

# 5 Technological modernization

## 5.1 Introduction

One of the profound positive effects of FDI is in their contribution to the modernization of the production structure. This is especially valid in the case of the transition economies in CEE and therefore also for Hungary. As a consequence of forty years of communism, Hungary was saddled with a huge technology gap compared to Western countries. Pre-1989 reforms (which started in 1968 under the New Economic Mechanism) could only reduce this gap in a limited way. However, there were some positive exceptions among the SOEs, since Hungary imported Western technology in relatively great numbers (as compared to other socialist countries) in the eighties. But at the time of changeover to a market-based economy the general picture was one of a somewhat obsolete manufacturing sector.

By using the empirical evidence provided by the interviews, we will study the contribution of foreign companies to the technological modernization of the Hungarian manufacturing industry in this chapter. We will give answers to the following three research questions of this thesis:

1. To what extent do foreign and domestic companies contribute to the technological modernization of the Hungarian manufacturing industry?
2. What are the motives for technological modernization, how is the modernization process taking place, and what are the plans for future investments?
3. Is there a difference in modernization between companies active in different sectors and companies located in different regions?

In order to answer these questions, the following outline is used in this chapter. After a short introduction on the methodology used, a general comparison is made pertaining to technological modernization in foreign privatized, foreign greenfield and domestic privatized companies shortly (section 5.2). Next technological modernization in all three types of companies is dealt with in separate sections in more detail (sections 5.3 to 5.5). In the concluding sixth section, we summarize the main conclusions in this chapter.

## 5.2 Methodology and general findings

### 5.2.1 Methodology

In our research on technological modernization, we asked the respondents to classify their production equipment both at time of establishment<sup>1</sup> and at present. Four classes were selected beforehand: totally obsolete (archaic), somewhat obsolete, accepted international standard and state-of-the-art. The managers we spoke to, did not have any problems with the classification of their company's production equipment according to the selected classes. In our analysis of technological modernization we derived the percentage of obsolete equipment by lumping together totally and somewhat obsolete equipment. By comparing the outcome both at time of establishment and at present we can say something about the technological modernization. Moreover, we calculated the decrease in obsolete equipment between the two points in time. This figure, however, can not give more than a rough indication of modernization. After all, a company that started with a high percentage of obsolete equipment can register a higher decrease than a company that started with only a limited proportion of obsolete production equipment.

Besides, the managers were asked for the current average age of the main production equipment. This way the other three measures can be put in perspective. The four chosen indicators together give a good picture of the state of a company's equipment at time of establishment and at present, and consequently of the contribution to technological modernization.

In order to determine the differences in technological modernization for different types of companies, companies in different sectors and located in different regions, different statistical analyses were used. First in our general comparison between the three types of companies we used one-way analysis of variance. However, since the sample is rather limited, analysis of variance becomes unreliable when we analyze the differences across the different types of companies, by sector and in different regions. For instance, as regards privatized companies in different sectors, the sample of 29 privatized companies is split in three groups. Moreover, all three sectors contain a different number of companies. In these cases the F-curve becomes unreliable. Therefore, two other statistical tests were used to calculate differences: the Mann-Whitney test for two independent samples (as in macro regions) and the Kruskal-Wallis test for three independent samples (as in sectors). Both tests are reliable in analyzing smaller samples of differing size.

Since our sample of domestic companies is very small (13 companies) we did not apply statistical tests to show up differences between companies operating in different sectors and located in different regions. For domestic companies we only used the four indicators described above.

In our statistical analysis we use three significance levels:

- $p \leq 0.10$  (°)
- $p \leq 0.05$  (\*)
- $p \leq 0.01$  (\*\*)

### 5.2.2 Foreign and domestic companies: general findings

Let us start by presenting some general findings on technological modernization, and analyzing the indicators as represented in the preceding section. We compare our findings for foreign privatized and greenfield companies, and for foreign privatized and domestic privatized companies.

In chapter 2 it was stated that we expected to find large differences between foreign privatized and greenfield companies. Privatized companies have to cope with the socialist inheritance to a much larger extent than greenfield plants, with largely obsolete production equipment as one of the main elements. For both greenfield and foreign privatized companies, we calculated the percentage of obsolete equipment (comprising totally obsolete and somewhat obsolete) both at the time of establishment and at present. Besides, we calculated the decrease in obsolete equipment between the two points in time, and the current average age of the main production equipment. Differences between foreign privatized and greenfield companies are analyzed using analysis of variance.

Table 5.1 Technological modernization in foreign companies by mode of investment

	N	% Obsolete equipment			Current average equipment age
		Foundation	Present	Decrease	
Foreign sample total	50	38.6	19.4	19.2	6.9
Privatized companies	29	56.4	28.4	28.0	8.5
Greenfield investments	21	14.0	7.1	6.9	4.7
<i>Difference</i>					
Analysis of variance		**	**	**	*

Our statistical analysis confirms the initial hypothesis that foreign companies can not be seen as a homogeneous group with respect to their contribution to technological modernization. Significant differences were found for all four indicators (table 5.1). The starting levels of privatized and greenfield companies differ significantly from one another. Privatized companies have to cope with on average 56.4 % obsolete equipment when they start their operations in Hungary. In contrast, greenfield companies start with 'only' 14% obsolete equipment. But privatized companies have done a lot to modernize their plants, resulting in a sharp decrease in the percentage of obsolete equipment. Nevertheless, at present there is still a difference between privatized and greenfield companies. On average, privatized companies still make use of 28.4% obsolete equipment compared to 7.1% for greenfield companies. Besides, the average age of the main equipment in privatized companies is almost twice that of greenfield companies.

The age of equipment in greenfield companies is a somewhat misleading measure, since it largely depends on when the investment was made. For instance the average age of equipment in the IBM plant – founded in 1995, and enlarged with a second much larger factory building where started production only in November 1996 – is 1 year. In contrast, the average age in the AUER plant, an Austrian candy manufacturer which set up a production plant in Budapest in 1989 is 6 years.

In general, managers found it more difficult to give an estimation of the average age of equipment than to classify equipment in the four selected categories. Especially in the case

of privatized companies, the new owners were mostly unaware of the exact age of the acquired machines. Besides, the big difference in the age of the different machines is a complicating factor. Many privatized companies work with brand-new equipment and equipment which is 10 years or 20 years old, or even older.

Next, our sample allows for a comparison between foreign and domestic privatized companies. We assumed that they both have to cope with obsolete equipment at the start of their operations to a large extent. Besides, we expected to find more technological modernization in foreign-owned companies than in domestic-owned companies.

Our analysis largely confirmed our assumptions (table 5.2). Significant differences were found for all four indicators. Both foreign and domestic privatized companies have to cope with largely obsolete production equipment at the start of their operations. However, our findings show that domestic privatized companies started with more obsolete equipment than foreign privatized companies, the difference between them is almost 20 percentage points. This finding confirms the often-heard remark that the best SOEs are sold to foreign investors, leaving the companies in a worse condition in state hands or for privatization to domestic owners.

