. During the same period, the industry structure changed by seven percentage points, in addition to considerable variations in the occupation mix within the industries. Against this backdrop, the analyses of relative occupational changes were undertaken in this paper in terms of the two components of a) the industry change (i.e., industry effect) and b) the changes in job pattern of industries (i.e., occupation mix effect). Investigations into these structural aspects focussed attention mainly on discerning the pattern, magnitude and direction of the influence of these two components on occupations distinguished here as the 'gaining' and 'losing' occupations. Parallel to these twin occupational groupings, industries were also divided into the two main categories of 'expanding' and 'contracting' industries.

In the decade 1950-1960, three-fifths of the occupational structure change was due to the industry effect and two-fifths due to the occupation mix effect. Underlying these changes, two distinct types called 'reinforcing' and 'offsetting' patterns of influence by the industry and occupation mix effects were observed. The occupations; namely, professional, clerical, service and sales workers, farmers and farm managers, and laborers were subject to the reinforcing pattern of influence and governed usually by a larger industry effect supplemented by the occupation mix effect. The remaining three categories of craftsmen, operatives, and proprietors were affected adversely by the occupation mix changes in industries that had offset to varying degree the favorable industry effect.

The magnitude of both industry and occupation mix effects varied considerably from industry to industry and by specific occupations. On the whole, the total occupational change involved principally the gains in professional, clerical and

service categories at the expense of farmers and laborers. Increase in professional and technical group was due largely to the expansion of professional and related services industry just as the loss of farmers and laborers accompanied the decline of agriculture. Changes in the remaining occupations were, besides the industry effect, affected appreciably by the occupation mix effect, the important ones being clerical, craftsmen, laborers, operatives, and proprietors.

More specifically, the clerical group was, as shown in Table 8, affected by the occupation mix variations in wholesale and retail trade, manufacturing, professional services, finance, insurance, and real estate; the craftsmen in those of business and repair services, and wholesale and retail trade; the laborers and operatives in that of manufacturing and the proprietors in that of wholesale and retail trade industry.

This paper emphasized the pattern of influence by the industry and occupation mix changes upon the overall and specific occupation trends in the United States during 1950-1960. The pattern of influence, over time and space, must be the subject of further research. Besides, the broad analyses limited to major industry and occupation groups might tend rather to obscure the picture, and therefore, more conclusive findings about the factors affecting occupational changes require comprehensive analyses in terms of detailed industry and occupation categories. Given a common pattern of influence, a range of possible applications arises. For example, it will offer a basis for grouping occupations subject to a common pattern of influence by industry and/or job pattern changes, and likewise, industries exerting the same kind of influence on various occupations. Using these results, it may also eventually be possible to adopt a more scientific method of manpower projections.

## **APPENDIX**

APPENDIX TABLE 1

## OCCUPATIONAL PATTERN BY SPECIFIC INDUSTRY, UNITED STATES, 1950

(In Percentage)

Major Industry Group	Prof. Wkrs.	Farmers & Managers, etc.	Clerical Wkrs.	Sales Wkrs.	Crafts-men	Opera-tives	Service Wkrs.	Laborers	Total
Agriculture	0.66	61.66	0.27	0.07	0.30	0.79	0.17	36.08	100.00
Mining	3.61	4.14	4.57	0.21	17.32	69.20	0.74	0.21	100.00
Construction	3.79	8.54	3.16	0.32	56.77	7.60	0.52	19.30	100.00
Manufacturing	4.85	4.86	11.05	2.93	19.53	45.94	1.90	8.94	100.00
Transport, etc.	4.23	7.14	23.37	0.56	21.10	27.35	3.41	12.84	100.00
Trade	2.05	23.45	11.42	27.55	6.17	12.45	13.65	3.26	100.00
Finance, etc.	3.34	17.02	42.11	23.60	2.36	0.72	9.00	1.85	100.00
Business serv.	5.33	13.60	10.97	3.16	50.49	9.99	2.93	3.53	100.00
Personal serv.	3.04	6.11	3.88	0.70	3.21	16.36	63.21	3.49	100.00
Entertainment	21.84	17.64	13.63	2.40	9.22	3.41	26.85	5.01	100.00
Prof. serv.	61.40	2.64	12.92	0.23	2.41	2.14	17.33	0.93	100.00
Public admn.	11.85	9.22	44.20	0.24	8.23	4.75	16.52	4.99	100.00
All Industries	8.85	16.79	12.42	7.08	14.00	20.09	10.30	10.47	100.00

Source: U.S. Bureau of the Census, 1950 Census: U.S. Summary: Characteristics of the Population, Vol. II, Part 1, Table 134, pp. 290-91.

**APPENDIX TABLE 2****OCCUPATIONAL PATTERN BY SPECIFIC INDUSTRY, UNITED STATES, 1960**

(In Percentage)

Major Industry Group	Prof. Wkrs.	Farmers & Managers, etc.	Clerical Wkrs.	Sales Wkrs.	Crafts-men	Operatives	Service Wkrs.	Laborers	Total
Agriculture	1.30	57.85	0.75	0.21	0.68	2.44	0.29	36.48	100.00
Mining	7.50	5.95	7.53	0.44	22.55	55.02	1.01	..	100.00
Construction	4.70	9.87	4.48	0.38	53.86	8.82	0.52	17.37	100.00
Manufacturing	7.67	5.17	12.22	3.81	19.84	43.45	1.68	6.16	100.00
Transport, etc.	5.17	7.71	24.26	0.95	21.51	28.20	2.82	9.38	100.00
Trade	1.97	19.25	13.97	27.33	7.42	12.16	14.08	3.82	100.00
Finance, etc.	3.36	17.53	47.05	22.48	1.90	0.46	5.81	1.41	100.00
Business serv.	8.89	11.87	18.23	3.38	36.78	11.64	5.70	3.51	100.00
Personal serv.	2.43	5.40	4.57	0.57	2.56	12.74	68.57	3.16	100.00
Entertainment	19.81	15.21	13.23	2.42	8.54	3.25	31.88	5.66	100.00
Prof. serv.	57.01	2.77	14.88	0.22	2.59	1.63	20.24	0.66	100.00
Public admn.	13.86	10.03	42.97	0.12	8.57	3.50	17.37	3.58	100.00
All Industries	11.77	12.75	15.20	7.54	14.17	19.38	11.79	7.40	100.00

Source: U.S. Bureau of the Census, U.S. Census of Population: 1960, Subject Reports, Occupation by Industry, Final Report PC(2)-7C, Washington, D.C., 1963, Table 1, pp. 1-4.

*UNIVERSITY of PENNSYLVANIA*  
*Population Studies Center*

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The Center is organized for graduate training and research in population and related fields. Its building houses offices, machine and other workrooms, seminar rooms, library and training laboratory. Research interests range widely over the various fields of demography and its relations with economics, sociology, and other social sciences, including *inter alia* fertility, mortality, migration, urbanization, labor force, and the interrelations of population changes with economic growth. The degrees of Master of Arts and Doctor of Philosophy in Demography are awarded, and doctoral candidates in Sociology, Economics, and related fields may emphasize population as an aspect of their programs. Post-doctoral scholars may undertake special programs of research and study. Inquiries may be addressed to the Director, Dr. Vincent H. Whitney.