

論 說

**Integration, Transformation
and Modernization in Hungary¹⁾**

— An Analysis of Hungarian Machinery Industry —

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Hungary is faced with two kinds of revolution, hand revolution and brain revolution, to copy with concurrently³⁾; in the case of the former, increasing productivity of physical labor would play a decisive role while that of white collar as well as that of knowledge-intensive-industry and service sector in the case of the latter. The development of machinery and equipment industry, especially engineering industry have a significant influence upon national economy because its products are used in all spheres not only of other industries, but service and dairy life as well. Transformation of this indus-

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try is an essential constituent of transition to a market economy and its performance directly leads to increasing productivity of physical labor and will prepare one of the conditions necessary for brain revolution. Not to mention, the both seem to be necessary conditions for modernization of Hungary and transformation. This is why we should pay an appropriate attention to the machinery industry.

The second reason to arouse our interest is the fact that, as is seen below, Hungarian machinery industry showed a big dynamic trend of downswing in the quite earlier period of transformation and, later, its upheaval tendency is a driving force of economic growth from the middle of 1990's. It is likely that to understand what is making such a big dynamic trend of machinery industry, supposedly, would be, in a sense, equivalent to ascertaining what is going on both in the micro integration of Hungarian economy into Europe and the system transformation in Hungary. But such verification would need a big volume of energy and time to do in-depth inquiry on every (sub) industry and typical firms as well as to survey theoretical issues and analyzing methods concerning to integration and system transformation. This paper is a preparatory one for completing this research work.

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This paper consists of three parts. The first part is assigned to comprehending modernization of industry in Japan for the purpose of obtaining an analyzing aspect in the below, the second focuses on fact-findings from statistical data about mushrooming and performance of machinery and equipment firms in the transformation (1989-1997), and the third is devoted to an assessment about the extent in which development of horizontal linkage among the micro and small-medium firms in the domestic and international arena has been achieved.

I Modernization of Industry in Japan — an Analyzing Aspect

The analyzing aspect of my preparatory-work is simply. It is to put a spotlight to some features of transformation and integration of Hungarian machinery industry from the view-point of experience and attainment of modernization and competitiveness of Japan's industry. We realize in a sense that there is theoretically and practically a risk in such an analogism. A risk, however, should not only be spoken in the economic sphere, say, entrepreneurship, but also in an economic research. Figure 1 shows both the historical development of technology in Japanese industry since the end of WWII and the present technology structure itself.

After WWII Japan started from mastering basic technology, but not from the outset. The basic technology does not mean low technology, which is identified with food industry, textile & clothe industry and so on according to the OECD classification. The basic technology is embodied in such elementary parts of production as metal-fitting, founding-casting and so on in the case of engineering industry. These elementary parts produced with basic technology are versatile and are used in any machinery industries other than engineering, such as toy industry to computing industry. The medium technology is ability and capacity to make up components, small-scale system made of parts, each of which has a specialized limited function. The high technology is developed in big firms and R&D oriented firms/institutions. So-called high-technology products, i.e. internationally competitive goods, are produced by joining(assembly) not only knowledge- and R&D intensive parts, but also basic and medium technological parts and components. It is well-known characteristics in Japan that many of these basic and medium technological parts and components are produced in family enterprises

(micro-firms) and small-medium size enterprises. Those who are specialized in different segments of this technology and production have been spontaneously forming networking cooperation, inside of which information and experiences, new technical knowledge and orders from outside are circulated to each other in a such close district that they communicate with each other even by walking or bicycling. There could be found it in such a typical district and city as Sumida-ku, Tokyo, and Higashi-Osaka, Osaka (Accumulated Technology Zone).

This type of networking has great flexibility, owing to which big assembly-makers could cut the costs, adjust their volume of supply according to changing demands and improve the quality level of their competitive commodities with less cost. And it is this networking that has guaranteed continuity of Japanese big companies' giving birth to final complete commodity series such as a radio, a TV, a car to a video & video camera in the international market. Waves of product innovation has been supported by process innovation based on this networking. Many economists seem to attribute the international competitiveness of Japanese big corporations to a special networking type of division of labor among family enterprise, small-medium scale enterprise and big assembly maker (multi-layers of subcontracting). A way of thinking development and transfer of technology as a vertical interaction between two economic agents would lead to underestimating this significant function of networking, which has been formed as a regional agglomeration (external economies).

Changing social and economic structure of Japan, however, has not permitted to develop or keep this networking and the special type of division of labor based on it, so that Japan has made efforts to rebuild a somewhat similar networking on the basis of international division of labour in the East Asia. This is another side of the success story, in short and medium

term, of Japan's FDI development in the East Asia since the middle of 1980's⁴⁾.

As we strayed a little from the subject, we will go back to the story. Compared with Japanese type of technological structure, Hungary, supposedly, used to be quite different. The state enterprise in socialism ran multi-factories with the production unit of basic technology to that of relatively high technology vertically integrated in. The parts and components were supplied only to the finally-completing unit in manufacturing process within the firm. Consequently, there had been missing or underdeveloped in highly advanced specialization of parts-components and horizontal relations between the production units of basic and medium technology across the firms and sectors. Since the second half of 1990's, more fundamentally since 1989-90 this type of vertical integration has been observed to dismantle in marketization, privatization and transformation. It should be added that privatization has been accompanied with internationalization of production and business by accepting a large volume of FDI from abroad in Hungary.

Anyway, the West European (and USA) type of technology structure seems to be situated somewhere on the way between the two types, and would not need to be discussed in this paper. Important is the conclusion of investigation aspect for a further analysis that could be deduced from the figure and explanation. They are as follows;

- 1) Is it possible to observe the appearance of a mass of economically independent actors in charge of basic and medium technology in market and production during transformation?

