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VAKGROEP ARBEIDSECONOMIE

THE ROLE OF THE SERVICE SECTORS WITHIN
THE CHANGING ECONOMIC STRUCTURE *

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ABSTRACT

This paper uses the input-output tables of the Belgian economy for 1965, 1970, 1975 and 1980 to analyze the characteristics of the intersectoral relations of the service sectors with the other sectors.

An answer will be given to the following questions:

1. Are services final or intermediate "goods"?
2. Which impact has the expansion of a particular sector on the total economic system and the other way round?
3. Have services a multiplier effect on total output and employment?

From the calculations it appears that most of the service industries have high value added ratios and are directed towards final demand.

The indices of dispersion and of sensitivity show a weak direct interweaving of the service sector with the rest of the economy. Finally, the employment multiplier analysis indicates that most of the service industries have a great opportunity to generate employment when final demand increases.

1. INTRODUCTION

Most of the research about the role of the service sectors in the economy is limited to the evolution of the relative share of the service industries in total employment and in GDP or GNP, and to the determinants that explain this structural change (see e.g. Baumol (1967); Baumol, Blackman and Wolff (1985 and 1989) and Van Gemert (1985)). Less attention is paid to changes in the links with the manufacturing and other sectors in the economy as a consequence of the increased division of labour and the development of new services caused by changes in the production technologies.

Are services dominantly final demand oriented or are some services, e.g. business services, intermediate "goods"? Do the volumes of intermediate deliveries of services change over time? What is the impact of the expansion of the service industries on the rest of the economy? Have services a multiplier effect on total output and employment?

In this paper we will give an answer to these questions.

The characteristics of the intersectoral relations of the service sectors with the other sectors will be analyzed by using the input-output tables of the Belgian economy for 1965, 1970, 1975 and 1980¹.

In the first part we measure to what extent the different sub-sectors of the economy are oriented towards final or intermediate demand. The forward and backward linkages between the economic sub-sectors are evaluated in part two by calculating sensitivity and dispersion indices. In the last part we estimate the capacity of the different sectors to generate employment.

¹ In order to get conformity between these input-output tables we put rather similar sectors together in one group and redefined the heading. Finally each input-output table consists of 50 sectors.

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2. ARE SERVICES FINAL OR INTERMEDIATE "GOODS"?

The answer to the question "Are services final or intermediate "goods"?" can be given by calculating the following ratios (Chenery and Watanabe (1958)):

$$u_j = \frac{\sum_i x_{ij}}{X_j} * 100$$

$$= \frac{\text{purchased inputs by sector } j}{\text{total output of sector } j} * 100$$

$$w_i = \frac{\sum_j x_{ij}}{D_i} * 100$$

$$= \frac{\text{intermediate demand for the output of sector } i}{\text{total demand for the output of sector } i} * 100$$

in which x_{ij} = inputs purchased by sector j from sector i

The u_j -ratio gives the percentage of purchased inputs per unit of output. Hence, $100-u_j$ gives the percentage of value added per unit of output.

Sectors with a high u_j have a relatively low ability to create value added per unit of output. These sectors are capital intensive and/or consume a lot of raw materials and other intermediate goods and services.

Table 1a: Productive sectors by nature of production (u_j) and use of output (w_i) (1965)

	Class I :		Class IV :	
	u_j	w_i	u_j	w_i
Water	11.52	62.10	0.00	0.00
<u>Communic</u>	<u>12.03</u>	<u>65.77</u>	3.64	46.73
Coal	28.37	53.19	<u>14.88</u>	<u>0.45</u>
Minerals	39.30	79.44	<u>15.27</u>	<u>0.00</u>
Rubber	41.51	60.33	<u>15.53</u>	<u>25.35</u>
Electrici	45.63	70.19	<u>18.45</u>	<u>45.74</u>
Gas	46.90	61.31	<u>18.79</u>	<u>3.62</u>
Cement	49.78	78.36	<u>22.08</u>	<u>45.47</u>
Petrol	50.00	67.56	<u>25.03</u>	<u>0.00</u>
			25.79	1.13
			<u>26.15</u>	<u>43.85</u>
			<u>32.20</u>	<u>48.18</u>
			35.06	11.60
			<u>38.01</u>	<u>45.70</u>
			44.43	26.84
			48.81	35.87

