

CHAPTER THREE

THE NICARAGUAN METALWORKING INDUSTRY

INTRODUCTION

Chapter Three outlines pressures and constraints on the Nicaraguan metalworking industry as compared with the manufacturing sector generally. Part One describes the specific circumstances facing metalworking enterprises from 1980 to 1987. Part Two then looks at the interaction between state strategy for reactivating and restructuring this industry and productive adaptation within the five main metalworking firms. The conclusion raises a set of questions to be pursued in the case studies and indicates their relevance for the metalworking industry and manufacturing sector generally.

This chapter is based upon a review of government reports and independent studies, background interviews with state planners and administrators, informal visits to state and private enterprises, and a pilot study of five main metalworking firms.¹ (See Chapter One, Research Method.) Annual figures and evaluation reports compiled by the Ministry of Industry provided the main source of quantitative information for this chapter. Government output figures are at constant 1983 prices and should be interpreted in light of the difficulties involved in calculating output value at constant prices in a period of hyperinflation.² This also applies to sales figures in local currency. These figures indicate output variations and trends, but not the precise magnitude of these changes over time. Import and export figures are in current US dollars and are disaggregated by geographical region.

Five state metalworking firms were selected for the pilot study based on their contribution to sectoral output. Chart 3.1 lists these firms according to product type, while 3.2 provides basic figures on each. In 1986, these firms accounted for 88 per cent of the value of imports, 82 per cent of output value, 70 per cent of exports and about 78 per cent of employment for the state metalworking industry.

Chart 3.1: Nicaragua: Metalworking Industry: Five Firms Selected for the Pilot Study according to Product Type

Reinforcing rods for concrete structures.
INCA^a, METASA^b

Structural components of buildings, bridges, liquid and gas tanks.
METASA, IMEP^c

Wire products and nails.
INCA

Agroindustrial equipment, agricultural trailers and implements.
IMEP, EMEMSA^d, IMPLAGSA^e

- Notes:
- a. National Nail and Barbed Wire Industry, Inc.: *Industria Nacional de Clavos y Alambres de Púas, S.A.*
 - b. Metals and Structures, Inc.: *Metales y Estructuras, S.A.*
 - c. The People's Metallurgy Industry: *Industrias Metalúrgicas del Pueblo.*
 - d. Metalworking Enterprise, Inc.: *Empresa Metal Mecánica, S.A..*
 - e. Agricultural Implements, Inc.: *Implementos Agrícolas, S.A.*

Source: Based on data provided by Nicaragua, Ministry of Industry.

Table 3.2: Nicaragua: Metalworking Industry: Basic Data on Five Firms selected for the Pilot Study, 1986

	Value of Imports ^a	%	Output Value ^b	%	Export Value ^c	%	Employ- ment ^d	%
METASA	8,744	31	210.4	30	723	15	649	28
INCA	13,381	48	270.3	38	2,573	55	652	28
IMEP	1,118	4	42.0	6	0	0	251	11
EMEMSA	1,299	5	39.0	6	0	0	138	6
IMPLAGSA	113	0	11.4	2	0	0	102	5
Sub-total	24,655	88	573.1	82	3,296	70	1,792	78
Total State Sector	27,972	100	700.5	100	4,684	100	2,292	100

Notes: a. Value of imports is in US dollars at current prices (thousands).
b. Output value is in Nicaraguan currency (*córdobas*) at 1983 prices (thousands).
c. Export value is in US dollars at current prices (thousands).
d. Employment figures are for 1985.

Source: Based on data provided by Nicaragua, Ministry of Industry (1986a).

PART ONE: PRESSURES AND CONSTRAINTS ON NICARAGUAN METALWORKING PRODUCTION

1. Nicaraguan Metalworking Industry

Prior to identifying the main pressures and constraints on metalworking enterprises, this section will briefly present background information on this industry and its output and export trends from 1980 to 1987. Thirty-six firms comprised the formal sector of the metalworking industry in 1987.³ Most of these firms had operated prior to 1979, but closed down operations in the final months of the 1978-79 uprising. Some had suffered direct damage during Somoza's bombing of Managua, and many were stripped of working capital when their owners left the country. Following the war, the first main challenge was to reactivate existing production capacity. Between 1979 and 1981, the new government also expropriated those manufacturing units belonging to Somoza and his associates. As a result, seventeen firms comprised the state metalworking sector, among them the five largest firms in the industry.

Output continued to be highly concentrated in a few large firms during the 1980s, as shown in Table 3.3.

Table 3.3: Nicaragua: Metalworking Industry: Size of Firms and their share in Total Annual Output Value*, 1986

Nicaraguan currency (*córdobas*: millions) at 1983 prices

Size	Number of Firms	% of Total Output
Large (Over 35 M C\$)*	5	69
Medium (10 M - 35 M C\$)	12	24
Small (< 10 M C\$)	13	7

Note: * This chart is based upon output figures for 30 firms included in the 1986 Annual Industrial Evaluation. The six firms excluded from this study would be classified as small.

Source: Based on data provided by Nicaragua, Ministry of Industry (1987a).

This largely explains the state sector's predominant share in total output. By 1986, the state sector represented 79 per cent of output value and 98 per cent of exports for the metalworking industry. In contrast, the state represented only 42 per cent of total manufacturing output value by 1987. Investment projects in the establishment of four new state-owned metalworking units were either still under construction or in the initial start-up phase by 1987.

Table 3.4 registers annual output value at constant prices for the manufacturing sector and metalworking industry. From 1980 to 1987, the metalworking industry showed positive output trends, although annual output value varied significantly from year to year. Metalworking output increased in 1981, reflecting efforts to reactivate existing plant across industrial branches in that year. Output then declined in 1982 mainly as a result of the foreign exchange constraint on manufacturing production generally. The metalworking industry recovered fairly rapidly in 1983, thereby showing a better performance than manufacturing generally. Yet it could not sustain these output levels in the following year. Metalworking output fell slightly in 1985 following the US trade embargo. The industry then reached its highest output levels in the 1986-87 period.

Table 3.4: Nicaragua: Manufacturing Sector and Metalworking Industry: Annual Output Value, 1980-1987Nicaraguan currency (*córdobas*: millions) at 1983 prices*

	1980	1981	1982	1983	1984	1985	1986	1987
Metalworking Industry	483	590	568	764	728	722	841	838
Annual % of Change	n.a.	22 %	-4 %	34 %	-5 %	-1 %	16 %	0 %
Index	100	122	118	158	151	150	174	174
Manufacturing Sector	7,860	9,300	8,939	8,714	9,274	8,499	9,282	9,039
Annual % of Change	n.a.	18 %	-4 %	-3 %	6 %	-8 %	9 %	-3 %
Index	100	118	114	111	118	108	118	115

Note: * Calculations are based on three decimal place figures.
n.a. signifies not applicable.

