

Metallurgical Kombinat Smederevo 1960–1990: A Case Study in the Economic Decline of Yugoslavia

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IN THE 1970S A NEW INTEGRATED flat-product iron and steel enterprise, Metallurgical Kombinat Smederevo (MKS), began to take shape on the flat-lands south-east of the town of Smederevo in Serbia. Conceived on an ambitious scale, the new steelworks, together with older facilities in the town, grew to employ (at its 1987 peak) 11 153 workers. However, it ran huge financial deficits as soon as it started producing, its productivity was abysmal, and its expansion plans saddled the Republic of Serbia (as guarantor) with unmanageable foreign debts. This study enquires why MKS, 'the sick man of the Danube', under-performed. It also explains why, despite its inefficiency, MKS became a leading export enterprise in the 1980s, and examines the implications of this. How did Yugoslavia, and in particular Serbia, bear so great a burden, and why was MKS ring-fenced from painful rationalisation? Some causes of its difficulties lay outside the control of the enterprise, and led to deep irrationality in resource allocation, but others could ultimately be traced to deep-rooted mismanagement within it.

In taking this single enterprise for study I aimed to explore the sources of decay which slowly undermined the economic system of socialist Yugoslavia. My research on Yugoslav enterprise history convinced me that macroeconomic performance was fundamentally conditioned by enterprise difficulties and strategies, and that only by studying how enterprises worked in practice (rather than in theory) can we make sense of what happened to the economy as a whole.

The experience of MKS parallels that of Yugoslavia's industrial economy: it started small and inefficient, but it expanded rapidly and productivity gradually improved. From the later 1960s plans became ever more ambitious, but the price paid for inefficiency mounted alarmingly. By the 1980s, the costs of industrial expansion policies reached crippling proportions—and contributed significantly to the deepening economic crisis which preceded the political upheaval of 1990–91.

This approach—the study of 'business' history and inference from enterprise experience on the development problems of the economy—differs from the customary Western analyses of the Yugoslav economy over the years 1945–90. These tend to adopt a top-down policy-orientated approach,¹ which more or less follows the macroeconomic framework adopted by Yugoslav writers. Enterprise history was never deemed in Yugoslavia an appropriate subject for historical investigation, so no enterprise studies were written—except in coffee-table format, to celebrate anniversaries.

saries. Enterprises were studied only within the theoretical context of workers' self-management, and in Adizes' well-known self-management analysis the identity of the firms studied was studiously concealed.² Distaste for public discussion of internal problems of enterprises was illustrated by the decision in 1988 to authorise consultants to evaluate the development programme of MKS, subject of the present study. The consultants were ordered to confine research to 'the stand-point of the economic needs of the republic', and not 'micro-economically from the stand-point of MKS'³—as if this detail were irrelevant to the interests of the wider community. A later restructuring study on the Yugoslav steel industry by British Steel Consultants (BISCOS) similarly confined itself to analysing projected steel demand and changes taking place in the economic system.⁴

In starting down this research road, I selected as case studies enterprises whose experience left strong traces in the public domain. So I concentrated on what were by Yugoslav standards very big firms. One of these was the car maker Crvena Zastava.⁵ Its business experience was frankly disastrous—as also was that of MKS. Confining this review to Serbia, a similarly negative appraisal could probably be made of such loss-making and heavily indebted enterprises as JAT, the flag-carrier airline, EI-Niš (electronics), Zorka-Šabac (metals and chemicals), RTB-Bor (non-ferrous metals) and HI-Prahovo (chemicals). Privileged firms like these cannot have been wholly representative of the performance of the mass of industry: if they had been, the system would have collapsed long before it did. These juggernauts consistently underperformed but their incapacities were no bar to their receiving massive investment allocations. The objectives framed for them were intensely politicised, partly because the system treated them as the prime bearers of technological advance, partly because of powerful vested interests in their expansion. Most smaller firms (except in engineering) after a fashion paid their way, though evidence on Zastava's component supplier Ramiz Sadiku in Kosovo⁶ shows that even they were not immune to the shortcomings of the industrial giants.

Growth theories fashionable among planners in the 1950s and 1960s attached peculiar importance to engineering and machine building. These industries were argued to be vital to the development process because they were the carriers of technological change. The pursuit of this logic caused the authorities in Serbia (especially) to promote the abnormal growth of metal processing. Thus in 'narrow' Serbia⁷ by 1988 mining, metallurgy, engineering and machine building, much of it unspecialised, accounted for 47% of industrial output.⁸ The policy was defective. Lacking world-class design capacity or a market which enabled them to specialise sufficiently, the metal fabricators were 'generally producers of everything and anything and at an expressly low technological level'.⁹ This was precisely the result of promoting capital goods industries in underdeveloped countries forecast by Rosenberg.¹⁰

The build-up of these industries, however ill-advised, rapidly expanded domestic demand for steel. It was therefore rational for Yugoslavia to develop its steel industry. Scale economies favoured its concentration in Bosnia. Here, uniquely in Yugoslavia, there existed an appropriate raw material and energy base, and a long-established iron and steel complex (at Zenica). There was less justification, however, in setting up integrated steel-making capacity in Serbia itself, since Serbia was poorly endowed

with iron ore and coking coal. However, Serbia's communist politicians always justified expenditure on the MKS project by arguing that Serbia needed an integrated steelworks to hold down the burgeoning bill for imports (which came to include supplies from other Yugoslav republics).

Import substitution, when transferred to a Serbian frame of reference, was not the real reason for insisting that Serbia got its own integrated steelworks. The possession of an integrated steel combine—above all, the blast furnace—symbolised the triumph of self-sufficient industrialising ideology. As in the Soviet Union, and in the bloc—for example in Bulgaria¹¹—this symbolism caused all the Yugoslav republics to build steel combines. Underdeveloped Macedonia and Montenegro built integrated plants disproportionate to their own modest needs at Nikšić and Skopje. Even Kosovo hankered after a steelworks of its own¹² (but did not get one). A case could be made for developing downstream capacity in Serbia to supply its metal fabricators, but Serbia gave priority to building the upstream elements, mining, smelting and steel refining, for whose outputs there was no local demand, not rolling mills for whose products there was. As a totem of pride in industrialisation, the MKS project was peculiarly favoured by the Serbian authorities. The federation took a cooler interest in the steel-making ambitions of the individual republics and after financing 65% of the MKS start-up fund, left Serbia to pick up future bills. This was to cause perennial financing problems.

Planning and integrated steel-mill development

The Smederevo steel complex originated in the formation of a company called SARTID in 1913 for ore exploitation and iron working. In 1921 it began building an iron construction and waggon repair factory, with a foundry and rolling mills on site at this Danube port.¹³ In 1937 it added an open hearth steel furnace.¹⁴ It did not acquire smelting capacity. It was nationalised in 1946, then slowly expanded during the 1950s, so raw steel output rose from 40 500 tons in 1951 to 79 790 tons in 1961.¹⁵ Most of this steel was cast or rolled into constructional sections.

The site was too cramped to allow much expansion, so in 1960 plans began to be drawn up for a new million ton (magic figure!) integrated steelworks on a green-field site at Radinac village, 9 km from Smederevo. Local pyrites ore supplies were to be enriched, sintered and smelted to raw iron in an electrical reduction furnace.¹⁶ This would exploit Serbia's relative abundance of brown coal, compensating for its deficiency in coking coal. (This technology was applied in Macedonia at Skopje, but failed as 'a competitive solution' there.¹⁷) Project design was entrusted to a 'foreign' firm, presumably Italian, since the smelting equipment was planned to come from Italy. The Yugoslav Federal Executive Council gave the project the go-ahead at the end of 1961,¹⁸ but the original funding arrangement provided only for the Phase 1 completion of plant to produce 300 000 tons of raw steel and 220 000 tons of rolled flat products.

However, in 1963 the contract was placed instead with Soviet suppliers who tore up the original project and imposed their own plans for a steelworks with a conventional Soviet-designed blast furnace (again with a million tons capacity) and integrated facilities in proportion. The Soviet plan was adopted in outline in 1965, but

to contain costs the Yugoslav Federal Investment Bank again insisted on building in phases. Even before Soviet re-planning, it was originally intended to start by building the smelter and an iron mine.¹⁹ These facilities retained their priority. In May 1964 construction started,²⁰ 65 000 tons of equipment were bought, mostly on credit from the Soviet Union, but bad site management²¹ and worse financial planning caused construction schedules to lag miserably.²² In 1966 blast furnace construction began at Radinac, with scaled down capacities—720 000 tons of raw iron were now to be smelted, while the convertor would produce 840 000 tons of steel slab. Work on the downstream facilities was suspended in 1966 to get the blast furnace finished by 1968.²³ Then, in 1967, to speed up construction of the steel convertors,²⁴ the rolling mill plan was transferred to Phase 2²⁵ for construction ‘later’, when ‘new sources of financing were discovered’.²⁶ The phased development plan for MKS now appeared as in Table 1. (Phase 3 was later forgotten.)

TABLE 1
PLANNING TARGETS (ANNUAL PRODUCTION, TONS) (1971)

| | Phase 1 | Phase 2 | Phase 3 |
|-------------------|---------|-----------|-----------|
| Blast furnace | 720 000 | 1 220 000 | 1 940 000 |
| Steel convertor | 840 000 | 1 160 000 | 2 000 000 |
| Hot rolling mill | – | 1 830 000 | 1 830 000 |
| Cold rolling mill | 200 000 | 1 200 000 | 1 400 000 |

Source: Miodrag Čeperković *et al.*, *Čelik i ljudi. Prica o izgradnji Metalurškog kombinata Smederevo* (Belgrade, n.d., unpaginated).