Table 5.2 Modernization of production in privatized companies

	N	% Obsolete equipment			Current average equipment age
		Foundation	Present	Decrease	
Foreign privatized	29	56.4	28.4	28.0	8.5
Domestic privatized	13	75.9	71.6	4.3	14.6
<i>Difference</i>					
Mann-Whitney U		*	**	**	**

The gap between foreign and domestic companies has widened further after operations began. In contrast with foreign privatized companies, domestic privatized companies have hardly been able to decrease their share of obsolete equipment. As a result, at present the average age of the main equipment is almost twice as much in domestic companies as in foreign privatized companies (14.6 versus 8.5 years old).

In this first analysis we found significant differences between all three types of companies in our survey with respect to their contributions to the modernization of production in Hungary, and between the share of obsolete equipment at present. Privatized companies have to cope with obsolete equipment at the start of their operations. But where foreign privatized companies have managed to decrease the share of sub-international standard equipment considerably, domestic companies have not. Foreign greenfield companies are in a totally different situation as they can furnish their plants according to their own wishes, using the latest technologies. Therefore, we can conclude that foreign greenfield and foreign privatized companies both contribute to the technological modernization considerably, though in a totally different way.

With this in mind, we will discuss the technological modernization in all three types of companies separately and in more detail below. For each of the three types of companies we deal with issues related to research questions 2 and 3. That means that we will discuss how this modernization process is taking place, what the motives are for investing in more

modern production equipment, and what the plans are for future investments. Moreover, we look for differences in technological modernization for companies operating in different sectors, and located in different regions.

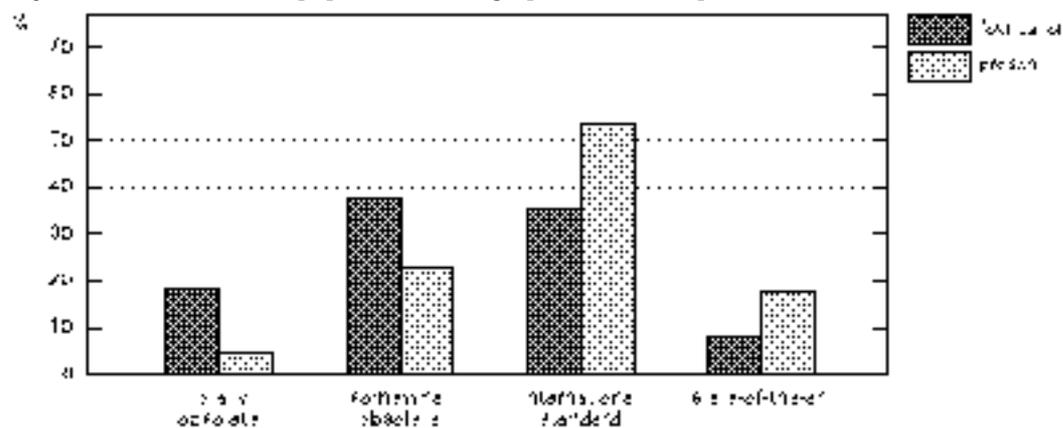
### 5.3 Technological modernization in foreign privatized companies

#### 5.3.1 Technological modernization

Privatized companies have to cope with on average 56.4% obsolete equipment at the start of their operations: 38.3% somewhat obsolete and 18.1% totally obsolete (archaic) (figure 5.1). But most privatized companies have done a lot to modernize their plants, resulting in a major reduction of obsolete equipment. From the 29 foreign privatized companies in our sample, 28 have invested in new equipment after establishment. At the time the interviews were held 'only' 28.4% of equipment was obsolete: the stock of somewhat obsolete equipment reduced to 23.5% and totally obsolete to 4.9%. The new investments have resulted in both an increased share of equipment of international standard and state-of-the-art equipment.

Foreign investors that invested in the privatization deal with obsolete equipment in different ways. The way they do can be deducted from the combination of investors' differing strategies and differing technological starting levels, as is illustrated in the following cases. A foreign investor may for instance (have to) opt for a gradual but steady technological modernization (see the example of UNILEVER below), replace the existing technology all at once (SCHÖLLER and ESKIMO) or hardly change anything at all (KRACHT).

Figure 5.1 Production equipment in foreign privatized companies



UNILEVER bought a major share in a margarine factory in Budapest in 1992<sup>2</sup>. The company was owned by UNILEVER before it was nationalized in 1948, and it produced under the license of UNILEVER afterwards. UNILEVER's policy is one of taking over local brands whenever possible. Besides, along with the local margarine brand Delma, UNILEVER started the production of Rama (the same brand name UNILEVER uses to sell margarine on the German and Austrian markets). Production is aimed solely at the local Hungarian market. After the acquisition the company invested heavily in new equipment. Half of the investment was allocated to increase production capacity. The other half was for the replacement of obso-

lete equipment: to improve efficiency and the quality of the products, modern machines were necessary. The Budapest-based plant has now become one of the better UNILEVER plants in the world. However, the company still uses some of the old machines. For instance although the wrapping machine for the cubes of Rama margarine is 40 years old, it still works very well. This strategy, where the new foreign owner modernizes production at a steady pace, but to some extent still makes use of the acquired machinery can be found in the majority of the foreign privatized companies.

A totally different case is the investment of the German company SCHÖLLER that replaced all the existing equipment shortly after the acquisition. Therefore, it can be characterized as a brownfield investment (see chapter 2). They bought an ice cream factory in Törökbálint (a town near Budapest), which produced the local brand Leo, the market leader at that time. It was the brand and the market share of Leo that they were interested in, and not the company as such. Looking back it would probably have been better to invest in a greenfield plant as the interviewee stated: "we took over many bad things which we still have to cope with, like for instance the structure of the building".

A different strategy was followed by another ice cream producer. ESKIMO, a UNILEVER plant, too bought an existing factory in Veszprém (near Lake Balaton which is the most important sales market). Already at the beginning it was clear that the factory would be replaced by a greenfield plant. But because of the strong competition from SCHÖLLER they had to bridge over one season. If they had not done so, they would have missed peak sales in the summer, and probably some of their stake in the market. Therefore, in this first year, they replaced only some of the worst machines. At the end of the summer of 1992 the factory was demolished completely and on the same location a new greenfield plant was established. The local brand name, the adjacent dairy and the proximity to the main sales market in Hungary were important factors in the investment decision, and not the building or the technology which were totally obsolete.