Source: Based on data provided by Nicaragua, Ministry of Economy, Industry and Commerce (1989c).

Table 3.5 records annual output value by industrial branch from 1980 to 1987. With the exception of textiles and clothing, the main industrial branches showed a decline in output in 1982 and 1985 - two years marked by severe import constraints on manufacturing. Metalworking was the only major industry to register its best performance in 1986 and 1987 based on output increases within existing firms.⁴ In contrast, annual output figures in branches such as food, beverages, tobacco and chemicals dropped below 1980 levels.

**Table 3.5: Nicaragua: Manufacturing Sector:
Output Value by Industrial Branch,
1980-1987**

Nicaraguan currency (*córdobas*: millions) at 1983 prices*

Branches	1980	1981	1982	1983	1984	1985	1986	1987
Food, Beverages, Tobacco	4,611	5,700	5,426	4,092	4,629	4,125	4,331	3,979
Annual % of Change		24 %	-5 %	-25 %	13 %	-11 %	5 %	-8 %
Index 1980 = 100	n.a. 100	124	118	89	100	89	94	86
Textiles, Clothing	418	534	701	950	1,065	1,026	1,302	1,342
Annual % of Change	n.a.	28 %	31 %	36 %	12 %	-4 %	27 %	3 %
Index 1980 = 100	100	128	168	228	255	246	312	321
Leather, Shoes	354	440	430	463	404	368	446	391
Annual % of Change	n.a.	24 %	-2 %	8 %	-13 %	-9 %	21 %	-12 %
Index 1980 = 100	100	124	121	131	114	104	126	110
Lumber and Wood Products	n.i.	n.i.	n.i.	242	228	165	164	168
Chemicals	1,018	1,096	882	1,161	1,087	995	979	888
Annual % of Change	n.a.	8 %	-20 %	32 %	-6 %	-8 %	-2 %	-9 %
Index 1980 = 100	100	108	87	114	107	98	96	87
Metalworking	483	590	568	764	728	722	841	838
Annual % of Change	n.a.	22 %	-4 %	34 %	-5 %	-1 %	16 %	0 %
Index 1980 = 100	100	108	118	158	151	150	174	174
Other Branches	933	910	909	1,042	1,133	1,099	1,219	1,434
Annual % of Change	n.a.	-3 %	0 %	15 %	9 %	-3 %	11 %	18 %
Index 1980 = 100	100	97	97	112	121	118	131	154
Total	7,817	9,268	8,916	8,714	9,274	8,499	9,282	9,039
Annual % of Change	n.a.	19 %	-4 %	-2 %	6 %	-8 %	9 %	-3 %
Index 1980 = 100	100	119	114	111	119	109	119	116

Note: * Calculations are based on three decimal place figures.

n.a. signifies not applicable.

n.i. indicates no information available.

Source: Based on data provided by Nicaragua, Ministry of Economy, Industry and Commerce (1989c).

Manufacturing exports declined significantly from 1980 to 1987, as shown in Table 3.6.

Table 3.6: Nicaragua: Manufacturing Sector and Metalworking Industry: Value of Exports, 1980-1987

US dollars (thousands) at current prices*

	1980	1981	1982	1983	1984	1985	1986	1987
Metalworking	6,248	5,196	4,571	8,626	5,926	3,391	4,761	6,058
Annual % of change	n.a.	-17 %	-12 %	89 %	-31 %	-43 %	40 %	27 %
Index (1980 = 100)	100	83	73	138	95	54	76	97
Manufacturing	51,435	51,416	43,571	46,498	48,537	22,442	21,707	22,515
Annual % of change	n.a.	0 %	-15 %	7 %	4 %	-54 %	-3 %	4 %
Index (1980 = 100)	100	100	85	90	94	44	42	44

Note: *Calculations are based on one decimal place figures.
n.a. signifies not applicable.

Source: Based on data provided by Nicaragua, Ministry of Economy, Industry and Commerce (1989c).

The annual value of exports in current prices fell from \$51.4 million in 1980 and 1981 to about \$22 million in the 1985-87 period. Both manufacturing and metalworking export value dropped in 1982 and again in 1985, the same years in which there was a decline in total output value. In 1986 and 1987, the metalworking industry began to regain export markets, while manufacturing exports remained at less than half of 1980 levels in current US dollars.

In 1987, metalworking was the only industrial branch to recover 1980 export levels, as shown in Table 3.7.

Table 3.7: Nicaragua: Manufacturing Sector: Value of Exports by Industrial Branch, 1980-1987

US dollars (millions) at current prices

Branches	1980	1981	1982	1983	1984	1985	1986	1987
Food, Beverage, Tobacco	12.1	13.2	18.9	14.0	20.0	10.0	9.3	8.7
Textiles, Clothing	2.5	1.6	1.2	3.1	3.1	2.5	2.9	1.8
Leather, Shoes	1.8	0.9	0.5	1.4	1.6	0.0	0.0	0.1
Lumber & Wood products	2.6	1.6	1.4	1.7	0.4	0.1	0.1	0.9
Chemicals	22.9	26.0	14.4	16.7	17.3	6.3	4.6	4.3
Metalworking	6.2	5.2	4.6	8.6	5.9	3.4	4.8	6.1
Other Branches	3.2	2.9	2.6	1.0	0.3	0.3	0.1	0.5
Total*	51.4	51.4	43.5	46.5	48.5	22.4	21.7	22.5

Note: * Calculations are based on three decimal place figures.

Source: Based on data provided by Nicaragua, Ministry of Economy, Industry and Commerce (1989c).

However, overall sectoral performance was less impressive than these figures suggest since one firm, INCA, accounted for 79 per cent of metalworking export value in 1987. (This firm contributed 35 per cent of metalworking export value in 1980.) From 1980 to 1987, the metalworking industry represented between 6 and 9 per cent of annual manufacturing output value, while contributing between 10 and 27 per cent of annual manufacturing export value. The following sections describe pressures and constraints on the efforts of state enterprises to maintain, increase and/or diversify output. In this context, we will also consider those factors that influenced firms' propensity to export.