	Class II :		Class III :	
	u_j	w_i	u_j	w_i
Metal	51.19	58.02	<u>53.00</u>	<u>3.24</u>
Agricult	51.71	69.86	53.40	24.30
Beverage	52.71	62.24	53.43	11.79
Paper	55.09	75.28	54.52	26.79
Coke	77.60	87.72	55.62	5.48
<u>Financial</u>	<u>82.37</u>	<u>74.87</u>	58.88	24.67
Plastic	86.47	53.02	60.69	11.37
Ferrous	88.02	67.12	60.78	49.09
Nonferrous	88.38	53.29	73.29	43.52
			<u>73.41</u>	<u>1.23</u>
			75.07	48.95
			75.94	47.85
			79.89	24.08
			81.50	41.65
			99.00	14.45
			<u>99.00</u>	<u>21.98</u>

Table 1b: Productive sectors by nature of production (u_j) and use of output (w_i) (1970)

	Class I :	u_j	w_i		Class IV :	u_j	w_i
Water		10.17	56.11	<u>Household</u>		0.00	0.00
<u>Communic</u>		<u>10.21</u>	<u>65.23</u>	<u>Servtr</u>		4.82	46.85
<u>Oreparat</u>		<u>13.25</u>	<u>59.06</u>	<u>Realestate</u>		12.74	1.79
Gas		28.40	64.41	<u>Education</u>		14.70	0.00
Coal		30.63	59.73	<u>Trade</u>		18.99	21.26
Electrici		43.01	64.60	<u>Health</u>		21.48	4.33
Minerals		43.22	80.09	<u>Business</u>		21.79	47.44
				<u>Canaltr</u>		23.87	40.91
				<u>Governm</u>		27.27	0.00
				Tobacco		29.63	1.35
				<u>Landtr</u>		30.37	42.88
				<u>Repmotor</u>		38.19	48.28
				Office		41.22	12.20
				Construct		43.74	12.09

	Class II :	u_j	w_i		Class III :	u_j	w_i
Petrol		50.17	65.40	Electron		51.46	24.47
Beverage		50.49	58.26	Glass		53.54	26.99
Rubber		51.71	51.02	Machinery		54.77	27.69
Metal		52.52	51.09	<u>Seatr</u>		56.47	1.33
Agricult		58.48	72.63	<u>Hotels</u>		57.48	5.80
Paper		58.68	69.69	Nonmotor		58.19	22.80
Cement		59.63	83.65	Clothes		58.88	8.05
Ferrous		72.53	51.13	Chemical		62.78	43.12
Coke		81.24	89.53	Leather		63.09	18.20
<u>Financial</u>		<u>88.81</u>	<u>76.79</u>	Otextiles		66.61	40.42
Nonferrous		99.99	53.57	Wood		66.78	40.90
				Plastic		69.88	49.83
				Omanufact		74.65	22.98
				Ofood		82.20	47.85
				Cars		82.20	40.45
				<u>Airtr</u>		84.57	23.93
				Meat		88.62	8.35
				Milk		89.01	17.57

Table 1c: Productive sectors by nature of production (u_j) and use of output (w_i) (1975)

Class I :		u_j	w_i	Class IV :		u_j	w_i
<u>Communic</u>		12.77	66.41	<u>Household</u>		0.00	0.00
Gas		13.63	64.04	<u>Servtr</u>		4.79	33.12
Water		17.91	58.23	<u>Education</u>		13.78	0.00
<u>Business</u>		24.40	53.40	<u>Realestate</u>		14.78	1.93
Coal		33.49	70.28	<u>Oreparat</u>		14.84	43.15
Electrici		42.53	61.83	<u>Trade</u>		18.38	23.17
Minerals		43.40	81.36	<u>Canaltr</u>		20.93	32.24
Metal		48.97	54.87	<u>Health</u>		26.90	3.38
				Tobacco		28.50	0.97
				<u>Governm</u>		29.66	0.00
				<u>Landtr</u>		30.49	40.72
				Office		38.55	10.95
				Glass		42.75	37.51
				<u>Hotels</u>		44.52	6.07
				Beverage		45.38	49.62
				<u>Repmotor</u>		46.26	39.33
				Nonmotor		47.38	27.37
				Electron		48.96	22.05
Class II :		u_j	w_i	Class III :		u_j	w_i
Cement		54.79	90.78	Construct		50.56	12.58
Paper		55.40	71.93	Clothes		52.41	9.42
Plastic		58.00	53.66	Rubber		52.59	43.66
Agricult		58.89	69.17	<u>Seatr</u>		52.87	1.14
Petrol		71.09	61.86	Machinery		53.11	25.17
Ferrous		76.46	52.49	Wood		56.82	34.12
Nonferrous		82.26	54.71	Leather		57.90	13.77
<u>Financial</u>		87.68	76.41	Omanufact		60.56	17.38
Coke		90.14	95.42	<u>Airtr</u>		63.30	23.41
				Otextiles		65.83	36.76
				Chemical		67.15	41.79
				Ofood		74.03	44.64
				Cars		78.06	35.65
				Meat		80.91	9.61
				Milk		85.99	17.10

