EMPLOYMENT IN THE INFORMATION SECTOR: THE CASE OF TURKEY

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I. INTRODUCTION

Advanced countries have experienced a transformation from the industrial society to the information society since the early 1950s. The new society is characterised by the increasing role of information and knowledge in the society. In this new society, the economy shifts from a goods producing sector to a service and information based economy. Research and development activities have an important share in total employment and production. Computer technology, information technology (IT) and more recently information and communications technologies (ICTs) replace the mental labour of men (Masuda, 1981).

However, the most important characteristic that represents this transformation is the change in the employment structure of the countries. This is because the change in the employment structure is the best indicator that reflects the economic development. The number of the workforce employed in information occupations such as education and management has increased more than the other occupations in information societies. As a result, the fourth sector, generally called the "information sector" has had an increasing employment share in developed countries. Although there is not a definite classification of the sub-sectors included in the information sector, this sector is mainly composed of education, research and development, and health. The employment in agriculture and industry has declined because of the technological developments while the employment in the services and the information sectors has increased.

Various approaches have been developed to determine the employment rate of the information sector in different countries. The literature review, however, has indicated that there is not any study that quantified the employment share of the information sector in Turkey. Therefore, the purpose of this article is twofolds. Firstly, empirical studies performed to measure the employment in the information sector is explained so that a methodological framework for the calculation of the employment in the information sector in this study can be constructed. Secondly, employment trends of the information sector in Turkey should be calculated and compared with that of the other countries to find out the extent to which the information sector has been developed in Turkey.

This article starts by examining the approaches applied to measure the employment share of the information sector in various countries as well as their results, strenghts and weaknesses. Secondly, employment trends of the information sector in Turkey will be examined.

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II. THE MEASUREMENT OF THE INFORMATION WORKFORCE: A REVIEW OF THE LITERATURE

There are different approaches used to determine employment share of the information sector[1]. These approaches mainly can be divided into two groups characterising the statistical data included into the empirical analysis. The first group approaches use the 'disaggregated' statistical data, while the second group approaches are based on the 'aggregated' statistical data. This section summarises the empirical studies based on these approaches.

A. The Approaches Used Disaggregated Statistical Data

Earlier studies based on disaggregated statistical data were developed in the US. Machlup (1962) and Porat (1977) calculated the employment share of the information sector in the US by using disaggregated data, although their methodologies differed widely. In 1981 and 1986, OECD followed Porat's methodology to determine the employment in the information sector in some of the OECD countries.

1. Fritz Machlup and the Knowledge Industry

Machlup (1962) was the first economist who determined the size of the employment in the knowledge industries in the US economy. He preferred the term "knowledge industry" to "information sector" as he attributes more value to knowledge than information.[2] Machlup's analysis was based on the US labour force statistics divided into eleven occupation groups which: (1) Professional, technical, and kindred workers, (2) managers, officials, and proprietors, except farm, (3) clerical and kindred workers, (4) sales workers, (5) craftsmen, foremen and kindred workers, (6) farmers and farm managers, (7) operatives and kindred workers, (8) private household workers, (9) service workers, except private household, (10) farm labourers and foremen, and (11) labourers, except farm and mine (Machlup, 1962, p.380). The workforce in each of the first five groups was divided into two groups as knowledge producing and non-knowledge producing in order to calculate the share of the knowledge producing workforce in the employment. Machlup's calculations were extended in another study to show the trends in knowledge producing and non-knowledge producing occupations (Machlup and Kronwinkler, 1975). Table 1 shows the share of the knowledge producing workforce in each of these five groups. Employment in all knowledge producing occupations increased from 10.7% in 1900 to 39.7% in 1970. However, employment in all non-knowledge producing occupations declined from 89.3% to 60.3% during the same period.

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[1] These approaches and their results were widely discussed in my Turkish PhD thesis entitled "Sanayi-Sonrası Toplum Sürecinde Avrupa Birliği", Erciyes Üniversitesi Sosyal Bilimler Enstitüsü, Kayseri, 1996.