2. Foreign Exchange Shortages, Changes in Supply Networks and Resource Constraints

This section outlines foreign exchange constraints on the Nicaraguan metalworking industry as distinct from the manufacturing sector generally and shows how this industry shifted to new international suppliers in order to overcome these constraints. Likewise, it identifies resource constraints on current production.⁵ The government's annual industrial evaluations (by branch, firm and product) provide a list of numerous external factors affecting manufacturing output negatively, most of which may be classified as resource constraints. Those factors most often cited may be grouped as follows:

- shortages of imported raw materials and inputs;
- numerous problems associated with the age and condition of the existing machinery park;
- lack of spare parts and machinery supplies, leading to downtime and inadequate maintenance procedures; and,
- electricity shut-downs, increasing downtime and damaging machinery parts.

Raw material shortages stemmed partly from the drop in domestic agricultural output. Otherwise the above factors resulted directly from import constraints on manufacturing firms and their domestic suppliers. These reports tend to confirm one of the main premises defined in the analytical framework; foreign exchange shortages (plus the US trade embargo) constituted the main factor determining resource constraints on production. The industrial evaluations also listed numerous problems associated with the reorganisation of supply channels.⁶

Furthermore, both these government reports and enterprise directors pointed to resource constraints rather than export market conditions as the main factor affecting manufacturing export performance from 1982 to 1987. The reasons cited in the industrial evaluations for the decline in exports correspond to those cited to explain the fall in output generally. This

coincides with the findings obtained by Geske Dijkstra in an interview survey of 34 private and state enterprise directors across industrial branches. To explain the decline in exports, most managers pointed to the lack of foreign exchange and subsequent shortages of imported raw materials and inputs.⁷

These shortages persisted despite the government's tendency to give priority to current production objectives when allocating resources. From 1980 to 1987, total foreign exchange available for current manufacturing production was ten times that available for investment. Priority was given to expenditure on imported raw material and inputs to meet immediate demand pressures over expenditure on maintenance and rehabilitation, thereby wearing down installed capacity in many firms. This reflected the nature of external finance available to Nicaragua, as well as the government's policy response to the opportunities and constraints facing this sector.

What was the specific nature of import constraints on metalworking production, and was this industry able to alter its supply channels in response to these constraints? Dependent upon imported raw materials and inputs, the metalworking industry was hit severely by the 1982 foreign exchange crisis. It responded by searching out new suppliers in countries that were extending credit lines to Nicaragua. Prior to 1980, this industry purchased about 80 per cent of its raw materials and inputs from the United States. By 1985, it had diversified its international economic and technical relations and obtained a Soviet credit line to finance steel imports. Therefore, it was less affected by the US trade embargo than other branches of industry.

From 1985 to 1987, the majority of metalworking firms enjoyed more stable raw material supplies than enterprises within those industrial branches that continued to purchase raw materials with convertible currency (such as the chemicals industry) or those that relied on local supplies of agricultural materials (such as the food, beverages, and leather products branches).⁸

Metalworking firms faced a similar situation to that of other manufacturing enterprises in two respects. Foreign exchange constraints on their domestic input suppliers continued to affect production throughout the period under study. Likewise, they faced shortages of imported spare parts, tools and accessories which could only be purchased with convertible currency.

Metalworking was among two industries to receive more foreign exchange for current

production in 1987 than in 1984. Yet in 1987, only 7 per cent of this foreign exchange was in convertible currency, as compared to 53 per cent in 1984. The other main branches of industry saw a reduction both in total foreign exchange allocation and in the share of convertible currency from 1984 to 1987, as shown in Table 3.8. Because of its access to supplier credit lines, the metalworking industry increased its share in total foreign exchange allocation for current manufacturing production from 14 per cent in 1984 to 29 per cent in 1987.

Table 3.8: Nicaragua: Manufacturing Sector: Annual Foreign Exchange Allocations for Current Production by Industrial Branch, Total and Share in Convertible Currency 1984 and 1987

US dollars (millions) at current prices*

Branches	1984			1987		
	Total (a)	Convertible Currency (b)	(b) as % of (a)	Total (c)	Convertible Currency (d)	(d) as % of (c)
Food, Beverages, Tobacco	47.5	12.8	27	13.4	0.8	6
Textiles, Clothing	20.3	5.5	27	18.6	0.8	4
Leather, Shoes	4.2	2.8	67	6.1	0.1	2
Chemicals	35.1	16.9	48	15.7	5.0	31
Metalworking	20.4	10.8	53	28.0	1.9	7
Other Branches	17.9	10.5	59	14.4	1.9	13
Total	145.4	59.3	41	96.2	10.6	11

Note: * Calculations are based on three decimal place figures.

Source: Based on data provided by Nicaragua, Ministry of Industry (1988).

Like manufacturing generally, the metalworking industry shifted mainly to Eastern European suppliers. By 1987, the Soviet Union supplied 62 per cent of the total value of raw material imports to the metalworking industry, while East Germany and Bulgaria provided 10 per cent. In contrast, the industry's main suppliers prior to 1979 now represented only a minor share of imports. Imports from the United States (through third countries) represented less than 1 per

cent, while Japan supplied only 3 per cent.

From 1980 to 1985, metalworking firms purchased machinery and equipment primarily through import packages which were financed through supplier credit lines based on bilateral government arrangements. The metalworking industry obtained guillotine shears, bending presses and universal machine tools through bilateral arrangements between the Nicaraguan government and North Korea, Czechoslovakia and Bulgaria. In 1986-87, the metalworking industry began to import machinery and equipment in the context of more comprehensive technology transfer arrangements related to specific projects in existing firms, as well as the establishment of new production units. In this latter period, East Germany became one of the main machinery and equipment suppliers to this industry.

What resource constraints confronted the five firms under study? Due to the shift to supplier credit lines to finance steel imports, they were able to avoid severe raw material shortages from 1984 to 1987. Yet they faced constant shortages of other inputs that were purchased locally or with convertible currency, including chemical inputs, lubricants, dies and electrical parts, among others. Production was often affected by delays in the purchase of a vital input as firms applied for foreign exchange. Often forklifts were not functioning due to a missing electrical part, thereby obstructing materials transfer. Frequent electricity shut-downs in 1987 both caused downtime and damaged machinery parts. Due to limitations on spare parts imports, these firms had to purchase spare parts on the parallel market or through barter trade with other Central American firms, or rely on in-house spare parts production.

These firms had priority access to machinery and equipment imports based on bilateral government arrangements. Yet they faced constraints on their ability to purchase machinery and equipment that were not included in supplier credit lines. The latter factor led to differences in investment behaviour and in the type of resource constraints facing production sections within the five firms under study. To illustrate these differences, the case studies will focus on equipment production in IMEP and the pipe section in METASA. Equipment production required standard or universal machinery and equipment of the type included in the machinery packages available to Nicaragua through supplier credit lines. In contrast, machinery purchases for METASA's pipe section would have required an additional market search and

negotiations of specific transfers. METASA's pipe section continued to utilise its existing machinery park. The age and condition of its machinery aggravated problems caused by limitations on spare parts imports.

