## OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

## DISCLAIMER



## FAIR USE POLICY



## CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

D00896

United Nations Industrial Development Organization

ID

Distr.
LIMITED

ID/WG.55/4
20 March 1970

ORIGINAL: ENGLISH

Working Group of Experts on
Industrial Project Planning

Beirut, Lebanon, 27 April - 1 May 1970

# IMPLEMENTATION OF INDUSTRIAL INVESTMENT PROJECTS: A STUDY ON THE EXPERIENCE IN YUGOSLAVIA 1/

Prepared by

Djordje Vrcelj
Institute for Industrial Economics
Belgrade

1/ This is a preliminary draft on the study which is yet to be completed. The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO.

This paper has been reproduced without formal editing.

id.70-1674

Table of contents

| | | Page |
|---|---|---|
| PREFACE | | 3 |
| I. | INTRODUCTION - Purpose and framework of the study | 4 |
| II. | CONCEPTS AND METHODOLOGY | 6 |
| | 1. Concept of implementation period used in the study | 6 |
| | 2. The programmed and the actual implementation periods and factors influencing these periods | 8 |
| | 3. Period of immobilization of investment funds | 10 |
| III. | RESULTS OF THE SURVEY: SUMMARY STATISTICS | 12 |
| IV. | CAUSES OF DELAY | 20 |
| V. | LOSSES CAUSED BY DELAYS | 30 |
| VI. | SUMMARY AND CONCLUSIONS | 33 |

## PREFACE

This mimeograph is based on the preliminary draft prepared by Djordje Vrcelj, Institute for Industrial Economics, Belgrade, on a special case study concerning the implementation of major industrial investment projects in Yugoslavia during the period 1956 to 1965. The presentation of the results of the case study and the exposition of their implications are still highly preliminary and need further elaboration and refinements in many respects.

In particular, one should note that the treatment of the concept of implementation period and fund immobilization period in the present draft is not only severely bounded by the nature of the investment records utilized for the survey, but also it appears that some of the analytical possibilities offered by the given data are not yet fully exploited in the present version of the study. Also, as regards the concept of economic losses that are to be associated with project implementation delays, the estimation attempted in this paper concentrates on the "direct" costs of delays and leaves practically untouched those additional cost implications which bear more or less indirectly upon the implementation delays of individual investment projects.

As it stands, however, the study offers a number of illuminating facts and observations regarding the problem of industrial project implementation. The problem is indeed deep-rooted and multi-faceted. The experience in Yugoslavia, as surveyed in this study, will help provide useful clues for those who wish to review systematically the project planning and implementation systems in the developing countries. The UNIDO Secretariat has thus decided to bring this paper, even in this preliminary form, to the attention of the Expert Group on Industrial Project Planning.

## I. INTRODUCTION

- Purpose and framework of the study

The principal purpose of this study, which is predominantly of an empirical nature, is to contribute to the illumination of the problem of implementation of investment projects, to indicate the length of implementing period and to analyse the causes and consequences of delays for selected industrial plants in Yugoslavia.

The results of the analysis given in this study do not relate to the whole Yugoslav industry, but only to 146 industrial projects, i.e. 56 new plants and 90 reconstructions and extensions. The analysis includes the relatively important manufacturing plants constructed and put into operation on the territory of one Yugoslav republic, namely Serbia, during the period of 1956 to 1965, but only those to which the Yugoslav Investment Bank and the three largest business banks in this republic gave credits. This means that the principal criterion for the choice of enterprises for analytical purposes was the magnitude of investment, and not the relative importance to the economy of the branches of industry to which they appertained. We had no intention of favouring this or that branch during the analysis, but made efforts to include as large a number of projects as available in the records of the banks.

Since plants of less than about 1.5 million new dinars (in current prices) are not included, the implementation period expressed here cannot be taken as representative of the branch characteristics. Certainly it would be shorter if all investments were taken into consideration. The relatively large projects, analysed in this study, have indeed contributed significantly to the whole industrial development of Yugoslavia. The largest investments took place in the power and extractive industries, but they have not been analyzed in this study. The analysis only was carried out for plants in the manufacturing industry, of which the following are the biggest and the most important to the Yugoslav economy: four chemical plants; one plant for paper manufacture; one plant for transport equipment manufacture; and one plant of the non-ferrous metal basic industry.

The classification of projects by branches of industry is as follows:

| (ISIC) | | |
|---|---|---|
| 311-312 | food manufacturing | 20 plants |
| 313 | beverage industries | 1 plant |
| 321 | manufacture of textiles | 25 plants |
| 322 | manufacturing of wearing apparel, except footwear | 1 plant |
| 323 | manufacture of leather and products of leather | 4 plants |
| 324 | manufacture of footwear | 3 plants |
| 331 | manufacture of wood and wood and cork products, except furniture | 4 plants |
| 332 | manufacture of furniture | 4 plants |
| 341 | manufacture of paper and paper products | 5 plants |
| 351 | manufacture of industrial chemicals | 7 plants |
| 352 | manufacture of other chemical products | 5 plants |
| 355 | manufacture of rubber products | 4 plants |
| 361 | manufacture of pottery, china and earthenware | 1 plant |
| 362 | manufacture of glass and glass products | 2 plants |
| 369 | manufacture of other non-metallic mineral products | 19 plants |
| 372 | non-ferrous metal basic industries | 3 plants |
| 381 | manufacture of fabricated metal products except machinery and equipment | 10 plants |
| 382 | manufacture of machinery except electrical | 8 plants |
| 383 | manufacture of electrical machinery, apparatuses, appliances and supplies | 10 plants |
| 384 | manufacture of transport equipment | 7 plants |
| 385 | manufacture of professional, scientific and controlling equipment not elsewhere classified | 3 plants |

The period of nine to ten years, i.e. 1956 to 1965, was chosen for several reasons. First of all, we endeavoured to make it more or less comparable to the average lifetime of equipment, which is estimated to be seven to twelve years for many branches. Secondly, since 1965, new events have occurred in the investment system in Yugoslavia, and in our opinion the experience during the post-1965 years is still insufficient for drawing definite conclusions as regards the performance characteristics of the new system. Finally, during the 1956-65 period a large number of plants were constructed and put into operation, so that it was possible to collect the necessary data on the construction of plants in that period.

Some of the problems analyzed in this study may not be equally applicable to other countries and economies. Nevertheless many of the aspects treated may

be found to be commonly relevant to the economy of other countries. In general, the implementation period in the developing countries tends to be relatively long, and delays in the execution of the programmed terms occur very frequently. It is important to recognize not only the time length of implementation but also the causes of delays. We hope this study will provide some insight in this field for those economists, planners and administrators in the developing countries who deal with investment problems.

## II. CONCEPTS AND METHODOLOGY

### 1. Concept of "implementation period" used in the study

In this study the implementation period is understood as the period comprising the time from the beginning of financial expenditure for the construction of a plant until its starting normal operations, i.e. it includes the time spent for construction and assembling, procurement, transport and installation of machinery and appliances and trial production, whether for new plants, extensions, or reconstructions. The implementation period, in the context of this study, does not cover pre-investment activities for project planning and negotiations. It starts when credits are granted for the construction of plants. The period of trial production is included in the implementation period, since during this work further investment is made, and bottlenecks in production are frequent; the invested funds are not fully activated until the trial production is completed. The period needed for testing the technical and technological capacities of the plant, for eliminating stoppages, for training personnel, etc., appeared to be in most cases from six to twelve months for new plants, and less than six months for reconstructed and extended plants, while in certain cases no such experimental period was necessary.