[2] Although information and knowledge are sometimes accepted in the same sense, knowledge has a wider meaning than information. That is, "information" means "data". But, "knowledge" means information processed into some useful form (Martin, 1988).

Rubin and Huber (1986) also extended Machlup's work for the US. They found that employment in all knowledge producing occupations comprised 41% of total employment in 1980.

Although Machlup's (1962) study is an important contribution for the information society literature, it carries a weakness as well. The classification of the knowledge industries is based on the US statistics which sometimes limit the application of Machlup's methodology to any other country because of different statistical classifications in the countries.

Table 1 The Share of the Knowledge Workforce in Knowledge Producing Activities in the US (1900-1970)-As % of total employment-

Occupations	1900	1910	1920	1930	1940	1950	1960	1970
Professional, technical and kindred workers	3.6	3.9	4.5	5.5	5.9	6.9	9.0	11.7
Managers, officials and proprietors, exl. Farm	2.5	3.4	3.4	3.8	3.9	5.5	5.7	6.6
Clerical and kindred workers	3.2	5.4	8.1	8.9	9.7	12.5	14.8	17.7
Sales workers	1.0	1.4	1.9	2.9	3.4	3.0	3.1	3.3
Craftsmen, foremen and kindred workers	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4
All knowledge producing occupations	10.7	14.6	18.3	21.6	23.4	28.3	33.0	39.7
All non-knowledge producing occupations	89.3	85.4	81.7	78.4	76.6	71.7	66.7	60.3

Source: F. Machlup and T. Kronwikler. (1975). "Workers Who Produce Knowledge:A Steady Increase, 1900 to 1970". **Welwirthschaftliches Archiv**, 111, pp.754-755.

2. Marc Uri Porat and the Information Sector

Following Machlup, Porat (1977) analyzed the size of the information workforce in the US employment. Porat developed a more comprehensive approach than Machlup to measure the share of the information workforce. Machlup's unit of analysis was the 'knowledge industry', whereas Porat's basic unit of analysis was 'information activity'. In Porat's view, an information activity includes all the resources consumed in producing, processing and distributing information goods and services. Porat classified information occupations into five groups in three markets for information services (See Table 2).

Table 2 The Classification of Information Occupations

Main Groups	Sub-groups
Markets for information	-Knowledge producers (scientific and technical producers of private information services)-Knowledge distributors (educators, public information disseminators, communication workers)
Information in markets	-Market research and coordination specialists (information gatherers, search and coordination specialists, planning and control workers)-Information processors (non-electronic based, electronic based)
Information infrastructure	-Information machine workers (non-electronic machine operators, electronic machine operators, telecommunication workers)

Source: Schement, J.R. (1990). "Porat, Bell and the Information Society Reconsidered: The Growth of Information Work in the Early Twentieth Century". **Information Processing and Management**, (26), 4, p.454.

If we examine the classification given in Table 2, it can be argued that the first group involves the occupations related to the production or distribution of the information commodities for sales in the market, while the second group involves the occupations related to the processing, movement, or handling of information. The last group consists of the occupations that are involved the operation of information machines (Schement, 1990, p.454).

The above classification suggests that Porat had a different classification from Machlup. Although Porat took Machlup's work as the departure point, he included different occupations into the "information" or "knowledge" sector. He also classified the active population into four sectors as opposed to the two sectors (knowledge producing and non-knowledge producing) in Machlup's work

Porat divided the US labour force into the four sectors of agriculture, industry, services and information. He estimated that information workers would comprise 46% of the workforce in 1980. As we can see from Table 3 and Figure 1, information workers overtook service workers in 1920.