The reorganisation of supply channels had numerous implications for these five firms. Their dependence upon tied credit lines left little room for selection based upon cost and quality. Freight costs were higher due to the distance between Nicaragua and its new suppliers. Raw materials were ordered on an annual basis due to these geographical considerations and the requirements of centralised planning within the supplier countries. This limited each firm's ability to adjust inventories to changing domestic demand conditions and/or export opportunities. In the process of reorganising supply channels, firms often had to place their orders through government institutions that were not familiar with their production process. Finally, they had to adjust to the industrial standards and measurement systems used by their new suppliers.

In sum, the metalworking industry enjoyed a relatively stable supply of raw material imports after 1984 and had access to machinery imports financed through supplier credit lines. The five firms under study were included as part of government development priorities which gave them better access to imports than low priority firms. These firms did confront occasional raw material constraints after 1982; yet they did not face the type of chronic material shortages that plagued several other manufacturers. They were similar to other enterprises in the following respects. They faced constant shortages of inputs that were purchased locally or with convertible currency and came up against numerous problems associated with the reorganisation of supply channels. Furthermore, they could only import machinery and equipment through supplier credit lines. Under these conditions, we would expect their purchasing and investment decisions to reflect adjustments carried out in light of a strict foreign exchange budget in convertible currency and the availability of supplier credit lines. The case studies will examine distinct forms of adaptation given foreign exchange considerations, their impact upon the type of resource constraints confronting each production section, and patterns of daily adjustment to immediate resource constraints.

3. Changing Domestic Demand Conditions

This section sets the context for the case studies of productive adaptation to changing domestic demand conditions. Although the annual industrial evaluations (by branch, firm and product) point to various factors affecting output negatively, they only mention demand constraints in relation to a limited number of products. In most cases, the industrial evaluations report output increases resulting from the growing demand for domestic manufactured products. This section will briefly describe metalworking output by product group prior to considering the main changes in demand conditions facing enterprises.

The Nicaraguan metalworking industry was distinct from both the import substitution consumer goods industries and the capital goods sectors which have formed the basis of debates concerning the role of this sector in economic development. The Nicaraguan metalworking industry played a complementary role, providing basic inputs for construction, agriculture, transport and industry. Likewise, metalworking skills were found in agricultural service shops and industrial maintenance and repair workshops. The metalworking industry included fabricated metal products, machinery and equipment and transport materials.

Metal products constituted the main subgroup, representing over three-quarters of this industry's annual output value at constant prices between 1980 and 1987.⁹ This subgroup consisted mainly of construction inputs such as nails, reinforcing rods, pipes, and structural steel for buildings and industrial installations. Metal products also included water and petrol storage and transport tanks, as well as some items utilised in agriculture such as machetes, grain silos, wire fencing, and barrels used to store agro-chemicals. In the 1980s, the metalworking industry began to fabricate metal products utilised in processing rice and basic grains.

Machinery and equipment's share in annual output value ranged between 11 per cent and 25 per cent from 1980 to 1987. Prior to 1979, this subgroup included mainly household appliances and other electrical products, manufactured in small assembly plants. This activity declined in the 1980s, at the same time that the industry began to develop production capacity in agricultural and agro-industrial equipment. The machinery and equipment subgroup also included electrical control panels, electrodes and car batteries, among other items. However, these products represented a minor share of metalworking output in the 1980s because they

were manufactured from imported materials that could only be purchased with convertible currency. Transport materials accounted for less than 1 per cent of this branch's annual output value during the period under study.

To what extent and how did the government and other customers exert pressure upon enterprises so as to bring about changes in metalworking output? At the branch level, there was inadequate information in this area. There were no available marketing studies for the different product lines within the metalworking industry. Likewise, the state metalworking division did not compile information on market conditions and requirements in terms of price, product quality and delivery dates. In a demand-constrained economy, there is generally ample information in these areas because the survival and growth of enterprises depends upon their ability to increase sales, given demand constraints. Market research is thus crucial to manufacturing performance. In a centrally-planned economy, the government generally compiles information on exchange relations between enterprises because these are organised within the framework of the plan. Exchange relations between Nicaraguan metalworking firms and other enterprises did not occur under either of these circumstances, which partially explains the lack of information on the demand side.

As customer and regulator of economic activity, the Nicaraguan government influenced these exchange relations, but generally did not centralise records of these transactions. We do not have sufficient information at branch level to show the degree and way in which firms came under demand-side pressures. The objective of this section is therefore limited to describing the main changes in marketing channels that occurred in the period under study. This will raise a set of issues to be pursued further in the case studies. We will also briefly consider the relation between domestic demand conditions and export performance.

3.a. Changes in Marketing Channels

To whom did the manufacturing sector and metalworking industry sell their products in the 1980s? The Ministry of Industry kept figures on annual output value by user sector from 1983 to 1987. Basic consumer goods represented between 66 per cent and 68 per cent of

manufacturing output value in these years. The second largest group was industrial inputs, followed by construction sector inputs, and then agricultural inputs. While the latter group increased its share in total manufacturing output value, it still represented only 3.5 per cent in 1987.

Table 3.9 shows metalworking output value by user sector in 1983 and 1987.

Table 3.9: Nicaragua: Metalworking Industry: Output Value by User Sector, 1983 and 1987

Per cent shares*

User Sector	1983	1987
Basic consumer goods	4	1
Agricultural inputs	13	16
Industrial inputs	10	5
Transport inputs	14	14
Construction inputs	57	62
Others	2	2
Total	100	100

Note: * Calculations are based on Nicaraguan currency (*córdobas*) at 1983 prices.

Source: Based on data provided by Nicaragua, Ministry of Industry (1988).

Basic consumer goods represented a small and declining share of total metalworking output value. The construction sector continued to absorb over half of this industry's output value, reflecting partly the demand generated by state investment projects and military construction. Production for the agricultural sector assumed increasing importance as the government attempted to restructure this industry in line with the requirements of agriculture and agro-industry. Transport inputs retained their share in total annual output value, while that of industrial inputs declined from 1983 to 1987. The army purchased construction and transport

inputs produced by metalworking firms, although there were no available figures on the share of metalworking output value sold to the military.

There are no figures at the sectoral or branch level on the share of total output value sold to the state (including distributors, investment projects and production units). Yet government studies point to the state as the main customer of the manufacturing sector and metalworking industry. The state did take over wholesale distribution of some metalworking products, particularly those used in small-scale agriculture. Nevertheless, state distributors played a relatively minor role in the metalworking industry as compared to the basic consumer goods industries. The metalworking division of the People's Industrial Corporation set output targets for its enterprises' main product lines. Yet unless a state agency was in charge of wholesale distribution, the annual plan did not specify to whom enterprises should sell their products.