If the banks began to grant credits for projects before the start of construction, the implementation period was considered to start at that moment. It should be noted that credits for projects had been granted when important means were required for them. Nevertheless, credits were granted in most cases only for the start of construction of the plant, so that the implementation period for most plants could be measured as from the moment of starting construction (where expenditures for projects were not very high).

A distinction should be made between the partial and the total implementation of an investment project. In certain cases, individual parts of the plant (shops) are put into operation successively, which may be referred to as partial implementation of the investment. Only when the complete plant starts normal work can we speak of the total implementation. Therefore, in calculating the implementation periods, we bore in mind both partial and total implementation.

The data on the start of construction and the finishing of each plant were obtained from the creditors. In a number of cases distinction was made between investments in reconstruction and those in new constructions, and in each of these cases particular factors influencing their implementation period were examined. In reconstruction the necessary building work is relatively small, focus being primarily on investments in equipment; thus the total period of implementation tends to be normally shorter than the investment in new constructions.

The average implementation period for the groups of enterprises by branches was calculated as a weighted arithmetic mean of the plant construction terms, and the investment value of plants was taken as the weight, i.e. the average construction for a branch of industry as a whole is:

$$\frac{\sum v_i t_i}{\sum v_i} = T$$

where $v_i$ = investment value in i-th plant,

$t_i$ = its period of construction

The above shown method would give precise results if there were not changes in the prices of building material, equipment, etc. While the prices in Yugoslavia changed, the extent of their rise varied from one commodity to another; the technical structure of investments was different not only between different branches, but between plants; even plants with the same capacity were subject to different price structures if they were built in different periods. It is necessary to take into consideration the time distribution of investment expenditures; in some cases a smaller percentage of the total expenditure takes place at the beginning. All this makes difficult the precise calculation of the average implementation period for branches. These difficulties can be moderated, but not completely removed, by converting the investment value into constant prices; this operation should be performed separately for investments in the construction works, in equipment and other things, individually for each year. But we did not have at our disposal the data necessary to perform such

adjustments for price changes. Nevertheless, the results obtained without such price adjustments are not so much misleading, since the equipment prices have not significantly changed, and the equipment constitutes more than half of the total investment value.

2. The programmed and the actual implementation periods and factors influencing these periods

In programming investment implementation, one would consider the period which gives a precise image of the manner of implementation and its optimum duration. Successive and co-ordinated completion of the various different phases of an investment programme is absolutely necessary; for instance, construction must not start before project details are ready. The delivery and assembling of equipment must not be delayed, i.e. it should arrive when the construction is finished and assembling is possible.

The programmed implementation period should correspond to an optimum one. But in actuality this is not often the case. It sometimes happens that shorter terms are presented in the hope of getting funds from the bank, and sometimes a longer period is planned than the optimum one, mainly because of lack of experience. Moreover, it is very difficult to determine the optimum period, for this is also a relative concept. The development of technology will generally act on the one hand in the direction of shortening the time (permitting faster performance of construction work), and on the other hand in the direction of lengthening it (favouring larger and more economical plants). Many other conditions influence the length of implementation period; there are differences between countries, periods, industrial groups, etc. In view of the difficulties in ascertaining an optimum implementation period for an individual case to be included in the study, the programmed terms of construction as reported were taken as the benchmark against which to measure implementation delays.

The actual implementation period usually differs from the optimum or programmed period for various reasons. These reasons, which will later be analysed, may relate, for example, to delays in construction work, late delivery of equipment, lack of foreign currency, etc.

All this shows that, as the programmed implementation period is generally insufficient in practice, a more concrete basis must be considered for the appraisal of the implementation. The optimum implementation period is, it may be said, usually

shorter than the actual one. In a considerable number of cases it can also be shorter than the programmed one. For this reason the gap between the actual and the programmed implementation period, as demonstrated in our study may generally tend to under-estimate the gap between the actual and the optimum.

In the industry of Yugoslavia, as in any other country, a series of factors on which the implementation period depends in its various phases affects both the actual and the programmed ones. Some factors have a general character, while others refer only to particular incidents. The most important general conditions are the following:

(i) The general level of development of the productive forces, and particularly the level of development of the technology in the construction industry and the building materials industry.

(ii) The number and level of professional personnel at the disposal of the society.

(iii) The nature of the investment policy and planning: i.e. whether or not they create conditions favourable for timely mobilization of the necessary investment funds and other resources and personnel.

(iv) The level of efficiency of the system of development administration in putting into effect given investment policies; above all, the efficiency of the credit and foreign payment system.

(v) The possibility of supplying construction materials in the required quantity and quality: cement, bricks, tiles, glass, various equipment, timber, etc.

It should be noted that these general conditions in Yugoslavia (except iii and iv above) have been less favourable than in the advanced countries, influencing on the whole in the direction of lengthening of the implementation period.

As regards the specific factors influencing the speed of project implementation, one would immediately consider the following:

(a) The managerial effectiveness of the personnel executing investment, in obtaining financial approval, licenses and technical documentation, in programming and directing construction schedules, in acquiring and assembling of equipment, in running experimental work and in organizing and carrying out other tasks connected with the construction. The organizational and technical measures depend on the quality and synchronization of the work performed by those responsible for the organization of the investment and its co-ordination.

(b) Quality of preliminary documentation and project design. For instance, if the project is not ready in time or if it is defective, or not based on a proper study of the problem or if it is drawn up

by inadequate professional personnel and in haste, its implementation will be prolonged and the costs of construction will rise. The same happens if the construction is started without a solid project.

(c) The process of plant construction, procuring and assembling of equipment. The faster the construction and the procuring and assembling of equipment, the shorter the implementation period. This depends on a series of factors: the regular supply of the needed building material, sufficient number of workers with correct qualifications, proper organization of work on the building site, the quantity and quality of the equipment for carrying out construction, etc.

(d) Duration of experimental work. It is clear that technical conditions require a shorter or longer time for the plant to reach the stage of normal production, to test the functioning of new machinery and to ensure the harmonization of all parts of the productive capacity, to train personnel, etc. In a great many cases the experimental work lasts longer than expected, thus delaying the total implementation of investment. Practice shows that it is often possible to shorten the period of experimental work, and in this way to accelerate the implementation of the investment.

Some general conditions also act directly on these determinants, e.g. level of skill and number of personnel, level of technology, etc. The Yugoslav industry still lags behind that of the industrialized countries in these respects and this obviously accounts for the relatively long investment implementation period in the Yugoslav industry.

### 3. Period of immobilization of investment funds

For a study of the implementation period it is not sufficient to consider only the construction time. But it is necessary to take into account the differences existing in the time pattern of investment expenditures over years and months, and thus to calculate the immobilization period of the invested funds.

In this study, the immobilization period was measured in the following manner: First, the volume of investments by years for each enterprise was stated, and the length of the construction period for its plant. Then, if the construction of a plant lasted, say, four years and in it was invested a total of 50 million, 10 million in the first, 15 in the second, 5 in the third and 20 million in the fourth year, the immobilization of the 10 million invested in the first year lasted 3.5 years, that of the 15 million invested in the second year lasted 2.5 years, etc. By multiplying the investment value of each year with the time (expressed in years and months) during which it remains inactive, and then by adding these results and dividing the total by the entire value of investment in the plant, we obtain:

$$\frac{(10 \times 3.5) + (15 \times 2.5) + (5 \times 1.5) + (20 \times 0.5)}{50} = 1.8$$

i.e. the average immobilization of the funds during the construction period is 1.8 years.

More generally, the immobilization period is obtained as:

$$\frac{\sum_t (t-0.5)x_t}{\sum_t x_t}$$

where $x_t$ stands for investment expenditures during the t-th year or month. t is measured backward as from the year or month when the plant starts normal production.