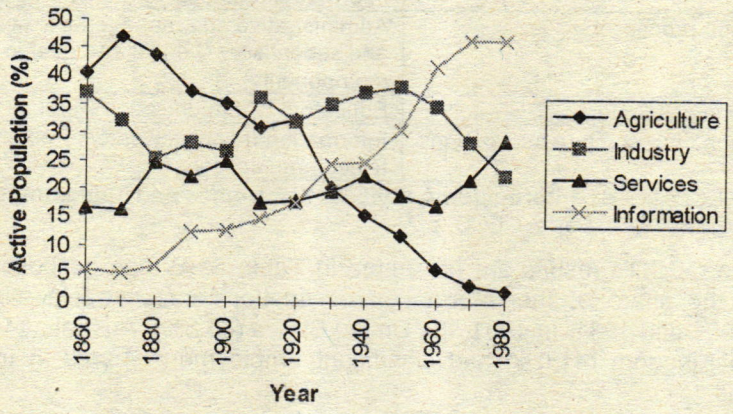
Table 3 Four Sectors Aggregation of The Active Population in the US (1860-1980) -As % of the active population-

Year	Agriculture	Industry	Service	Information
1860	40.6	37.0	16.6	5.8
1870	47.0	32.0	16.2	4.8
1880	43.7	25.2	24.6	6.5
1890	37.2	28.1	22.3	12.4
1900	35.3	26.8	25.1	12.8
1910	31.1	36.3	17.7	14.9
1920	32.5	32.0	17.8	17.7
1930	20.4	35.3	19.8	24.5
1940	15.4	37.2	22.5	24.9
1950	11.9	38.3	19.0	30.8
1960	6.0	34.8	17.2	42.0
1970	3.1	28.6	21.9	46.4
1980	2.1	22.5	28.8	46.6

Source: Bell, D. (1982). "The Social Framework of The Information Society". In T. Forester (Ed.), **The Microelectronics Revolution: The Complete Guide to The New Technology and its Impact on Society** (4th ed.), Oxford: Basil Blackwell, p. 523.

The above explanations show that Porat applied a more complicated approach than Machlup as he divided economic activities into four sectors. However, Porat's methodology has been criticized as his classification of information workers covered different types of workers from factory workers assembling information transmission equipment to university researchers. It is argued that this broad categorization could "weaken the social distinctiveness of the information sector" (Steinfeld and Salvaggio, 1989, p.4).

Figure 1 Four Sectors Aggregation of the Active Population in the US (1860-1980)



Source: Based upon data in Table 3.

3. The Measurement of the Information Workforce in OECD Countries

Machlup's and Porat's analyses were based only on the US economy. Therefore, it is not possible to make comparisons between countries. The first study that allows comparisons between countries was undertaken by Organization for Economic Cooperation and Development (OECD) in 1981 and extended with new countries in 1986. The data for empirical investigation was collected from member country data sources.

OECD's Committee for Information Computer and Communication Policy (ICCP) used Porat's list to define information occupations and developed a similar list which consists of four groups occupations (Table 4).

The workforce which produces new information or packages existing information into a new form are accepted as information producers. In contrast to information producers, information processors receive information and give necessary responses to the related people. For example, administrative people receive some details about the firm and then organize, plan or interpret these information for other people. Information distributors generally transfer the information from one person to the another. Workers employed in information infrastructure occupations operate and repair the necessary machines used in information related activities (OECD, 1981, p.9).

Table 4 The Classification of Information Occupations

Occupational Groups	Occupations
Information producers	Scientific and technical workers (components) Market research and coordination specialists Information gatherers Consultative services
Information processors	Administrative and managerial Process control and supervisory Clerical and related (components)
Information distributors	Educators Communication workers
Information infrastructure occupations	Information machine workers Postal and telecommunications

Source: OECD. (1981). **Information Activities, Electronics and Telecommunication Technologies.** Vol. II. Paris: OECD, p.7.

The OECD's results are presented in Table 5. As can be observed from Table 5, the share of the information occupations increased in all countries between 1951 and 1981. In 1981, the United States (45.8%), Australia (41.5%) and the United Kingdom (41.0%) had significant employment shares in information occupations.