4) See Mitsuhiro SEKI "Beyond Dis-industrialization" 1997. Nihokeizai-shinbunsha

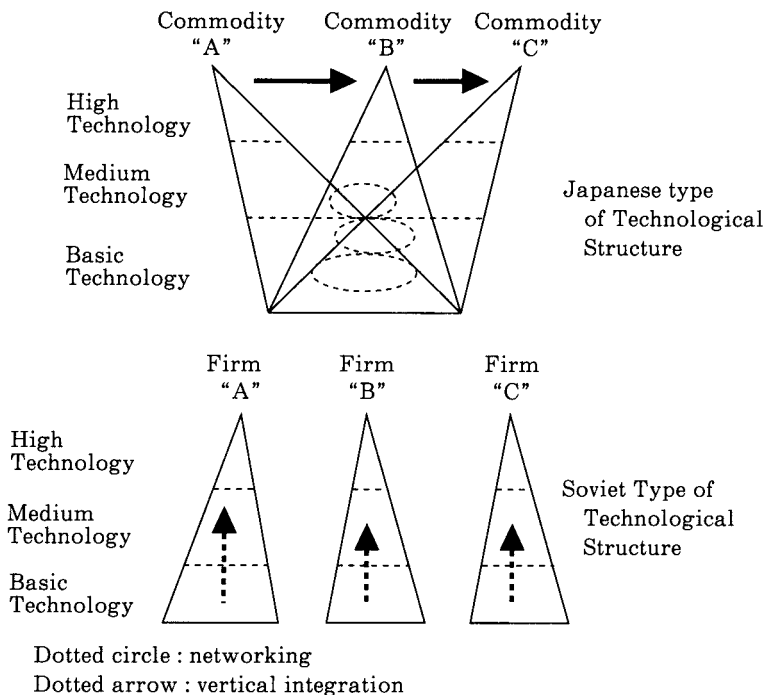


Figure 1 Two types of Technological structure

- 2) Is it possible to ascertain the development of horizontal linkage between the economic agents not only in the domestic arena, but in the international as well during transformation?

If these two could be found out in some way by using statistical data, we would be able to identify the development of three momentums; European integration, transformation and modernization, in the same picture.

II Mushrooming of machinery firms and its performance in 1989-1996

Firstly, we will look at the trends of machinery industry from statistical data in the transformation period (1989-1997). The table 1 shows the indices

of industry production and sale in 1990-1996, indicating that production of industry decreased radically from 1990-1992 and began to increase gradually from 1993. But this recover did still arrive at long last 90.9% of the level of 1990. There are only two sub-sectors which increased beyond the level of 1990 in 1996. They are manufacture of wood, paper and printing (102.9% as percentage of 1990) and manufacture of machinery and equipment (126.3%). However the manufacture of machinery and equipment was the deepest in

Table 1 Indices of Industrial Production and Sales (by branches)
(constant price)

(1990=100)	1991	1992	1993	1994	1995	1996	1996/90
Production	81.7	73.7	76.6	84	87.9	90.9	
Sales Domestic	82.6	77.6	80.1	85.2	83.8	82.6	
Export	76.3	73.7	73.8	89.3	106.1	124.9	
Total	81.7	76.7	78.2	85.9	89.2	92.9	
Production							
Manufacturing	78.8	91.3	103.3	109.3	105	103.5	89.1
Machinery & Equipment	71	89.1	110.3	120.1	121	123.5	125.5
Industry, Total	81.7	90.3	104	107.8	104.4	103.6	88.3
Industry, Total, including small enterprise*				109.6	104.6	103.4	91.1
Sales							
Manufacturing	79	94.7	101.9	109.5	104	104.5	91.1
Machinery & Equipment	71	89.1	109.1	120	120.7	125	126.3
Industry, Total	81.7	93.1	102.9	108	103.5	104.5	90.2
Industry, Total, including small enterprise*				109.8	103.8	104.2	93.3
Export							
Manufacturing	76.3	96.4	99.3	119.3	118.5	118.5	122.9
Machinery & Equipment	68.2	90.4	98.6	128.8	144.6	148.3	168.9
Industry, Total	76	96.6	100.2	119.6	118.5	119.6	124.7
Industry, Total*				119.6	118.5	119.6	124.7
Industry, Total, including small enterprise*				121	118.8	117.7	125.6

Source : Statistical Pocket-Book of Hungary, 1994. pp. 134-141, 1996. pp. 192-197.

* : previous year=100

Table 2 Volume Indexes of Brutt Output of Industry by branches, 1992-1996
(previous year = 100)

Branch	1993	1994	1995	1996
Mining	99	82.7	86.7	102.4
Manufacturing	103.3	109.3	105	103.5
Food (15, 16)	95.8	105.5	101.6	100.1
Textiles, clothes (17-19)	102.5	104.2	95.2	96.3
Wood products, paper, printing (20-22)	107.6	103.3	103.5	94.5
Chemicals (23-25)	100.8	105.9	98.8	97.2
Non-metallic mineral products (26)	110.7	103.8	101.7	101
Metal products (27, 28)	114	119.8	105.5	97.4
Engineering (29)	96.7	109.6	110.9	94.7
Office, computing machinery (30)	264.7	80	92.6	842.2
Electrical machinery, apparatus (31)	104.4	138.7	110.8	112.7
Radio, TV, Communication equipment (32)	116.4	153.4	116	147.8
Medical, Precision Instrument (33)	102.5	108.8	103.1	104.4
Motor Vehicles (34)	127.8	117	152.5	127.7
Other transport equipment (35)	134.7	99.4	90.3	93.7
Machinery industry (29-35)	110.3	120.1	121	123.5
Other manufacturings (36-37)	106.7	96.4	100.7	92.2
Electricity, Gas, Water supply	97.8	101.7	101.8	104.9
Total of Industry	102.4	107.8	104.4	103.6