If more expenditures are made at the beginning, and less afterwards, this increases the average immobilization.

It may even occur that the total construction period of a plant is long, but the immobilization of funds involved in it is shorter than that of another plant which has a shorter construction period but a different time pattern of expenditures. It should be noted that critical value of the immobilization period be set at one-half of the total construction period. Thus, if a constant amount of expenditure were made every year throughout the construction period, say, four years, then the immobilization period would be two years. The immobilization period would also correspond to the critical value if the time pattern of investment expenditures followed a normal distribution curve. As will be seen later, most of the cases studied here proved to have longer periods of immobilization than one-half of their construction periods. This implies that there are relatively large expenditures at early phases of the construction period.

However, it should be noted that the time patterns of expenditures represented by such a critical value offer no more than a general, arbitrary benchmark and that there is no a priori basis to attach an "optimality" implication to such expenditure patterns. If one considers the average immobilization period implied in the "programmed" implementation to be a benchmark, then its difference from that implied in the actual implementation will be readily associated with the opportunity costs of prolonged immobilization of funds. Since the immobilization period in this context is calculated as an average concept, the foregone revenue due to delayed implementation, as at the time point when a given plant has just started normal production, may simply be

obtained as: $I\ (1 + i)^{dT^*}$

where I is the total investment cost of the plant, dT* the difference of average immobilization period between the actual and the programmed implementation, and i interest rate (market or social rate, whichever may be preferred for the purpose of analysis).

## III. RESULTS OF THE SURVEY: SUMMARY STATISTICS

The actual implementation periods, their differences from the programmed implementation periods, and the average (actual) fund immobilization periods are tabulated below for the 146 industrial projects studied.

In the tabulation, new plants and reconstructions are so distinguished and indicated by (n) and (r), respectively, in the first column.

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| **311-312 Manufacture of food, beverages and tobacco** | | | | |
| **3111 Slaughtering, meat preparation and preservation** | | | | |
| 1 (n) | 33 | 13 | 65 | 17 |
| 2 (n) | 38 | 9 | 31 | 12 |
| 3 (n) | 46 | 12 | 35 | 24.7 |
| **3112 Dairy products** | | | | |
| 1 (n) | 41 | 9 | 28 | 31 |
| 2 (n) | 35 | 6 | 21 | 25 |
| 3 (n) | 30 | 12 | 67 | 18 |
| **3113 Fruits and vegetable canning and preserving** | | | | |
| 1 (n) | 27 | 12 | 80 | 17 |
| 2 (n) | 28 | - 6 | - 18 | 18 |
| 3 (n) | 43 | 22 | 105 | 32.8 |
| 4 (r) | 52 | 33 | 174 | 38.4 |
| **3115 Vegetable and animal oils and fats** | | | | |
| 1 (r) | 47 | 19 | 68 | 32 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | Difference from the programmed (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| 3116 Grain mill products | | | | |
| 1 (r) | 34 | 23 | 209 | 24 |
| 2 (r) | 25 | 12 | 92 | 8.6 |
| 3 (r) | 40 | 23 | 135 | 25 |
| 3118 Sugar refineries | | | | |
| 1 (r) | 54 | 0 | 0 | 25 |
| 2 (r) | 56 | 8 | 17 | 35 |
| 3 (r) | 36 | 0 | 0 | 21.5 |
| 4 (r) | 52 | 12 | 30 | 26.7 |
| 5 (n) | 52 | 12 | 30 | 29 |
| 6 (n) | 34 | 25 | 278 | ... |
| 321-322 Manufacture of textiles | | | | |
| 3211 Spinning, weaving and finishing | | | | |
| 1 (n) | 38 | 12 | 46 | 21.5 |
| 2 (n) | 32 | 16 | 100 | 19.3 |
| 3 (n) | 43 | 22 | 105 | 31.3 |
| 4 (r) | 30 | 0 | 0 | 13.2 |
| 5 (n) | 44 | 8 | 22 | 25.5 |
| 6 (r) | 14 | 1 | 9 | 10.8 |
| 7 (r) | 25 | 18 | 257 | 19 |
| 8 (r) | 17 | 12 | 200 | 12 |
| 9 (r) | 31 | 25 | 417 | 15 |
| 10 (n) | 39 | 3 | 8 | 22.3 |
| 11 (n) | 44 | 15 | 52 | ... |
| 12 (n) | 67 | 39 | 130 | ... |
| 13 (r) | 42 | 12 | 40 | ... |
| 14 (r) | 19 | 2 | 12 | ... |
| 15 (n) | 33 | 12 | 57 | 16.3 |
| 16 (r) | 13 | 4 | 44 | 7 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| 3213 Knitting mills | | | | |
| 1 (r) | 21 | 18 | 600 | 9.8 |
| 2 (r) | 25 | 14 | 127 | 11 |
| 3 (r) | 16 | 10 | 167 | 10 |
| 3215 Cordage, twine and ropes | | | | |
| 1 (n) | 16 | 1 | 7 | 10 |
| 2 (n) | 21 | 12 | 133 | 9 |
| 3 (r) | 46 | 33 | 254 | 19.4 |
| 4 (n) | 31 | 8 | 35 | 31 |
| 5 (n) | 34 | 8 | 31 | 18 |
| 3219 Manufacture of textiles n.e.c. | | | | |
| 1 (r) | 17 | 9 | 150 | 7.7 |
| 3220 Wearing apparel, except footwear | | | | |
| 1 (n) | 1[illegible] | 19 | 83 | 20.5 |
| 323-324 Manufacture of leather and leather products | | | | |
| 3231-3232 Leather tanneries and fur processing | | | | |
| 1 (r) | 32 | 17 | 113 | 19 |
| 2 (r) | 33 | 16 | 94 | 22.6 |
| 3 (r) | 33 | 19 | 136 | 20 |
| 4 (r) | 18 | 4 | 29 | 13.2 |
| 3240 Footwear, except rubber and plastic | | | | |
| 1 (n) | 34 | 32 | 183 | 17.4 |
| 2 (n) | 26 | 4 | 18 | 12.4 |
| 3 (n) | 23 | 0 | 0 | 19 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| **331-332 Manufacture of wood and wood products** | | | | |
| **3311 Sawmills** | | | | |
| 1 (n) | 27 | 5 | 23 | 15.3 |
| 2 (n) | 31 | 12 | 63 | 23.6 |
| 3 (r) | 51 | 30 | 143 | 38 |
| 4 (n) | 37 | 0 | 0 | ... |
| **3320 Wooden furniture and fixtures** | | | | |
| 1 (n) | 32 | 10 | 45 | 18.3 |
| 2 (r) | 34 | 24 | 240 | 19.7 |
| 3 (r) | 30 | 24 | 400 | 19.7 |
| 4 (r) | 13 | 6 | 86 | 8.6 |
| **341 Manufacturing of paper and paper products** | | | | |
| **3411-3412 Pulp, paper, paperboard and their products** | | | | |
| 1 (n) | 57 | 15 | 26 | 33 |
| 2 (r) | 30 | 6 | 25 | 14.8 |
| 3 (n) | 50 | 18 | 56 | 23.7 |
| 4 (n) | 43 | 4 | 10 | 40 |
| 5 (n) | 41 | 17 | 71 | ... |
| **351-352 Manufacture of chemicals** | | | | |
| **3511 Basic industrial chemicals** | | | | |
| 1 (r) | 41 | 19 | 86 | 21 |
| **3512 Fertilizers and pesticides** | | | | |
| 1 (n) | 53 | - 12 | - 18 | ... |
| 2 (r) | 36 | 15 | 71 | ... |
| 3 (n) | 79 | 0 | 0 | 43.8 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| 3513 Synthetic resins and fibres | | | | |
| 1 (n) | 74 | 0 | 0 | ... |
| 2 (n) | 37 | 24 | 185 | ... |
| 3 (r) | 52 | 33 | 174 | 29.5 |
| 3521 Paints, varnishes and lacquers | | | | |
| 1 (r) | 48 | 28 | 140 | 18.1 |
| 3523 Soap, cosmetics and toilet preparations | | | | |
| 1 (r) | 26 | 15 | 136 | ... |
| 2 (r) | 18 | 3 | 20 | 14.4 |
| 3 (r) | 32 | 7 | 28 | 24.7 |
| 3529 Chemical products, n.e.c. | | | | |
| 1 (n) | 91 | 7 | 8 | 63.8 |
| 355 Manufacture of rubber products | | | | |
| 3551-3559 Tyres, tubes and other rubber products | | | | |
| 1 (r) | 27 | 13 | 93 | 12.8 |
| 2 (r) | 19 | 0 | 0 | 10.7 |
| 3 (r) | 39 | 23 | 144 | 26 |
| 4 (r) | 47 | 37 | 370 | 32 |
| 362-369 Manufacture of non-metallic mineral products | | | | |
| 3620 Glass and glass products | | | | |
| 1 (r) | 15 | 0 | 0 | 11.3 |
| 2 (r) | 34 | 21 | 161 | 31 |
| 3691 Structural clay products | | | | |
| 1 (r) | 38 | 22 | 137 | ... |
| 2 (r) | 37 | 0 | 0 | 23.6 |
| 3 (n) | 40 | 16 | 67 | 28 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| 3691 Structural clay products (continued) | | | | |
| 4 (n) | 48 | 26 | 118 | 32.8 |
| 5 (n) | 42 | 23 | 121 | 21.8 |
| 6 (n) | 30 | 18 | 150 | 17 |
| 7 (n) | 44 | 13 | 109 | 28.4 |
| 8 (n) | 29 | 7 | 32 | ... |
| 9 (r) | 60 | 42 | 233 | ... |
| 10 (r) | 32 | 26 | 433 | ... |
| 11 (r) | 57 | 39 | 217 | ... |
| 3692 Cement, lime and plaster | | | | |
| 1 (r) | 44 | 0 | 0 | ... |
| 2 (r) | 42 | 11 | 35 | ... |
| 3 (n) | 48 | 32 | 200 | 19.6 |
| 4 (n) | 51 | 30 | 143 | 23 |
| 5 (n) | 43 | 15 | 54 | 22.3 |
| 3699 Other non-metallic mineral products | | | | |
| 1 (n) | 38 | 14 | 58 | ... |
| 2 (r) | 40 | 22 | 122 | ... |
| 3 (n) | 21 | 9 | 75 | ... |
| 372 Basic non-ferrous metals | | | | |
| 3720 Non-ferrous metals | | | | |
| 1 (n) | 30 | 12 | 67 | ... |
| 2 (r) | 29 | 5 | 21 | 12.4 |
| 3 (n) | 24 | - 25 | - 51 | ... |
| 381-385 Manufacture of fabricated metal products, machinery and equipment | | | | |
| 3811 Cutlery, handtools and hardware | | | | |
| 1 (r) | 23 | 12 | 109 | 17 |
| 2 (r) | 40 | 12 | 43 | 32 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| 3811 Cutlery, handtools and hardware (continued) | | | | |
| 3 (r) | 44 | 20 | 144 | ... |
| 4 (r) | 13 | 1 | 8 | ... |
| 3813 Structural metal products | | | | |
| 1 (r) | 43 | 19 | 79 | 24.2 |
| 2 (r) | 34 | 19 | 127 | 21.6 |
| 3 (r) | 38 | 35 | 1167 | ... |
| 4 (r) | 19 | 8 | 73 | 11 |
| 3819 Fabricated metal products, n.e.c. | | | | |
| 1 (r) | 20 | 16 | 400 | ... |
| 2 (r) | 33 | 22 | 137 | ... |
| 3821 Engines and turbines | | | | |
| 1 (r) | 14 | 6 | 75 | ... |
| 2 (r) | 43 | 33 | 220 | ... |
| 3822 Agricultural machinery and equipment | | | | |
| 1 (r) | 40 | 22 | 122 | ... |
| 2 (r) | 29 | 11 | 61 | ... |
| 3823 Metal- and wood-working machinery | | | | |
| 1 (r) | 50 | 29 | 138 | 27 |
| 2 (r) | 28 | 20 | 250 | 16 |
| 3 (r) | 31 | 15 | 94 | 16.7 |
| 4 (r) | 29 | 19 | 190 | 11.7 |
| 3831 Electrical industrial machinery and apparatus | | | | |
| 1 (r) | 16 | 15 | 1500 | 11.2 |
| 2 (r) | 31 | 12 | 63 | 23.7 |
| 3 (r) | 14 | 0 | 0 | 7.1 |
| 4 (r) | 16 | 0 | 0 | 8.8 |