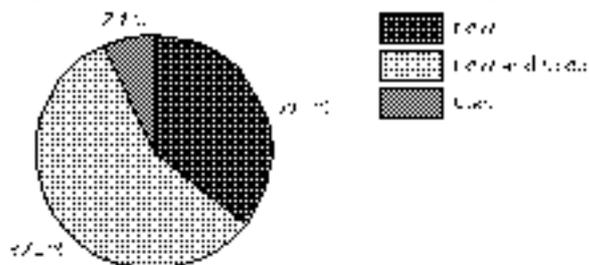
In contrast to the examples above, a limited number of companies made hardly any investments in the modernization of production equipment, although the state of the equipment was found wanting. One example is the German KRACHT, which bought a Hungarian company manufacturing hydraulic pumps, electric gears and machine parts. The company produced for the German parent company under license from 1983 onwards and was involved in outward processing. When the state company was liquidated in 1992, the German company decided to buy it. At that time all the machines were more than 10 years old. In the meantime only limited investments have been made: to achieve greater accuracy, for noise reduction and to replace dilapidated obsolete machines. The main reason for the restrictive policy and the limited modernization is the lack of money. The plant is kept short by the parent company, which prefers to invest in Germany rather than in Hungary. The Budapest-based plant is partly involved in outward processing for the company which means that labor-intensive production is transferred from the German company to the plant in Hungary. The low labor costs more than compensate for the lower productivity of the old machines. The plant manager indicated, however, that more replacements should be made in the near future.

#### *FOLLOW-UP INVESTMENTS: NEW OR USED EQUIPMENT?*

Thus far we have only discussed whether or a not a company has invested in new equipment after the establishment and the motives for doing so. Here, 'new' means 'new for the subsidiary'. In fact this can either mean entirely new equipment, or used equipment that was

bought from other companies, or that came from other (Western) subsidiaries of the company. The latter is referred to often in the case of FDI in CEE. Through the transfer of production (equipment) they could extend the life cycles of products for which there is no longer any market in the West. In our research we found no evidence for this phenomenon. Nowadays competition in Hungary is tough and consumer demand has become more discerning in the post-socialist period (pertaining quality), matching Western standards.

Figure 5.2 Follow-up investment in foreign privatized companies (N=28)



However, investment in used equipment is a common phenomenon in privatized foreign companies (figure 5.2). For 'only' 35% of the companies was follow-up investments in new equipment. But the number of companies that have invested *only* in used equipment is limited to two companies. Most companies (57%) invested in both new and used equipment. However, the extensive investment in used equipment does not imply that a large share of the equipment is obsolete. For instance, the equipment in the two companies that invested solely in used equipment was of international standard. Overall, investment in state-of-the-art and international standard equipment is predominant.

New equipment was mostly bought abroad, although some was bought in Hungary. The price difference with equipment made in Western countries is enormous. For instance, one of the companies in our sample gave a domestic company the task to develop a new machine for producing wrapping material. The locally manufactured machine was only 10% of the price of a German-made machine and of the same quality.

As regards follow-up investments, foreign privatized companies (notably the larger multinational companies) make use of their international network to a large extent. This might explain the high rate of used equipment in follow-up investments as noted earlier. The equipment used is from either the parent company or other Western subsidiaries. In the case of a transfer of production capacity this is clear. Moreover, multinational companies use equipment from their European subsidiaries which became available after rationalization of production and/or overcapacity in the West for the Hungarian plant. It should be pointed out that this does not concern written-off machinery, but often relatively new machines. In the case of a big multinational in the food industry, a more aggressive strategy was followed. The company bought an almost new, but bankrupt plant in Spain, and closed it immediately because of overcapacity in the West. The equipment went to subsidiaries in several Central European countries, where they could start producing immediately for the local markets. Normally it takes about nine months to have new machines at one's disposal.

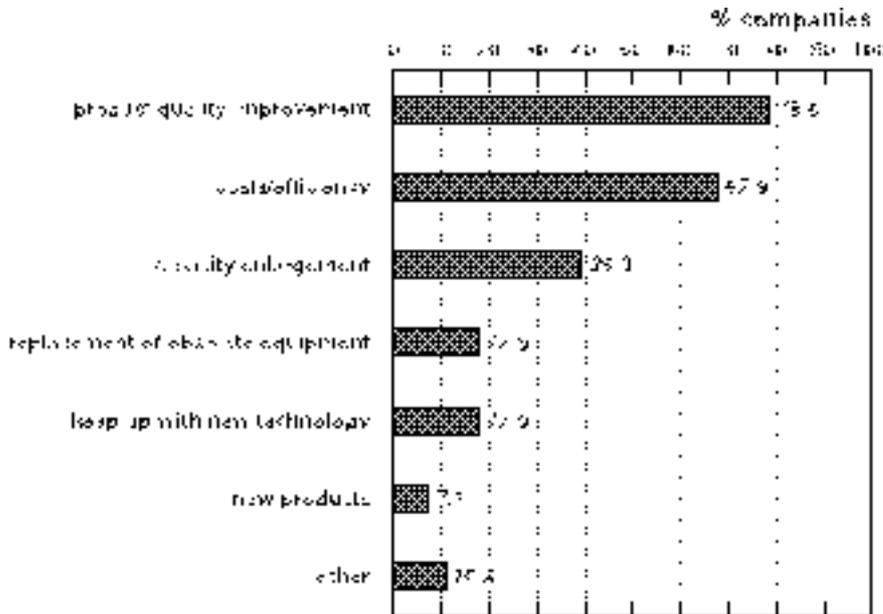
Some managers indicated that they invested in used machinery which they bought from bankrupt SOEs. As we stated above, equipment in SOEs was not always obsolete. Liquidation of an SOE offers the opportunity to buy relatively good machinery at bargain prices.

MOTIVES FOR AND RESTRICTIONS TO MODERNIZATION

Considering the high proportion of obsolete equipment found, one would expect that the replacement of obsolete equipment would be an important argument for investing in new machinery. However, a quick look at figure 5.3 does not verify this assumption. The replacement of obsolete equipment was mentioned by only 5 foreign privatized companies (17.9%). The necessity to replace old machinery may be due to several reasons. In a number of cases managers indicated that the equipment was so obsolete that they could not work with it, as we found for instance in the example of SCHÖLLER. Besides, obsolete equipment needs a lot of maintenance and the risk of it falling apart is so high that it makes economic sense to replace them. Others indicated that obsolete machines were not able to produce the large quantities required: in these cases replacement is often preferred above investment in additional capacity.

In fact, the motives for investment are very much interrelated. The replacement of obsolete equipment can be a reason in itself, but it can also be a *means* to improve efficiency and to improve the quality of the products. Both these last two motives were mentioned by the majority of the managers.

Figure 5.3 Motives for follow-up investments in foreign privatized companies<sup>a</sup>



<sup>a</sup> N=28. Managers could give more than one motive. For instance, 78.6% of the managers of foreign privatized companies that invested in new equipment after establishment indicated that higher quality was an important argument for investment.