Each year, new finance was procured, works would begin ‘on a broad front’, then seize up in May or June because the contractors had been left unpaid.²⁷ MKS spent two-and-a-half years building the blast furnace to a stage of completion which similar Soviet mills reached in three months.²⁸ It was blown-in in 1971. This set a pattern, as in 1977 MKS construction times were reckoned (conservatively) at about double the European average.²⁹

Without rolling mills MKS could not function as an integrated steelworks. From 1971 to 1975, when the first oxygen steel convertors came on stream, the blast furnace delivered its high-cost pig iron to other steelworks in distant parts of Yugoslavia. In 1969 East Germany offered to finance and build a small cold rolling mill, against subsequent payment in kind. Work started in 1971. The Germans were late with deliveries but the mill was completed only one year late, in 1974, because the Yugoslavs did not have to finance it themselves.³⁰ In 1975, when MKS began producing raw steel, the cycle remained incomplete. So till 1979 three-quarters of MKS’ raw steel was sent as slab to other ironworks, which returned hot rolled strip (‘hotband’) for the cold mill.³¹ This diseconomy was airily dismissed on the grounds that it was normal for steelworks to exchange products between themselves. In view of Serbia’s lack of raw materials, these exchanges made no economic sense.

The ‘totem’ culture still flourished in 1975, when the foundations were laid for a second blast furnace, whose equipment was financed by a Soviet credit. Into them were built 3000 tons of concrete and 350 tons of equipment. In June 1976 the money ran out and construction stopped. The Soviet equipment arrived in Smederevo

regardless and was 'warehoused' mainly in the open, where it deteriorated till a further construction credit was secured in 1984.³²

The glaring inefficiency arising from the lack of integrated processing was turned into a virtue, persuading World Bank experts to argue that eliminating the poor balance of facilities (in this and other Yugoslav mills) would provide 'high returns on a rather massive investment programme, if well co-ordinated'.³³ In 1970 it was decided therefore to bring the hot mill back into phase 1.³⁴ This unit, built with \$111 million of equipment supplied by Thyssen, was scheduled for completion in 1974³⁵ or 1975.³⁶ This could not be achieved because of slow payment. It was only completed in 1979.³⁷

Building the second cold mill

Even when the Thyssen hot rolling mill came on stream, the 'cycle' remained incomplete. Only 40% of its capacity could be integrated with the industrial demands of Serbia, mainly because the cold mill could not make high-grade car-body sheet. This was needed for the fast expanding Zastava car factory at Kragujevac, which promised to become the largest single outlet for MKS steel. In any case problems upstream perpetuated production imbalances. In 1982 MKS planned to import 90 000 tons of hotband but simultaneously scheduled the hot mill to export part of its hotband output to Western Europe. This was rolled from imported slabs, because the convertor could not provide the inputs needed.³⁸

Since planning and investment decisions were unaffected by the financial condition of the enterprise, failure to assemble the phase 2 blast furnace was irrelevant for future capital spending plans. Interest shifted to building the phase 2 cold rolling mill. In 1976 MKS put out a tender³⁹ and began negotiating with foreign equipment suppliers. In 1978, the project won financing priority. The cold mill was not intended to export much steel directly, but its customers (especially Zastava) were taking on export business.⁴⁰ To enable consumers to produce to export standards, the planners required the cold mill to embody the most advanced technology money could buy. They designated it 'AN ECONOMIC NECESSITY' (their capitals) since only by closing the cycle would the whole MKS project be restored (hopefully) to profitability.⁴¹ In May 1979 a \$168 million contract was signed with Davy-Loewy (later Davy-McKee) of Sheffield for equipment and supervision of installation, with provisional agreement for a further \$312 million of supplies. Davy based its offer 'upon a theoretical model (i.e. not a retrofit)'.⁴² Yugoslavia was to get 'the Western world's first new fully automated and computer controlled steel finishing mill'.⁴³

Cold mill construction and installation began in August 1979. Davy expected to complete construction in three years, 'followed by seven years production, and hopefully operational profit'.⁴⁴ The Yugoslavs said in public that they expected completion by August 1982,⁴⁵ but the planners less sanguinely envisaged a start-up in 1984 and a build-up to capacity use by 1986.⁴⁶ According to their projections of 1979, the project would cost \$363 million, including \$180 million in foreign exchange for imported equipment and know-how.⁴⁷ Because of the pioneering nature of the design, the project demanded a high order of organisational and managerial competence.

This was not forthcoming. Construction times could not be met. MKS blamed the site contractors, their lack of organisation, and the shortage of skilled craftsmen on site, though such complaints probably signify the difficulty of the contractors in procuring payment. By late 1981 construction was running six to seven months late, for want of materials.⁴⁸ MKS' perennial financial difficulties rendered it unable in 1981 to get imported equipment out of customs bond.⁴⁹ This problem was still unsolved in 1983.⁵⁰ In 1984 delay was also attributed to non-arrival of locally ordered equipment, particularly cranes and cable. As usual, MKS' inability to pay the contractors on time led to rows with them, and slowed the work down. MKS was reduced to 'begging the contractors to carry work out'.⁵¹

Cold rolling uses hotband as its input. This leaves the hot mill coated with scale so, on reaching the cold mill, the hotband is scrubbed through a tank of hydrochloric acid, the 'pickle line'. The East German cold mill had a line appropriate to its own capacity, but because of difficulties arising from a 'joint-venture' provision in the original contract, the phase 2 cold mill project went ahead without providing for a pickle line. Only in January 1984 was a contract signed (for \$36 million) with Davy-McKee for supply of a second pickle line with 750 000 tons capacity.⁵² Construction was then delayed until October 1985 (though completion had been scheduled for December that year⁵³). It immediately fell behind plan. Davy, against its better judgement, was pressured to sub-contract equipment such as conveyors with local firms in Serbia, to the value of \$12 million.⁵⁴ They were not really equal to the task, so they probably gave priority to other jobs.⁵⁵ Therefore, despite the prompt delivery of most of Davy's own equipment, Yugoslav-made plant arrived very late, and under-payment of the construction teams caused further delays.⁵⁶

The cold mill equipment was still being tested in March 1986 when it sustained \$50 million of damage through a fire. Repairs were carried out without much consultation with the supplier, and largely with Yugoslav-made components to save foreign exchange.⁵⁷ After the fire, expected completion of the line was re-programmed to October 1987. However, by January that year, the local equipment suppliers were 20 months late, especially Ivo Lola Ribara of Železnik, even though as subcontractors for Davy, they were allowed to receive payment in foreign exchange.⁵⁸ Much of the equipment that arrived from them suffered from defects which had to be rectified on site.⁵⁹ There was uncertainty because of the (usual) lack of funds to pay for investment work.⁶⁰ Construction was gripped by 'ultimate disorganisation'.⁶¹ Despite all this MKS was to boast that 'the contractors have succeeded in doing the job in record time',⁶² and to blame 'momentary problems' on 'mistakes in the Davy-McKee project'.⁶³

The line was completed in spring 1988. At last this entirely unnecessary bottleneck was broken, allowing the cold mill fully to resume work.⁶⁴ (Indeed the cold mill was claimed—inaccurately—to have been complete in December 1985, but unable to work normally for lack of a pickle line.⁶⁵) This released a large amount of pent-up capacity. Even so, operation in 1988 was dogged by breakdowns in the Yugoslav-made equipment, especially the hydraulics. Some of it was so defective that it had to be replaced by imported machinery.⁶⁶

This was not the only problem. The Soviet-designed iron and steel plant consisted of 'simple long-life machinery of very good quality, at a low price'.⁶⁷ The blast

furnace indeed gave 16 years of continuous service without any major refit.⁶⁸ But the complex could not deliver top quality steel for rolling. Longer standing practice had been for shortcomings upstream to be rectified progressively on their way downstream, but Western 1970s rolling mill design assumed the input of top grade materials, which the Yugoslavs could not provide.⁶⁹ By the time the new cold mill was ready, the quality of the slabs arriving at the rolling complex was if anything deteriorating because of the unsatisfactory quality of the domestic ores and coke used in the blast furnace (see below).

In 1984 the project for the second blast furnace was resurrected. It now needed to be built in a hurry. The existing blast furnace had been producing continuously since 1971 (a testimony to the solidity of its Soviet engineering). Despite claims that there would be a massive surge in production when both furnaces were running, the older furnace was worn out and the engineers feared it might overheat at any moment.⁷⁰ The new furnace was blown-in on 27 March 1987. It cost a reported \$175 million.⁷¹ The older furnace was soon shut down, and largely dismantled.⁷²

Performance

Table 2 records the expansion in the output of the new steelworks. As was characteristic of Yugoslav enterprises in the 1950s and 1960s, the (old) Smederevo steelworks was run according to tight budget constraints, and generated surpluses permitting the government to maintain a formidable rate of investment. Coherent accounting figures for the steelworks are only available for 1954 to 1979. When corrected for inflation, the following performance trends become apparent (see Figures 1 and 2).

Figures 1 and 2 show the approximative results of adapting Yugoslav accounting. In particular, our procedure for deflating to constant prices differs from the Yugoslav, by deflating inventory values rather than following the Yugoslav practice of deflating the values of inventory *changes*. Figure 1 shows the return to the state of the MKS enterprise after deducting from its turnover the costs of externally purchased inputs, gross wages and plant depreciation. It takes no account of the interest costs of the capital invested. On this basis, until 1965 MKS generated a steady and substantial surplus, but this dwindled rapidly over the next three years. Thereafter (with the exception of 1974) it ran up the heavy real trading losses shown in the chart. These were, in reality, further engorged by the costs of servicing the debts incurred for investment expenditures and past deficits.

Figure 2 displays the value-added and gross annual wage costs per employee, and affirms a similar picture. Again productivity falls away abruptly from 1965 onward, and then displays an erratic but diminishing trend. In 1977 MKS was subtracting value. The trend in wage costs bears little relation to productivity, except apparently after 1977, when wage costs appear to have been ruthlessly pruned back to mid-1950s levels.

Over the period 1980–91 we have only fragmentary statistics for MKS, mainly of the Yugoslav accounting terms *prihod* and *dohodak*, which roughly correspond to turnover and value added. Where fuller accounts were given, these lack the vital data on inventories without which meaningful surplus and value-added figures cannot be

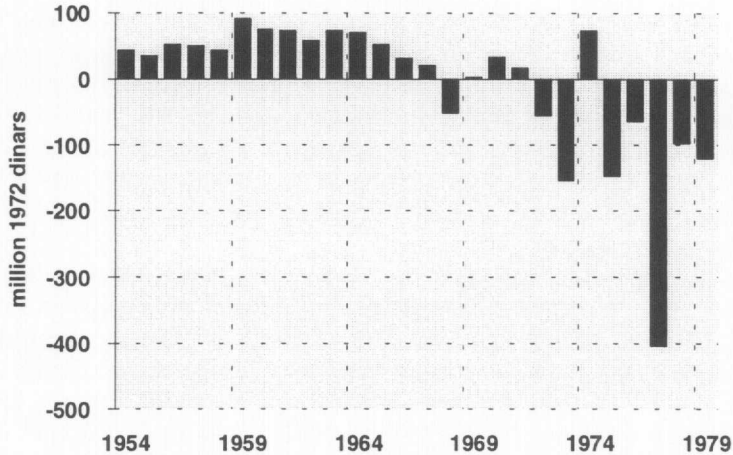


FIGURE 1. TRADING SURPLUS, METALLURGICAL KOMBINAT SMEDEREVO.