| Project | Actual implementation period (months) | Difference from the programmed (months) | (%) | Average (actual) fund immobilization (months) |
|---|---|---|---|---|
| 3832 Radio, television and communication equipment | | | | |
| 1 (r) | 10 | 0 | 0 | 10 |
| 2 (r) | 12 | 0 | 0 | 12 |
| 3 (r) | 39 | 30 | 333 | 25 |
| 3839 Electrical apparatus and supplies, n.e.c. | | | | |
| 1 (r) | 20 | 12 | 150 | 16.7 |
| 2 (r) | 26 | 9 | 53 | 10 |
| 3 (n) | 24 | 3 | 14 | 18 |
| 3842 Railroad equipment | | | | |
| 1 (r) | 24 | 16 | 200 | ... |
| 2 (r) | 27 | 12 | 80 | ... |
| 3843 Motor vehicles | | | | |
| 1 (r) | 42 | 10 | 31 | ... |
| 2 (r) | 7 | - 3 | - 30 | 7 |
| 3 (r) | 27 | 9 | 50 | 13.8 |
| 4 (r) | 15 | 0 | 0 | ... |
| 5 (r) | 30 | - 5 | - 14 | ... |
| 3851 Precision equipment and instruments | | | | |
| 1 (r) | 22 | 10 | 83 | ... |
| 2 (r) | 44 | 28 | 175 | 26.8 |
| 3 (r) | 35 | 12 | 52 | ... |

## IV. CAUSES OF DELAY

### 1. Various causes of implementation delays

In the preceding expositions it was stated that in the majority of plants there were delays in implementation relative to the agreed terms. These could be associated with a variety of problems arising in different phases of construction. Some of these problems were to be settled by the investors themselves, within the limits of their capabilities. For the solution of some other problems, factors external to their projects (government authorities, banks, chambers, associations, etc.) had to be considered. There may also have been a number of problems which reflected the general economic conditions of the country and could not be solved on the spot by any agents.

There were many causes of delay, some of which appeared more often and others less. There are usually not one but many causes that contribute to delays with varying degrees of intensity. Delays occurred practically in all implementation phases, but relatively more often during the actual construction and assembling and in the supplying and assembling of equipment.