Source : KSH, Az Ipar és az építőipar 1996. évi tevékenysége, 1997, 23. o.

dropping production among sub-sectors of industry⁵⁾. According to Török, it is in 1990-1993 that the output of Hungarian engineering branch in the industry declined deeply, and from 1994 that it entered into recovering process. The extent of declining of machinery industry was far more than the whole manufacturing and that of recovery in 1993-1996 seemed to be more than the total of industry as well as manufacturing (See table 2). Table 3 shows the factors compelling the production of machinery industry of Hungary fall down in 1991-93, according to which drastically falling domestic demands from agriculture, forestry, mining, light industry, basic metals branches and rapid increase of import had a greater influence than export

5) Statistical Yearbook of Hungary, 1995. pp. 370-371.

and the others branches, even with taking inflation rate into considerations. Török attributed the reasons of suffering a slump in 1990-1993 to the collapse of the former CMEA markets, the dwindling of domestic market, the impact of a sweeping import liberalization, and increasing of undercapitalization and technological backwardness of most firms in the industry⁶⁾.

On the contrary, it is owing to growing not only export (148% increase in 1994-1996, see table 1), but also investment in spite of increasing import of engineering products that in 1994-96 there was significant development of industry, and the machinery industry, among others, office & computing machine telecommunication and motor vehicles became driving forces in this increase⁷⁾. It should be added that strongly developing are foreign capital owned firms, established many years ago in the sub-branches such as car industry, business machine & computer technology, and telecommunication.

Between 1990 and 1996 the number of registered firms grew two and half times and reached more than one million in Hungary⁸⁾. The number of active industrial firms is more than 90 thousand, out of which the sole proprietors are the biggest (55.9thousand, 60%) in number and the next are limited liability company (18.6thousand, 19.9%) and limited partnership without legal entity (14.2 thousand, 15.2%). But it should be noticed that the total number of industrial firms is stagnating or decreasing in spite that the total

6) Adam Török, Privatization, Structural Adjustment, and Exports, The case of the Hungarian Engineering Industry, *Eastern European Economics*, may-July 1994. pp. 76-96. See p. 77.

7) Becsky Robert, Gépipari Export, Ahány statistika, annyi (féle) adat, *Figyelő*, 1995. November 9., Feldolgozóipar 1992 - 1996, A növekedés középpontjában a gépipar bővülése, *Napi gazdaság*, 1996. Március 23. 6.o.

8) A Társadalmi és gazdaság főbb folyamatai 1996, *Statistikai Szemle* 1994. Aug.-Szept. 734. o.

Table 3 Output and Import of Machinery

Destination of output and import	1991 (a)	imp. 1991 (b)	Total (a)+(b)	(a)-(b)	1992 (c)
Agriculture	7866	4949.4	12835.4	2936.6	7070.1
Forestry	175.4	194.6	370	-19.2	87.4
Mining	1875.5	2267.1	4142.6	-391.6	1429.7
Foods	3752.5	2591.7	6344.2	1160.8	3391
Light industry	1558	2124.9	3682.9	-566.9	1605.1
Chemicals	2282.1	1649.6	3931.7	632.5	1907.9
Non-metallic mineral production	1109	331.2	1440.2	777.8	851.4
Basic metals & metal production	4625.5	3006.7	7632.2	1618.8	2398.4
Machine industry	20733.5	35911.5	56645	-15178	17584
Not-above-mentioned manufacture	380.5	222.4	602.9	158.1	294.8
Electricity, gaz, water supply	7832.7	2074.6	9907.3	5758.1	8668
Construction	9040.7	2306.5	11347.2	6734.2	10088.7
Wholesale retail sale,	7081	7261.9	14342.9	-180.9	6821.8
Hotel & restaunts	709.1	330.9	1040	378.2	687.6
Trasport, storage	3112.1	6748	9860.1	-3635.9	9746.9
Post, communication	271.5	1705.8	1977.3	-1434.3	470.1
Financial intermediation	3175.2	905.7	4080.9	2269.5	2002.1
Real estate, renting, business service	3088.5	8375.8	11464.3	-5287.3	3697.2
Public administration	1386.8	3065.3	4452.1	-1678.5	1140.6
education	1072.2	527.1	1599.3	545.1	2027
Health, social work	488.1	3358.3	3846.4	-2870.2	1863.7
Total	81635.9	89909	171544.9	-8273.1	83833.5
Total intermediate output	81635.9		81635.9	81635.9	83833.5
Actual final consumption of households	23826.5		23826.5	23826.5	29478.7
Actual final consumption of government	2010		2010	2010	2298
Actual final consumption, total	25836.5	55376.3	81212.8	-29539.8	31776.7
Gross fixed capital formation	96389.9	101475.6	197865.5	-5085.7	93253.9
Changes in inventories	-23472.8	8041	-15431.8	-31513.8	-19014.4
Gross capital formation, total	72917.1	109516.6	182433.7	-36599.5	74239.5
Export	149060.5		149060.5	149060.5	151242.3
Total final use	247814.1	164892.9	412707	82921.2	257258.5
Total output	329450	254801.9	584251.9	74648.1	341092

Source : Input-output Tables of Hungary, 1991-1993

and Equipment in 1991-93

(current price, million Ft.)