Table 5 Employment Share of Information Occupations in OECD Countries (1951-1982)-As % of active population-

Countries	1951	1961	1971	1975	1981	1982
Australia			39.4		41.5	
Austria	18.0	22.0	28.5	32.2 (a)		
Canada	29.4	34.2	39.9			
Denmark					30.4 (b)	
Finland	12.6 (i)	17.3 (g)	22.1 (c)	27.5	30.1 (b)	
France	20.3 (d)	24.1 (e)	28.5 (f)	32.1		
Germany	18.3 (i)	23.4	29.3 (c)	32.8 (a)	33.5	34.8
Japan	17.9 (g)	22.2 (h)	25.4 (c)	29.6		
New Zealand				39.4 (a)	39.8	
Norway				20.8	22.9	
Sweden	26.0 (g)	28.7 (h)	32.6 (c)	34.9	36.1 (b)	
United Kingdom	26.7	32.1	35.6		41.0	
United States	30.7 (i)	34.7 (g)	41.1 (c)			45.8 (b)

Notes: a.1976, b.1980, c.1970, d.1954, e. 1962, f.1968, g.1960, h.1965, i.1950
Source: OECD. (1986). **The Trends in the Information Economy**. Paris: OECD. p.8.

It is clear that OECD's study allows international comparisons of the information workforce. Although this feature distinguishes this study from the earlier studies, the data collection method limits the comparability of the size of the information sector within the countries. As the data utilized in OECD's study are based on the member country data sources, the information industries and the information occupations defined by OECD sometimes differed from the definitions in the member country data sources.

4. The Measurement of the Information Workforce in Other Countries

The size of the information workforce has also been calculated in some developing nations and some industrialized nations in the Pacific Basin such as Australia, Singapore, Philippines, Indonesia, Malaysia, and Thailand by using a different approach from the above studies (See Jussawalla, *et al.* 1988). Although these studies are based on the same approach, it is difficult to compare the results across countries because of the differences in definition of the information work and information sector (Dordick and Wang, 1993, p.47).

B.The Approaches Used Aggregated Statistical Data

Disaggregated statistical data utilized in the earlier studies is not available for all countries, especially for developing countries. Therefore, some authors (Katz 1986; Dordick and Wang 1993) used aggregated statistical data from ILO, *Yearbook of Labour Statistics*.

Katz (1986) has examined the change in the workforce structure of the developing countries between 1960 and 1980. He utilized the occupational statistics arranged by 1968 International Standard Classification of Occupations (ISCO) in ILO; *Yearbook of Labour Statistics*, to calculate the information workforce. Using the information occupations suggested by OECD to chose occupational groups from ISCO classification, he proposed that the first three occupational groups of ISCO should be accepted as information workforce. These groups are (Katz, 1986, p.267):

-Professional, technical and related workers,

-Administrative, executive and managerial workers,

-Clerical workers.

The occupations included in these groups are given in Appendix I. Although Katz used OECD's classification as a starting point to chose information occupations from ISCO. Some occupations considered information-based by OECD are not included in the ISCO Groups 1, 2, and 3 (See Appendix I).

In contrast to OECD, which collected the necessary data from the statistical offices of the member countries, Katz used readily available statistical data from ILO. Hence, it can be argued that Katz applied an easier approach than OECD even though he used OECD's classification as a starting point. But, Katz's classification can be critised as it does not contain some of the information- related occupations suggested by OECD (Appendix I). In his view, the main disadvantage of his classification is the inclusion of telecommunications and media workers to the service sector instead of the information sector (Katz, 1986, p.269).

Table 6 Employment in the Information Sector in Developing Countries (1960-1980)-Percentage-

Country	1960	1970	1980
Argentina	21. 2	21. 8	24. 1
Bahrain	. .	18. 6	26. 3
Brazil	12. 0	12. 2	. .
Chile	14. 6	20. 0	22. 3
Egypt	8. 0	12. 4	18. 6
Ghana	4. 6	6. 9	. .
Hong Kong	14. 2	15. 8	23. 5
India	4. 4	6. 6	. .
Iran	3. 6	7. 9	. .
Korea	6. 3	10. 1	14. 6
Kuwait	. .	23. 7	29. 9
Mexico	10. 6	16. 5	. .
Pakistan	3.7	4. 7	6. 4
Panama	13. 7	16. 6	26. 4
Philippines	5. 8	10. 5	10. 8
Singapore	17. 1	24. 1	30. 0
Sri Lanka	9. 3	10. 6	11. 8
Syria	6. 3	8. 9	17. 6
Tunisia	. .	10. 0	12. 1
Venezuela	14. 1	21. 3	25. 6

Source: R. L. Katz. (1986). "Explaining Information Sector Growth in Developing Countries". **Telecommunications Policy**, 10, (September), p. 212.