Among the causes of delay which are worth mentioning, the following appeared to be the most important in the period considered:

(a) Insufficient development of the economy: frequent foreign trade deficits and lack of funds for the procurement of equipment and for the import of production material by domestic machinery manufacturers;

(b) Defects in the system of planning, crediting and financing of investments;

(c) Insufficiency of technical experience and knowledge of modern technology, insufficient elaboration of investment projects;

(d) Insufficient depth of study on investment programmes, as well as changes of the original conceptions, which caused the over-running of estimated investment amounts and increase in construction costs;

(e) Lack of means to cover foreseen investment costs;

(f) Start of plant construction without adequate elaboration of the main project;

(g) Lengthy process of revision of documentation (which the banks performed in the period under study) and the relatively long procedure of the crediting of money to the investor's account in the bank; frequent changes of site and the protracted process of obtaining administrative and other documents (approval of construction, localization, waterworks and electric distribution, etc.), as well as slowness in the bidding for the estimate and choice of executing contractor;

(h) Relatively long period of preparation with executors of the work, insufficient mechanical equipment for building operations and slowness in performing craftsmen's work;

(i) Defects in the estimated value and elements of the project; frequent appearance of gaps between the estimated prices for individual operations and the actual costs incurred;

(j) Lack of some fundamental building materials and frequent changes in their prices (cement, glass, steel and iron for concrete), gaps between the capacities of building industries and the production of building materials;

(k) Lack of investor's funds to pay the executors in time, leading to stoppages of work;

(l) Loss of time in discussions with national and foreign manufacturers of machinery; insufficient mastery of machinery production by domestic manufacturers;

(m) Delay in the delivery of home-manufactured equipment because of defects in co-operation relations, and sometimes because of the unsatisfactory quality of such equipment, which caused a re-orientation of the supply to the foreign market;

(n) Relatively long process with the bank for obtaining certain guarantees for foreign loans for the import of equipment, for opening letters of credit, for the assignment of advances, as well as in a number of cases slowness in delivery of foreign equipment due to lack of funds for advance and interim payments;

(o) Relatively frequent changes in import and export regulations especially concerning equipment import (customs duties, turnover tax, changes in the exchange rate, etc.);

(p) Rise in the prices of home and foreign equipment;

(q) Long process of tendering the choice of the equipment suppliers before drawing up the contract;

(r) Technical problems in the experimental work and slow mastering of production and technology by the Yugoslav workers; etc.

If we attempt to reduce the number of the cited causes or to re-group them in more general terms, they would be as follows:

- Insufficient economic and technical development of the economy and short-comings in the system of planning, crediting and financing of investments;
- Short-comings in the preparation of plant construction, project designing and granting of loans;
- Defects in the organization of building operations and project management;
- Defects in domestically manufactured machinery.

Some of these defects were eliminated, at least partially, during the period considered for this study, and especially after the enacting of the economic reform of 1965, which ensures a better investment system.

Concerning the frequency of individual causes of delay, analysis shows that in the total 117 projects the over-running of the programmed construction costs contributed to delays in 94 cases; then there were delays in the delivery of home and foreign equipment in 75 projects; the performing of additional work caused by other delays and changes in 70 projects. In a great number of cases (47) defects in the execution of building works were the cause of delay in construction, while incomplete project studies and their defects contributed to delays in 56 cases, and changes in the original conception in 47 projects. Very often the origin of the delay - in 52 cases - was lack of foreign currency for the import of equipment and reproduction material. Lack of means for the guarantee for foreign credits and for personal financial participation caused delays in 16 projects. To obtain a more complete survey of causes of delay, it is necessary to analyse these causes more closely, and the impact of the most important ones.

2. The effects of the main factors on the cases studied

One of the principal and general causes of delays in the implementation of a number of plants was the insufficient development of the industrial economy. Although the industry of Yugoslavia has achieved great progress in the post-war period, its development level still considerably lags behind that of the industrialized countries. Insufficient development restricts the possibility of capital accumulation and of investment in industry; the industrial branches which were to materially ensure the realization of investment have not been in a state matured enough to do so. The deficit in the trade balance often caused lack of foreign exchange, and this was one of the reasons why many arrangements concerning the supply of equipment, although well conceived, could not be realized satisfactorily. Lack of foreign currency had a great influence on the home manufacturers of machinery. The import of production material for the manufacture of equipment often could not be carried out due to lack of foreign exchanges, or was effectuated with considerable delay. Therefore, the construction of many plants was delayed, or the agreed implementation term was prolonged by the bank-creditor for an indefinite time.

Defects in the system of planning, distributing and using the investment funds were particularly notable in the period before the enactment of the 1965 economic reform. In this connexion, it should be noted that the investment front was too wide; often the construction of a great number of plants started

simultaneously. The investment plans were not sufficiently concordant with the available funds, and construction started often before the necessary funds had been provided. In one-third of the total number of projects studied, the prolongation of the implementation period was caused by lack of guarantees and of personal financial participation; in 45 per cent of the projects foreign currency was lacking for the import of equipment and production materials. In a large number of cases the executors of work were obliged to reduce or even temporarily stop construction because the investors did not have the necessary means for payment, etc.

Adequate attention was not always paid to the development of the building materials industry. Fluctuations occurred in the investment market. In a certain period there was a lot of building work in some branches and then a stagnation occurred. Generally the volume of funds at the disposal of investors varied too greatly from one year to another.

Deficiencies existed in the preparation as well. Before the economic reform it was not the Yugoslav practice to separate the funds for research and project studies from those for construction. Only 5 per cent of the total investment value was earmarked for preliminary work and project studies (while in some Western countries this percentage comes to about 20 per cent). Construction frequently had started before equipment was not precisely known, before the construction site was sufficiently studied, before the supply of raw material, water, energy, communication lines, personnel, market, etc. was secured.

The 1956-1965 period suffered defects in the system of crediting and financing of investment. Definite criteria and rates of investment efficiency as the conditions for obtaining a loan were yet to be established. Investors sometimes artificially reduced the construction terms only with the aim of obtaining credits. The bidding which the banks announced was sometimes carried out without a competent analysis of the necessary capacities; sometimes the credits once suggested were no longer ensured when the tendering of contractors actually took place; funds expected to become available by a given date did not always become so in time.

The state organs and banks took measures for the elimination of these and other deficiencies. Many were eliminated or alleviated, either by changes in the organizational system of crediting and financing, or by enacting new rules and procedures. However, only with the enactment of the economic reform did

the situation change radically. Today, the main sponsors of investments are individual enterprises, and a greater part of investment funds belongs to them; the system of competition for bank credits has ceased, and the role of banks has changed to a great degree.

The frequent changes and deficiencies in the régime of import and export were one of the causes of implementation delays in the 1956-1965 period. A large number of measures concerning imports and exports, customs duties, turnover tax, were promulgated during this period. The dollar rate was often changed (1 dollar was the equivalent to 300, then 350, then 633, 750 old dinars, etc.) and there were also a number of changes in the regulations concerning the mode of payment of the obligations to foreign countries. The greatest deficiencies arose in long-term transactions, due to lack of foreign currency. In relation to foreign countries there were frequent changes of regulations, restrictions, regional discrimination policies, embargo on equipment import, etc.

The lack of foreign currency for the import of production material for domestic manufacturers of machinery was particularly notable. For this reason the latter were often not able to produce and deliver the adequate number of equipment and machines, and this resulted in the inevitable retardation and prolongation of the construction time for many plants.

It should also be mentioned that the specification of the regions from which to procure equipment, which was conditioned by the bank, changed frequently. Changes of supplier countries meant changes in the original technical standards, magnitude, terms of delivery, etc. Besides delaying the delivery term, this affected the choice of the technological process and other basic elements of investment programmes.

The lack of foreign currency exerted critical influences on the already allocated quota as well as on the additional quota required for the completion of plants under construction. Investors had often to wait for the allocation of funds and in certain cases they were obliged to modify their procurement direction if the lack of funds proved to be of long duration.