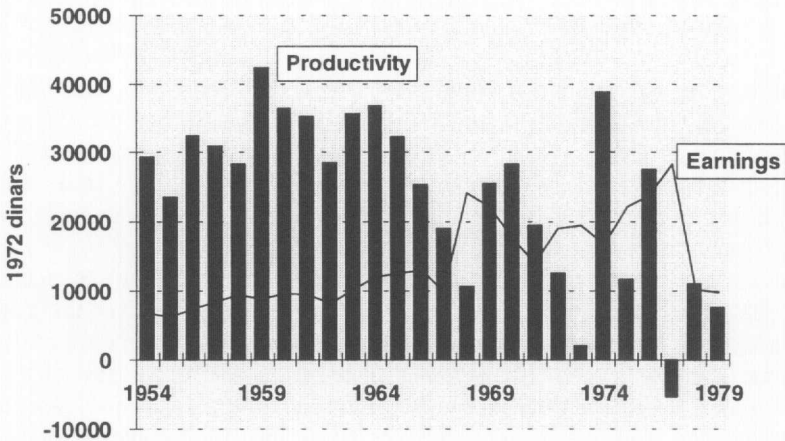


FIGURE 2. PRODUCTIVITY AND EARNINGS PER WORKER, METALLURGICAL KOMBINAT SMEDEREVO.

Note: Calculations of surplus and productivity use labour force (LF) and current price data on inventories (IN), sales (S), material expenses (ME), wage costs (W) and depreciation (D). For each year financial variables are first converted to constant 1972 prices using the RPI. Inventory gain or loss (dIN) is established by subtracting the preceding year's IN (at constant price). Surplus = (dIN + S - ME - W - D) where variables are expressed in constant prices. Productivity is calculated as (dIN + S - ME)/LF.

Sources: Tables of basic financial indicators by enterprise (figures for MKS) in the following internal publications: UJŽ, *Statistički godišnjak... 1939 i 1946-1963* (Belgrade, 1967), pp. 480 ff.; UJŽ, *Statistički godišnjak... 1964 do 1973 god.*, pp. 437 ff.; OUCMJ, *Statistički godišnjak... 1974-1980 godine*, pp. 352 ff. For abbreviations see sources to Table 2.

calculated. Official figures for losses are however available, and are assembled from various sources in Table 3. Their calculation and meaning is ambiguous, and is based on historic cost accounting, which flatters them. These figures probably understate the true level of losses. They do take account of the cost of servicing debt, but this was kept artificially low by forcing the banks to charge interest at half the (negative-real)

TABLE 2
MKS NEW STEELWORKS OUTPUT (ANNUAL AVERAGE)

| | Sinter tons | Raw iron tons | Oxygen steel tons | Hot rolled tons | Cold rolled tons | Output value million dinars of 1974-77 |
|--|----------------|---------------------|-------------------------|-----------------------|------------------------|--|
| 1971-75 | 551 013 | 303 950 | 8 545 | 0 | 10 776 | 947 |
| 1976-80 | 723 993 | 398 508 | 210 921 | 63 300 | 105 920 | 1 455 |
| 1981-85 | 984 770 | 554 357 | 498 666 | 558 264 | 174 325 | 2 762 |
| 1985-90 | 1 047 560 | 695 300 | 646 720 | 689 424 | 280 602 | 3 501 |
| Product prices, 1974-77, dinars per ton: | | | | | | |
| Average | | 3080.38 | 3364.16 | 4766.26 | 5510.78 | |
| Stage increment | | 3080.38 | 283.78 | 1402.1 | 744.52 | |

Note: Output in dinars is calculated by multiplying the physical production figures at each stage by the stage price increment, then aggregating.

Sources: Quantities: 1971-73: Udruženje jugoslovenskih železara (UJŽ), *Statistički godišnjak . . . 1964-1973* (Belgrade, 1977), pp. 42, 47, 56, 57; 1974-79: Opšte udruženje crne metalurgije Jugoslavije (OUCMJ), *Statistički godišnjak . . . 1974-1980 godine* (Belgrade, 1982), pp. 40, 42, 45, 54-56, 58, 75; 1980: (iron and raw steel) and 1980-82: (rolled products) OUCMJ, *Statistički bilten [SB] za 1984 godinu* (Belgrade, 1985) tables I.4, 5, 9, 11, 14, 17; 1981-90 (iron and raw steel) Udruženje crne metalurgije Jugoslavije d.o.o. (UCMJ), *Statistički godišnjak* (Belgrade, 1993) mimeo, Tables 6 and 7; 1983-87 (rolled products) OUCMJ: *SB, 1987* (Belgrade, 1988), pp. 25, 26, 29, 30; 1988 (rolled products) OUCMJ: *SB, 1988* (Belgrade, 1989), pp. 11, 12; 1989-90 (rolled products) *Industrija čelika Jugoslavije '89/95 (Čelik, posebno izdanje, Belgrade, n.d.)*, Table 4, p. 39.

Product prices: OUCMJ, *Statistički godišnjak . . . 1974-1980*, pp. 343, 345.

market rate. The figures are also struck after deducting unrealistically small provisions for depreciation. Moreover, most dinar debt evaporated in a few years of its own accord thanks to inflation. As they were usually given in dinars, a fast depreciating currency, losses have been converted to dollars at the official exchange rate at the end of the year concerned. It is unfortunately not possible to set any of the post-1979 figures in relation to those of the preceding period.

We may estimate the overall magnitude of the losses incurred by MKS by mid-1987, when MKS convertible foreign exchange debt was estimated at \$1400-1650 million.⁷³ A further \$290 million had been raised and invested from domestic (dinar) sources.⁷⁴ Yet the 1987 value of the fixed assets of the black metallurgy sector in 'narrow' Serbia was \$418 million.⁷⁵ The value of MKS inventories (if pro-rated to capital stock in 1970s proportions) would have amounted to around \$140 million, against which MKS carried bank dinar debt equivalent to \$76 million. This implies that its capital losses at this point had accumulated to upwards of \$1300 million. Losses declared from late 1987 onward would raise this figure to around \$1600 million at the end of 1990. However, enormous dinar losses on current trading had already been socialised via inflation and through subsidies.

To set MKS' losses in perspective, the (net) earnings of MKS' 11 153 employees in 1987 (at an average \$196 a month) amounted to 19.76 billion dinars, or \$26.2 million at the (geometric) mean dollar exchange rate for 1987. So during that year the officially conceded loss amounted to nearly five times the pay-roll. Probably—as was already beginning to happen in the late 1970s—MKS was subtracting value in the 1980s, and heavily. By how much is unclear, because losses may have resulted from

TABLE 3
PROFIT/LOSS OF MKS

| | <i>Billion dinars</i> | <i>\$ million</i> |
|------|-----------------------|-------------------|
| 1980 | - 1.844 | - 62.9 |
| 1981 | - 2.127 | - 50.9 |
| 1982 | - 4.56 | - 73.0 |
| 1983 | - 3.554 | - 28.3 |
| 1984 | - 0.47 | - 2.2 |
| 1985 | - 2.75 | - 8.8 |
| 1986 | - 15.4 | - 33.7 |
| 1987 | - 159.6 | - 128.3 |
| 1988 | - 473.13 | - 90.8 |
| 1989 | | - 26.0 |
| 1990 | | - 133.6 |

Note: Dinar losses to 1988 are converted to dollars at the year end official dollar rate given in *Statistički godišnjak Jugoslavije*, 1989, p. 229.

Sources: 1980: *Naš glas*, 13 April 1982; 1981: (new steelworks only) *Naš glas*, 5 May 1982; 1982-83: *Informativni bilten . . . MKS . . . II* (1984) 3 (May), p. 9; 1984: *Čelik*, 113 (August 1985), p. 41; 1985: *Ekonomoska politika*, 14 April 1986, p. 35; 1986: *Ekonomoska politika*, 6 April 1987, p. 41; 1987: *Ekonomoska politika*, 28 March 1988, p. 33; 1988 and 1989: *Metkos*, 29 March 1990, p. 1; 1990: *Ekonomoska politika*, 29 April 1991, p. 42.

servicing debt in excess of enterprise assets, but for reasons discussed below, this appears unlikely.

Indirect costs and benefits

As the Yugoslav federation left most steel industry financing to the republics, Serbia had to pay dearly for its industrial totem. All its major blocks of investment were based on imported technology, and were financed mainly by raising foreign credits, which carried state repayment guarantees. From the point of view of the domestic banks which had to service MKS debt, lending to MKS was tantamount to giving money away.

MKS' lien on the economy of Serbia was remarkable. In 1981 it was to receive 41% of the 'incentive funds of the Republic of Serbia',⁷⁶ though it accounted for a puny 1.2% of its industrial output. In February that year it was announced that under Serbia's 'new medium-term plan for MKS development' to 1985, MKS would receive \$1884 million in 'investment' and subsidies. As well as the fixed subsidy (raised through the tax system) of \$457 million (dinar equivalent at end-1980), state credits of \$167 million would be channelled to it, while the banks would advance \$300 million in new money, and write off \$116 million interest owned. Additionally, for its investments, MKS would receive 'foreign' credits of \$809 million, which would include \$249 million 'earmarked' from (hard currency) savings deposits at the banks

and post offices. MKS would contribute a token \$6 million from its depreciation fund. These funds would in theory double blast furnace capacity, nearly quadruple that of raw steel, expand hot rolling by a quarter and complete the new cold mill. Productivity would rise from 46 tons of steel per employee in 1978 to 218 tons by 1985.⁷⁷ None of these projects was fulfilled. Small wonder the press referred to MKS as 'the barrel without a bottom'.