Katz compared his results with those of Porat and OECD. When he compared his calculations for British workforce with those of OECD (1981) and Wall (1977) for the year 1966, Katz's results based on aggregated data were 8% smaller than Wall's and 6 % smaller than OECD's. According to his calculations for 1970, the difference decreased to 2 % (Katz, 1986, p.272). Katz also calculated the difference between Porat's method and his approach in a number of countries for different years. Data indicated that Katz's measurement provides a difference in a range between +4 and -4 except the calculation for Canada. However, Katz concluded that this approach can be used to measure the size of the information workforce, if we do not have disaggregated statistics (Katz, 1986, p.274).

Katz calculations for the information sector are presented in Table 6. The results indicate that employment in the information sector increased in all countries between 1960 and 1990. In 1980, the size of the active population employed in the information sector changed between 6.4% and 30%.

Katz methodology is easier than Porat's and OECD's approaches to measure the employment shares of the four sectors because it does not need complicated calculations. The share of the information sector in the employment can be calculated for any country that arranges the labour force statistics according to the ISCO classifications.

III. FOUR SECTORS AGGREGATION OF EMPLOYMENT IN TURKEY

It was stressed earlier that there is not any study carried to calculate the employment share of the information sector in Turkey. The literature review has also indicated that disaggregated statistical data used by Porat and OECD is not

available for Turkey. Thus, it is not possible to follow Porat's and OECD's methodologies to show the four sectors aggregation of employment in Turkey. Aggregated statistical data utilized by Katz, however, is available from ILO, *Yearbook of Labour Statistics*, to calculate the employment trends of the information sector in Turkey. Because of the available data Katz's methodology is followed in this article to analyze four sectors aggregation of employment in Turkey.

Table 7 presents the employment trends of four sectors in Turkey between 1975 and 1993. The trends can be summarised as follows:

(i) Employment rate of agriculture has declined from 64.1% in 1975 to 28.9% in 1993. Although employment in agriculture has decreased, this sector still had an important employment share in 1993, having the second highest employment rate after industry.

(ii) Employment in industry incerased from 21.1% to 29.3% during the years included in this study. Industry had the highest employment share in 1993.

(iii) Employment in services went up from 6.6% in 1975 to 28% in 1993.

(iv)Table 7 presents that employment rate of the information sector in Turkey grew from 8.2% in 1975 to 13.8% in 1993. However, employment in this sector did not show a stable tendency during the period included in Table 7. It increased between 1975 and 1985. However, it declined from 14.1% in 1985 to 10.5% in 1989 and then started to increase.

Table 7 Four Sectors Aggregation of Employment in Turkey (1975-1993)

Years	Agriculture	Industry	Services	Information
1975	64.1	21.1	6.6	8.2
1980	59.7	22.0	9.4	8.9
1985	43.7	27.8	14.4	14.1
1988	49.0	23.3	16.4	11.3
1989	49.0	22.4	18.1	10.5
1990	53.5	24.1	11.8	10.6
1991	48.2	21.4	19.4	11.0
1993	28.9	29.3	28.0	13.8

Notes: Information sector contains the first three ISCO groups used by Katz (1986); Agriculture contains 6th occupational groups (Agric.animal husbandary...); Industry comprises 7-9th occupational groups (Prod./related workers...) ; Services contains 4th (sales workers) and 5th (service workers) occupational groups in ISCO classification.
Source: Calculated from ILO. **Yearbook of Labour Statistics**, various years.