Table 1d: Productive sectors by nature of production (u_j) and use of output (w_i) (1980)

Class I :		u_j	w_i	Class IV :		u_j	w_i
<u>Communic</u>		8.15	65.38	<u>Household</u>		0.00	0.00
Gas		9.94	61.68	<u>Servtr</u>		4.41	23.90
Water		20.68	58.33	<u>Education</u>		12.74	0.00
<u>Business</u>		23.03	50.63	<u>Oreparat</u>		14.67	35.08
Coal		41.12	74.66	<u>Realestate</u>		15.05	2.34
Electrici		45.31	59.74	<u>Trade</u>		18.31	26.31
Minerals		48.02	78.35	<u>Canaltr</u>		18.80	31.10
Metal		49.55	52.71	<u>Health</u>		30.69	2.74
				<u>Governm</u>		31.19	0.00
				Tobacco		34.58	6.47
				<u>Landtr</u>		38.03	41.63
				Glass		41.19	33.23
				Beverage		45.08	44.06
				Nonmotor		45.50	34.47
				Electron		47.70	23.25
Class II :				Class III :			
Paper		56.07	60.71	<u>Seatr</u>		50.63	1.52
Agricult		56.33	66.48	Machinery		52.21	21.83
Plastic		57.78	50.29	Hotels		53.06	6.43
Cement		57.87	90.90	<u>Repmotor</u>		53.53	38.74
Coke		72.61	86.42	Office		54.46	15.05
Ferrous		74.66	53.22	Construct		55.19	13.11
Petrol		80.42	58.35	Rubber		56.80	43.56
<u>Financial</u>		80.68	70.55	Wood		58.91	36.55
Nonferrous		90.33	54.75	Clothes		60.00	5.56
				Chemical		63.73	37.18
				Leather		63.98	9.83
				Otextiles		65.42	34.91
				<u>Aitr</u>		66.59	26.32
				<u>Omanufact</u>		67.96	15.82
				Cars		72.64	31.89
				Ofood		75.05	39.09
				Meat		88.04	10.67
				Milk		99.99	20.47

All services except hotels, sea transport and financial services have a low intermediate input ratio (see tables 1a, 1b, 1c and 1d). Car repair services are a nice example of a service with increasing capital intensity over the period 1965-1980.

Business services show a modest u_j -ratio, which smoothly increased over time.

The w_i -ratio gives an idea of the degree of the final demand oriented characteristic of the sectors. The lower the value of w_i , the higher the sector is directed to final demand (private capital formation, exports and household and government consumption).

In 1965 only financial and communication services have a w_i -ratio above 50 %. Business services are final demand oriented in 1965 and 1970 but became intermediate demand oriented in 1975 and 1980 (see tables 1a, 1b, 1c and 1d).

One can combine the two ratios to divide the sectors into four classes according to their production structure (u_j) in combination with their degree of final demand orientation (w_i):

Class I: $u_j < 50 \%$ and $w_i > 50 \%$

sectors with more than 50 % value added directed to intermediate demand

Class II: $u_j > 50 \%$ and $w_i > 50 \%$

"basic sectors", capital intensive, which produce dominantly intermediate goods and services

Class III: $u_j > 50 \%$ and $w_i < 50 \%$

manufacturing sectors, which produce consumer goods

Class IV: $u_j < 50 \%$ and $w_i < 50 \%$

sectors with more than 50 % value added oriented to the final demand

The economic structure remains rather stable over the whole period. Only 13 sectors do not remain in the same class. Most of the changes are due to the fact that their input purchasing

ratio (u_j) fluctuates around 50 % : cement, petrol, hotels, office equipment, glass, reparation of vehicles, construction, non-motor vehicles and electronics.

In the first period the rubber products sector became more capital intensive and later more final demand oriented (= export oriented). Between 1970 and 1975 the beverages sector moved from class II to class IV for similar reasons.

For the business services, however, one can observe a systematic increase in the w_i -ratio. The intermediate demand orientation became more and more pronounced during the 1965-1980 period. These facts took place between 1970 and 1975.

The tables 1a, 1b, 1c and 1d also show that nearly all of the other services have high value added ratios and are directed to final demand. Banking and insurance differ fundamentally from the rest of the service sectors. The u_j -ratio is very high and 75 % of this sector's output is sold to other industries.

3. FORWARD AND BACKWARD LINKAGES IN THE ECONOMIC STRUCTURE

The dependence of some industries on the rest of the economy can be assessed by the Leontief inverse and the indices of sensitivity and dispersion.

These two indices give an answer to the question: "Which impact has the expansion of a particular sector on the total economic system and the other way round?"