Because of the alleged benefit of MKS completion to enterprises using its steel, they were ordered to 'associate' funds of their own into joint projects for the completion of the steelworks. A 1975 law provided MKS with 900 million dinars of investment (about \$50 million) over two years from 'obligatory association of resources' of other enterprises in Serbia, while another million or so were scrounged as a loan of a month's pay from 90% of MKS' own workforce.⁷⁸ A similar 1977 Republic law demanded another \$70 million of obligatory association funds.⁷⁹ Between 1981 and 1984 MKS got 130 steel-using firms to pledge it 7.2 billion dinars (again around \$70 million). In theory these represented investment and would eventually be repaid. However, the steel purchasers were extremely reluctant to honour their pledges. In 1984 only 380 million out of 7.8 billion dinars contracted under 1978 agreements had actually been paid to MKS,⁸⁰ though a report the following year mentions 40% payment, which only worsened the already acute financial difficulties of the 'associates'.⁸¹ Resources were even prised from Kosovo to be fed into MKS. Four Kosovo metal-using firms signed agreements in 1983–84 to 'associate' 2.77 billion dinars (\$22 million) in MKS.⁸² This sum equalled 9.4% of 1983 federal development funding for Kosovo,⁸³ and it probably came straight out of that budget. Another Kosovo enterprise, Investmetali, chipped in a further 600 million dinars in 1986.⁸⁴

As MKS never ceased to haemorrhage losses, the 'associated' funds were probably used to cover current deficits, slowing the investment programme. In 1984 MKS announced that 'investments' of consumers would have to continue until 1990.⁸⁵ As late as 1986 MKS admitted that its plans (after 22 years of construction) were still only 60% complete.⁸⁶

The authorities pressed on relentlessly.⁸⁷ In 1987 a special levy of 0.469% of Social Product—enough theoretically to raise \$83 million⁸⁸—was imposed on all enterprises in Serbia to fund the completion of the Kombinat.⁸⁹ This came back to MKS as a subsidy. It looked like becoming a near-permanent impost, because MKS did not expect the works (theoretically) to be rounded out and self-supporting before 1995 and maybe 2000.⁹⁰ The authorities also ordered almost all MKS domestic debt to be written off, telling firms which had 'associated' their funds into MKS not to complain because their 'investments' had secured them cheap steel. This was nonsense really, because the 'associated' funds were effectively a surcharge on the domestic steel price. A still 'tighter' obligation was clamped on user firms to continue 'associating' funds into MKS,⁹¹ only now their funds were to be non-returnable, and were to be used for covering MKS losses.⁹² Indeed, as much as one-third of the 1987 loss was to 'fall on the shoulders of our purchasers'—and MKS told them to sharpen up on payment of 'their obligations'. This was not well received. A Novi Sad enterprise, Novopak, complained at the unfairness of one loss-making firm having to invest part of its funds in covering the losses of another.⁹³

The justification for forcing user firms to 'invest' in MKS was that it supposedly guaranteed them deliveries of supplies. Association agreements signed in 1981 guaranteed 97 users 1 323 000 tons a year of rolled steel when capacities were completed, a volume MKS never remotely succeeded in producing.⁹⁴ The persistent failure of enterprises efficiently to co-ordinate supplier–customer arrangements was a long-standing defect in the Yugoslav economic system. It led in the 1970s and 1980s to the proliferation of similar 'self-management agreements' between enterprises, to ensure a lien on supplies. Sacks has argued for the economic rationality of cross-investment between enterprises given the Yugoslav institutional environment.⁹⁵ This was sometimes the case, but the MKS investment agreements were applied under compulsion, as cover for hijacking funds from smaller firms (and from the Kosovo slush fund) to prop up a political factory.

The benefits the users obtained from 'associating funds' were problematic, because MKS failed to provide them with the products guaranteed them. Though a major steel user, the Zastava car firm for long resisted making the heavy commitment to MKS that the latter expected, but committed itself in 1982 to taking 64 000 tons of strip and 'associating' \$4 million.⁹⁶ It was so dissatisfied with MKS' incapacity to meet its specifications that it demanded a voice in MKS' management.⁹⁷ In late 1986 Zastava was conducting a press campaign to complain of MKS' shortcomings.⁹⁸ Though construction of the new cold mill had been justified by its need for car body sheet, it received little. By 1985, according to plan, Zastava should have taken 223 000 tons or 36% of the factory's 615 000 ton output,⁹⁹ but in 1987 Yugoslav steel suppliers provided the car factory with only a 'symbolic' 2–3% of its cold rolled steel needs, the rest being imported mainly from Austria. Under pressure to raise the quality of the cars it was trying to mass export to the USA, Zastava told MKS its sheet steel was not good enough for its car-bodies.¹⁰⁰ Deliveries of steel were erratic, and Zastava rejected much of what it received, because of quality defects, especially herring-boning on the sheet.¹⁰¹ With the new capacity on stream in 1988 and 1989, deliveries to Zastava increased, but continual cold mill stoppages and the shortcomings of its product meant that Zastava's steel needs 'were not even nearly satisfied'.¹⁰²

Location and systemic cost disadvantages

I have grouped the principal causes of MKS' losses under three headings: supply side deficiencies arising from location disadvantages and system defects, its failure to exploit its capacity effectively, and its commitment in the 1980s to the mass export of steel products.

The original MKS project provided for the steelworks to enjoy access to local raw materials and fuel through the parallel development in Serbia of mines for iron ore and coal.¹⁰³ Consequently MKS opened two iron ore mines at Kopaonik mountain in 1966 and 1971. The scheme ran into problems immediately because of the low grade of the ore extracted.¹⁰⁴ As these mines proved useless to it, MKS transferred them to Zorka-Šabac in 1986.¹⁰⁵

By the 1980s all MKS' domestic ore was drawn from the iron orefields of Vareš and Prijedor in Bosnia. Transport links were circuitous and deliveries unreliable. Moreover, Bosnian ore was of unsatisfactory chemical composition, and had a low

iron content.¹⁰⁶ Even after mixing with imported ore, its use reduced MKS blast furnace output by about 8%.¹⁰⁷ It was also in short supply, so 'to free the country from the import of iron ore', MKS began investing in 1971 in developing the Omarska mine in Bosnia.¹⁰⁸ Because this mining project kept running short of funds, Omarska supplied no ore until November 1985.¹⁰⁹ MKS' 30% participation in the scheme was budgeted for 1979–82 at \$52 million,¹¹⁰ but in 1984 a further \$13 million was needed.¹¹¹ The mine did not achieve its objectives, and was later used by the Serbs as a concentration camp.

Because of the shortage and qualitative shortcomings of Yugoslav ore, MKS became highly dependent on ore imports. Figures for January–June 1985 show that 54.7% of ore entering the MKS sinter plant was imported, mainly from Peru and Liberia.¹¹² Although in 1984 MKS still expected to get 'most' of its future ore deliveries from within Yugoslavia, especially from Omarska and from mines in Serbia,¹¹³ by 1990 MKS became 90% dependent on imported ore, and no ore came from Serbia.¹¹⁴ In 1979, to minimise foreign exchange outlays, the Yugoslavs began investing in the Mifergui-Nimba mining project in socialist Guinea.¹¹⁵ This was probably a barter deal with President Sekou Touré.¹¹⁶ Despite great expectations, the project, like Omarska, seems to have been a waste of money, for MKS received no Guinean ore during January–June 1985, and I know of no later references to it.

The flow of imported ore was erratic since it depended to a large extent on MKS' momentary ability to find the requisite foreign exchange,¹¹⁷ and ore deliveries from Bosnia were also irregular. Even when outright ore (or coke) shortages did not force output cuts, as they often did,¹¹⁸ the failure of ore deliveries to arrive in their planned rotation caused variations in the ore-mix at the storage pyramid of the sinter works. This could have very damaging consequences. For example, if the mix taken from the pyramid was too rich in thin Bosnian ores,¹¹⁹ or in high-sulphur low-manganese ore from Peru (of which MKS was a big importer, probably because Peru gave Yugoslavia easy credit), its composition would affect the quality of the raw iron, and consequently of the steel refined from it.¹²⁰ Not infrequently, for this reason, the steel slab was rejected as scrap at the rolling mills, in one case because it contained gas bubbles.¹²¹ In May–June 1985 the cold mill could roll only half the steel planned because of the unsatisfactory chemical composition of its inputs.¹²² So bad was some of the steel coming from the convertor in 1986 and 1987 that stoppages interrupted work at the hot rolling mill, because imported slab could not be procured to replace it.¹²³

To offset local material deficiencies, MKS expected to enjoy cheap access to water-borne inputs. The opening of the Danube Iron Gate to river traffic was a major reason for developing the new MKS works.¹²⁴ But at Smederevo the port facilities were inadequate, and the steelworks had no waterway connection with the river save for a channel dug to bring in industrial water.¹²⁵ So Danube-borne supplies had to be transhipped overland. The 'river road' was under-exploited.¹²⁶ Even shippers of Soviet ore from the Black Sea preferred not to use the Danube as a water route, and like importers of transoceanic supplies, they consigned cargoes to the Adriatic ports,¹²⁷ mainly Bar in Montenegro. After the Bar to Belgrade railway was opened in 1976, it conveyed ore the 530-odd km to Smederevo, but because it was costly and

badly organised, MKS also imported ore by the even more circuitous route from Split to Sisak in Croatia and then by the Sava and Danube to Smederevo.¹²⁸

The original electro-smelting plan probably responded to the lack of coking coal in Yugoslavia and the intention of substituting locally available brown coal. Its abandonment in favour of a blast furnace further undermined the location logic of the Smederevo site. Coke (partly from imported coking coal)¹²⁹ was taken from the Boris Kidrič coke batteries at Lukavac (near Tuzla) in Bosnia. This coke supply became insecure in the 1980s because, in order to earn hard currency, Kidrič supplies were diverted towards export contracts (despite Yugoslavia's serious coke deficit).¹³⁰ Knowing that coke was in long-term deficit, the steelworks was apt to overstock it when it could. As storage capacity was lacking, the coke dumps would overflow into the piles of sinter, and react with them, causing stoppages.¹³¹

Periodic shortages of refractory materials, of which domestic supplies (mainly from Macedonia) were inadequate, also from time to time forced reductions in output on MKS and other Yugoslav steelworks.¹³² MKS became dependent on the import of these materials.