Even in Hungary where labor costs are relatively low, the cost/efficiency argument is important. This is an indication of the inefficient production in SOEs and high costs connected to this. But it is also an indication of the tough competition, not only in export markets, but also on the domestic market, since a lot of the companies in this research sell a major part of their products on the local Hungarian market. Fierce rivalry is also reflected by the need to improve quality, a point mentioned by almost 80% of the privatized foreign companies. In the sectors studied, product quality is often directly related to the equipment

used. In mechanical and electrical engineering, accuracy is an important element in the quality of the products. For instance, in the production of small electrical instruments, surface mounted device technology (SMD) enables precision manufacturing. In fact, the use of SMD is a prerequisite for the competitive production of small modern electronic instruments. But also in the food industry there is a direct link between the technology used and the taste (read quality). For instance a process leading computer (PLC) is used to mix the exact proportion of the different ingredients, add ingredients at the right time and to control the whole production process in for instance chocolate or ice cream production.

Capacity expansion was mentioned by nearly 40% of the companies, an indication of the active investment strategy of foreign companies in Hungary and their optimistic sales projections. This is also reflected in the turnover, which grew sharply in foreign privatized companies<sup>3</sup>.

But there are in the specific case of Hungary also factors that make companies refrain from investing in more modern equipment. One reason, mentioned by only a few managers at foreign privatized companies is that investment in automation is not profitable because of low labor costs. A case in point is for instance the investment of UNITED BISCUITS in Győr<sup>4</sup>. The manager reported that they have not invested in automation, since labor costs are low and the costs of investment in capital equipment are high, because they are bought in the West. Therefore, it is hard to recover the costs in investment, especially since labor costs make up only 10% of the cost price. However, in contrast, there are other companies which invest in automation. In two companies the foreign owner or foreign partner (as in joint ventures) is the one who blocks investments in technological modernization.

#### *FUTURE INVESTMENTS*

Although foreign privatized companies have done a lot to modernize their plants thus far, the vast majority indicated that they were planning further investments in the near future (two years following the interviews). From the 29 companies in our sample, 26 planned further investments. For 2 other companies, future investments in extra capacity will depend on market developments. Only 1 company had no plans to invest in new equipment in the next two years. The manager of this company indicated that they have made enough investments to get by for the coming years, but they intend to invest in brand-new technology after 2000.

Future investments are often a continuation of the (necessary) technological modernization, aimed at an improvement of their competitiveness both in domestic and export markets. Besides, in one-third of the companies future investments are in extra capacity, which is an indication of the optimistic outlook, further intensifying the company's involvement in Hungary.

#### *5.3.2 Differences: sectors and regions*

Thus far we have dealt with the impact on the modernization of production in Hungary for all foreign privatized companies. However, it might well be that there are differences between the starting levels of companies and the ensuing technological modernization between companies operating in different sectors and companies located in different regions.

As for sectors, it turns out that mechanical engineering companies on average have the worst starting level (table 5.3). But what is more important, they modernized the equipment

to a much smaller extent than companies in the other two sectors. The result is that at present, mechanical engineering companies have more than twice the amount of obsolete equipment than companies in the food and beverages sector, and three times more than electrical engineering companies. Hence, we found a significant difference with the other two sectors at the 0.01 level. Not surprisingly, the main equipment is much older.

The reason for the relatively poor condition of production equipment in privatized mechanical engineering companies probably lies in the labor-intensive nature of the production, where handwork is an important element, and where single piece production and production in small batches are the prevailing production forms. As a result, most foreign companies in this sector came to Hungary because of the large savings in labor costs that could be made (in relation to high professional skills). Investments in new technology and automation can only partly reduce the labor intensity of production. Combined with low labor costs, returns on investment take a long time, and therefore investments in new technology are financially rather unattractive. The example of MTD HUNGARIA is a good illustration in this respect. The company relocated the assembly of small agricultural machines from Germany to Hungary, where wages are still at one-tenth the level in Germany. The assembly is done by hand, which takes three times as long as in Germany where the assembly is automated. Since it is still cheaper to do it manually, investment in automation is not profitable. Nevertheless, most companies indicated that some investments have been made, as indicated in table 5.3. First, because they had to give in to market demand, which requires higher accuracy and more flexible responses to fluctuations in demand. Second, because the dilapidated machinery was no longer functioning.

Table 5.3 Technological modernization in foreign privatized companies, by sector and by region

	N	% Obsolete equipment			Current average equipment age
		Foundation	Present	Decrease	
<i>Sector</i>					
Mechanical engineering	10	61.0	44.2	16.8	11.5
Electrical engineering	6	49.2	14.2	35.0	5.6
Food & beverages	13	56.2	19.5	36.7	7.4
<i>Difference</i>					
Kruskal-Wallis		n.s.	**	n.s.	o
<i>Region</i>					
Center	16	59.4	26.1	33.3	6.8
Northwest	13	52.7	28.0	24.7	10.7
<i>Difference</i>					
Mann-Whitney U		n.s.	n.s.	n.s.	n.s.

The production equipment in companies in electrical engineering and the food and beverages sector is less obsolete than in mechanical engineering companies. But what is more important, is that they have managed to decrease the share of obsolete equipment considerably. In contrast to mechanical engineering, production in these sectors is mostly in larger batches, and the role of technology is more important, or even a prerequisite for competitive production (for instance through SMD technology, see above).

As for regions we expected to find some differences between the center and the northwest regions, at least with respect to the starting positions of companies. The manufacturing sector in Hungary has been dominated by Budapest from the early years of the twentieth century onwards. However, the manufacturing sector in the northwest of Hungary is also generally considered to be of a relatively high level. Therefore, we would expect the starting levels of privatized companies in the center region to be slightly better than those of companies that bought an SOE in the northwest.

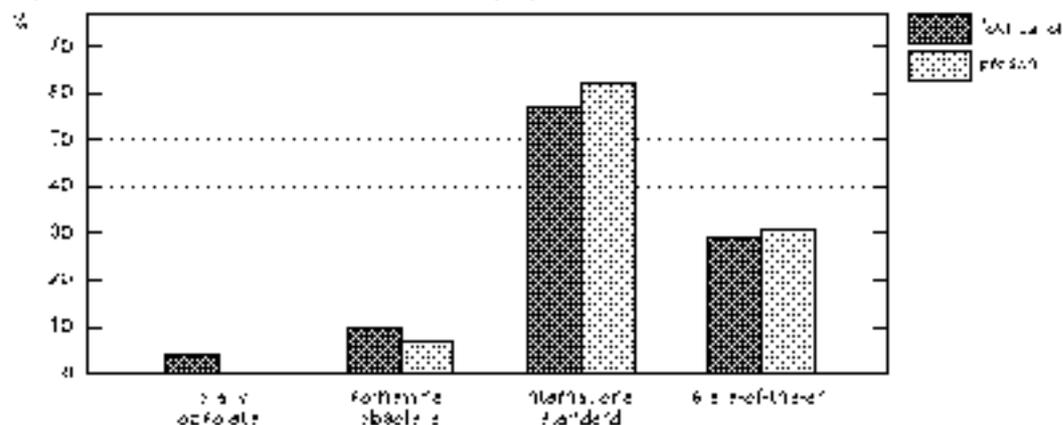
However, we could not find any significant differences between companies located in the center region or the northwest of Hungary. In fact, the differences between the shares of sub-international standard equipment are very low. Only the present age of equipment differed to a certain extent, though it is not supported statistically.