These observations suggest that agriculture and industry are still the dominant sectors in Turkey in contrast to the information societies in which the services and the information sectors have the highest employment rate. The reason of the low employment rate in the information sector in Turkey is the development level of Turkey towards the information society. Because, Turkey does not have the characteristics -such as high enrolment rate in tertiary education and qualified labour force- of an information society. Therefore, employment in the information sector will increase in Turkey as it moves towards an information society.

As Katz's calculations are based on the same methodology, we can compare our results with his results for 1980. The reason of choosing 1980 for comparison is the lack of statistical data for other developing countries. The employment rate of the information sector in Turkey is lower than that of the other developing countries when Katz's results are considered (See Table 6). For example, Egypt (18.6%) and Tunisia (12.1%) had a higher employment rate than Turkey (8.9%) in 1980. Even Turkish employment rate in 1993 was lower than the employment rate of the other countries in 1980. If Katz's findings in Table 6 is observed, it can be seen that most of the countries, except Pakistan (6.4%), Philippines (10.8%) and Tunisia (12.1%), had a higher employment in information sector in 1980 than Turkey (13.8% in 1993).

The distribution of the information workforce is also another indicator of the development towards the information society. Aggregated statistical data is only available for 1989, if we would like to show the distribution of information workforce according to occupations in Turkey. Table 8 gives the information workforce in Turkey in 1989 according to main occupations.

Table 8 The Distribution of Information Workforce in Turkey (1989)

Occupations	Employment Rate (%)
Professional, technical and related workforce	4.8
Administrative and managerial workforce	1.8
Clerical and related workforce	3.9

Source: Calculated from ILO, **Yearbook of Labour Statistics 1990**.

The statistical data on Table 8 presents that professional, technical and related workforce had the largest employment rate in Turkey in 1990. However, administrative and managerial workforce had the lowest share within the information sector. This distribution presents that most of the information workforce is employed as professional and technical workforce or clerical workforce. Clerical workforce is generally composed of office workers and machine operators (See Appendix I). The characteristics of the workforce included in this group is the low education level in comparison with professional and technical workforce. So, it is clear that Turkey does not have a highly educated workforce in the information sector.

Table 9 Employment Share of The Information Sector in The European Union Countries (1980-1993)

Countries	1980	1988	1989	1990	1991	1993
Denmark	. .	46.2	47.0	43.0	47.1	43.0
France	35.0	38.8	47.9	. .	49.4	. .
Germany	37.2	48.3	39.8	40.1	44.1	39.3
UK	45.0	48.7	49.2	. .	49.7	. .
Greece	21.1	24.5	24.7	25.3	26.4	26.2
Spain	18.3	23.0	24.7	24.0	26.7	27.0
Portugal	17.4	21.6	23.6	24.0	25.2	27.0

Source: Calculated from ILO, **Yearbook of Labour Statistics**, various years.

The same methodology has been applied to calculate the employment in the information sector in some EU countries to show the extent to which the information sector has developed in Turkey in comparison with the EU members

(See Table 9). In 1993, employment rate of the information sector in Turkey was 13.8% (See Table 7). When this rate is compared with the EU members, it is clear that Turkey had the lowest employment rate. In the same year, employment in the information sector was 43% in Denmark and 39.3% in Germany. Even the less developed EU members such as Greece (26.2%), Spain (27%) and Portugal (27%) had a higher employment rates than Turkey. Employment rate of this sector reached 49.7% in the UK and 49.4% in France in 1991.

The above comparisons show that Turkey does not have an employment structure represented by advanced countries or information societies. Nor Turkey has a satisfactory employment rate in the information sector, when the employment rates in this sector are compared with developed and developing countries.

IV. CONCLUSION

Employment in the information sector has been increasing in the advanced countries as the fourth economic sector. Various approaches based on disaggregated and aggregated data have been adopted in developed and developing countries. The approaches based on disaggregated statistical data can not be applied to determine the employment in the information sector if the countries do not have detailed occupational statistics. However, approaches using aggregated statistical data is more convenient to apply since most of the countries arrange their statistics according to ISCO classification.