To whom did the five firms under study sell their products? METASA had always produced for large construction and infrastructure projects. In the 1980s, the state became its main customer, thereby influencing directly the nature of demand pressures on production. INCA's customers varied according to product line. INCA produced reinforcing rods for construction and infrastructure projects, and also sold nail and wire products to hardware stores. In 1984, it began to market wire products to small-scale agriculture through the state distributor of agricultural supplies.¹⁰ IMEP sold its products directly to construction projects and agricultural and agro-industrial production units in both the state and private sector. EMEMSA and IMPLAGSA sold their products to state and private sector agricultural producers. In 1986, IMPLAGSA began to market its products through the state distributor of agricultural machinery and equipment. With the exception of IMPLAGSA, these firms sold a significant share of output to the military sector. The latter required items such as construction inputs and water and petrol storage and transport tanks, traditionally produced by these enterprises.

3.b. Domestic Demand Conditions and Export Performance

The above section cited both government reports and Dijkstra's survey of enterprise directors, showing that resource constraints rather than export market conditions constituted the main

factor affecting export levels from 1982 to 1987. Given resource constraints, the industrial evaluations attributed the loss of the regional market to two additional factors. First, government strategy gave priority to production for the domestic market.¹¹ Second, firms were often unable to guarantee exports in the required quantity and according to quality standards.

These reasons were interrelated. Installed capacity was utilised to maximise output for the domestic market in the face of numerous constraints, often without investment in maintaining, rehabilitating or upgrading the plant. Furthermore, the type of productive adaptations carried out in response to resource constraints often had a negative impact on product quality. This affected firms' ability to meet quality standards and delivery dates, leading their customers in other Central American countries to turn to new suppliers. The inability of firms to meet export requirements reinforced the shift to the domestic market. The above reports do not provide precise information in these areas. For example, they do not indicate the number of export contracts lost and the reasons provided by the customer in each case. Nor was this information available from other government sources. However, these reports do raise important issues which require further research at firm level.

Among the five firms under study, only METASA and INCA sold their products abroad. Together they contributed over half of total annual metalworking export value in every year except 1981. From 1980 to 1987, exports represented a declining share of total annual output (measured in metric tons) within these two firms. Both INCA and METASA provide a good context in which to analyse the relation between domestic demand conditions, productive adaptation and export performance.

4. Financial Conditions in Local Currency

What specific circumstances affected the financial situation of metalworking firms as distinct from other industries? The metalworking industry processed imported raw materials purchased at low cost due to an overvalued local currency. This held down direct costs within metalworking firms, leaving them in a favourable position relative to other manufacturing enterprises which processed domestic raw materials. However, metalworking firms did

purchase other inputs, spare parts and accessories on the domestic market whose prices were affected by high inflation rates.

Metalworking firms differed from basic consumer goods producers insofar as they did not face strict government control on product prices. Metalworking firms based product prices on costs plus a profit margin set by the government, and had to justify their prices for standard products accordingly. The government regulated the prices of some standard metal products because of their direct impact upon domestic construction costs, and thus inflation rates. It did not review prices on custom-ordered items or contracts.

Profit margins did differ between those manufacturing firms facing low state-controlled prices and those that could either set their own prices or negotiate favourably with the government and/or customers. To some extent, profit margins determined firms' ability to purchase spare parts and other items on the domestic market at the parallel or illegal exchange rate. This affected the degree of flexibility with which they could respond to a wide range of production and maintenance problems. Furthermore, those firms showing higher profits could offer more favourable social benefits, thereby placing them in a better position to compete for skilled workers in a period of labour shortages. Otherwise, access to imports rather than profits in local currency determined firms' ability to increase production and invest during the period under study.

Four of the five firms under study showed profits after 1982. These firms raised product prices in response to devaluation, periodic government-authorized wage increases, and rising costs on items purchased locally. They were generally able to adjust product prices according to increases in input costs without losing the domestic market for their products. However, these firms did face liquidity problems immediately following a devaluation or wage increase which persisted until product prices could be adjusted. From 1984 to 1987, their accounting offices were primarily concerned with calculating the effect of inflation on each cost item so as to reflect this accurately in product prices. These calculations were available to the customer in the case of price adjustments on contracts or custom-ordered items, and were presented to the state metalworking division in the case of standard products.

The state metalworking division attempted to improve accounting procedures in these firms,

particularly in the 1985-87 period. The objective was to provide better financial indicators by which to guide decision-making and evaluate plant performance. Yet even improved company accounts could not fulfil this objective in a period of hyperinflation. Finally, the government introduced a series of export promotion schemes to compensate for official exchange rates which held down export prices in local currency. INCA and METASA's directors did mention export prices among the factors affecting their decision to export or sell their products locally. However, when explaining the decline in exports, they gave less importance to this factor than to resource constraints and pressures to meet domestic contracts.

Differences in investment behaviour among the five firms cannot be explained in terms of each firm's financial situation in local currency. All five firms had access to credit from state banks at negative interest rates and the costs of imported machinery and equipment remained low in local currency due to exchange rate policy. There was an incentive to invest profits immediately as interest rates on savings trailed behind inflation rates. These firms did invest when given the opportunity to import machinery and equipment through supplier credit lines. They did not carry out pre-investment studies or attempt to calculate the profitability of investment in new machinery and equipment.

Enterprise directors stated that their annual earnings did not include the real depreciation costs of machinery and equipment due to the government's refusal to revalue equipment in the inflationary period. They argued that this led to higher taxes and could curb their ability to replace machinery and equipment in the future. Government policy in this area further blocked any attempt to evaluate the efficiency with which an investment was carried out based on financial indicators in local currency.

In sum, differences in profit margins among manufacturing enterprises stemmed partly from government exchange rate and price policies. The main metalworking firms purchased raw materials at the official exchange rate and did not face strict government controls on product prices, thereby leaving them in a favourable position relative to other manufacturing enterprises. These factors are considered in Chapter Four's account of the effects of inflation on IMEP and METASA's operations. However, this study is primarily concerned with the relation between the soft budget constraint on enterprises and the nature of productive adaptation.

Metalworking firms were similar to the majority of other manufacturing enterprises insofar as they did not face strict financial constraints in local currency on their ability to increase production and invest from 1980 to 1987. The case studies will analyse how this soft budget constraint, combined with high inflation rates, affected firm-level adjustment processes. We will consider the extent of price-enforced adaptation, although this was unlikely to constitute a predominant form of adjustment. The case studies will then examine how these financial conditions influenced the way in which firms adjusted to severe resource constraints and changing demand conditions.