imp. 1992 (d)	Total (c)+(d)	(c)-(d)	1993 (e)	imp. 1993 (f)	Total (e)+(f)	(e)-(f)	1992/91 (c)/(a)	1993/91 (e)/(a)
2862.9	9933	4207.2	7749.5	4653	12402.5	3096.5	89.7	98.3
205.6	293	-118.2	152.5	414	566.5	-261.5	49.8	86.9
1115.5	2545.2	314.2	1489.7	1978.8	3468.5	-489.1	76.2	79.4
2130	5521	1261	3532.8	5105.3	8638.1	-1572.5	90.4	94.1
2982.5	4587.6	-1377.4	909.8	4585.8	5495.6	-3676	103.0	58.4
4022.8	5930.7	-2114.9	1995.1	5930.4	7925.5	-3935.3	83.6	87.4
703.2	1554.6	148.2	1048.3	1527.7	2576	-479.4	76.8	94.5
1800.6	4199	597.8	2379.3	4942.4	7321.7	-2563.1	51.9	51.4
40363.5	57947.5	-22779.5	19361.9	60478.1	97840	-41116.2	84.8	93.4
285.6	580.4	9.2	218.7	692.6	911.3	-473.9	77.5	57.5
1845.1	10513.1	6822.9	11683.8	2564.8	14248.6	9119	110.7	149.2
1710.1	11798.8	8378.6	10290.6	4619.5	14910.1	5671.1	111.6	113.8
5086.1	11907.9	1735.7	7602.2	7224.8	14827	377.4	96.3	107.4
321.1	1008.7	366.5	884	848.6	1732.6	35.4	97.0	124.7
3451.9	13198.8	6295	5437.2	7270.8	12708	-1833.6	313.2	174.7
3087.5	3557.6	-2617.4	1097.4	3946.5	5043.9	-2849.1	173.1	404.2
686.4	2688.5	1315.7	2748.6	3040.3	5788.9	-291.7	69.1	86.6
4848.1	8545.3	-1150.9	1682.9	8523.3	10206.2	-6840.4	119.7	54.5
1844.3	2984.9	-703.7	2579.2	80490	83069.2	-77910.8	82.2	186.0
1140.1	3167.1	886.9	949.4	2078	3027.4	-1128.6	189.1	88.5
2345.8	4209.5	-482.1	881.8	5307.6	6189.4	-4425.8	381.8	180.7
82848.7	166682.2	984.8	84674.7	216222.3	300897	-131548	102.7	103.7
	83833.5	83833.5	84674.7		84674.7	84674.7	102.7	103.7
	29478.7	29478.7	33656.4		33656.4	33656.4	123.7	141.3
	2298	2298	2073		2073	2073	114.3	103.1
76639.7	108416.4	-44863	35729.4	99197.4	134926.8	-63468	123.0	138.3
137342.1	230596	-44088.2	108046	149978	258024	-41932	96.7	112.1
-6894	-25908.4	-12120.4	4300	-1542	2758	5842	81.0	-18.3
130448.1	204687.6	-56208.6	112346	148436	260782	-36090	101.8	154.1
	151242.3	151242.3	170834.9		170834.9	170834.9	101.5	114.6
207087.8	464346.3	50170.7	318910.3	247633.4	566543.7	71276.9	103.8	128.7
289936.5	631028.5	51155.5	403585	463855.7	867440.7	-60270.7	103.5	122.5

Table 4 Number of Firms in Industry

(1991and1996)

	1991		1996	
	Reg.*	Ind.Act**	Reg.*	Ind.Act**
Enterprise	2 233	970		
Company with legal entity	42 697		125 940	19 586
limited liability company	41 209	9 218	122 044	18 601
joint stock company	1 072	325	3 536	968
Cooperative	7 764	1 562	8 362	809
Other corporation with legal entity			1 932	3
Economic organizations bound to transformation			683	133
Company with legal entity	52 694	12 128	136 917	20 531
Partnership without legal entity			132 119	14 808
unlimited general partnership			4 394	6 114
limited partnership			127 725	14 194
Other partnership without legal entity			22 712	14
Ceasing economic organizations			12 595	2 014
Partnership without legal entity	20 000		167 426	16 836
Sole proprietors (entrepreneurs) (a)	521 417	90 727	745 247	55 980
Total			1 049 590	93 347
Of which				
less than 20 persons (b)		6 981		
10 persons and less***				85 285
11-20 persons				2 969
21-50 persons (c)		2 226		2 478
51-300 persons (d)		2 021		2 020
more than 301 persons (e)		900		595
economic working team (f)		7 006		
Sum of (a)+(b)+(c)+(d)+(e)+(f)		95 274		93 347

Source : Statistical Pocket-Book of Hungary, 1991, p. 101, 121., 1996. p.128., 191,

* Number of registered corporations and unincorporate enterprises

** Number of active corporations and unincorporate enterprises

*** including enterprises with unknown staff number

number of firms in Hungary are increasing during 1991-1996 (See table 4, the sum of (a) + ... + (f)). Table 5, 6, 7 and 8 indicate the structural composition within the manufacturing industry in 1995. Their characteristics is as follows ;

Table 5 Number of Active Machinery & Equipment Enterprises in Industry by Size (1995)

	less than				Total	
	11	11-20	21-50	51-300		
29 Engineering	1447	304	276	232	39	2298
30 Office, computing machine	99	14	14	7	2	136
31 Electrical Machine and apparatus	383	68	43	43	24	561
32 Telecommunication	312	44	63	39	25	483
33 Chemicals	475	58	56	59	15	663
34 Motor vehicles	97	20	33	25	14	189
35 Other transport equipment	65	9	7	11	5	97
29-35 Machinery and Equipment	2878	517	492	416	124	4427
Industry Total	11064	1921	2155	1996	655	17791

Source: Yearbook of Industrial and Construction Statistics Hungary 1995., p. 52., 55., 58.

