# "SOME ASPECTS OF EFFICIENCY OF INVESTMENT IN A SOCIALIST ECONOMY : A CASE STUDY OF USSR AND POLAND DURING 1965-75"

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# C O N T E N T S

# PREFACE

Among the most important economic problems of socialist construction are those of economic effectiveness of capital investment in the national economy. Capital investment must be used most effectively because the rates of growth of production and the period required for the solution of the USSR's Chief economic task depend on this. The determination of effectiveness of capital investment is closely linked with national economic planning and should become an integral part of it. The problem of efficiency of investment is, in particular, related to the investment planning in the centrally planned economies like Poland and USSR. The total investment and its distribution between economic sectors and probably individual industries within each sector in the centrally planned economies, is determined as a policy decision of the government and not as a resultant of market forces. What is left to the enterprises is the choice of projects and the present work exclusively deals with this aspect.

In the recent past one finds that industries in the USSR and Poland suffered from inefficiency with regard to the investment made in them as a result of longer gestation periods. The present research work examines the nature of the problem of inefficiency in capital investment in the USSR and Poland and suggests ways in which the effectiveness of capital investment can be improved.

This problem of inefficiency of investment has been analysed in the light of prevalent investment criterion which involves a discussion on the arguments for and against the defferentiated recoupment period criteria and thus a case is made for the uniform recoupment period criterion in Chapter I. This is followed by a discussion on the problems faced in determing a synthetic formula for efficiency of investment in Chapter 2 and it has been further followed by the concrete experience of USSR and Polandin regard to the choice of projects in actual practice in Chapter 3, and finally the work has been concluded.

I take this opportunity to express my gratitude and indebtedness to Dr. Arvind Vyas, who supervised my reseach work Dr. Vyas was generous both with his time and his own research work. Even during his stay at West Germany for one year, he continued to send me the suggestions regarding my research work through correspondence. All through the period of my research work, he provided both inspiration and perceptive criticism, offered with such charm that its force was not immediately felt.

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# INTRODUCTION

In planned economies, there are three fundamental decisions regarding investment planning:

1. The total amount of investment to be made out of current income;
2. The distribution of this total among different industrial branches;
3. The technical form (or variant) that investment should take in any particular case.

It should be made very clear at the very outset that we would be mainly concerned with the choice of technical variants of investment, namely, the third. The problem can be posed much more precisely by saying that total investment in the economy as well as the investment going to particular branches is given in centrally planned economies from above and what is to be determined or chosen is projects. It would have been no problem if only one variant is associated with a project. But the main issue involved here is that "most industrial construction, whether it be a power plant - or a clothing factory or an engineering works, is capable of being planned according to several so-called technical variants."[1] For example, once it has been decided to give priority to electric power, the question arises: how to produce electricity - should we go for hydro, thermal or atomic power stations? Once planned investment has

1. Maurice Dobb, Papers On Capitalism, development and Planning (Routledge and Kegan Paul, London, 1967) P.144.

been allocated between various industrial branches this presents itself as the crucial problem of investment planning (or project making). These technical variants will differ (1) in their initial cost of construction; and (2) in the results which they subsequently yield when in operation - results which may alternatively be regarded as an increase in productivity of labour or as a decreased expenditure of labour (or prime cost) required to produce a given output.

In any given case, (2) can be expressed as a ratio of(1); and different projects can be arranged in an order according to the size of this ratio in each case. It will not follow of course that a higher labour productivity in operation (e.g., when a new machine is installed or in use) will always be associated with a higher initial (investment) cost. When it is not, there is no doubt which of the alternatives to use; for practical purposes only one of them that yields the higher, productivity will ever come upon the planning agenda, the others being rejected from the start as inferior. "But a real problem of choice will arise in the case of any pair of alternatives in which higher productivity is associated with higher investment cost."[2]

For example, by spending large additional sums on the construction of an expensive hydroelectric plant much cheaper electricity can be produced eventually than if cheaper (and probably smaller) coal burning plants are being constructed.

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2. Ibid P.145.

How to decide which to construct? If one had enough steel and equipment etc. at any one time to place no ceiling on the total construction the economy could undertake (or the size of the general investment plan) - there would be no problem - hydro-electric stations would win every time. But in actuality this is never so - some ceiling is necessarily imposed by the existing size and productive capacity of the capital goods industries (Marx's Department I). Hence a limit has to be placed at some point on additional investment cost that is worthwhile to incur in order to achieve a given result.

As in practice in the Soviet Union the criterion of differentiated recoupment period has been used in order to decide the choice of investment variants, which implies the period within which the investment made on a project would be recouped and this period was differentiated branch-wise. However, this criterion of differentiated recoupment period was criticised and a case was made for "uniform recoupment period" for the whole economy.

We would discuss in chapter 1 the arguments for and against the differentiated and uniform recoupment period. And in chapter 2, we would focus our attention on the problems in deriving a synthetic uniform formula for the efficiency of investment paying particular attention to reducing the gestation lag. Then in chapter 3, we would discuss how the choice of projects is made in actual practice with illustrations from USSR and Poland. These illustrations would be considered in the light of chapter 1 and 2.