The key variable cost falling on steel production is that of energy. In this respect MKS did enjoy location advantage, because of heavy investment in thermal power from the brown coal of the Kolubara basin. Moreover the industry enjoyed subsidised electricity tariffs,¹³³ despite which MKS failed to pay its power bills when in difficulties.¹³⁴ As it used energy inefficiently (though no more so than other Yugoslav steelworks), it enjoyed little advantage from this to offset abnormal costs elsewhere. In 1990 MKS energy consumption per ton of rolled product was given as 29 GJ against a 'world standard' of 21.¹³⁵

Despite MKS' location and systemic handicaps in access to raw materials and fuels, the World Bank and later BISCOS regarded Smederevo as one of the most promising centres onto which the Yugoslav steel industry should be re-focused. This was mainly because of the high quality and modernity of its equipment. The trade association collected an enviable number of foreign opinions in MKS' favour with which to rebut the plant's domestic critics, and to blame its shortcomings on inadequacies in financing.¹³⁶ MKS took pride in these plaudits—'with great efforts Smederevo does its job well'.¹³⁷

New technology and capacity utilisation

A modern integrated steelworks embeds a high fixed cost for the servicing and depreciation of capital. During the construction phase interest charges and technological depreciation increase capital cost and reduce asset value. The fixed element in the cost of production therefore varies according to the speed with which the capital investment is brought on stream. Once the plant is producing, this capital charge, which composes the predominant element in value added, is independent of the volume of output, while marginal (variable) costs (materials, power and labour) remain well below average cost right up to close to full capacity operation. If commissioning times are over-run, the effective fixed-cost capital charge to be serviced accumulates. Moreover, the technology becomes obsolescent, and the enterprise consequently forfeits the short-term super-normal profit the investor had hoped

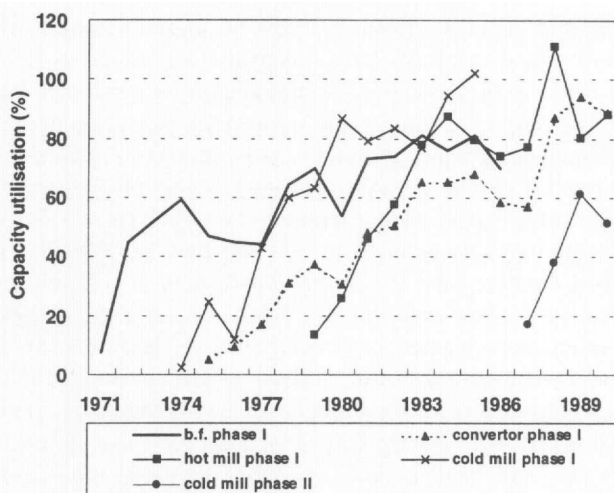


FIGURE 3. MKS CAPACITY UTILISATION.

Sources: As for Table 2.

to gain from its modernity. If the plant then fails to produce close to capacity (after the normal running-in period), capital and depreciation charges are loaded onto too small a volume of production to generate a surplus. The MKS steelworks consistently failed both on construction times and on capacity utilisation. Irrespective of other sources of inefficiency, this predestined it to unprofitability.

The inability to keep to tight construction schedules, and to produce close to design capacity, were not new problems for MKS' new steelworks in the 1970s and 1980s. Its predecessor, the old steelworks, was quite as bumbling and inefficient. Yet it managed up to 1965 (Figure 1) both to return a surplus to the Yugoslav state and (Figure 2) to achieve modest growth in productivity. However, it was not capital-intensive, so the cost of constructional inefficiency and low capacity utilisation could be compensated by holding variable costs down through low wages. On the other hand, the new steelworks was highly capital-intensive, and needed to be built on schedule and then run to capacity. Taking the first and last pairs of comparable statistics, those for 1964–65 and 1978–79, the fixed capital stock of MKS in 1964–65 sustained 2.5 times its own value of gross output, but in 1978–79 only 0.24 times.¹³⁸ So the plant became 10 times as intensive in its application of capital, and the fixed cost per unit of output rose more or less proportionately.

Construction times are difficult to estimate for these major new steelworks investments, though, as noted above, they were usually extraordinarily protracted. However, utilisation of capacity is charted in Figure 3.

The original blast furnace was blown-in in 1971 and produced at 49.6% of capacity between 1972 and 1976. It only achieved more than 70% of capacity between 1981 and 1986, by which time it was obsolete and worn out. The oxygen steelworks came on stream in 1975 but only built up production very slowly. It achieved 68% of project capacity 10 years later.

The hot rolling mill came on stream in 1979, but only exceeded 70% of capacity from 1983 onward. The small East German cold mill started up in 1974. It had only reached 63% of capacity by 1979, though subsequently it performed better. After its vicissitudes in construction the second cold mill started producing at the end of 1987. The two cold mills together were supposed to produce 800 000 tons of sheet and strip a year. Their combined output in 1988, the first full year of operation, was 306 000 tons of cold rolled steel. It reached a maximum of 449 000 tons or 61% of combined capacity in 1989, before falling back to 368 700 tons in 1990. If the older mill operated, as it had done in 1981–85, at around 87% of its capacity, then the best outcome achieved by the new cold mill (in 1989) was around 316 000 tons or 53% of capacity.¹³⁹ Even these figures probably flatter its performance, for cold mill outputs may have been over-reported by a third, at least between 1985 and 1988.¹⁴⁰

In short, even when MKS belatedly brought its new plant on stream it was operated at far below capacity for many years. Once it approached capacity use it was already becoming obsolescent and uncompetitive. As MKS' failure to run its plant broadly in line with its design capacities was critical to its loss-making propensity, we now examine potential sources of this shortcoming.

Yugoslav administrators and planners customarily discussed performance, typically plan fulfilment, in terms of the 'objective' problems of the firm, meaning problems in procuring supplies, and 'subjective' problems, which emanated from mistakes and negligence within the enterprise itself. Given the perennially overheated condition of the Yugoslav economy, with rampant inflation, foreign exchange crises and shortages, 'objective' limitations were inescapable, and enterprises naturally apportioned blame to suppliers rather than themselves. However, the works newspaper provides valuable insights on 'subjective' weaknesses which would not otherwise enter public discussion. One courageous workers' council member from the sinter plant denied there were any 'objective' difficulties in his 'collective' at all, and blamed all its shortcomings on 'the communists, who watch television during their shifts and play cards and drink'.¹⁴¹ This was a little extreme, but as General Director Svetislav Radivojević made plain in 1984, the worst of MKS' problems were 'not a question of raw materials, rather our subjective weaknesses in the collective'.¹⁴²

Among the 'subjective' weaknesses one significant area would repay close attention. The various plants at MKS were plagued by a high level of stoppages, and the down-time which resulted from them. Breakdowns are an unavoidable fact of manufacturing, but good production management can minimise them with careful maintenance and refit programmes, and deals with stoppages through efficient repair procedures.

Maintenance at MKS was neglectful. At the hot rolling mill in 1986 the 'state of the equipment' rendered the growth of production 'problematic'.¹⁴³ 'Breaches of prescribed technology' led to an urgent directive 'whose wording in itself speaks sufficiently about what sort of a state it is in'.¹⁴⁴ Between January and September stoppages consumed 46.6% of total planned work time. The problem was attributed to 'weak maintenance of plant, loss of highly trained personnel, numerous unplanned stoppages [and] bad interpersonal relations'. The work of the spare parts service was described as 'unskilled' and conditions had not changed fundamentally since earlier interventions.¹⁴⁵



As equipment aged, it broke down increasingly frequently. A workers' council delegate claimed there was 'a simple solution'. 'Larger and more complex refits are needed instead of the present quick, poor-quality ones when it appears the basic aim was to complete the refit within the time limit' prescribed by the plan.¹⁴⁶ This view supports the contention of Davy's Project Director that MKS 'wanted big projects and would not implement minor retrofit investments'.¹⁴⁷

Repair procedures, too, were inefficient. At the convertor, 'difficulties with coke and refractory material quality and skill structure of employees cause small repairs . . . to last 10 hours instead of a few minutes', and required the help of outside specialists.¹⁴⁸

The refit and maintenance problem was aggravated by the consistent inability of MKS to maintain a spare parts inventory appropriate to its equipment. This had been singled out as a weak sector right back in 1953.¹⁴⁹ More generally, the warehouses were badly disorganised in 1960, and the matter had not been rectified by 1961, when there was inadequate control over what went in or out.¹⁵⁰ In 1987 MKS' spares inventories were held out as 'a kind of mirror of imprecision and slovenly work and lack of care towards social property'. An earlier attempt had been made at a census of spares, and some 4 billion dinars worth were thrown out. The job was scamped, for the state of the inventories remained appalling, their use irrational and their documentation inaccurate.¹⁵¹

Shortage of spares contributed seriously to machine down-time. At the hot mill 'all stoppages last longer than they should because some broken components have to be repaired rather than replaced'.¹⁵² This problem was attributed to the shortage of foreign exchange to import spares and to the doubtful quality of domestically produced substitutes.