## 5.4 Technological modernization in foreign greenfield companies

### 5.4.1 Technological modernization

In contrast to privatized companies, greenfield investments do not have to cope with largely obsolete equipment that accompany the acquisition. Therefore, one might conclude that greenfield companies contribute to the modernization of production by definition. However, as we found in section 5.2.2, greenfield companies use obsolete equipment as well. When operations began they utilized on average 14% obsolete equipment: 10% somewhat obsolete and 4% totally obsolete (figure 5.4). The equipment in one company accounts for the latter figure (see the example of APV below). This indicates that not all plants were furnished with the latest new technology. Of the 21 greenfield plants in our research, 14 solely utilized equipment which match or surpass international standard. The other seven greenfield plants in our survey, to some extent, make use of sub-international standard equipment. Of these 7 companies, 4 have made further investments in improving their equipment since establishment. Overall, 19 of the 21 greenfield companies in our survey invested in new equipment after the setting up of the plant. As a consequence, the share of obsolete equipment decreased to 7% at the time when the interviews were conducted. Totally obsolete equipment was no longer used.

Figure 5.4 Production equipment in foreign greenfield companies



Within greenfield investments, a distinction can be made between plants that only make use of new equipment and are mainly set up for an *expansion of production capacity*, and plants that make use of used equipment, whether or not with supplementary new equipment. These investments mainly involve a *transfer of production capacity* from the West. We will illustrate these different types of greenfield investments shortly on the basis of selected cases.

Some good examples of new modern technologies which entered the country in greenfield plants that are set up with the aim of an *expansion of production capacity* are found in the automotive industry. Although the production of passenger cars was absent in Hungary before 1989, 4 major worldwide manufacturers have set up production and assembly plants in the northwest of Hungary: OPEL in Szentgotthard (Vas), SUZUKI in Esztergom (Komárom-Esztergom), AUDI in Győr (Győr-Moson-Sopron) and FORD in Székesfehérvár (Fejér). All these companies work with the latest technologies. OPEL, for instance, set up a plant for the production of engines for several car models and the assembly of the Astra for the local market. Between 1991 and 1997, OPEL invested DM 750 million in the Hungarian plant, which makes OPEL one of the major foreign investors in the country. Currently the plant produces more than 300,000 engines and assembles over 11,200 cars per annum<sup>5</sup>. At the start of production in July 1992 the engine plant was the most modern OPEL engine plant in the world. Additional investments after its establishment were all in the engine plant, further increasing its capacity and flexibility. Furthermore, a new cylinder plant was established which uses a technique which was new in Europe. This plant was built to eliminate the bottlenecks at the first plant. The production line is able to produce 4 types of cylinders at the same time and it can change in one second from the production of one type to another.

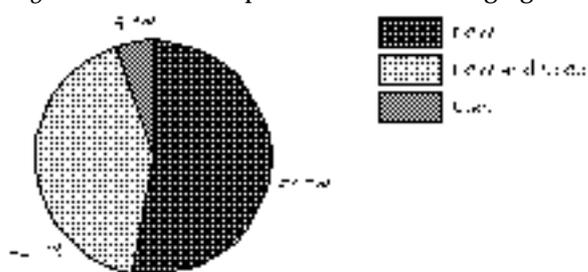
Another greenfield company using state-of-the-art technology is IBM STORAGE PRODUCTS in Székesfehérvár. IBM started its production of hard disk drives only in November 1995. The factory was built by VIDEOTON (a large state-owned enterprise which was privatized and taken over by Hungarian owners) on the VIDEOTON INDUSTRIAL PARK. Hardly a year later a second factory was built by VIDEOTON next to the first one. Besides, IBM invested \$ 110 million in the production lines. The production of hard disk drives requires the use of state-of-the-art technology. Besides, since every 4-5 months a new product is launched, the technology needs to be renewed or changed continually.

Another type of greenfield investment is induced by a *transfer of production capacity* because of the lower production costs in Hungary. Mostly this concerns the shift of production processes which are labor-intensive from Western Europe to Hungary. Since the investment in Hungary coincides with the closure of a plant or production unit in the West, often (some of) the machines are physically transferred to the new plant. Therefore this 'type' of greenfield investment differs from that of OPEL and IBM in the way that they make use of existing (used) machines to a large extent. This explains the use of obsolete equipment in greenfield companies as we found in figure 5.4 above. FISHER-ROSEMOUNT<sup>6</sup>, part of the American multinational EMERSON ELECTRIC, transferred production from Germany and the Netherlands to Székesfehérvár, where they started as a greenfield in a renovated building on the VIDEOTON INDUSTRIAL PARK. At the start almost all equipment came from Western European plants, but all the machines were less than one and a half years old. In addition, some new CNC layers were bought in Hungary. Some extra equipment was bought, since they needed a buffer: They had to build up production capacity in Hungary before they could close their West European premises. The company is still expanding its activities in Székesfehérvár, paving the way for further new investments.

#### FOLLOW-UP INVESTMENTS: NEW OR USED EQUIPMENT?

In studying the contribution of foreign companies to the technological modernization, the issue of follow-up investments is less important in the case of greenfield investments than for privatized companies. Nevertheless, we found that the vast majority of the greenfield companies invested in new equipment after their foundation. In more than half of these companies, this involved only new equipment (figure 5.5). But, as in privatized companies, investment in used equipment is common also in greenfield companies. In more than 42% of the companies, follow-up investments were both in new and used equipment. In one company, investment was only in used equipment. It concerns an investment of a German company, that bought an empty, but already existing factory. The plant is furnished with equipment from the parent company only, as the investment is a transfer of labor-intensive production processes to low-labor-cost Hungary. Some 90% of the Hungarian plant's production is in outward processing for the parent company.