The defects in the projects themselves were one of the most important causes for the over-running of terms and the slow implementation in a number of plants. Some investors started the construction of expensive capacities with construction agents and equipment manufacturers who were not conversant with the domestic market. Consequently, production was performed with high costs.

In general, the incompetence of investors was one of the most important causes of delay. An inadequately specialized group happened to draw up a scheme, and on this basis the investment project was elaborated and documented for competition for the granting of credit. Later, in the course of construction, the investor asked an engineering organization to provide him in a very short time with a project for the desired plant, for which the site had already been determined, but which sometimes did not satisfy the exigencies of the urban authorities or the water administration.

In some investment programmes an inadequate project study led to their changes during the construction period, and in some cases this involved an augmentation of the total investment by more plants, as well as the changing of the construction terms foreseen in the loan agreement (this occurred in 40 per cent of the cases studied).

In some projects in the metal-working industry, for example, changes in the investment programme occurred, not only at the beginning of construction, but also in the phase when the selection of equipment took place. The change of equipment, procurement choice, and direction immediately affected the magnitude of building works, the speed of their execution, and the mechanization characteristics of plants.

In the building material industry, changes in project conception occurred in all the projects for the production of bricks and tiles, while for cement production and for other plants such changes seldom occurred. Changes in the projects for bricks and tiles occurred principally because of deficiencies in the original investment programmes with which the investors participated in competitions for obtaining bank loans. During construction the investors changed the original conceptions, with orientation to more modern technological solutions and more modern equipment. The original programmes which served as the basis for obtaining loans, were oriented toward domestic equipment, relying on the declarations of the home manufacturers that they could deliver all the necessary equipment in time. However, in practice it proved that the home manufacturers of machines could not always satisfy the investors' requests either as regards assortment or quality, so that in order to accelerate construction the bank had to allocate to the investors, foreign exchange for the procurement of machines for the production of bricks and tiles.

Retardation in the elaboration of projects occurred due to the professional incompetence of those who prepared them. But the incompetence of

the investors was also to be blamed, who did not know all the necessary technical data on the domestic and foreign equipment (number of machines, technical data, work characteristics, etc.) to be considered before they made commitments. The over-running of investment costs, especially equipment costs, occurred in those branches where projects aimed at the development of new production capacities (particularly in the non-ferrous metallurgy and chemical industries, as well as in the machinery industry).

Investors had to solve by themselves the problems of over-running costs in various phases of construction. Although the bank procedure for solving such problem was typically slow, the granting of new funds nevertheless permitted the investor to continue construction. However, lack of funds for the payment of the bills for the building work executed by the contractors hit the investors hardest. Enormous damage was done in situations when the bank, due to lack of foreign currency, could not make payable to the investor the funds to settle their liabilities against the foreign supplier of equipment whose delivery was in progress.

One of the causes of the over-running of the planned terms in a large number of projects might be deficiencies on the part of building contractors. Today, the building industry is characterized by a high rate of expansion, increased mechanization, increased division of work, improved specialization for executing particular works, increase in the number of engineers and technicians, highly qualified, and qualified workers at its disposal. There are many successful enterprises which are equipped with the capacity of ensuring the execution of works on manifold projects at home and abroad.

In many cases examined in this study, in fact, the problem of retarded work of contractors was not so much related to the deficiences of building operations themselves as other more external factors which conditioned the execution of work (late reception of detailed design of the project, changes in the project during the execution of work, lack of some building materials on the market, lack of funds at the investor's disposal, etc.).

Despite the notable progress made in the building industry, it continued to suffer from a range of deficiencies which impeded fast investment implementation. The capacity of the major building enterprises was still relatively small; they were small and scattered, and commenced works on more sites than their capacity allowed. A number of building enterprises were not yet sufficiently specialized. Strictly specialized enterprises hardly could

survive. In order to survive they had to undertake manifold projects and frequent re-orientation of business. Expensive, slow and irrational construction methods still exist in the building trade.

One of the deficiencies in the building industry is attributable to the insufficient preparation of the plant construction. This was manifested in frequent stoppages, interruptions, etc. Building contractors did not devote sufficient attention to the working-out in detail of the construction, but were accustomed to begin with preliminary measurements and calculations. Their attention was directed mostly to the execution of individual works as they were identified.

One of the most frequent causes of the over-running of the planned implementation terms was deficiencies in the home manufacture of machinery, since this branch played an important part in ensuring the continuity of plant construction, whether it was a new construction or an extension and modernization.

In a number of cases the investors lost a lot of time discussing with the home machine producers the question as to what equipment they would undertake to produce in the country and what should be imported.

The home manufacturers of machinery sometimes undertook the delivery of equipment whose production had not been mastered. Therefore the quality of this equipment did not satisfy the needs of investors and consequently the latter had to resort to imports at later stages.

There was frequent non-fulfilment of the terms of delivery on the part of the home manufacturers of machinery. The causes were either the deficiencies of individual manufacturers or the deficiencies in their network of co-operation. A certain number of machinery manufacturers found it impossible, due to lack of foreign currency, to import production material for the scheduled production.

Delays in the delivery of equipment occurred also when the increase in machinery prices was met by the investors who lacked the funds to pay for the increments.

The effects of the above-cited causes of implementation delays vary from branch to branch - some causes appear more often in one branch than in another. Of course, their frequency changes from period to period, depending on the basic environmental conditions. The data for 1956-1965 for 117 projects where delays in the planned implementation terms arose are summarized in the following table.

Important direct causes of project implementation delays by branches

| | 311 313 | 321 322 | 323 324 | 331 332 | 341 | 351 352 | 355 | 361 362 369 | 372 | 381-2 383-5 | 383 | Total number | % of total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of projects by branches | 18 | 24 | 6 | 7 | 4 | 9 | 3 | 19 | 2 | 22 | 3 | 117 | 100.0 |
| 1. Incompleteness and poor quality of projects | 10 | 4 | 2 | 4 | 3 | 5 | 2 | 14 | - | 10 | 2 | 56 | 47.9 |
| 2. Change of project conceptions | 10 | 5 | 4 | 3 | 3 | 2 | 2 | 13 | 1 | 2 | 2 | 47 | 40.2 |
| 3. Deficiencies of building operatives | 13 | 14 | 4 | 5 | 4 | 6 | 1 | 10 | - | 9 | 1 | 67 | 57.3 |
| 4. Changes of site | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 4 | 1 | 1 | - | 18 | 15.4 |
| 5. Delay of delivery of machinery | 14 | 16 | 2 | 5 | 3 | 2 | 3 | 14 | 1 | 15 | - | 75 | 64.1 |
| 6. Over-running of costs due to price increase | 16 | 18 | 4 | 6 | 4 | 7 | 3 | 14 | 2 | 18 | 2 | 94 | 80.3 |
| 7. Supplementary works needed | 15 | 10 | 4 | 3 | 3 | 6 | 2 | 11 | 1 | 13 | 2 | 70 | 59.8 |
| 8. Lack of foreign currencies for equipment and production material | 11 | 5 | 3 | 5 | 2 | 6 | 1 | 9 | 1 | 7 | 2 | 52 | 44.4 |
| 9. Late approval of commercial agreement and letter of credit from bank | 6 | 8 | 4 | 4 | 2 | 4 | 3 | 9 | 1 | 6 | 3 | 50 | 42.7 |
| 10. Lack of funds | 10 | 4 | 2 | 3 | 2 | 5 | 2 | 4 | 1 | 6 | 1 | 40 | 34.2 |
| 11. Act of God (underground waters, land-slide, bad weather, etc.) | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 4 | - | 1 | - | 16 | 13.7 |
| 12. Change of region from which to procure equipment imports | 6 | 3 | 3 | 2 | 1 | 1 | 2 | 5 | - | 5 | - | 28 | 23.9 |

In all branches the most frequent cause of delay was lack of funds for construction, which in turn occurred due to the over-running of costs. Over-running appeared in all phases of construction (in building works, in procurement of equipment, etc.). Some 60 per cent of the investors were faced with unforeseen additional works which necessarily had to be executed in order to complete the plant for normal production. The cost over-running and supplementary works indicate at least two things: the changes in prices for goods and services were frequent; and the elaboration of the main investment project often was not adequate.