Such bottlenecks could arise even when spares were held in the inventories, but could not be found. 'In the ordering and documentation of the . . . spare parts inventories total disorganisation is felt', records a 1983 report,¹⁵³ so 'it seems nobody knows how many spares and what spares we have'.¹⁵⁴ Davy's reporting at the cold mill penetrated still further into the practicalities of warehouse disorganisation. After 10 years of the project, a spare parts inventory had yet to be established.¹⁵⁵ About 40% of the spares documentation was missing, and what remained was not updated with amendments; as a result MKS drew increasingly heavily on Davy's own manuals and drawings, 'but a recent snap check has shown that even here drawings have been withdrawn and the set is incomplete'.¹⁵⁶

On the other hand, the various plants were accused of 'free spending' behaviour in the import of spare parts,¹⁵⁷ and 'they say the warehouses are full to the brim'.¹⁵⁸ Yet at the hot mill the range of spare parts available was 'not the most fortunate'.¹⁵⁹ Bad inventory management resulted in the accumulation of perishable spare parts which had passed their use-by date. Using them to service and refit equipment contributed to the frequency of machine stoppages.¹⁶⁰ The reluctance of MKS to retrofit and update ageing plant also caused spare parts problems. The sinter and blast furnace complexes dated from the mid-1960s (and were based on mid-1950s Soviet technology). From 1979 onward getting spares to keep them running became increasingly difficult, and this led to a fall in reliability.¹⁶¹ By 1990 the same problem affected the

older cold mill, as 'producers of existing equipment cannot supply the spares needed and if they do deliver them it is at very high prices . . .'.¹⁶²

The spare parts policies pursued at the works were uncondusive to rectifying the problem, because management was concerned mainly to save money by reducing inventories of redundant spares. There was certainly scope. In 1986, 'in our collective inventories are not managed in a corresponding way and in the warehouses there are spare parts which have stood there for three and more years and nobody has used them'.¹⁶³ At the end of 1987, 'in the inventories lie spares which were written off long ago or were thrown out of use 10 or more years ago'.¹⁶⁴ Inventories of certain components were 'enough for the next 100 years'.¹⁶⁵ At the new cold mill, Davy-McKee induced MKS to engage British consultants. The team included a warehouse and spare parts manager. Such was the extent of warehouse disorganisation that he set up a temporary parts warehouse in the foundry hall to unburden the cold mill warehouse of little-used spares.¹⁶⁶

Management was less concerned to ensure the inventories were adequately restocked, and practised the false economy of under-ordering. At the hot mill in 1982 a list was drawn up of the spares needed, 'but it had to be reduced because of the foreign exchange situation'. Even the highest priority items were not procured.¹⁶⁷ The reorganisation of warehousing at the cold mill was only of limited assistance because Davy later pointed out to MKS that identified deficiencies persisted yet visits by accredited suppliers were being cancelled by MKS, so the stores level was 25% below 'the quantity considered necessary by other similar installations'. Machines were being cannibalised to keep others running. For want of spares, 'a large proportion of the stand-by systems were being used to maintain the prime systems',¹⁶⁸ so equipment lacked any back-up system in the event of its breakdown.¹⁶⁹ This was hardly surprising since over the period 1986–90 \$515 million of spares should have been replaced at the cold mill but only \$1.5 million were ordered.¹⁷⁰

The foreign exchange shortage led MKS increasingly to source spare parts from local firms, rather than from supplier-accredited manufacturers. The policy seems to have been founded on a misguided philosophy: 'frequently [departments] justify the import of spares by lower prices, but this can sometimes only be justified from the stand-point of the work organisation. From the point of view of the country, import is always irrational if that which is imported can be made in the country'. Therefore, it was concluded, importing spares 'diminishes national income and the welfare of the population' relative to their level if those imports had been substituted.¹⁷¹

The substitution programme may have saved foreign exchange, but it yielded less reliable spares, often at much higher cost. Foreign spare parts suppliers rarely sold the workshop technical documentation for manufacture.¹⁷² Therefore, since the home-produced spares were essentially pirated goods, their manufacturers often failed to produce them to accurate specification.¹⁷³

The pressure to minimise equipment outlays in foreign exchange was intensified by the 1986 fire at the cold rolling mill. Repairs were carried out, without much consultation with the supplier, and largely with Yugoslav-made components to save foreign exchange.¹⁷⁴ Much of the replacement equipment was supplied from Slovenia

and Croatia.¹⁷⁵ The speed of repairs was impressive,¹⁷⁶ and a self-congratulatory study claimed great successes, and savings not only in foreign exchange but also in equipment costs.¹⁷⁷

However, the 'poor quality and inaccuracy' of Yugoslav-made spare parts made for frequent breakdowns.¹⁷⁸ Among the foreign exchange 'savings' made was the decision of MKS to commission the new pickle line itself, landing the enterprise with responsibility for equipment malfunction. As set up, the line could not receive strip for pickling at the rate for which it was designed, and as the fault could not be traced its capacity was lowered permanently. The relevant equipment was built by a local firm. A similar problem at the cold mill shear line was probably caused by installation of locally made magnets after the fire, which removed responsibility from the original supplier.¹⁷⁹

As the inventory had been understocked, electrical maintenance teams repaired much of the equipment 'using domestically made spares which were almost 100% written off'.¹⁸⁰ Suppliers of equipment and proprietary spare parts suppliers obviously had an interest in criticising 'the poor quality and inaccuracy' of import-substituted supplies and to advise against the premature reduction in expatriate advice.¹⁸¹ However, their comments seem to have been justified. Asked to appraise the quality of the new Yugoslav-made components with which the damage was being rectified, MKS' electrical maintenance manager described them as 'variegated' (*šarolik*). He was unable to be more specific as to which spares were good and which were not, because 'in our collective unfortunately no quality control exists' for testing parts on receipt from the manufacturer, 'only a control that counts the pieces'. As a rule, bigger orders were satisfactorily executed, but suppliers 'did not much labour' over making small runs.¹⁸²

This, of course, was always a major problem with component substitution. Small runs entailed high-cost and low-quality manufacturing using general-purpose equipment rather than purpose-built machine tools. Even for assembly-type industries which needed relatively large runs of components, sourcing for domestic content caused difficulties. So the effort of domestic sourcing to meet the diverse spares needs of a single enterprise was largely misapplied.

Having noted this problem of spare parts supply and storage, it is tempting to say that while this may have been a source of inefficiency, it was rectifiable in the short term, and hardly fundamental to the success or otherwise of MKS. This was not necessarily true. It was systemic, and it was never rectified. The failure of the (fairly) new cold mill to achieve the output and sales for which it was designed could be damaging to the British supplier's reputation, and in 1990 it pointed out to MKS that its low sales were largely caused by production under-performance,¹⁸³ which made a mockery of all profit projections.¹⁸⁴ Indeed, so far from being built up, its capacity was if anything diminishing, for between 1988 and 1990 the equipment deteriorated, and (according to Davy) the prime cause for this was the lack of spares and maintenance.¹⁸⁵ Moreover, the ageing equipment of the older cold mill, whose components after the fire had been subjected to intense import substitution, remained unmodernised, so it was decreasingly able to produce to the demands of the fabricators.¹⁸⁶

Exports

MKS, a high cost import substitutor, emerged in the 1980s as a massive steel exporter—and remained so. There was no improvement in its competitive capacity to explain this new export orientation, yet macroeconomic changes in Yugoslavia gave it little alternative.

Until the early 1980s MKS, like other steel enterprises in Yugoslavia, obtained foreign exchange allocations from the funds of its Republic. However, because of the Yugoslav debt crisis of the 1980s, the Republic lacked the foreign exchange needed to honour MKS' 'hard currency rights'.¹⁸⁷ The steel makers pressured their customers, the engineering and machine-building enterprises, to provide them with hard currency, arguing (probably erroneously) that they were in a better position to export their products. These demands were energetically resisted by the fabricators.¹⁸⁸ MKS (temporarily) retreated from pressing them, though others did not. It did however continually hanker for 'joint export' arrangements with fabricators. It could not secure such deals, presumably because the fabricators had no interest in sharing with their suppliers any foreign exchange they made from export business—especially as most of them could only export at a loss.

MKS' privileged links into government in Serbia procured it enough foreign exchange to get by in 1981 and 1982, despite restricting its export business to insignificant proportions. It condemned other steel makers' demands for hard currency from their customers as 'blackmail' and claimed it had not demanded foreign exchange from its customers,¹⁸⁹ though some was volunteered, presumably to accelerate deliveries, and was not refused.

By 1983 MKS was desperate for foreign exchange once more. It swallowed its high-minded earlier declaration, and demanded a stiff foreign exchange 'participation' on the steel it delivered, ranging between \$100 and \$400 a ton depending on quality.¹⁹⁰ The customers did not pay up. MKS got the authorities to press them 'to meet in good time their foreign exchange obligations under self-management agreements' to MKS.¹⁹¹ However, self-management agreements were notoriously difficult to enforce. MKS soon had to admit it had failed to 'associate the planned foreign exchange with consumers to provide the import content . . .'.¹⁹²

As little foreign exchange could be extracted from the fabricators, MKS in 1983 began exporting rolled products on a substantial scale¹⁹³ to procure foreign exchange, mainly to import spare parts. Its preference was to avoid a large export business and it illustrated its point by comparing the price at which it exported hot-rolled products, \$220–250, with the home market price of \$400.¹⁹⁴ If it had exported at this relatively low price to utilise spare capacity, and if the export price had exceeded marginal cost, exporting would have been a rational way to maximise profit, but at the time there was no surplus capacity. The home market was 'steel hungry', and MKS had to ration supplies among home market customers. It planned in the coming year only to supply some 65% of their 'needs'.¹⁹⁵

Most of the export data in Table 4 are drawn from definitive official sources, but they are unreliable. MKS' exports were recorded at zero in 1984, but in July that year MKS came under fire for exporting steel while the fabricators were having to import it. The enterprise admitted to exporting around 60 000 tons, adding that the fabricators

did not criticise it because they could not provide MKS with foreign exchange. It could export still more, but restricted its export to its need for foreign exchange, as its exports sold for 30% less than home market deliveries.¹⁹⁶ The foreign exchange charges for home deliveries were not, however, dropped—indeed, in August MKS promised to reduce its exports and depend more on its customers.¹⁹⁷ However, at the end of the year, it was forcing out deliveries for export, and passing defective goods for despatch ‘so as not to delay export deliveries’, and declaring seconds to the purchasers as of first class.¹⁹⁸

TABLE 4
DIRECT EXPORTS OF MKS PRODUCTS

| | <i>Exports</i> | | <i>Of which rolled</i> | <i>Total output (tons)</i> |
|------|---------------------|---------------|------------------------|----------------------------|
| | <i>(\$ million)</i> | <i>(tons)</i> | | |
| 1978 | 7.4 | 51 609 | 0 | |
| 1979 | 4.0 | 23 229 | 0 | |
| 1980 | 1.3 | 6 551 | 0 | |
| 1981 | 0.3 | n.d. | 0 | 282 500 |
| 1982 | 0.3 | n.d. | all | 495 600 |
| 1983 | 7.5 | 40 694 | all | 585 100 |
| 1984 | n.d. | 60 000a | | 547 200 |
| 1985 | 18.9 | 120 441 | | 652 400 |
| 1986 | 23.4 | 125 484 | | 597 800 |
| 1987 | 116.5 | 433 662 | | 931 400 |
| 1988 | 150.0 | 332 280 | | 931 400 |
| 1989 | n.d. | 304 500 | | 1090 100 |
| 1990 | n.d. | 539 000 | | 1074 900 |

Sources: Exports by value in dinars: 1978–79: OUCMJ, *SB* 1979, pp. 117–118; 1980–83: *SB* 1984, Table V1–2; 1983–87: *SB* 1987, pp. 117–119; 1988: *Metkos*, 2 February 1989, p. 1. Dinar values have been converted to dollars at the geometric mean of end of year exchange rates of the current and preceding year.