Figure 5.5 Follow-up investment in foreign greenfield companies (N=19)



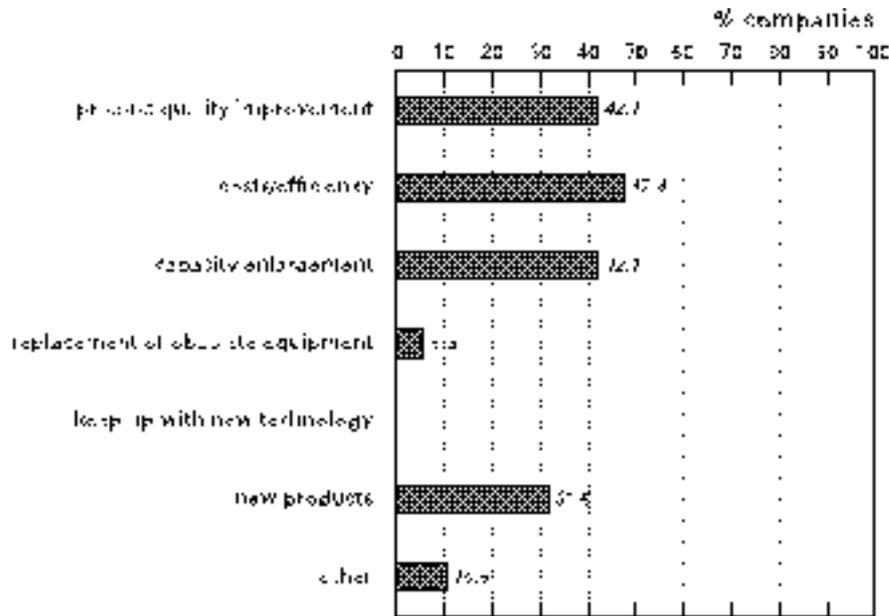
These follow-up investments are mainly in state-of-the-art and international standard equipment (as we also found at privatized companies above). However, greenfield companies invested more often solely in state-of-the-art equipment.

Used equipment came generally from other Western subsidiaries or the parent company. This equipment became available either because the greenfield plant in Hungary is the result of a transfer of production capacity to Hungary, or because of overcapacity in the West, or because of rationalization in Western subsidiaries. Only one greenfield company reported that they bought some equipment from a liquidated SOE in Hungary.

#### MOTIVES FOR AND RESTRICTIONS TO MODERNIZATION

From the 21 greenfield companies in our research 19 indicated that they invested in new equipment after their establishment in Hungary. Because of a totally different starting position as compared to privatized companies, one might expect that different motivations play a role in follow-up investments. As figure 5.6 shows, we found similar motives as with foreign privatized companies, but the frequencies of each motive differed. The active investment strategy of most greenfield companies is reflected by the fact that both capacity expansion and the production of new products are important motives for the investment in new equipment. Surprisingly, the improvement of quality and the costs/efficiency argument are mentioned often as well. Tough competition on both domestic and export markets forces the companies to improve the quality of the products and reduce cost constantly. In this respect, they do not differ from any other company in the West.

Figure 5.6 Motives for follow-up investments in foreign greenfield companies<sup>a</sup>



<sup>a</sup> N=19. Managers could give more than one motive. For instance, 42.1% of the managers of foreign greenfield companies that invested in new equipment after establishment indicated that higher quality was an important argument for investment.

Restrictions to follow-up investments were not reported frequently, since most companies made a lot of extra investments. Some managers at greenfield companies indicated that there was no need for technological modernization, since the company was producing with state-of-the-art or international standard equipment already.

#### FUTURE INVESTMENTS

As we already referred to above, a lot of greenfield companies are still in the investment phase. This explains why we found the large share of the companies planning future investments. From the 21 greenfields in our sample, 13 were planning future investments. This can be interpreted in two ways. Either it is an indication of the careful strategy related to higher risks in setting up greenfield plants, or it is an exponent of their positive expectations, which exceeded their initial projections. For another 4 companies future investments depend on the outcome of sales. In this light, it may not come as a surprise that the main motives for future investments are an increase in capacity and the extension of the product range. Moreover, a further improvement of efficiency and product quality is of some importance as well.

#### 5.4.2 Differences: sectors and regions

As we found above when discussing privatized companies, the mechanical engineering sector also takes an exceptional position within greenfield investments, positively and negatively. At the time of establishment almost one-quarter of the production equipment in this

sector was obsolete (table 5.4). At present this share has diminished to 3.3%, making it the 'best' sector according to our mode of assessment.

*Table 5.4* Technological modernization in foreign greenfield companies, by sector and by region

	N	% Obsolete equipment			Current average equipment age
		Foundation	Present	Decrease	
<i>Sector</i>					
Mechanical engineering	6	24.2	3.3	20.8	5.4
Electrical engineering	11	11.8	10.0	1.8	3.6
Food & beverages	4	5.0	5.0	-	6.3
<i>Difference</i>					
Kruskal-Wallis		n.s.	n.s.	n.s.	°
<i>Region</i>					
Center	11	13.2	4.5	8.6	3.9
Northwest	10	15.0	10.0	5.0	5.6
<i>Difference</i>					
Mann-Whitney U		n.s.	n.s.	n.s.	n.s.

But where we found sector-specific reasons at privatized companies, at greenfield companies the low starting level as compared to companies in the other two sectors is caused by two companies which dramatically influence the general average of the six companies in this category. The first is APV UK. They invested already in 1985 by establishing a greenfield joint venture representative office with some smaller independent Hungarian groups, because they did not want to cooperate with an SOE<sup>7</sup>. Local production started in 1988, mainly with very old machines which they got from the British parent company. They had to buy some 'normal' additional equipment to be able to produce at a reasonable level. Therefore, the setting up of the production line in Hungary (before the change of economic systems), has to be seen as a trial project of the British investor. Since then, a lot of additional investments have been made resulting in an average age of equipment of 3-4 years at the time the interview was held. The other company in this category is FISHER-ROSEMOUNT (see also section 5.4.1). Although the manager indicated that at the start of production all machinery was less than one and a half years old, he classified a substantial proportion of this equipment below the international standard. Further investments in new equipment after their foundation has improved the capital stock in these two companies considerably.

Not surprisingly, as for regions, we found no differences between the greenfield companies in our sample.