In branches 321, 322, 331, 332, 341, 355, 361, 362, 369, 372, 381, 382, 384, and 385, the second most important factor was delays in the delivery of equipment by home and foreign producers of machinery. It appeared in 64 per cent of the total 117 projects in which the over-running of the programmed construction terms occurred.

In all branches, except 355, 361, 362, 369, 372 and 383, the cause which took the third place in significance consisted of deficiencies on the part of the building contractors. However, as explained earlier, they cannot be considered as being completely the fault of the building contractors, but changes in project conception, various supplements, investors' failure to supply them with the necessary payments, etc. are associated with this factor. According to our data obtained from interviews, the work contractors were late because of their incompetence and deficiencies, or deficiencies of craftsmen in less than 30 per cent of a total of 117 projects.

Inadequacy of projects was also a significant cause of delays in the majority of branches, especially in 311, 312, 341, 361, 369, 381, 382, 384 and 385.

As regards lack of foreign exchange for the import of equipment and production material, this appears as the cause of retardation in a considerable number of projects in branches 311, 312, 313, 331, 332, 351, 352, 361, 362, 369 and 383. It appears in all other branches too, but to a lesser degree.

In all branches the change of project conception in the investment programme appears as one of the important causes of delays in implementation, especially in branches 311, 313, 323, 324, 331, 332, 341, 355, 361, 362 and 369.

Similarly in all branches one of the most important causes of delay in implementation was the delayed approval of the commercial agreement, bank credits and advance and interim payments to the foreign supplier of equipment; this cause was even the main one in branches 323, 324, 355, 383 and 385. It appeared in 50 out of 117 projects.

## V. LOSSES CAUSED BY DELAYS

### 1. Principal categories of losses caused by delays at enterprise, branch and aggregate level

The losses caused by delays of implementation can be manifold. In the first place, for those years spanning from the programmed date of completion to the actual date of completion, one can speak of direct losses in production and income. There are also losses in the form of the over-running of construction costs caused by lengthening of the building time which should be counted in. In addition, there are opportunity costs of prolonged immobilization of funds, as mentioned in the previous section.

The delay of implementation often leads to a situation in which the investment values suffer a loss in terms of technological obsolescence. During the long period of construction, it may happen that projects undergo changes, which causes additional construction costs; when projects do not change, then some of the machines may prove already obsolete by the time they are actually installed.

In the calculation of losses, as will be presented later in this study, the lost social product for the extra period required for implementation was considered as the most important indicator. In the calculation of this, the foreseen annual production volume of new plants (in the case of reconstructions, the expected growth of social product) was taken as it was; this was divided by 12 in order to obtain the monthly foreseen production; then the result was multiplied by the number of months during which the putting into operation of the plant was retarded. In this way we obtained the direct losses in social product.

We proceeded similarly in calculating export losses. For a great number of projects the necessary data was not available for the calculation of net losses in foreign currency. Also, the calculation was made with prices as given in the original programme itself.

Direct losses were also calculated in terms of the number of jobs which failed to be created in the expected years due to delayed implementation.

All these calculated direct losses are conceptually straightforward and do not need any arithmetic sophistication. For the losses of more "indirect" nature, no attempt was made in this study to calculate them in quantitative terms, mostly due to the lack of necessary data. But this aspect will be dealt with in more detail later in a follow-up research.

The total amount of the direct loss in social product of all the 112 analysed projects is 986 million new dinars in current prices. The greatest losses in this form occurred in the construction of plants for the manufacture of metal products, machinery and equipment, especially of plants for the

| Branch of projects | Number of plants with delayed starting-up | The lost social product in millions of new dinars (in current prices) |
|---|---|---|
| 311-312 | 15 | 95.00 |
| 313 | 1 | 0.26 |
| 321 | 16 | 111.97 |
| 322 | 1 | 0.20 |
| 323 | 4 | 9.10 |
| 324 | 2 | 8.72 |
| 331 | 3 | 20.76 |
| 332 | 4 | 25.12 |
| 341 | 5 | 68.40 |
| 351 | 4 | 58.93 |
| 352 | 5 | 32.44 |
| 355 | 2 | 47.60 |
| 361 | 1 | 0.75 |
| 362 | 1 | 2.52 |
| 369 | 17 | 45.46 |
| 372 | 2 | 85.00 |
| 381 | 8 | 70.00 |
| 382 | 8 | 146.46 |
| 383 | 5 | 68.46 |
| 384 | 5 | 62.00 |
| 385 | 3 | 26.31 |

manufacture of machinery and equipment. The plants of this branch, which suffered delays in their construction, constitute 26 per cent of the total number of 112 plants, but their share in the loss of social product amounts to about 38 per cent. The textiles industry occupies the second place and a single project in this branch accounted for about 7 million new dinars of loss. However, the largest amount of loss arose in the non-ferrous metal industry, where two projects alone suffered 85 million new dinars of loss, since the investment in these projects was much greater than in other branches. The same can be said for the projects in the chemical industry.

Another type of direct loss, i.e. over-running of the programmed construction costs, was also quite significant. The cost over-running in the analysed projects amounted to about 43[illegible] million new dinars in total.

The failure to activate a great number of projects in due time retarded the pace of employment too. On the basis of available data on the analysed projects 19,400 workers could not get the jobs in the years as promised by the programme. This total number of foregone jobs is distributed with regard to their time length as follows:

| | | |
|---|---|---|
| up to 1 year | 9,950 | 51% |
| 1 to 2 years | 8,670 | 45% |
| 2 to 3 years | 630 | 3% |
| more than 3 years | 121 | 1% |

Delayed implementation retards the programmed export increase, and consequently results in the loss of the extra import capacity expected on that basis. We had the necessary data only for 13 plants which could not export their products since their starting up was delayed.

For all the cited projects together, the foregone exports amounted to 295 million new dinars. If we expressed this loss in today's prices, the sum would be considerably higher. The largest deficit in comparison with the planned export occurred in the non-ferrous metal industry, and in the manufacture of metal products, transport equipment and food.