The index of dispersion is defined as follows:

$$d_j = \frac{\sum_i b_{ij}}{\frac{1}{n} \sum_i \sum_j b_{ij}} \quad (j=1, 2, \dots, n)$$

and the index of sensitivity

$$s_i = \frac{\sum_j b_{ij}}{\frac{1}{n} \sum_i \sum_j b_{ij}} \quad (i=1, 2, \dots, n)$$

where:

b_{ij} : element of the Leontief inverse

n : the number of sectors

The parameter d_j measures the extent to which the entire system of industries is influenced by an expansion of a given industry. Thus, d_j quantifies the increase of the value of production in the whole economy when final demand in sector j increases with one unit. These effects are called the "forward linkage effects".

The index s_i indicates how sensitive a given industry is to an expansion of the entire system of industries. s_i measures the increase of the value of production in sector i when final demand is increasing with one unit in all sectors. These responses are called "backward linkage effects".

Table 2: Dispersion index

Sector	1965		1970		1975		1980	
	Rank	Disp	Rank	Disp	Rank	Disp	Rank	Disp
Nonferrous	1	1.90	1	2.34	1	1.68	1	2.48
Ferrous	2	1.83	8	1.29	7	1.36	9	1.24
Cars	3	1.79	2	1.76	2	1.66	5	1.38
Omanufact	4	1.73	4	1.54	13	1.45	7	1.29
Milk	5	1.48	5	1.45	5	1.48	3	1.62
Financial	6	1.47	3	1.58	3	1.65	4	1.40
Plastic	7	1.41	9	1.19	16	1.11	16	1.06
Otextiles	8	1.32	10	1.18	9	1.21	13	1.15
Airtr	9	1.26	13	1.15	14	1.14	10	1.20
Ofood	10	1.26	7	1.43	8	1.36	8	1.28
Chemical	11	1.23	17	1.10	10	1.21	11	1.19
Machinery	12	1.19	21	1.06	20	1.04	23	0.99
Clothes	13	1.13	16	1.11	17	1.06	14	1.10
Metal	14	1.12	20	1.07	21	1.04	20	1.03
Wood	15	1.09	14	1.14	18	1.05	22	1.02
Meat	16	1.08	6	1.46	6	1.40	6	1.38
Coke	17	1.05	18	1.08	11	1.20	21	1.02
Electron	18	1.05	19	1.08	27	0.99	28	0.97
Agricul	19	1.03	12	1.16	12	1.17	15	1.07
Office	20	1.02	32	0.88	34	0.86	27	0.98
Leather	21	1.02	11	1.18	15	1.13	12	1.17
Paper	22	1.01	22	1.04	23	1.04	24	0.99
Seatr	23	0.99	29	0.94	24	1.03	25	0.99
Nonmotor	24	0.99	15	1.12	28	0.99	32	0.91
Glass	25	0.97	27	0.95	33	0.89	35	0.84
Beverage	26	0.96	26	0.96	29	0.96	34	0.88
Hotels	27	0.95	24	1.01	32	0.90	30	0.93
Petrol	28	0.95	30	0.94	4	1.59	2	2.10
Rubber	29	0.91	25	0.99	19	1.04	17	1.04
Gas	30	0.89	39	0.71	48	0.58	48	0.52
Cement	31	0.89	23	1.01	26	1.00	26	0.98
Oreparat	32	0.88	46	0.59	45	0.62	45	0.59
Repmotor	33	0.85	28	0.95	22	1.04	19	1.03
Electrici	34	0.85	34	0.84	31	0.91	29	0.94
Construct	35	0.83	31	0.92	25	1.00	18	1.04
Minerals	36	0.82	33	0.85	30	0.91	31	0.91
Coal	37	0.74	37	0.76	36	0.80	36	0.83
Landtr	38	0.72	36	0.77	35	0.83	33	0.91
Tobacco	39	0.72	35	0.77	37	0.78	37	0.77
Governm	40	0.70	38	0.72	38	0.77	39	0.74
Canaltr	41	0.67	40	0.69	41	0.71	41	0.67
Health	42	0.65	41	0.68	39	0.76	38	0.76
Business	43	0.64	42	0.67	40	0.73	40	0.69
Trade	44	0.61	43	0.64	42	0.68	42	0.66
Realestate	45	0.61	45	0.59	44	0.64	44	0.60
Education	46	0.60	44	0.60	46	0.61	46	0.57
Water	47	0.60	47	0.56	43	0.65	43	0.65
Communic	48	0.57	48	0.56	47	0.59	47	0.52
Servtr	49	0.51	49	0.51	49	0.52	49	0.48
Household	50	0.47	50	0.47	50	0.47	50	0.44