As the information society literature has not developed in Turkey, there is not any study that analyzed the employment rate of the fourth sector in Turkey. Hence, the main contribution of this article has been the analysis of the employment structure of Turkey by considering the information sector.

Advanced countries are employed 50% of the active population in the information sector. However, it is clear from the four sectors aggregation of the employment in Turkey that Turkish employment structure does not have a similar pattern with the information societies. In contrast to the advanced countries, Turkey has a significant employment share in agriculture while she has a low employment rate in information sector. Employment rate of the information sector in Turkey is also lower than that of the some other developing countries. However, it is expected that Turkish employment structure will change as Turkey moves towards a new development stage represented by advanced industrial society or the information society.

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APPENDIX I. Information Occupations

This appendix will present information occupations included in the first three ISCO groups and the occupations not included in the ISCO classification, although they defined as information occupations by OECD.

A. Information Occupations Included in the First Three ISCO Groups

In this study information workforce comprises the first three groups of the ISCO classification. Occupations included in these groups can be given as follows (ILO, 1994, p. 1116):

Group 0/1 Professional, Technical and Related Workers

0-1 Physical scientists and related technicians

0-2/3 Architects, engineers and related technicians

0-4 Aircraft and ships' officers

0-5 Life scientists and related technicians

0-6/7 Medical, dental, veterinary and related workers

0-8 Statisticians, mathematicians, system analysts and related technicians

0-9 Economists

1-1 Accountants

1-2 Jurists

1-3 Teachers

1-4 Workers in religion

1-5 Authors, journalists and related writers

1-6 Sculptors, painters, photographers and related creative artists

1-7 Composers and performing artists

1-8 Athletes, sportsmen and related workers

1-9 Professional, technical and related workers not elsewhere classified

Group 2 Administrative and managerial workers

2-0 Legislative officials and government administrators

2-1 Managers

Group 3 Clerical and related workers

3-0 Clerical supervisors

3-1 Government executive officials

3-2 Stenographers, typists and card-and tape-punching machine operators

3-3 Bookkeepers, cashiers and related workers

3-4 Computing machine operators

3-5 Transport and communications supervisors

3-6 Transport conductors

3-7 Mail distribution clerks

3-8 Telephone and telegraph operators

3-9 Clerical related workers not elsewhere classified

B. Information Occupations Not Included in ISCO Groups 1, 2 and 3

Katz also determined the information related occupations not included in ISCO Groups 1, 2 and 3. He grouped these occupations according to OECD's main categories (Katz, 1988, p.142:

I. Information Producers

Market search and co-ordination specialists

4-10.20 Commodity brokers

4-22 Purchasing agents and buyers

4-31 Technical salesmen and advisers

4-41 Insurance and stock agents, brokers and jobbers

4-43.20 Auctioneers

II. Information Gatherers

4-43.30 Valuation surveyors

7-54.70 Fabrics examiners

8-59.20 Inspectors, viewers, and testers

9-49.80 Quality inspectors

5-89.20 Private inquiry agents

III. Information Processors

Administration and managerial

4-00 Managers (wholesale/ retail trade)

Process control and supervisory

4-21 Sales supervisors

5-20 Housekeeper

5-31.20 Head cook

6-00.30 Supervisors: clerical, sales, and other

6-32.30 Forest supervisors

7-0 Supervisors and general foremen (production)

IV. Information Infrastructure Occupations

Information machine workers

8-49.65 Office machine repairmen

8.62 Sound and vision equipment operators

9-21 Compositors and typesetters

9-22 Printing pressmen (except 9-22.70)

9-23 Stereotypers and electrotypers

9-24 Printing engravers (except 9-24.15 and 9-24.30)

9-25 Photoengravers

9-26 Bookbinders and related workforce

9-27 Photographic processors postman and telecommunications related workforce

8-54 Radio and television repairmen

8.56 Telephone and telegraph installer/repairmen

8-57.40 Telephone and telegraph linesmen

8-62 Broadcasting station operators.