It should also be mentioned that delays in the implementation of those plants whose products were lacking in the country made it impossible to reduce the import of these products and burdened the foreign exchange position. A gross calculation for 17 projects shows that losses incurred because competitive imports were not reduced owing to their delayed starting up amounted to as much as 350 million new dinars.

| Branch | Number of projects | Delay in months | Foregone exports in millions of new dinars (in current prices) |
|---|---|---|---|
| 311-312 | 2 | 46 | 42.2 |
| 322 | 1 | 9 | 0.3 |
| 352 | 2 | 35 | 16.7 |
| 372 | 2 | 17 | 149.5 |
| 381 | 2 | 47 | 49.6 |
| 382 | 1 | 20 | 0.5 |
| 383 | 1 | 12 | 0.7 |
| 384 | 2 | 21 | 35.9 |

## VI. SUMMARY AND CONCLUSIONS

The entire analysis of the implementation period accomplished for 146 industrial projects indicates that the programmed periods in most cases were over-run, that this was conditioned by a broad range of factors, and that this had manifold negative effects on the national economy. The analysis shows that the economy can greatly benefit by taking measures to not only ensure that the programmed terms be not over-run, but also that the elaboration of implementation programme be made realistically, taking into consideration all the possibilities and factors which can influence the implementation period

The analysis demonstrates that the greatest delays arise in the phase of carrying out the building work and in the procurement and assembling of equipment. Among the direct causes of delays, we can include first of all those which are connected with the quality of the project documentation and the project design, the terms of equipment delivery, the possession of definitive financial means, including the foreign currency for equipment import, the aptness and exactness of the executors of the construction work. Incompleteness and poor quality of investment documentation and that of projects can appear in a great number of cases as a main cause of delay, because it leads to changes of projects during construction and to additional works, which contribute to the over-running of investment costs. One of the most important types of delay can be

connected with the delivery of equipment from national or foreign manufacturers of machinery, which in turn is often related to the lack of foreign currency. Lack of financial means necessary for the settlement of liabilities appears as a frequent cause of delays. This is above all the question of supplementary funds needed due to project changes, rising prices, etc.

The analysis of delays and their causes indicates that those who deal with investment problems in developing countries should take into account as least the following very important factors.

First of all, it is necessary to pay more attention to the scheduling of the implementation period so that it may be nearer to what can be actually achieved.

Secondly, after having determined the programme, it is indispensable to ensure its execution, and for this, some very important conditions should be satisfied:

- In programming, the consistency between magnitude and structure of investments on the one hand and the natural resource availabilities, on the other, should be assured. An investment should be based only on real financial accumulation, and physical commitments should not begin before the funds have been completely secured. Even when the financial means exist it is necessary to ascertain the time when an investment will be economically the most efficient, since new circumstances can often modify the economic justification of the investment. It is particularly important to verify how a new investment fits the international division of work, what prospects the expected production offers, if the investment leads to specialization, if the new production will be able to export successfully with that of the industrialized countries, how large the production costs will be, and how large an income the investment will bring in.

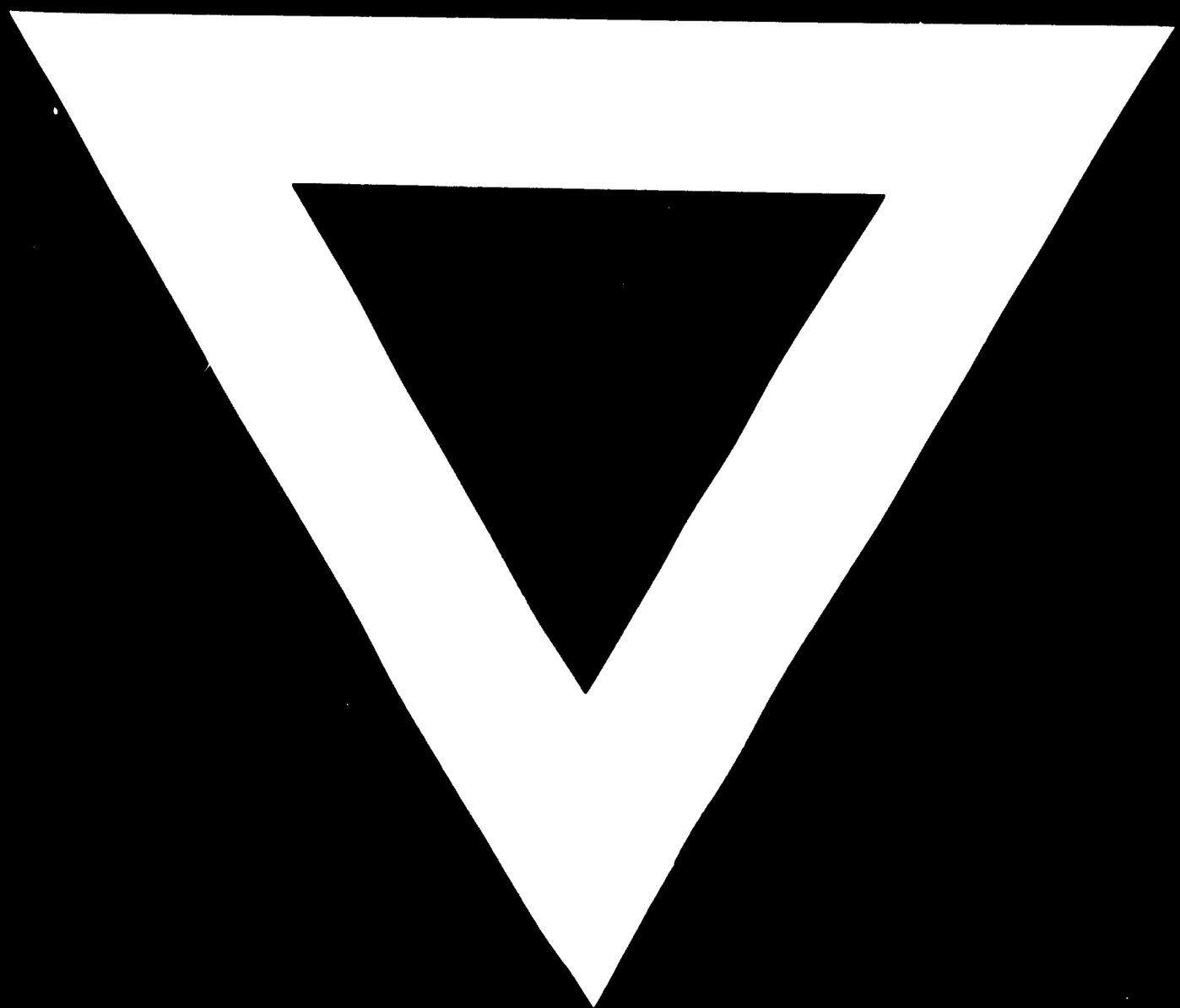
- The proper preparation of pre-investment works should be ensured, since this is one of the prerequisites for ensuring continuity in the execution of projects, and efficiency of investment. During the preparation, satisfactory solutions of technical and other details should be ensured, covering the elaboration of the project concept, technical designs, investment costs, choice of site, sources of finance, choice of principal contractors, adequate equipment, assembling processes, etc. Before contracting the construction it is indispensable to investigate carefully whether the home and foreign markets are interested in the production of the planned plant, to examine the possibility of procuring the necessary production materials and manpower, and to check the estimates for building, equipment, and production costs. Not before all these studies demonstrate the feasibility and plausibility of investment, should the materialization of the project be approached. It should be verified whether enough time was allocated for the elaboration of the project itself and if the directorate had managed to

make a sound and detailed project, thus avoiding changes, supplements, and other unnecessary and expensive works during the building process. It is very useful to include the building enterprises in the project preparation phase to some extent in order that they may be prepared in time for the execution of the work.

- It should be made certain that the equipment be delivered in time and in satisfactory quality, that the equipment suppliers perform their duties in time, that the delivery is carried out successively according to the programmed phases of plant construction with respect to individual technological parts and shops. It is particularly important that the right equipment supplier is chosen. The fulfilment of the planned investment implementation entails not only the timely delivery and assembling of equipment, but also the training of personnel in time, which should start on the site where the equipment is produced. It is necessary that the production workers should be present during assembling and experimental work, so that they may be trained in good time and that subsequent stoppages, defects, etc. may be avoided.

Efforts along these lines would certainly positively contribute to the implementation of investment programmes and the process of economic development of the developing countries.

---



14.3.74