Part One has outlined pressures and constraints on the metalworking industry as compared with the manufacturing sector generally. It has focused particularly upon the five main metalworking firms which enjoyed priority status within state strategy for this industry. Part Two will now show how this strategy built from and influenced productive adaptation in these five enterprises.

PART TWO: STATE STRATEGY AND PRODUCTIVE ADAPTATION IN FIVE MAIN METALWORKING FIRMS

Chapter Two described government industrial development strategy which established priorities between different branches of industry. Each industrial division in turn outlined its strategy, thereby setting priorities between different product lines. State strategy for the metalworking industry gave priority to the production of spare parts and intermediate goods for key sectors within the domestic economy and also called for the construction of agricultural and agro-industrial equipment. It emphasised the development of the country's technical infrastructure in areas such as casting, forging, machining and heat treatment. This strategy required both investment in the establishment of new manufacturing units and effective productive adaptation within existing firms. The government promoted this strategy on the supply side, providing priority firms with privileged access to imported inputs, machinery and/or technical assistance. This sectoral policy environment remained in constant interaction with firm-level adjustment processes, as demonstrated in the following account of four main programmes designed to

advance state strategy for this industry.

1. Entry into Equipment Production

Entry into equipment production was based on the restructuring and expansion of production capacity in IMEP, IMPLAGSA and EMEMSA. All three firms came under state administration in the early 1980s. Established in 1972, IMEP began as a small-scale producer of water tanks, angles, beams, and structures for the domestic construction sector. During the 1980s, IMEP diversified into agro-industrial equipment construction, while continuing to fabricate structures and tanks. EMEMSA was established in 1976 by local private capital. In 1982, the Ministry of Industry gave priority to reactivating and developing this firm as part of its strategy for entry into agricultural equipment production. EMEMSA produced trailers for transporting Nicaragua's main agricultural crops, as well as multi-use trailers and other products.

Initially, IMPLAGSA was a small workshop which repaired and reconstructed agricultural implements. It began to construct its own agricultural implements in 1976 based on the assembly of imported components from Columbia. Production was small-scale; in 1976, IMPLAGSA assembled only 140 units. Following the 1978-79 war, the firm was reactivated as a service workshop and gradually began to produce a variety of implements based on customer orders. In 1985, it narrowed its product range to four implements (plows, harrows, cultivators and sowers) and began small batch production, increasing output to 420 units in 1986. In 1987, IMPLAGSA initiated an investment project with the aim of broadening its product range to fourteen implements and increasing output to 2,000 units annually. Initially 10 per cent of the equipment would be produced locally and this would increase to 80 per cent over a five-year period.

State investment projects in casting, machining and heat treatment were designed to facilitate parts production for agricultural equipment. Likewise, the government's technological development strategy called for the introduction of mechanical design, standards, metallurgy and materials- and prototype-testing to accompany entry into equipment production in IMEP,

EMEMSA and IMPLAGSA.¹² These firms had priority access to both machinery imports and foreign technical assistance. In 1987, IMPLAGSA and the Ministry of Industry negotiated a technology transfer package with East German suppliers, including a comprehensive training programme for workers, technical staff and engineers. In the same year, IMEP participated in international technology transfers in the area of heat treatment, as well as product design.

The metalworking industry attempted to channel demand-oriented adaptation in these firms into a strategy for technological development. Agricultural equipment still represented a minor share of this industry's output value by 1987. Yet by mobilising existing equipment-building skills, these firms were able to solve some of the immediate problems confronting other production units due to import constraints. This constituted the first step in restructuring the metalworking industry in line with the requirements of agriculture and agro-industry. Entry into equipment production could also potentially contribute to skill formation, thereby providing qualified personnel to other branches of industry.

2. Reactivation of the Major Firms Developed under the Central American Common Market

The metalworking firms that evolved under the Central American Common Market were designed originally to operate in a fairly stable production environment. Raw materials, inputs, spare parts, tools and accessories could be purchased at short notice from US companies. Their operations consisted of the limited processing of imported inputs for the domestic market and Central America. While access to a protected regional market promoted the expansion of the metalworking sector, it did not stimulate technological development. Most of these firms had been established on the basis of second-hand machinery and received few foreign technology inputs prior to 1979. By 1980, their machinery was on average fifteen to twenty years old. Output in this industry was highly concentrated, with INCA and METASA accounting for 27 per cent in 1977.¹³

Founded in 1958 and 1964 respectively, METASA and INCA were the country's first two metalworking firms to be established on an industrial scale. METASA manufactured pipes,

angles and beams based on cold roll forming and galvanization processes. Organised on a workshop basis, another section within METASA fabricated structural steel for buildings and industrial installations. INCA's main plant processed imported wire rods and included wire drawing, galvanization and a series of specialised machines used in manufacturing nails, staples, fencing and barbed wire. Both firms also included an iron rod mill.¹⁴ METASA and INCA continued to manufacture the same product mix in the 1980s.

The government gave priority to reactivating these two enterprises in the 1980s under pressure to complete major state construction and infrastructure projects. INCA also faced a growing demand for wire products utilised by agricultural producers. METASA and INCA became priority firms because their existing installed capacity could be utilised to meet current production objectives. They therefore received privileged access to imported raw materials and technical assistance. However, they were not targeted for major investments in new plant. Although they imported some new machinery as part of larger import packages to the metalworking industry, their main production sections continued to operate with obsolete equipment.

In METASA's cold roll forming and galvanization processes, INCA's wire drawing and galvanization sections, and each firm's rod mill, the machinery and equipment were organised in a line layout according to their intervention in the production of a set of standard products. Interruptions in input supplies and machinery-related problems could bring the entire plant to a halt. The speed with which these problems were resolved affected output levels significantly. State strategy for reactivating these enterprises relied upon their capacity to adapt to constant resource constraints.

By reactivating these firms, the state sector retained the operating experience and knowledge which INCA and METASA had accumulated in previous years. Together these two firms represented 56 per cent of employment in 1985 and 68 per cent of annual output value in 1986 for the state metalworking sector. They also contributed to the industry's efforts to recover export markets in 1986 and 1987, together representing 70 per cent and 50 per cent of state metalworking exports in these two years respectively.