Exports in tons: 1978–79: OUCMJ, *SB* 1979, pp. 113–114; 1980: *SB* 1981, pp. 113, 117; 1983 and 1985–87: *SB* 1987, pp. 113–114; 1984(a) see text; 1988: OUCMJ, *SB* 1988, pp. 11–12; 1989–90: *Ekonomska politika*, 29 April 1991, p. 42.

Total MKS merchandise output (tons): UCMJ, *Statistički godišnjak 1991*, Table 9.

In 1985 and 1986 MKS exports rose still further. In the first half of 1985 MKS became the second largest exporter in its region.¹⁹⁹ It reiterated that its ‘true economic interest is not in the direct sale of its products on the world market’.²⁰⁰ It bewailed the unprofitability of the business, adding that if it were profitable it would export much more. It did not regard the direct export of steel as a solution to the problems of the industry.²⁰¹

Unlike local purchasers, who seldom risked complaining about what they received (because of the short supply situation), foreign purchasers demanded refunds against the frequently inferior goods with which MKS supplied them.²⁰² The export plan for the first half of 1986 was not fulfilled ‘because of the unresolved quality problem of hot-rolled products exported to European Community markets’. So defects further increased export losses. These losses were mitigated by an export subsidy, but as

Yugoslavia emerged as an exporter of subsidised steel, the EEC slapped an anti-dumping tax on it.²⁰³

MKS exports continued their surge in 1987, but the reasons for the export drive now changed. Firstly, the rapid deceleration of investment sharply reduced home demand for hot-rolled engineering steel. Secondly, the cold mill fire prevented the enterprise from re-processing hotband to cold rolled strip, for which there was unsatisfied domestic demand. Since the output of the enterprise was entirely unresponsive to the market for its products, the warehouses soon bulged with unwanted hot mill products,²⁰⁴ and the incoming management responded with a massive export drive to get rid of them.²⁰⁵

Exports did not become profitable. Comparison of Tables 3 and 4 suggests that the more steel MKS exported the heavier its losses became, but the magnitude of export losses was not known precisely even at MKS. In 1987 Radivojević spoke of 'reasons which drive MKS to foreign markets when *probably* [my italics] financially it does not pay us to do so'.²⁰⁶ He could not speak with certainty for book-keeping had deteriorated into 'disorder and imprecision', while the state of funds was 'incorrectly recorded', as were financial results and enterprise debt.²⁰⁷

When Yugoslavia stabilised its currency at the end of 1989, the reason for MKS to export changed once again—and its need became more pressing than ever. The extreme inflation of the late 1980s had resulted from enormous (concealed) losses sustained by the socialist sector of industry, which were made good by printing money. After the December 1989 currency reform, supposedly tight control was imposed on the issue of commercial credit. The banks could provide only relatively meagre new advances to support their big loss-making clients. These were inadequate to sustain the latter's normal scale—and style—of business. The engineering industry in Serbia, MKS' main customer, was particularly unsound financially, for much the same reasons as was MKS itself. Rapidly outrunning their credits, the fabricators acted as socialist enterprises always did in distress. They screamed for easier credit (i.e. for a return to inflation financing) and failed to settle their debts to trade creditors. They were not troubled by (hypothetical) prospects that bankruptcy might lead to closure. So 'nearly all' MKS' home market customers failed to make payment for what they bought. In April 1990 they owed MKS \$80 million in unpaid invoices.²⁰⁸ This was not a new problem. In 1988 it was already acute,²⁰⁹ but could then be offset by new bank credits. Now the banks were no longer so forthcoming. So MKS, like the other Yugoslav steelworks, boosted its export efforts, as its sole means of getting its hands on cash. It exported \$33 million of its products in the first quarter of 1990,²¹⁰ later admitting the 'substantial' export losses incurred.²¹¹ Nevertheless, exports and foreign credits 'somehow maintained the production cycle'.²¹²

Because Yugoslavia was willing to finance the production of exports at a loss, and on a massive scale, one of its least efficient enterprises emerged as a major source of export earnings. MKS was not exceptional in this respect. Zastava too accepted massive losses on its exports.²¹³ These two firms' export drives helped to swell the volume of corporate losses that led into hyperinflation in 1989 and collapse in 1990–91.

The struggle to preserve MKS

In 1980, when Tito died, the Yugoslav economy had just passed its climacteric. The economy was overburdened with debt, investment declined from year to year, as did per capita income, employment and real earnings.²¹⁴ In 1986 a spending binge in the hope of reviving output produced little but galloping inflation. Press opinion became increasingly outspoken, and a consensus began to shape for a renewed effort at economic liberalisation. Especially after the cold mill fire (March 1986) the press targeted MKS as a symbol of what had gone wrong with the economy. Serbian party boss Ivan Stambolić stated in January 1987 the (hitherto inadmissible) thought that 'this steelworks is a rock on the shoulder of Serbia and . . . a significant factor in its relative backwardness'. The executive council for Serbia debated, as often in the past, how to secure more funds to turn the enterprise round. Now however it did not rule out the possibility of closing the works, or at least of selling off the mass of uninstalled or idle equipment.²¹⁵

Economic reform was anathema to the hard-line nationalist wing of the party in Serbia, and the threat the reformers posed to the future of MKS and its employees was fiercely resisted. MKS was a political stronghold of the party. Its 'political condition' was described as 'good', and its employees, of whom 29.5% were party members, were reputedly 'highly class conscious'.²¹⁶

Efforts by the Yugoslav state to restrain inflation reduced MKS' access to assistance. For example, MKS was to receive no state help to deal with the damage caused by the cold mill fire. The practical effect was abruptly to shrink its employees' remuneration—and to delay payment of wages. Between 1980 and 1985 MKS wages had shrunk in real terms by 32%, to slightly below the Serbian average. Their value was momentarily stimulated during the inflationary boom of 1986, but between December of that year and the second quarter of 1987 they fell from 83.4% of 1980 to 52.6%.²¹⁷ Fear of abandonment to the mercies of market forces caused an upsurge of labour unrest.²¹⁸ In April 1987 the workforce was warned that 'even without the new laws we could not pay higher wages because we have not earned enough'. Production performance had deteriorated, partly because sales had slumped, partly because of the internal shortcomings of the enterprise. There was to be 'rigorous saving' and a temporary cessation of all new investment.²¹⁹

The threat to MKS was one of several linked issues which brought Slobodan Milošević to power, displacing Stambolić from his job. Serbia's economic performance was allegedly deteriorating relative to the Yugoslav average. MKS' woes were blamed by Milošević's ally Borisav Jović not on its own shortcomings but on 'temporary circumstances' and 'inconsistencies in the system and economic policy'. Another supporter, Stefanović, inveighed against 'mistaken official policy that drives MKS into liquidation, into bankruptcy'.²²⁰

The Milošević ascendancy presaged a turn-round in the fortunes of the firm, and a blatant effort to pose as its saviour. Stefanović, at the Republic Executive Council of Serbia, belittled 'the momentary shortage of 50 billion dollars' and derided the effort to make it good 'by the . . . increased sweating of a few . . . thousand increasingly poorly paid workers at MKS'.²²¹ He had a case, but this was equally a case for

closing the factory altogether. This he rejected, claiming that in the longer run closure would cost more than completing the plans for rounding out the enterprise.

Shortly afterwards (April 1987) General Director Radivojević resigned from his post. It is not clear why he resigned, for it was not until August that the party replaced him. This period was one of uncertainty before Milošević's assumption of control. As there followed a clear-out of Radivojević's senior managers,²²² the inference must be that his departure was connected with Milošević's 'anti-bureaucratic revolution'. Once Milošević was securely in the saddle from September 1987, further funds were released to revitalise the factory, and a new attempt was made to complete construction work.

The new temporary manager, Luka Mačkić, enjoyed favourable circumstances for turning its fortunes round, admittedly at enormous cost. His one-year incumbency was accompanied by suspension of self-management by the workers' council. This body (in the view of Davy's Project Director) had been both 'obtuse and thick'. Its teeth were drawn by suspension of self-management, which gave Mačkić greater freedom of action. He demanded 'maximal mobilisation for greater employment' and greater production, which would lead to increased wages.²²³ However, a few days later the workforce learned that there would be redundancies. They were presented as a threat. 'Those who work little or don't work can't have a right to a personal income [wage] or any other right'.²²⁴ However, the shrinkage projected was gradual and modest, with planned diminution of employment from 11 081 in 1987 to 9018 in 1993.²²⁵

Milošević's 'anti-bureaucratic revolution' in the industrial field was concerned primarily to avoid restructuring the Serbian economy. He protected heavy industry interests, and tried through credit creation to boost production and revive the investment cycle. Such policies were unwanted in the northern republics, which came increasingly to be contained within Yugoslavia by military threats. Safe under Milošević's wing, MKS ambitions remained impervious to past experience. Soviet credits had been secured in 1986 for reconstructing the old blast furnace.²²⁶ Despite the lack of convincing reasons why this capacity should be added (other than because the plan said it should), a total of \$322 million in Soviet and Yugoslav funds was earmarked for it.²²⁷ Originally scheduled for completion in 1990, the date was advanced to August 1989,²²⁸ However, work slowed in 1988, as resources were diverted to other projects.²²⁹ Construction was suspended at the end of 1990, probably because a Soviet merchandise credit of \$140 million was 'unrealised'.²³⁰ Major planned investments for the same completion date included a new continuous casting works, new power plant and investment in transport.²³¹ Much of the equipment had probably already been delivered, for MKS admitted in 1988 that some \$70 million of uninstalled equipment was lying in its warehouses. Installation, as usual, moved at a snail's pace for lack of funds.²³² In 1988 MKS planned to achieve final outputs of 1.307 million tons of goods by 1992.²³³ In 1989 it told the World Bank, from which it sought a loan for (cosmetic) restructuring, of its aim to produce 1.65 million.²³⁴

The late 1980s production and investment boom at MKS contrasted with acute difficulties experienced by most other Yugoslav steelworks.²³⁵ To sustain it, the financing needs of the enterprise soared, and the only mechanism for meeting them was the creation of new money. Under a new 'cleansing' programme MKS was awarded, among other subsidies, 'part of the funds of non-paid interest of the National

Bank of Serbia'.²³⁶ No great sum was involved, but the measure draws attention to the increasing role of this Republic 'central' Bank in creating (hyper)inflation finance independently of the Yugoslav central bank.