Table 3: Index of sensitivity

Sector	1965		1970		1975		1980	
	Rank	Sens	Rank	Sens	Rank	Sens	Rank	Sens
Agricul	1	2.53	2	2.68	2	2.36	3	2.29
Ferrous	2	2.40	6	1.80	10	1.55	11	1.39
Petrol	3	2.25	1	3.35	1	4.54	1	5.35
Nonferrous	4	2.25	3	2.26	4	1.95	2	3.50
<u>Business</u>	5	1.98	5	2.02	5	1.89	5	1.66
Chemical	6	1.91	4	2.10	3	2.34	4	2.28
<u>Trade</u>	7	1.77	11	1.30	11	1.41	6	1.58
Cars	8	1.76	7	1.73	6	1.67	7	1.52
Paper	9	1.67	8	1.72	8	1.59	9	1.41
<u>Financial</u>	10	1.50	10	1.59	7	1.63	8	1.42
Otextiles	11	1.43	17	1.11	15	1.11	14	1.09
Ofood	12	1.40	9	1.61	9	1.56	10	1.40
Metal	13	1.33	12	1.22	12	1.24	12	1.19
<u>Servtr</u>	14	1.31	14	1.15	18	0.90	22	0.79
Coal	15	1.31	15	1.13	16	1.07	19	0.88
Omanufact	16	1.27	13	1.20	21	0.84	15	1.01
Electrici	17	1.09	18	1.09	13	1.23	13	1.17
<u>Landtr</u>	18	0.99	20	0.96	17	0.96	20	0.87
Machinery	19	0.96	16	1.13	14	1.11	16	0.96
Construct	20	0.92	21	0.84	20	0.87	21	0.81
<u>Communic</u>	21	0.90	23	0.82	24	0.78	23	0.76
Electron	22	0.79	22	0.84	19	0.90	17	0.92
Minerals	23	0.79	24	0.74	23	0.79	27	0.68
Coke	24	0.78	25	0.73	29	0.67	33	0.59
Wood	25	0.76	26	0.72	25	0.72	26	0.70
Rubber	26	0.67	34	0.59	38	0.57	34	0.57
Leather	27	0.66	32	0.60	33	0.60	35	0.55
Nonmotor	28	0.66	30	0.61	26	0.70	25	0.73
<u>Repmotor</u>	29	0.65	27	0.65	31	0.65	28	0.63
<u>Oreparat</u>	30	0.63	19	1.09	28	0.68	39	0.53
Beverage	31	0.63	29	0.62	32	0.62	32	0.60
Meat	32	0.62	35	0.58	34	0.60	30	0.61
<u>Canaltr</u>	33	0.60	39	0.54	43	0.52	43	0.48
Cement	34	0.59	28	0.62	30	0.66	29	0.61
Gas	35	0.59	33	0.59	22	0.81	18	0.91
Water	36	0.56	41	0.53	40	0.53	42	0.49
Glass	37	0.56	36	0.56	35	0.59	38	0.53
Plastic	38	0.55	31	0.60	27	0.68	24	0.74
Milk	39	0.54	38	0.55	37	0.58	31	0.61
<u>Hotels</u>	40	0.52	37	0.56	36	0.58	36	0.55
<u>Education</u>	41	0.52	49	0.47	49	0.47	49	0.44
Office	42	0.52	40	0.54	42	0.52	37	0.53
<u>Health</u>	43	0.52	43	0.51	44	0.51	44	0.48
Clothes	44	0.51	42	0.53	39	0.57	40	0.50
<u>Airtr</u>	45	0.50	44	0.50	41	0.52	41	0.50
Tobacco	46	0.48	47	0.47	46	0.48	45	0.47
<u>Seatr</u>	47	0.48	46	0.47	47	0.48	47	0.44
<u>Realestate</u>	48	0.47	45	0.47	45	0.48	46	0.45
<u>Governm</u>	49	0.47	48	0.47	48	0.47	48	0.44
<u>Household</u>	50	0.47	50	0.47	50	0.47	50	0.44

Table 2 and 3 show the results calculated from the input-output tables 1965, 1970, 1975 and 1980.

The higher the value of d_j or s_i , the stronger the forward or the backward linkages are.

Sectors with a strong forward linkage ($d_j > 1$) are seen as key sectors to stimulate an economy.

From table 2 it appears that only two service sectors have an important stimulating ability: banking and insurance and air transport.

The hotel and restaurant sector, car repair and sea transport show a moderate effect on the economy. The other services are at the bottom of the list with d_j values below 0.75. Therefore, an expansion of the business services will have a weak impact on the whole economy.

The picture changes completely when we look at the sensitivity index. Table 3 shows that in all years the service sectors are much more equally spread over the list of sectors. But still an important number of service industries rank at the bottom of the list. We have to conclude that the direct interweaving of the service sector with the rest of the economy is weak.