Table 6 Structure of Active Machinery & Equipment Enterprises by Form in 1995

	Legal forms		Legal Entity			Non-legal Entity			Total				
	Enterprise	Company	Limited liability	(limited liability) by shares	Co-operative	Others	Total	Unlimited gen. part.		Private bus. part.	Sole proprietor		
29 Engineering	24	2183	2104	77	91	2298	69	1347	268	62	1746		
30 Office, computing machine		130	118	12	6	136	2	75	15	2	94		
31 Electrical Machine and apparatus	4	529	510	19	28	561	24	499	129	28	680		
32 Telecommunication	4	465	432	33	14	483	23	308	119	5	455		
33 Chemicals	4	631	601	30	28	663	29	473	118	13	7187		
34 Motor vehicles	4	175	158	17	10	189	3	66	10	1	80		
35 Other transport equipment	1	93	85	8	3	97	5	67	11	1000	7	1090	
29-35 Machinery and Equipment	41	4206	4008	196	180	4427	155	2835	670	7554	118	11332	
Industry Total	166	16769	15813	939	854	2	17791	529	11276	1937	56411	267	70420

Source: See Table 5, p. 52, 55, 58

Table 7 Number of enterprises by sales groups, 1995

Million Ft	less than 100	100-500	500- 1000	1000- 5000	5000- 10000	More than 10000	Total numb. of enterprise
29 Engineering	175	162	30	28	1	1	397
30 Office, computing machine	2	6	2	1			11
31 Electrical Machine and apparatus	33	28	11	12	4	2	90
32 Telecommunication	33	29	14	8	3	1	88
33 Chemicals	48	35	11	7	1		102
34 Motor vihecles	16	21	8	5	2	5	57
35 Other transport equipment	7	4	2	4			17
29-35 Machinery and Equipment	314	285	77	66	11	9	762
Industry Total	1 677	1 298	388	371	74	52	3 860

Source : See Table 5, pp. 256-257

Table 8 Number of employees by sales groups, 1995

Million Ft	less than 100	100-500	500- 1000	1000- 5000	5000- 10000	More than 10000	Total numb. of employees
29 Engineering	7 565	17 804	7 949	15 803	1 203	2 802	53 126
30 Office, computing machine	309	1 184	81	360			1 934
31 Electrical Machine and apparatus	2 610	3 782	2 846	6 657	4 107	11 743	31 736
32 Telecommunication	1 919	5 151	6 098	5 428	1 544	537	20 677
33 Chemicals	2 178	3 170	3 150	3 837	2 476		14 811
34 Motor vihecles	731	1 981	2 941	3 399	1 777	12 623	23 452
35 Other transport equipment	453	503	543	2 183			3 682
29-35 Machinery and Equipment	15 765	33 575	23 608	37 667	11 107	27 696	149 418
Industry Total	90 073	154 231	105 684	196 254	79 978	137 355	673 575

Source : See Table 5., pp. 258-259.

Engineering sector is the largest in number of active enterprise (2 298 out of 4 427) and chemicals, telecommunication and electrical machine are at the same level in number. As far as the size is concerned, the enterprises of engineering with below 10 persons has the biggest in number (1 447 out of 2 298) and the next are chemicals firm, electrical machine and telecommunication with below 10 persons. Overwhelming majority of firms in every branch are doing business as a limited liability company and the more than 1 300 limited partnerships as a non-legal entity are producing in the engineering sector. Contrasted with engineering, there are a great mass of sole

proprietors in chemicals.

According to the sales group, the firm with sale of both less than 100 million Ft and the range from 100 to 500 million Ft make two clusters in number while the number of employees are relatively concentrated in the two categories, firms with the sale of range from 100 to 500 million Ft and those from 1 000 million Ft to 5 000 Ft. These figures are far from the reality in machinery industry because the coverage of this data is very small.

III Measuring and estimating

It is identified in the above that in the machinery industry there born a mass of economic agents, i.e. micro- and small firms, which could take part in reorganizing the technology structure in Hungary more horizontally. The next will be an examination by using statistical data about not only whether horizontal relations have been established, but also the extent and the scope in which, and the scale on which a progress has been made in developing this relations. For this purpose, there invented a simplified model presenting the cooperative relations between assembling makers and intermediates supplier as well as among the supplier themselves both in the internal market and

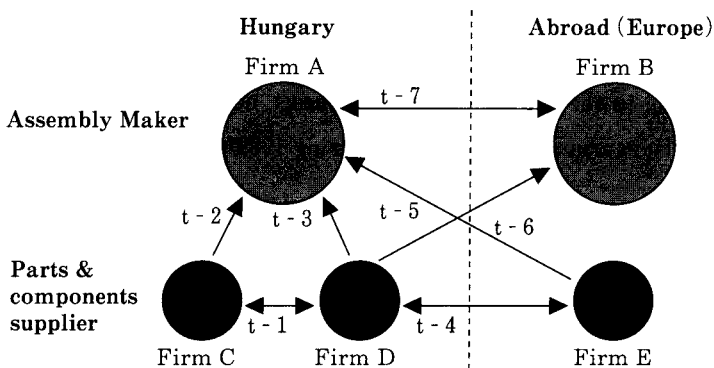


Figure 2 Model of Cooperation between Firms in Basic and Medium Technology

abroad below.

In this chart of Figure 2 there are two assembly makers, one of which, Firm A, is in Hungary, and another, Firm B, abroad, while Firm C, D and E are producing parts & components. We could assume, for instance, even affiliated relations between Firm A and B. In this case they might be supposed to export or import parts & components with each other or in one way. The term $t-1, 2, 3, \dots$ means the trade turnover of parts & components and the arrow the direction of trade. We might find out not only supply from the parts & components manufactures to the assembly makers in both domestic market and foreign market (see $t-2, 3, 5, 6$), but also mutual supplying them between Firm C, D and E ($t-1$ and $t-4$), development of which could be evaluated as horizontal accumulation of basic & medium technology and deepening the micro-level cross-border integration.