3. Entry into Spare Parts Production

INCA and METASA began to fabricate spare parts for their own machinery in 1981. In subsequent years, they imported machine tools for their maintenance sections to improve spare-parts production capacity. By 1986, INCA produced approximately 40 per cent of spare parts for its plant. METASA also relied increasingly upon its maintenance section to supply replacement parts. Throughout industry, maintenance workers began to produce spare parts in the early 1980s as both the foreign exchange constraint and the age of the machinery limited firms' ability to acquire replacement parts. In most cases, spare parts were produced by copying the damaged imported part. There was neither the available raw materials nor the production capacity to produce a stock of spare parts for the plant. While firms shifted to in-house spare-parts production throughout industry, the government took specific steps to promote the development of spare-parts production capacity in the metalworking industry. Steps were taken to develop technical processes such as casting, machining and heat treatment.¹⁵

Casting processes were limited to six small artisan foundries which cast iron and non-ferrous metal parts for the agricultural sectors and railways. In addition to providing technical assistance to these foundries, the government drew up investment plans for a steel foundry financed by Cuba which was designed to cast steel parts from scrap metal. It also initiated investment in the establishment of a central maintenance workshop, funded by Bulgaria and located alongside the foundry, with the objective of producing replacement parts for all types of machinery. In 1987, the foundry was still under construction. The central maintenance workshop was completing the construction phase and had begun to install its machinery.

At the same time, the Ministry of Industry and the People's Industrial Corporation promoted the development of machining processes in other ways. Through machinery import packages based on bilateral government arrangements, the major metalworking firms imported machine tools to strengthen spare-parts production capacity within their maintenance sections from 1980 to 1985. Yet this was not accompanied by a parallel programme for developing technological capacity in spare-parts production. Immediately following the US trade embargo,

the government outlined a more comprehensive spare-parts production programme coordinated by the state metalworking division.

In its initial stages, this programme carried out an inventory of spare-parts production capacity in small workshops and maintenance sections across various branches of industry. Its eventual goal was to provide technical assistance in areas such as design, quality control, material testing, tolerances and finishing. Likewise, it set out to identify production units which could serve as centres for technological development in spare-parts production, in turn providing technical assistance to other workshops in their geographical area and branch of industry. The spare-parts programme attempted to co-ordinate the above activities with the worker innovators' movement.

The metalworking industry also set out to develop capacity in agricultural and agro-industrial equipment-parts production. IMPLAGSA's future plans to raise output significantly would depend partly upon the opening of the new foundry, which was to cast some of the parts for its four standard implements. IMEP, IMPLAGSA and EMEMSA imported machine tools for equipment-parts production during the period under study. Heat treatment processes still did not exist on an industrial scale in Nicaragua. IMEP had obtained a small oven to facilitate agricultural equipment-parts production. In 1987, this firm constructed a separate heat treatment plant and imported four large ovens from East Germany. The state metalworking division included IMEP among its selection of firms to become centres for technological development in parts production.

Under the circumstances prevailing in the 1980s, Nicaragua needed to develop spare-parts production capacity in order to operate INCA and METASA and several other major manufacturing enterprises developed under the Central American Common Market. Casting, machining and heat treatment processes were also required to facilitate agricultural and agro-industrial equipment production within IMEP, IMPLAGSA and EMEMSA. The five firms under study took initial steps towards developing parts production capacity during the period under study. INCA and METASA began to fabricate spare parts for their own machinery as a form of forced substitution in the face of severe import constraints. IMEP, IMPLAGSA, and EMEMSA initiated equipment-parts production while attempting to meet customer demand,

despite local supply problems.

4. The Rationalisation Programme

In 1982, the Ministry of Industry began to implement the Rationalisation Programme, which aimed to save foreign exchange and achieve a more efficient use of resources generally. Diverse initiatives came from shop-floor employees, engineering staff, management, and the different branch divisions of the People's Industrial Corporation. Government planners then promoted these measures by including them in annual planning and evaluation procedures.¹⁶

The main measures carried out in the area of input usage may be classified as follows:

- the reduction of the import content per unit of output through material-saving changes and/or the substitution of local raw materials and inputs for imported ones;
- a reduction in material wastage during the production process;
- the use of by-products previously treated as waste materials;
- in-house spare-parts production to replace imported parts; and,
- changes in packaging materials.

For example, the textile industry reduced its usage of imported polyester and nylon in the production of fabric and socks respectively. The beverages industry began to produce soda flavours to substitute for formerly imported ones. A tobacco company developed a new kind of filter from the stem of the tobacco plant to replace imported cellulose filters. Bottling plants significantly lowered the number of breakages, thereby reducing material wastage. A number of firms across industrial branches began to produce spare parts which were formerly imported. The food and beverages industry altered the packaging of its products, replacing imported cellophane wrapping with locally-produced plastic. The industrial evaluations describe several other cases of adaptation in the area of input usage. Yet they do not provide any way of

measuring the extent to which these changes occurred throughout industry, and their results in terms of overall foreign exchange savings or other indicators.

The Rationalisation Programme also included changes in output composition aimed at foreign exchange savings and the adjustment of output to available inputs. The types of changes in output composition varied between firms and may be classified as follows:

- the suspension or reduction of product lines with a high import content;
- the switch from a broad product line to low-cost, high-volume items made of more local raw materials; and
- diversification into new product lines to substitute for formerly imported items.

For example, the beverages industry suspended the production of fruit juices using imported concentrates. The textile and clothing industry reduced the variety of its output mix so as to reduce its import content. These initiatives were not limited to Nicaraguan enterprises. Austin and Ickis found that five multinational companies that once manufactured a broad product line in Nicaragua switched to low-cost, high-volume items made of more local raw materials. As a result, these companies had higher inventory turnover and reduced dependence on government foreign exchange allocations.¹⁷

INCA and METASA participated in this programme by shifting to in-house spare-parts production, reducing material wastage, and using by-products previously treated as waste materials. IMEP, EMEMSA and IMPLAGSA contributed to this programme by introducing new products to replace formerly-imported items. These initiatives were significant insofar as they occurred throughout industry and represented foreign exchange savings for the country. The industrial evaluations described numerous measures carried out by enterprises across industrial branches, but did not provide precise figures on total foreign exchange savings.

Part Two described four programmes designed to advance state strategy for the metalworking industry, each of which was tied to firm-level adjustment processes. Entry into equipment production built upon processes of demand-oriented adaptation underway in three enterprises, while spare-parts production began as a form of forced substitution in several manufacturing

firms. The Rationalisation Programme promoted shop-floor initiatives aimed at saving foreign exchange, while the reactivation of the major metalworking firms relied upon ongoing processes of adaptation to resource constraints.