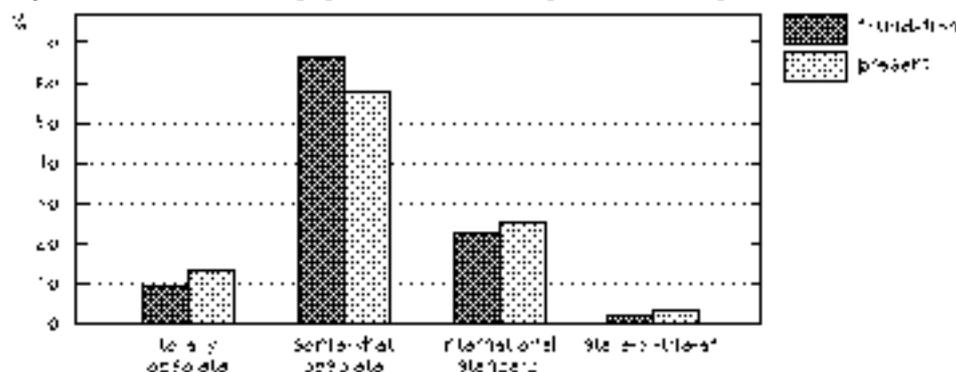
## **5.5 Technological modernization in domestic privatized companies**

### *5.5.1 Technological modernization*

In contrast to both foreign privatized and greenfield companies, the contribution of domestic privatized companies to the modernization of production is extremely modest (figure 5.7). Domestic companies were only able to decrease the share of below international

standard equipment by 4.3 percentage points. At present, 71.6% of production equipment is below international standard. Of this, 58.1% is somewhat obsolete and 13.5% totally obsolete. Not surprisingly, the average age of production equipment is high (14.6 years). These findings do not only indicate that technological modernization at domestic companies is low. It also puts the contribution of foreign privatized companies in sharp relief.

Figure 5.7 Production equipment in domestic privatized companies



Nevertheless, 10 of the 13 domestic companies in our survey reported that they have invested in new equipment after the privatization of the company. This can mean two things: Either the companies have made only limited investments, or their new investments were in obsolete equipment as well. A closer look at figure 5.7 reveals that the first statement is a valid one. The share of somewhat obsolete equipment decreased by 8.2 percentage points. But apparently they were unable to make sufficient investment in new equipment, since the share of totally obsolete equipment increased because of the further aging of some of the obsolete equipment. Therefore, on average, the domestic companies show a slight increase in both international standard equipment and state-of-the-art equipment. But one has to admit that the latter is extremely low compared to foreign privatized companies (2.8% compared to 17.5%).

#### FOLLOW-UP INVESTMENTS: NEW OR USED EQUIPMENT?

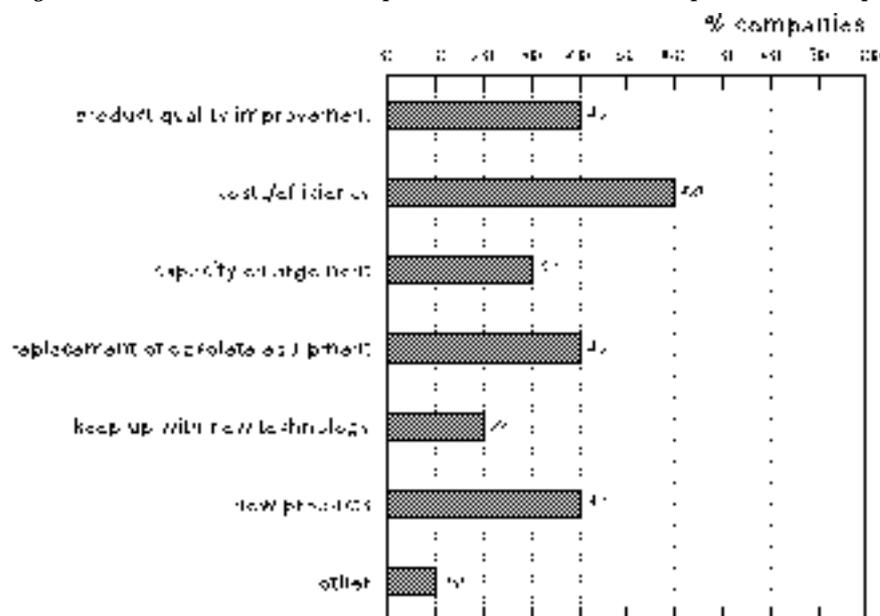
From the 10 domestic companies that have invested in new equipment after the privatization, 5 invested solely in new equipment. In the other 5 companies, follow-up investments were both in new and used machinery. In contrast to foreign companies, domestic companies could not invest in used equipment from their subsidiaries. For 3 domestic companies, the used equipment came from liquidated SOEs. In general the follow-up investments were less modern than at foreign privatized and greenfield companies. Equipment was most often up to international standard and modern compared to other equipment in the subsidiary. This might be another explanation for our finding above that the decrease in obsolete equipment was rather limited, despite the large number of companies that made follow-up investments.

#### MOTIVES FOR AND RESTRICTIONS TO MODERNIZATION

Because investments in technological modernization have turned out to be rather limited, we have to interpret the motives, as presented in figure 5.8, with caution. It would for in-

stance be wrong to conclude that 60% of these companies have achieved a major increase in efficiency and a reduction of costs.

Figure 5.8 Motives for follow-up investments in domestic privatized companies<sup>a</sup>

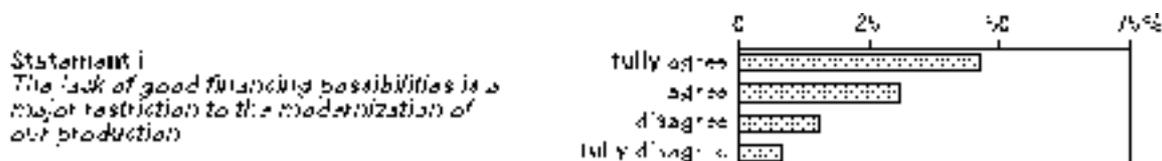


<sup>a</sup> N=10. Managers could give more than one motive. For instance, 40.0% of the managers of domestic privatized companies that invested in new equipment after establishment indicated that higher quality was an important argument for investment.

It would be most appropriate to compare the domestic companies with the foreign privatized companies. Strangely enough, 40% of the managers indicated that the replacement of obsolete equipment was an important motive for follow-up investments. Obviously this concerned only very limited investments, since it is not reflected in a high decrease in obsolete equipment. The introduction of new products was mentioned by managers at domestic companies much more often than at foreign privatized companies. In contrast, improvement of the quality was mentioned by only 40% of the managers at domestic companies as opposed to almost 80% at foreign privatized companies. This might indicate that domestic companies try to outstrip their competitors by a strategy of market diversion, whereas foreign privatized companies focus more on an improvement of the quality of their products.

Concerning the limited technological modernization, there are more restrictions to technological modernization in the case of domestic companies. The main and only restriction cited was the lack of money, which was mentioned by only 4 out of 13 companies. This is, more convincingly, supported by the reaction of managers at domestic companies to the statement: *The lack of good financing possibilities is a major restriction to the modernization of our production.* More than 75% of the managers agreed with this statement, with 46.2% fully agreeing (statement i)<sup>8</sup>. As for the lack of good financing possibilities two different interpretations are valid. For some companies it refers to the high interest rates in Hungary and other unfavorable factors. For other companies it refers to the fact that banks are not willing to give them a loan. However, concerning the latter, one can ask if the cause lies in the banks

or in the companies themselves, whose equipment is for a large part obsolete. From the point of view of financial institutions the medium and long-term profitability of these companies is questionable.