Business services, however, react very strongly to an overall economic expansion. This means that this sector is very sensitive to the business cycle, just like banking and insurance and trade.

It is interesting to note that the ranking remains very stable over time. Little change in the dynamic intersectoral structure can be observed.

4. THE EMPLOYMENT CREATION CAPACITY OF SERVICES

With the help of employment multipliers an answer can be given to the question : "What is the impact of an increase of final demand with one unit in a particular sector on the total number of jobs?".

These employment multipliers are obtained by multiplying the Leontief inverse with a row vector of employment coefficients:

$$w' = a' * [I - A]^{-1}$$

where:

w' : row vector of the employment multipliers

a' : row vector of the employment coefficients

A : matrix of technical coefficients

An employment multiplier measures the number of jobs which are created directly and indirectly when final demand in a particular sector has been increased with 1 unit.

To calculate the row vector of the employment coefficients (a') we have used two series of employment data: total employment (self-employed people and wage earners) and employment of wage earners only.

The results are reported in table 4 (total employment) and in table 5 (wage earners).

Table 4: Employment multipliers
(national production, total employment)

Sector	1965		1970		1975		1980	
	Rank	E-mp	Rank	E-mp	Rank	E-mp	Rank	E-mp
<u>Household</u>	1	4.11	1	4.56	1	4.49	1	4.02
<u>Oreparat</u>	2	4.03	38	0.99	35	0.96	37	0.76
<u>Financial</u>	3	3.47	2	3.38	2	3.37	2	2.42
Glass	4	3.33	6	1.98	12	1.51	25	1.00
Milk	5	3.14	8	1.96	23	1.27	23	1.01
Clothes	6	3.06	3	2.46	6	1.89	11	1.59
Agricul	7	2.88	9	1.93	17	1.42	17	1.08
<u>Airtr</u>	8	2.82	17	1.80	36	0.95	29	0.87
Plastic	9	2.69	28	1.44	34	0.98	39	0.72
Omanufact	10	2.59	29	1.43	28	1.16	36	0.78
Wood	11	2.57	15	1.84	15	1.44	22	1.03
Office	12	2.56	36	1.12	37	0.92	24	1.00
Coal	13	2.54	5	2.02	4	2.13	3	2.09
Minerals	14	2.49	18	1.76	14	1.45	15	1.21
<u>Communic</u>	15	2.45	10	1.89	3	2.30	8	1.70
Otextiles	16	2.34	23	1.54	22	1.29	31	0.83
Gas	17	2.33	32	1.37	48	0.41	47	0.42
<u>Education</u>	18	2.33	4	2.11	5	2.03	9	1.70
Metal	19	2.31	20	1.72	21	1.39	18	1.07
<u>Hotels</u>	20	2.24	13	1.86	19	1.40	12	1.49
Nonmotor	21	2.24	11	1.88	24	1.27	19	1.06
<u>Trade</u>	22	2.21	12	1.88	7	1.80	6	1.72
<u>Landtr</u>	23	2.17	19	1.75	10	1.70	10	1.65
Machinery	24	2.14	33	1.35	31	1.14	30	0.87
<u>Governm</u>	25	2.13	14	1.84	9	1.72	4	1.98
Leather	26	2.11	7	1.97	11	1.67	7	1.71
Electron	27	2.11	26	1.46	27	1.17	27	0.95
Chemical	28	1.95	40	0.92	43	0.69	44	0.46
Beverage	29	1.83	35	1.20	38	0.89	38	0.75
Cement	30	1.82	27	1.44	25	1.26	20	1.06
Ferrous	31	1.77	41	0.91	33	1.04	35	0.78
Paper	32	1.76	31	1.38	30	1.15	32	0.83
<u>Business</u>	33	1.76	16	1.84	8	1.76	5	1.77
<u>Health</u>	34	1.72	25	1.48	16	1.43	13	1.49
Meat	35	1.69	21	1.71	29	1.15	26	0.97
Rubber	36	1.62	30	1.43	26	1.25	28	0.94
Construct	37	1.61	24	1.53	18	1.41	16	1.21
<u>Repmotor</u>	38	1.60	22	1.55	20	1.40	14	1.24
<u>Canaltr</u>	39	1.53	34	1.25	13	1.46	21	1.05
Coke	40	1.51	39	0.99	32	1.14	34	0.80
Ofood	41	1.49	37	1.10	39	0.86	40	0.71
Electrici	42	1.44	43	0.74	46	0.48	45	0.45
Cars	43	0.96	42	0.81	44	0.58	43	0.50
<u>Servtr</u>	44	0.91	45	0.67	42	0.70	42	0.57
Water	45	0.83	44	0.72	40	0.81	33	0.81
Nonferrous	46	0.78	48	0.48	47	0.43	48	0.24
<u>Seatr</u>	47	0.76	46	0.63	41	0.73	41	0.63
Tobacco	48	0.70	47	0.56	45	0.50	46	0.44
<u>Realestate</u>	49	0.27	49	0.22	49	0.26	49	0.21
Petrol	50	0.07	50	0.04	50	0.04	50	0.04