The dismantling from vertical technology structure might bring out increasing volume of the sum of $t-1+t-2+\dots+t-7$ in some way, which would be sorted into the two categories; domestic and international. The former could be identified as increasing the production and turnover of intermediate goods while the latter as increasing intra-industry and/or intra-firm trade (including international subcontracting and so on) in theory, which could be observed in some way by using statistical data.

According to the above working hypothesis, next we will move to reprocessing of Hungarian statistical data during 1989/90-1996.

Intra-Industry Foreign Trade

Intra-industry foreign trade is well developed in the present world market and there made a progress in this field of studies and researches. So far as Hungary is concerned, we could find one joint paper by Tamás Gáspár and László Kacsirek.

The paper, starting from a study of theoretical models, extends to analyzing macro-foreign trade structure by main-goods-group and by country-group of Hungary in 1995 and then finish an analysis of intra-industry trade with an interesting conclusion as follows⁹⁾;

We can find the intra-industry trade in only a very limited scope of product by means of the analysis based on the one-two digit classification of Foreign Trade Statistics 1995. But in the case of going down into more detail, i.e. going down to 4 digit-numbers of the machinery industry, a fact that the index indicating the intra-industry foreign trade is completely high can be identified in such product groups inquired; management & computer components, accessories (8473), electric water-warmer & household electrical appliances (8516), ball- and roller-bearing & its components (8482), harvester, thresher, baling machine, mover, agricultural-products-chopping machine and components (8433), electrical transformer, static electric current converter, inductor and components (8504), maximum 1000V strained electric circuit connector-appliance (8536).

The trade partner of these products are advanced countries, especially, Germany. Intensive trade turnover can not be found with developing countries and transforming countries. There would be a various estimation about the above. Gáspár brought up a hypothetical conclusion that there is a kind of "quasi- intra-industry trade" between the advanced countries and Hungary, meaning that within a relatively partial industry Hungary imports machine and equipment from the advanced countries, while exports

9) Gáspár Tamás-Kacsikék László, *Az Iparágon Belüli Külkereskedelm-Elméleti Keretek és a Magyar Külkereskedelem Szerkezeték Jellemzői Egy Konkrét Példa: A Gépipar, Versenyben A Vilaggal, A magyar gazdaság nemzetközi versenyképességének mikrogazdasági tényezői*, A tanulmányosorozat 22 kötete,

their parts & components and accessories to them. This form is characterized as “outworker” type integration of firm level into the advanced countries. Importing capital as a foreign direct investment in 1990’s shows its significance. However, it is recognized that Hungary-Germany intra-industry trade is not the same as those between developed countries because of the goods realized within the intra-industry trade being not high-technological ones. In other words, Hungary-Germany intra-industry trade is not accounted to “classical type” without any conditions in the respect of its purpose and function.

It should be mentioned that although there is not necessarily need that the commodities of intra-industry trade should be high-technological one, Hungary-Germany relations in the sphere of intra-industry trade is near the vertical cooperation.

Intermediates Supply in the Domestic Market

We will go forward to the last, but, supposedly, the most difficult topics, which is to give a statistical proof about increasing the production and turnover of intermediate products (t-1, 2, 3).

The difficulties lie in two matters here. One is lacking of Yearbooks of Industrial and Construction Statistics Hungary in 1989-1992 respectively, and another imperfect information on details of intermediate goods dealing. What is worse is that the enterprises that the statistics in 1992 and 1993 covered were those with more than 20 employees and the enterprises in 1994 more than 10 employees. There are shortcomings that would-be firms which could play an important role in producing parts and components went out of the statistical coverage. Table 9, in spite of a flaw, i.e. including not only intermediates, but also material, tells us the rapid increase of intermediate goods turnovers for manufacture of machinery and equipment in 1992-1995. The grow rate of sale of intermediates in machinery and equipment was

Table 9 The share of materials and intermediate goods sold by end-use group in 1992-1995

	Million HUF				%
	1992	1993	1994	1995	1995/1992
Energy and Water (1)	269 543	284 316	279 467	350 172	129.9
Materials and intermediates for manufacture of machinery and equipment (26)	110 402	124 513	175 922	261 371	236.7
Materials and intermediates (2)	642 572	681 545	869 671	1 242 136	193.3
Investment goods (3)	115 869	136 770	168 988	274 437	236.9
Consumer goods	816 707	905 188	1 064 407	1 377 362	168.6
Total	1 844 691	2 007 820	2 382 533	3 244 107	175.9
	Share (%)				1995-1992
Energy and Water (1)	14.6	14.2	11.7	10.8	-3.8
Materials and intermediates for manufacture of machinery and equipment (26)	6	6	7.4	8.1	2.1
Materials and intermediates (2)	34.8	33.9	36.5	38.3	3.5
Investment goods (3)	6.3	6.8	7.1	8.5	2.2
Consumer goods	44.3	45.1	44.7	42.5	-1.8
Total	100	100	100	100	0

Source: Yearbook of Industrial and Construction Statistics Hungary, 1993, p. 103., 1995. p. 161.

236% (336% in 1994-1995), i.e. the same as investment goods and far more than the average.