Thus the protection of the MKS programme at unaffordable expense became an element in the break-up of Yugoslavia. Its experience during Milošević's wars lies outside the ambit of this study, save only to mention that its preservation, and that of similar enterprises, became the lynchpin of the economic policy of Serbia-Yugoslavia.

Conclusions

MKS generated substantial surpluses till the mid 1960s, which then gave way to losses. These deepened so much by the late 1970s that it was barely adding value at all: by the 1980s the enterprise was probably subtracting value. As a result an enormous debt burden was clamped onto Serbia's economy, diverting its investment capacity into an economically sterile project. Even disregarding the debt burden, the putative indirect benefit derived by the fabricators from access to the steel it supplied was probably negative, because of its many shortcomings.

I have identified three key areas that caused MKS' increasing loss-making propensities. Firstly, the enterprise was handicapped by its unbalanced production structure up to 1988, and (a related problem) by its location and systemic lack of access to appropriate raw materials. Distance from the Bosnian orefields, coke shortages and foreign exchange policies restricted and distorted the structure of its supplies, lowering both the productivity of the MKS plant and the quality of its output. In defence of its location it enjoyed favourable access to energy. It also controlled a rather dispersed 'home' market represented by the Serbian metal fabricators, a market on which competition from other Yugoslav steelworks was discouraged.

Secondly, losses arose unavoidably from its inability to construct its highly capital-intensive plant efficiently, and its failure then to operate it close to design capacity. This problem was associated with its organisational incapacity to service, refit and retrofit its machinery efficiently, and to organise the management of its spare parts inventories with even minimal efficiency. The problem was worsened by a drive to minimise foreign exchange expenditure on spare parts and to source them domestically.

Thirdly, MKS' losses were swollen by its increasing export orientation. The Yugoslav financial crisis of the 1980s deprived MKS of access to official sources of foreign exchange. To survive, MKS tried to extort foreign exchange from its consumers, and when this failed, orientated output increasingly to exports. When domestic investment demand slumped in the later 1980s, it exported increasingly to keep the factory occupied. Finally, when currency reform caused domestic customers to default on their bills, exports became its only remaining source of cash. At no time were its exports profitable. For most of the period, MKS steel exports were offset by increased imports by the fabricators.

By 1987, even Serbia's communist politicians were questioning the wisdom of supporting the 'sick man of the Danube'. Funding and wages were squeezed, but Serbia's rejection of economic reform and restructuring under Milošević resulted in the preservation of the status quo, with disastrous results.

The analysis of MKS' 'subjective' shortcomings stops short of explaining what underlay them. MKS had a well skilled workforce and abundant trained engineers. A potential source of this failure of management was the workers' self-management system, at least in the form into which it was remodelled in the 1970s. However, there are other potential factors, for example, the slavish adherence to 'the plan' which ran through all exhortations. Ultimately, MKS wallowed in inefficiency because nobody had both the responsibility and incentive to make things run better. It was managed with an indifference to its problems, as if their solution lay beyond the power of human agency. For example, in 1987 a long stoppage at the blast furnace was caused 'by the big absence of workers and the total demotivation of those who remained', but 'nobody cared about this stoppage'.²³⁷

After the moribund years of war and sanctions, MKS is trying to rebuild its business. It claims 'we are capable of going out onto the world market braver and more aggressively than earlier'.²³⁸ With the help of a \$122 million credit, MKS (reincarnated as SARTID 1913) boosted blast furnace throughput, restarted the convertor and the rolling mills in April 1996, and in the next six months rolled 280 000 tons of steel, exporting 180 000 tons.²³⁹ However, no convincing economic reform is in prospect, so the authorities will have to fund the resulting losses.

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The author gratefully acknowledges the kindness of Mr J. F. Pyman, formerly Davy-McKee Project Director at the MKS cold mill, for interview information and loan of materials in 1992, and thanks the Yugoslav Black Metallurgy Association in Belgrade for access in 1996 to internal statistical publications. The Nuffield Foundation funded preliminary research in 1992 and the Carnegie Trust for the Universities of Scotland funded further research in 1996.

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- ³⁶ *Smederevska železara, informativni podlistak*, 7 July 1971, p. 16.
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- ⁵² *Metkos*, 9 January 1984, p. 1; 12 January 1984, p. 3.
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- ⁹⁹ Feasibility study, f. 30. This plan was wildly optimistic: 223 000 tons of sheet and strip would have sufficed to build at least 350 000 cars, though Zastava made only 136 383 cars in 1985, and never made more than 177 359 (in 1989).
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- ¹³⁹ *Čelik* (special edition), *Industrija čelika Jugoslavije '89/95* (Belgrade, n.d.), p. 39.
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- ¹⁵² *Metkos*, 1 September 1983, p. 3.
- ¹⁵³ *Metkos*, 18 August 1983, p. 3.
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- ¹⁵⁵ Project close-out report, f. 13.
- ¹⁵⁶ Pyman-Čolić, Sheffield, 5 October 1990, fo. 2, annexed to Project close-out report.
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- ¹⁶³ *Metkos*, 6 November 1986, p. 3.
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- ¹⁶⁸ Pyman-Čolić, ff. 2–3.
- ¹⁶⁹ Project close-out report, f. 14.
- ¹⁷⁰ Interview with J. F. Pyman.
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- ¹⁷² *Metkos*, 26 September 1985, p. 5.
- ¹⁷³ *Metkos*, 7 March 1985, p. 5.
- ¹⁷⁴ Nikola Tasić, 'Sanacija dekapirnice u hladnoj valjaonici MK Smederevo', *Čelik*, April 1987, pp. 23–26.
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- ¹⁷⁶ 'International Project. From This . . . To This', *Achievement*, November 1987, pp. 6–7.
- ¹⁷⁷ Tasić, pp. 23–26.

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¹⁸³ See above.
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¹⁸⁶ *Metkos*, 17 May 1990, p. 5.
¹⁸⁷ *Naš glas*, 3 March 1981, p. 10.
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¹⁹⁰ *Metkos*, 29 September 1983, p. 4.
¹⁹¹ *Metkos*, 27 October 1983.
¹⁹² *Metkos*, 12 January 1984, p. 3.
¹⁹³ *Ibid.*
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¹⁹⁵ *Metkos*, 10 November 1983, p. 1.
¹⁹⁶ *Metkos*, 26 July 1984, p. 5.
¹⁹⁷ *Metkos*, 9 August 1984, p. 8.
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²⁰¹ *Metkos*, 6 November 1986, p. 3.
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²⁰³ *Metkos*, 6 November 1986, p. 3.
²⁰⁴ *Metkos*, 6 November 1986, p. 1.
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²¹⁰ *Metkos*, 26 April 1990, p. 1.
²¹¹ *Čelik*, 142, December 1990, p. 35.
²¹² *Ekonomska politika*, 5 March 1990, p. 24.
²¹³ Palairt, 'Mismanaging innovation', p. 125.
²¹⁴ M. Palairt, 'Real Wages and Earnings in Long Run Decline: Serbia and Yugoslavia Since 1862', in P. Scholliers & V. Zamagni (eds), *Labour's Reward. Real Wages and Economic Change in 19th and 20th Century Europe* (Aldershot, 1995), pp. 76–86.
²¹⁵ *Metkos*, 29 January 1987, p. 7.
²¹⁶ *Naš glas*, 23 June 1981, p. 11 and 15 December 1981, p. 11.
²¹⁷ MKS monthly wages January–September 1980: *Naš glas*, 16 June 1981; 1985: *Metkos*, 28 March 1986, p. 15; December 1986: *Metkos*, 14 May 1987, p. 3; April–June 1987: *Metkos*, 2 June 1988, p. 1. The RPI is used as deflator.
²¹⁸ Extracts from *Metkos* in *Čelik*, 125 (April 1987).
²¹⁹ *Metkos*, 9 April 1987, p. 2.
²²⁰ *Metkos*, 25 June 1987, p. 1.
²²¹ *Ibid.*
²²² *Metkos*, 3 September 1987, p. 1.
²²³ *Metkos*, 17 September 1987, p. 1.
²²⁴ *Metkos*, 1 October 1987, p. 1.
²²⁵ *Metkos*, 12 November 1987, p. 1.
²²⁶ *Metkos*, 17 July 1986, p. 1.
²²⁷ *Ekonomska politika*, 25 July 1988, p. 36.
²²⁸ *Metkos*, 4 August 1988, p. 3.
²²⁹ *Ekonomska politika*, 14 March 1988, p. 19.
²³⁰ *Ekonomska politika*, 6 August 1990, p. 35; 24 December 1990, p. 15.
²³¹ *Metkos*, 10 December 1987, p. 6.
²³² *Metkos*, 10 March 1988, p. 3; 16 March 1989, p. 1.
²³³ *Metkos*, 14 January 1988, p. 1.
²³⁴ *Metkos*, 22 June 1989, p. 1.

²³⁵ *Metkos*, 28 January 1988, p. 3.

²³⁶ *Metkos*, 7 April 1988, p. 7.

²³⁷ *Metkos*, 14 May 1987, p. 3.

²³⁸ Duško Matković, 'SARTID 1913—danas', *Industrija čelika Jugoslavije* '89/95, p. 6.

²³⁹ *Ekonomska politika*, 11 November 1996, p. 32.