**Table 5: Employment multipliers
(national production, wage earners)**

Sector	1965		1970		1975		1980	
	Rank	E-mp	Rank	E-mp	Rank	E-mp	Rank	E-mp
<u>Household</u>	1	4.11	1	4.56	1	4.49	1	4.02
<u>Financial</u>	2	3.27	2	3.17	2	3.13	2	2.23
<u>Glass</u>	3	3.22	6	1.90	10	1.45	18	0.94
<u>Clothes</u>	4	2.82	3	2.24	6	1.73	8	1.44
<u>Airtr</u>	5	2.66	11	1.73	29	0.91	24	0.81
<u>Plastic</u>	6	2.51	18	1.35	30	0.91	33	0.66
<u>Coal</u>	7	2.45	5	1.97	4	2.08	3	2.04
<u>Oreparat</u>	8	2.43	48	0.42	43	0.48	46	0.36
<u>Communic</u>	9	2.42	7	1.87	3	2.27	5	1.69
<u>Office</u>	10	2.40	31	1.03	31	0.86	20	0.93
<u>Minerals</u>	11	2.34	12	1.59	12	1.29	13	1.05
<u>Education</u>	12	2.29	4	2.09	5	2.00	6	1.68
<u>Gas</u>	13	2.26	22	1.31	48	0.38	45	0.37
<u>Otextiles</u>	14	2.15	16	1.44	15	1.21	28	0.76
<u>Nonmotor</u>	15	2.14	8	1.80	14	1.22	15	1.00
<u>Governm</u>	16	2.07	9	1.79	7	1.67	4	1.94
<u>Omanufact</u>	17	2.06	25	1.24	27	1.01	32	0.66
<u>Wood</u>	18	2.06	15	1.45	19	1.17	25	0.79
<u>Metal</u>	19	2.02	13	1.58	13	1.25	16	0.95
<u>Electron</u>	20	1.97	17	1.41	21	1.13	21	0.91
<u>Machinery</u>	21	1.97	24	1.28	24	1.07	23	0.83
<u>Landtr</u>	22	1.86	14	1.56	8	1.52	7	1.49
<u>Chemical</u>	23	1.84	35	0.86	39	0.64	42	0.41
<u>Leather</u>	24	1.82	10	1.78	9	1.49	9	1.41
<u>Cement</u>	25	1.69	21	1.31	20	1.16	17	0.95
<u>Ferrous</u>	26	1.64	36	0.86	28	0.99	30	0.71
<u>Paper</u>	27	1.64	26	1.24	26	1.01	29	0.71
<u>Beverage</u>	28	1.62	29	1.08	32	0.80	34	0.66
<u>Rubber</u>	29	1.55	20	1.35	18	1.17	22	0.88
<u>Coke</u>	30	1.43	33	0.95	22	1.11	27	0.77
<u>Electrici</u>	31	1.38	40	0.70	45	0.45	44	0.40
<u>Construct</u>	32	1.34	23	1.29	17	1.20	14	1.03
<u>Business</u>	33	1.34	19	1.35	11	1.30	10	1.32
<u>Milk</u>	34	1.23	32	0.96	37	0.68	37	0.54
<u>Repmotor</u>	35	1.20	28	1.08	25	1.03	19	0.94
<u>Trade</u>	36	1.14	27	1.14	16	1.21	11	1.18
<u>Health</u>	37	1.10	30	1.05	23	1.08	12	1.15
<u>Ofood</u>	38	1.00	37	0.78	40	0.64	38	0.53
<u>Hotels</u>	39	0.97	34	0.94	34	0.74	26	0.79
<u>Canaltr</u>	40	0.94	42	0.66	35	0.72	40	0.44
<u>Cars</u>	41	0.90	38	0.76	41	0.55	39	0.47
<u>Servtr</u>	42	0.84	43	0.63	38	0.67	36	0.55
<u>Water</u>	43	0.81	39	0.70	33	0.77	31	0.68
<u>Nonferrous</u>	44	0.71	47	0.47	47	0.40	48	0.22
<u>Tobacco</u>	45	0.65	46	0.52	44	0.46	43	0.41
<u>Seatr</u>	46	0.65	44	0.59	36	0.69	35	0.60
<u>Agricul</u>	47	0.62	45	0.57	46	0.44	47	0.34
<u>Meat</u>	48	0.55	41	0.70	42	0.50	41	0.42
<u>Realestate</u>	49	0.22	49	0.19	49	0.22	49	0.18
<u>Petrol</u>	50	0.07	50	0.04	50	0.04	50	0.03