We made a list of goods which would be thought to be intermediate goods by selecting from the Industry and Construction Statistics 1995. Table 10 shows the production and sale of them. It turns out that there are not clear-cut trends, but the tendency of almost goods looks to be the similar as the above-mentioned machinery industry's trend with the exception of a few goods. It indicates that we could, not to a satisfactory extent, still ascertain significant development of intermediate goods supplier. Exceptional are engine of internal combustion (321), electric appliance for road vehicle (435), electric and photo wire, cable (436), fitting for cable, electric installation supplies (437) which are rather export-oriented owing to the high shares of export in sale in 1995. It is likely that these two statistic data seem to

Table 10 Trends of Production and Sales of

		Natural unit			
		1991	1992	1993	
311	Transmission	unit	19824	8930	7579
312	Clutch	unit	78962	34649	29489
314	Bearing	1000unit	23665	12943	11731
319	Units for general purposes of machinery	Ft			
321	Engine of internal combustion	unit	12154	40325	78296
324	Pumps for liquids	unit	171677	140245	129373
325	Compressor, compressor for refrigerator, vacuum pump, fan	ton	8208	5811	3582
4139	Intermediate products for road vehicles				
42122	Three-phase altering current asynchronous machine	unit			118399
42123	Altering current special machine	unit			616463
4212	Altering current roter	unit			734869
4213	Direct current machine	unit			12393
421	Electric roter	Ft			
422	Transformator	Ft			
423	Low-voltage electric appliance	Ft			
424	High-voltage electric appliance	Ft			
425	Power-current rectifier elements	Ft			
432	Electric welding apparatus	Ft			
433	Battery and dry cell	Ft			
435	Electric appliances for road vehicle	Ft			
436	Electric and photo wire, cable	Ft			
437	Fitting for cable, electric installation supplies	Ft			
446	Supply units, rectifier, voltage regulator	unit	25548	21483	20670
447	Elements, units, part of telecommunication for general purposes	1000unit	163128	274591	88712
481	Elements of electric controllers and regulators	Ft			
482	Elements of control technics and regulators, using pointers	Ft			
483	Elements of analogue process control systems, operated by auxiliary pneumatic and hydraulic energy	Ft			
484	Elements by analogue process control systems, by auxiliary electric energy	Ft			

Source: Yearbook of industry and Constuction Statistics Hungary, 1993, 1994, 1995

Selected Intermediate Goods in Hungary, 1991-1995

1994	1995	Million Ft sale				sale		
		1991	1992	1993	1994	Exp.	1995	Exp.
12536	10821			345	532	282	460	175
20152	30619			281	248	92	402	226
10344	10295			1723	2193	1687	3245	2715
		1230	899	916	1009	373	1891	910
178272	372507			11203	31403	30385	102042	100671
133197	166085			951	1349	508	1783	1097
4832	6285			1054	1672	376	3224	616
74341	103258				1203	791	1728	1363
651372	630561				958	296	1198	486
725717	733830				2161	1087	2924	1848
15405	12446				204	185	55	44
		2989	2295	2389	2748	1645	4049	2933
		1622	1450	1323	1654	485	4659	3122
		1734	1308	1628	1815	227	2603	657
		762	770	1929	2296	1718	3361	1974
		116	75	200	405	31	247	35
		636	495	439	697	0	931	784
		2888	2642	2789	2873	276	3606	329
		2977	3541	5898	7815		10371	8995
		9493	9645	8969	12673		14812	3880
		2227	2216	2679	3328		4813	2199
14709	3583			20799			73	10
135849	332052			70634			6637	4553
		597	554	659	641		836	393
		371	484	565	504		529	168
		868	416	881	1468		2487	1975
		868	416	881	507		674	203

present a symptom of increasing the parts & components production and deepening division of labour between the final complete goods manufacture and intermediate goods manufactures in machinery and equipment and/or among them. More detail analysis would need an inquiry other than statistic data.

A survey by Futó on subcontractor- parts supplier of not machinery industry, but the industry in general tells us interesting features of Hungarian type of small firms' cooperation: Hungary is moving, realizing birth of a mass of small firms, to the stage of improving and intensification of cooperation between firms and increasing efficiency. The smaller the scale of enterprise, the more inclined to intensify cooperation with other firms for modernization of technology. There is differential extent of attitude toward cooperation between industries. The machinery industry belongs to the strongest group. It is characteristics in Hungary, compared with the Central-East European countries, that cooperation between the state-run enterprise and private enterprise are developed on the basis of personal-informal relations already established before independence of the small firm from the state firm as well as borrowing a space of building and equipment from the state firm. This type of cooperation made an obstacle to a new in-comer's appearance in the market on the one hand, while lost perspectives to develop owing to economic recession and heavy social-tax burdens on the other. In the other case of survey, 25-30% of small enterprises surveyed has been producing as a subcontractor for 4-5 years¹⁰⁾.

10) Futó Peter, *Alvállalkozók-beszállítók nemzetközi összehasonlításban, Statisztikai Szemle*, KSH., 1995. Február. 155-165. o.

Foreign Owned Firms and intermediates Supplier

Any way, so far as the export-orientation of intermediate goods is concerned, we could not exclude the role of multinationals and foreign owned enterprises from our examination. Related to starting economic growth in the machinery industry as was seen above, there is an optimist view predicting further increasing its products, especially by foreign-owned companies, within coming four years and having more inflow of foreign direct investment in machinery and equipment industry. Nevertheless two problems should not be overlooked according to Erdős and Ráthy. One lies in that although most of 630 Hungarian engineering firms whose numbers of employees are more than 300 have reached the international level of quality control, the share of value added by production in Hungary is small in the products assembled by foreign-owned firms. And the parts-supplying industries where about ten thousand small firms are conducting are still out of development. These supplying industries would not be likely to start economic growth so far as big firms would not give a mass order to supplying industries to an extent that mass production by mass order could become economically profitable. The second problem is that there is decreasing sale of engineering products in real term in the domestic market, meaning that general domestic demand did not oriented toward investment goods. The development is confined to the limited segment of industry¹¹⁾.