The other interpretation of high interest rates and other unfavorable factors is a valid argument indeed. As opposed to companies with foreign capital participation, domestic companies are generally not able to finance their investments on Western capital markets where interest rates are much lower. One can bring in the argument here that the cause for high interest rates in Hungary is high inflation. But for a company that takes out a loan, this is hardly a mitigating circumstance. With interest rates between 22 and 30% and profit rates on equity of on average 10-12%, it is still far too expensive to finance investments on the Hungarian capital market.

Our emphasis here was on the financial restrictions to technological modernization in domestic companies, partly since this was the only restriction indicated by the managers we spoke to. However, our general impression was that technological modernization in particular, and company restructuring in general was not a high priority in domestic companies. This contrasts with foreign privatized companies where both issues have top priority, as was also indicated by our findings above.

#### *FUTURE INVESTMENTS*

From the 13 domestic companies in our sample, 9 have plans for future investments. The replacement of obsolete equipment was the most important motive for these investments as mentioned by managers at 4 companies. Other factors are capacity expansion (3 companies) and improvement of product quality (2 companies).

Three others have no intention to invest, although for 2 of them the state of equipment requires upgrading with respectively 100% and 80% obsolete equipment. The company with 100% obsolete equipment explained that they have already made the necessary/planned investments in the past, when they bought new and used machines from bankrupt SOEs. However, this did not lead to a decrease in obsolete equipment. According to the manager of the company that produces open and covered stairs for airplanes, it is not necessary to use modern machines since it concerns single-piece production, involving much handwork and general tools. The second company, using 80% obsolete equipment, is not planning future investments since orders are decreasing. Future market developments are also relevant in the case of the domestic company that is still unsure about future investments.

#### *5.5.2 Differences: sectors and regions*

Looking at the technological modernization in domestic companies by sector we found some remarkable differences. In line with findings in foreign privatized companies, the mechanical engineering sector is the worst sector according to our classification: both at the

time operations began and at present around 90% of production equipment is obsolete (table 5.5). Electrical engineering fares slightly better. The present share of obsolete equipment in both sectors is still higher than that of foreign privatized companies at the commencement of their operations (compare table 5.3).

The starting level of the domestic companies in the food and beverages sector is remarkably good. Not only compared to the other sectors, both also compared to the proportion of obsolete equipment in foreign privatized companies at the time of establishment. In fact, of the 3 domestic companies in this sector, only 1 started with a substantial share of obsolete equipment. The other 2 started with only a very limited share of obsolete equipment, for instance, PANNON GABONA in Győr, that produces flour and grain mainly for the Hungarian market. According to the deputy general manager they owe their good starting position to the fact that a lot of investments have been made already before the privatization. The company had a very dynamic management that was able to secure a lot of money from the state budget to invest in new equipment.

*Table 5.5* Technological modernization in domestic privatized companies, by sector and by region

	N	% Obsolete equipment			Current average equipment age
		Foundation	Present	Decrease	
<i>Sector</i>					
Mechanical engineering	6	92.8	89.1	3.7	14.3
Electrical engineering	4	81.3	74.8	6.5	14.0
Food & beverages	3	35.0	32.3	2.7	15.8
<i>Region</i>					
Center	9	87.4	82.1	5.3	14.7
Northwest	4	50.0	48.0	2.0	14.4

Nevertheless, one has to place these findings in perspective. First the number of companies in the food and beverages sector is limited (3). Second the equipment is almost 16 years old, making it older than the ones used in mechanical and electrical engineering.

These two food companies located in the northwest of Hungary are also responsible for regional differences (table 5.5). The four domestic companies we interviewed in the northwest accounted for three companies in the food and beverages sector, which operated a surprisingly low percentage of obsolete equipment<sup>9</sup>. Looking at the average age of equipment, one sees that they are practically the same.

## 5.6 Conclusion

In this concluding section the most important findings in this chapter are:

- Both foreign greenfield and privatized companies contribute to the technological modernization of the Hungarian manufacturing industry in their own specific ways. However, in general, production equipment in greenfield investments was and still is superior to that in privatized companies.

- Foreign privatized companies have done a lot to replace obsolete production equipment in their acquired plants. Most of them take a gradual but steady course in replacing equipment. Some replace all the acquired equipment shortly after the investment with new equipment, so-called brownfield investments. In only a few companies we found only limited technological modernization. These companies are involved in labor-intensive production aimed at outward processing to other subsidiaries in Western Europe.  
Some 90% of the privatized companies are planning to invest more in technological upgrading in the years to come. When modernizing production equipment, foreign privatized companies make use of their international network of subsidiaries extensively. As a result technological modernization often involves already used equipment of accepted international standard.
- Production equipment in greenfield investments set up as a result of an expansion of production capacity is more modern than those in greenfields where the investment in Hungary was the result of a transfer of production capacity from the expensive EU to low-labor-cost Hungary. Here the investment coincides with a physical transfer of production equipment from Western subsidiaries as well, whereas greenfields that involve an expansion of capacity more often use new, state-of-the-art equipment.
- Companies involved in labor-intensive production have invested less in technological modernization because the effects on cost savings are limited due to low labor costs. Thus, investment returns take a long time to materialize. In our survey this mainly goes for companies in mechanical engineering, where handwork is an important element in production.
- There are no regional differences in the extent of technological modernization at foreign companies.
- Domestic privatized companies have seen their position worsen as opposed to foreign companies, because of a higher share of obsolete production equipment than in foreign privatized companies at the start of their operations, and their very limited investments in technological modernization afterwards. Technological modernization at domestic companies is seriously hampered by financial restrictions (that is high interest rates in relation to profit expectations), and (too) high risks for financial institutions, because of the largely outdated production equipment. Besides the impression given was the low propensity of domestic companies to modernize their plants.

## NOTES

<sup>1</sup> In the case of foreign investments this refers to the date the foreign company actually started operations in Hungary (time of entry). In the case of domestic companies this refers to the date the company was actually privatized. The present situation refers to the time the interviews were conducted (February - April 1997).

<sup>2</sup> The other 20% is owned by an Italian company. The management is fully in the hands of UNILEVER.

<sup>3</sup> In this study the development in turnover is not discussed in detail.

<sup>4</sup> See also the example of MTD HUNGARIA below.

<sup>5</sup> That is at the beginning of 1997. OPEL will stop assembling the Astra model in the course of 1999.

<sup>6</sup> The company produces control valves and flow measurement equipment.

<sup>7</sup> 100% foreign ownership was not possible at that time.

<sup>8</sup> For an overview of the reactions to all statements see annex 3.

<sup>9</sup> The food and beverages sector in Budapest is dominated by foreign investors which acquired practically all the SOEs. Therefore it is not surprising that we were not able to find domestic companies in this sector here.