The difference in the value of the employment multipliers in table 4 and 5 shows the employment multiplier for self-employed people when final demand has been raised with one unit. For example the self-employment creation in business services and trade develops as follows:

	Business services	Trade
1965	1.76 - 1.34 = 0.42	2.21 - 1.14 = 1.07
1970	1.84 - 1.35 = 0.49	1.88 - 1.14 = 0.74
1975	1.76 - 1.30 = 0.46	1.80 - 1.21 = 0.79
1980	1.77 - 1.32 = 0.45	1.72 - 1.18 = 0.54

These results show that in business services the wage earners multiplier and the self-employed multiplier remain constant over time. In the trade sector, however, the first one is stable but the second one decreases. This means that the labour productivity gains in the trade sector is mainly realized by diminishing self-employment.

We cannot observe any labour productivity gain in the business services during the period 1965-1980.

And the same evolution holds for most of the service sectors. This explains why these sectors are moving up in the ranking over time (see the diminishing rank correlations in table 6).

Table 6: Rankcorrelation of Spearman

a) TOTAL EMPLOYMENT				
	1965	1970	1975	1980
1965	1	0.74	0.56	0.50
1970		1	0.89	0.87
1975			1	0.95
1980				1
b) WAGE EARNERS				
	1965	1970	1975	1980
1965	1	0.81	0.65	0.58
1970		1	0.90	0.86
1975			1	0.96
1980				1

Business services, for example moved from rank 33 in 1965 to rank 5 in 1980 (see table 4).

In 1980 all the service industries with the exception of the transport sectors and real estate belong to the top fifteen of the ranking. When we look at table 5 (wage earners) this picture has been confirmed. Only the hotel and restaurant sector shows a rather low employment multiplier. On average the expansion in the non-service sector has to be twice as high as the expansion in the service industries to create the same number of jobs.

5. CONCLUSION

We may conclude from the above calculations that the service industries are characterised by a low input purchasing ratio and a final demand oriented output. The communication sector and banking and insurance are exceptions.

The most interesting result, however, is that the character of the business services changed systematically over time from a sector oriented towards final demand to a sector oriented towards intermediate demand.

The interweaving of the service industries with the rest of the economy remains low.

The forward linkage of the business services does not exist. The sector, however, reacts very strong to a global expansion of the economy. This means that business services rather follow the economic development than that they stimulate the economic activity.

From the employment multiplier analysis we may conclude that business services production is labour intensive (see also the low u_j -ratio) and that there was no significant increase in labour productivity over the period 1965-1980. This explains the quick growth of employment in this sector. To a great extent its overall expansion is due to an externalisation process.

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APPENDIX: Description of sectors

Abbreviation	Description
agricul	Agriculture, fishing and forestry
coal	Coal and briquettes
coke	Coke, gas and crude petroleum
petrol	Crude petroleum and petroleum refineries
gas	Gas
water	Water works and supply
electrici	Electricity
ferrous	Iron and steel basic industries
nonferrous	Non-ferrous metals
cement	Cement, clay and plaster (gypsum)
glass	Glass and glass manufactures
minerals	Non-metal minerals
chemical	Chemicals
metal	Metal manufactures
machinery	Machinery (agricultural and industrial)
office	Office machines, machinery of measuring and controlling equipment, photographic and optical instruments
electron	Electronics
cars	Road motor vehicles
nonmotor	Road vehicles non-motor
meat	Meat and meat products
milk	Milk and cream
ofood	Other food preparations
beverage	Beverages
tobacco	Tobacco industries
clothes	Textile clothes, knitted and not knitted
otextiles	Other textiles
leather	Leather, footwear and maroquinerie
wood	Wood and wood products
paper	Paper and paper products, printing and publishing

rubber	Rubber products
plastic	Plastic manufactures
omanufact	Other manufacturing industries
construct	Construction
repmotor	Reparation of vehicles
oreparat	Other reparations
trade	Wholesale and retail trade
hotels	Restaurants and hotels
landtr	Land transport
canaltr	Canal transport
seatr	Sea transport
airtr	Air transport
servtr	Services connected with transport
communic	Communication
financial	Banking and insurance
business	Services to enterprises (like: accountants, legal services, computer services etc.)
real estate	Real estate
health	Sanitary and similar services
governm	Public administration and defense Government
education	Education
household	Domestic (household) services

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