SUMMARY AND CONCLUSION

Chapter Three has highlighted specific pressures and constraints facing metalworking enterprises and has underlined the interaction between state strategy and firm-level adjustment processes. These findings raise a set of questions regarding productive adaptation and indicate their relevance for the metalworking industry and manufacturing sector generally. Highly dependent upon imported inputs and machinery, the metalworking industry shifted to new international suppliers who were extending credit lines to Nicaragua. Nevertheless, it continued to face severe shortages of convertible currency. Resource constraints constituted the main factor affecting metalworking output and export performance. In most cases, resource constraints stemmed directly from foreign exchange constraints on firms and their domestic suppliers, thereby confirming one of the main premises defined in the analytical framework.

IMEP and METASA were selected for the case studies because they illustrate contrasting patterns of investment generated by these supply conditions. Likewise, they faced constant shortages of inputs purchased locally or with convertible currency, despite their access to imported raw materials. We would thus expect production performance to depend upon ongoing processes of adjustment in input usage and/or output mix to overcome current constraints. On the supply side, the case studies will pursue three questions crucial to metalworking and manufacturing performance in the 1980s. First, to what degree and how did their investment and purchasing decisions constitute a form of adaptation given foreign exchange considerations? Second, how did these decisions affect the type of resource constraints confronting each production section? Third, what were the main forms and patterns of daily adjustment to immediate resource constraints? By pursuing these questions, the case studies will provide direct feedback to state industrial policies and planning procedures implemented on the supply side.

With few exceptions, the main metalworking firms established direct relations with their customers in the construction, agriculture and transport sectors, as well as the military. Public investment projects, import constraints and war conditions influenced the demand for domestic metalworking products. The main metalworking firms received privileged access to imported resources because they supplied inputs to priority sectors designated in the government's economic development strategy. How did government economic policies and purchasing decisions influence exchange relations and, thus, the degree and nature of demand-oriented adaptation? How did the nature of adaptation to changing domestic demand conditions affect export performance? These questions were decisive to economic strategy and particularly the role played by the metalworking industry.

Like other manufacturing units, the five main metalworking firms did not face strict financial constraints in local currency on their ability to increase production and invest. Differences in profit margins among enterprises reflected government foreign exchange and price policies in the inflationary period more than production performance. How did this soft budget constraint, combined with high inflation rates, influence the way in which firms adjusted to other external conditions? The case studies will consider their room to manoeuvre in adjusting to severe resource constraints and changing demand conditions, as well as limitations associated with these adjustment processes.

Finally, the effectiveness of state strategy for the metalworking industry depended significantly upon firm-level adjustment processes which were influenced by the government in its diverse roles as industrial planner, customer and regulator of economic activity. This lends further significance to one of two main questions guiding this thesis. How did external pressures and constraints combine to generate specific forms of productive adaptation within Nicaraguan state metalworking firms from 1980 to 1987? Building upon the findings presented in Chapter Three, the case studies will now apply this question to those processes of productive adaptation potentially most significant for the metalworking industry.

NOTES

¹ Government reports included Nicaragua, Ministry of Economy, Industry and Commerce (1989a, 1989b, 1989c); Nicaragua, Ministry of Industry (1985a, 1985b, 1986a, 1986b, 1987a, 1987b, 1988); Nicaragua, Ministry of Planning (1980, 1981, 1983, 1984); and Nicaragua, Planning and Budget Secretariat (1985, 1986a, 1986b).

Also see Ahlers and Nolff (1981); Austin and Ickis (1986); Brundenius (1987); Castillo (1987, 1989); Dijkstra (1988); Gustafsson (1983); Harris (1985); and Jenkins (1988).

² Government figures use 1983 as a base year because this is the first year in which the Ministry of Industry kept comprehensive figures on enterprises. There were problems involved in calculating the value of products introduced after 1983. In the metalworking division, state planners were familiar with each firm due to the small size of the industry. This contributed to the relative reliability of figures provided by these firms.

³ In this context, 'formal sector' refers to firms with over five workers. Figures for the metalworking industry were based on these thirty-six firms. There were also numerous small workshops with one to five workers which were not included within this study.

⁴ The textile and clothing industry also showed its best performance in 1986-87. Yet this was based on investment in new production units.

⁵ This study distinguishes between foreign exchange and resource constraints. The former applies to firms' purchasing and investment decisions, while the latter refers to immediate constraints of a physical or technical nature encountered in the course of production. (See Chapter One, Analytical Framework.)

⁶ The industrial evaluations also mention supply problems and high labour turnover rates in the 1984-87 period, as discussed in Chapter Five.

The above industrial evaluations may be biased to some degree because they were based upon enterprise reports to the state metalworking division which was responsible for foreign exchange allocations to firms. For additional evidence, see Dijkstra, 1988, p.236-242, for results of interview survey of thirty-four private and state enterprise directors across industrial branches on production performance from 1980 to 1984. This survey covered almost a quarter of the number of industrial enterprises with over thirty workers. When asked why they operated below full capacity, enterprise directors provided a similar list of resource constraints. See Jenkins, 1988, p.61-63, for an account of these resource constraints on capacity utilisation in textile firms which were already constrained by obsolete machinery.

⁷ Dijkstra (1988), p.244-246. This survey only covered the 1980-84 period.

⁸ The main metalworking firms processed steel which was included in supplier credit lines. In contrast, those metalworking firms utilising imported glass or aluminium continued to face severe raw material shortages throughout the period under study.

⁹ Nicaragua, Ministry of Economy, Industry and Commerce (1989a), statistical appendix, for figures on the share of each subgroup in annual output value.

¹⁰ In 1984, INCA reduced the number of its customers for nail and wire products to 25 per cent of former levels by limiting its customers to only large hardware stores and selling 100 per cent of wire products to the state distributor of agricultural supplies.

¹¹ In Dijkstra's survey, several directors also indicated that they had reduced exports from 1980 to 1984

because they were supplying relatively more to the domestic market. Dijkstra (1988), p.244-246.

¹² See Nicaragua, Ministry of Industry (1987a), p.58-85.

¹³ Ahlers and Nolff (1981), p.9, for figures on INCA's and METASA's share in total metalworking output in 1977.

¹⁴ In 1973, INCA installed a rod mill with the aim of producing wire rods, thereby substituting for imports of its main inputs. When this did not prove feasible, it initiated production of reinforcing rods for concrete structures.

¹⁵ See Nicaragua, Ministry of Industry, (1987a), p.58-65, for a description of casting, machining and heat treatment processes as of 1987, and the state metalworking division's plans for their development.

¹⁶ These measures were not implemented through planning indices. Rather the annual plans merely described the type of measures to be carried out. Often firms developed their own initiatives which were later acknowledged in the industrial evaluations. In some cases, industrial planners linked foreign exchange allocation to the implementation of specific measures.

¹⁷ Austin and Ickis (1986), p.105-106.