Similar opinion could be found out in the survey by Peter Farkas¹²⁾.

11) Erdős Vera, Ráthy Sándor, *Gépipar fellendülés, Pörgő masnák, Figyelő* 1997. Július 24, 18-19. o.

12) Peter Farkas, *Component Supply, Contract Work And Technical Development. A Study of Hungarian Companies*, IWE, Working Paper No. 71, October 1996. The analysis does not refer to engineering itself but, mainly, the car industry and additionally the textiles and footwear.

Interesting is the fact that in privatization and transformation multinationals and the companies bought out by foreign investors, with greater exposure of the Hungarian economy into the world economy, had broken down the vertical technical integration and previous domestic cooperation with other companies. There were cases where they switched outsourcing to the supplier within a multinational cooperation. The multinationals and foreign capital enterprise have an unfavourable influence upon developing intermediate goods manufactures from the respect of lacking business attitude of raising Hungarian suppliers and offering even technical support to them¹³⁾.

In this respect an attention might well be paid to the analysing aspect of Hamar's research, which classified the foreign backed enterprise into two categories, wholly foreign owned company and joint venture¹⁴⁾. The former is rather domestic-market oriented, while the latter external-market oriented and disposed toward supporting the cooperation with subcontractors (including in neighboring countries). This characteristics seems to coincide with Farkas's reference to Suzuki contrasted with the other car makers¹⁵⁾ as well as the case study of Excel-Csepel Machine Tools Ltd¹⁶⁾.

If we would turn to a sub-sector other than engineering in the machinery

13) Farkas marked an interesting quotation as follows; "In Hungary, companies of small and medium size are not oriented toward industry, and as a consequence there is no subcontractor network existing, and this company range does not take part satisfactorily in innovative development"

14) Judit HAMAR, Industrial Policy, Structure and Efficiency in the Hungarian Manufacturing Industry, Kopint-Datorg, Discussion Papers No. 31., September 1995.

15) Farkas denies this positive role even in joint ventures.

16) Andrea Szalavetz, Case Study No. 3, Takeover and Modernization of a "typical socialist" machine-tools factory. (unpubished)

and equipment industry, i.e. electronics industry, a delicate shade could be found out in the differentiation in the spheres of development of manufacturing components for telecommunication and electronics, subcontracting, inter-industrial cooperation, maintaining their own R & D¹⁷⁾ as well as export-orientation and international competitiveness of the components-makers¹⁸⁾. The point to observe is the density of subcontracting and the intensity of intra-trade. According to Penyigey and Török, out of all the companies surveyed, 70.6% have subcontracting relationships with 1 to 30. Seven manufactures of electronics have more than 100 subcontractors. Inputs used by Hungarian electronics firms are still mainly Hungarian origin. Half of the firms surveyed spoke of more than 50% of inputs purchased from other electronics firms. Problems related with foreign owned firms lie in that only some Hungarian firms are able to meet the high quality and delivery timing and are lacking of availability of information, i.e. a modern database. We need hardly mention about the passive attitude to integrate local supplier into the multinational networking only in the case of relatively high transport costs of parts and components. These findings of the survey results in that electronics seems to be a sector which is near our image about horizontal cooperation.

Conclusion

The investigation above on the development of intermediates supply by using statistical data and other case studies comes to two conclusions. It is one conclusion that this supply, in spite of having given birth to a mass of

17) Krisztina Penyigey and Ádám Török, An overview of the Hungarian electronics industry, Research Institute of Industrial Economics of the HAS, March 1997.

18) Penyigey Krisztina, *A magyar informatikai piac elemzése*, 1997. április (unpublished) p.17

small firms which would be in charge of it, has not yet evolved with such a maturity that its appearance can easily be disclosed in the internal market and over the border. In this sense, the micro level of integration of Hungary into Europe is in the beginning and the transformation is on the way. Modernization has still a lot of tasks to solve.

Secondly it should be emphasized that there will need to improve and adapt the statistical information system to the coming two kinds of revolution, without which any research could not be allowed access to the core of reality. Not to mention, concrete inquiries and case studies will be necessary for further research in this field.

Thirdly, a question remains to be proved whether significant intrinsic differences could be found out or not in the comparison between the case of engineering industry, which is relatively worse position, car industry and computing & telecommunication industry, which is in relatively better position as mentioned above. To understand factors bearing the difference might lead to taking these factors into consideration in decision-making of industrial policy. There is a problem as well related to establish the way how to estimate and promote innovation and modernization. Is market adequate for this estimation or does the bank system play a sufficient role as Schumpeter mentioned. What could we do in the beginning of transformation of banking system, i.e. in the period when the bank fulfilled this function imperfectly? Could the state substitute for it? If multinationals and foreign owned firms would be reluctant to support these innovation and modernization in Hungary, then is there left no alternative but the protective policy?

It seems to be inevitable that "Mega-Competition" has compelled multinationals and foreign owned companies to conduct management more completely in accordance with the global logistics of outsourcing. Although

the relationship with multinationals is a necessary condition; besides always ambivalent, the networking of multinationals is destined to be more intensified and denser. The vertical line of multinationals-subsidiaries-subcontractors relations are becoming more and more universal. However, if scrutinizing aspect of development of technology shifted from the vertical relations between two actors, i.e. economic agents, to the plane where technological achievement are accumulating, other perspective would spread like a special type of flexible networking spontaneously formed by basic and medium technology supplier in Japan. Hungary might well and should create its own type or pattern according to the historical nationality.