## CHAPTER I

## Efficiency of Investment In a Socialist Economy
## Differentiated Vs Uniform Recoupment Criteria

Under the rough-and ready system in operation so far i.e. the recoupment period criterion, a decision to expand (for whatever reason) the aluminium industry was one of the factors determining investments in, and the location of electricity generating stations, or of a railway line to take the bauxite to the aluminium plant. Let us take the simplest aspect of the matter. The power station could be thermal or hydro; the railway line could be steam or electric. In each case, higher initial investments are more or less compensated by lower operating costs. Which variant should be chosen and why? In the case of capitalist economies differential rates of return may be used to rank the projects that is, the projects yielding higher rate of return will be chosen in contrast to the projects yielding lower rates of return. But in centrally planned economies, the picture is entirely different.[3] Here the choice of projects has to be made given the rate of interest and given also the rate of investment. How this choice is made in the centrally planned economies like USSR and Poland? Ideally the choice should be made about the project that will minimize the consumption of scarce capital

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3. The problem of investment choice has been discussed in Gregory Grossman; "Scarce Capital and Soviet Doctrine", in Wayne A. Leeman(ed.) Capitalism, Market Socialism, And Central Planning, Readings in Comparative Economic Systems, (Khosla & Co., Delhi(India), 1976) PP.155-76. See also Alfred Zauberman, Aspects of Planometrics, (New Heaven, Conn. Yale University Press, 1967), Chaps. 13 and 14.

resources while achieving the required capacity expansion. Thus the need for a criterion for the planners is self-evident.

Investment Rules(1960-69)[4]:

Keeping the above in view, the principle that a given result (given by the plan) should be achieved with due economy of capital by choosing the variant which "pays for itself" most quickly, was accepted in principle without much arguments at various conferences called to discuss the subject after Stalin's death. This is the so-called period of recoupment or its inverse, namely, the coefficient of Relative Effectiveness(CRE). If project A requires more capital than project B but will save on current costs or if the new project will reduce costs compared with existing practice, in such a way that the gain can wipe out the extra investment required over a given period of years, say, ten, then the given investment pays for itself in ten years. If other things being equal, another variant pays for itself in eight years, then it should be preferred. This method was designed to evaluate the trade-offs between capital outlays and operating expenses. Such a measure was to be easily rationalized in terms of Marxian theory of value since operating expenses ultimately reflect labour costs and capital should be

4. These rules have been discussed in a number of articles and books; Abram Bergson, The Economics of Soviet Planning, New Heaven, Conn; Yale University Press, 1964, Chap.11 ; Alan Abouchar, "The New Soviet Standard Methodology For Investment Allocation", Soviet Studies, Vol.24, No.3 (Jan. 1973),PP 402-10; Dobb,n.PP 143-49; Paul R. Gregory and Robert C. Stuart, Soviet Economic Structure And Performance, Harper & Row, New York, 1974; PP 214-29. Alec Nove, The Soviet Economy, George Allen and Unwin, London, 1968), PP 219-40.

evaluated according to how well it economises the use of labour. For any two alternative technological variants, producing the same stream of output with instantaneous single capital expenditures of $K_1$ and $K_2$ for two variants respectively and uniform annual operating costs, including depreciation on capital assets, but excluding a charge for capital, $C_1$ and $C_2$ respectively. Then

$$\text{CRE } (= \phi) = \frac{C_1 - C_2}{K_2 - K_1} \quad \ldots \quad \ldots \quad \ldots \qquad (1)$$

where subscripts 1, 2 refer to the alternative projects and its reciprocal (the recoupment period) is given by

$$T = \frac{K_2 - K_1}{C_1 - C_2}$$

where "T" refers to the "Time" or period of recoupment.

Under the normal circumstances the higher the capital outlay, the lower the operating costs and CRE must evaluate this trade-off. The omission of capital charge may bias the CRE measure in favour of capital intensive projects. For example,[5]

If $K_1$ = 1 m. rubles; $K_2$ = 2 m. rubles

$C_1$ = .2 m. rubles; $C_2$ = .1 m. rubles

then CRE = $\frac{.2-.1}{2-1} = \frac{.1}{1}$ = 10%, or T = 10 years.

This means that for every additional ruble of capital outlay on project 2, .1 ruble of operating costs would be saved over project 1. Thus these calculations give us a recoupment period of ten years. Now given the standard recoupment period $T_s$ fixed up by the central planners, the project selection procedure would be: choose a project if $T \leqslant T_s$. In other words, if the central

5. Gregory & Stuart, n.4, P 221.

planners have fixed up $T_s$ = 12 years, then, the project yielding a recoupment period of ten years in the above example would be selected.

An equivalent test[6] would be; let E be the standard coefficient of efficiency, then, the two projects could be compared by comparing their full costs (i.e. current and capital costs) including an imputed interest cost:

$$C_2+EK_2 \leqslant C_1+EK_1 \quad \ldots \quad \ldots \quad (2)$$

In the choice of investment within any given sector, to the current cost of production involved in adopting this particular variant there should be added a kind of imputed cost of capital a de-facto interest rate, representing the normative rate of investment efficiency, a normative recoupment period. Allowance must be made, in the recommended method of calculation, for complementary investment needs at least in the proximate branches. The immobilization of capital assets during construction should also to be allowed for in this disguised interest rate. The recommendations[7] do not insist on a single 'normative' rate for the economy as a whole, and in fact envisage the use of different rates in different sectors of industry and of the

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6. Bergson, n.4, P.254.

7. "Recommendations of the All-Union Scientific-Technical Conference on Problems of Determining the Economic Effectiveness of Capital Investment and New Techniques in the USSR National Economy", Problems of Economics: A Journal of Translations, Vol.1,no.9 (Jan.1959) PP 68-90. See also "Standard Methodology For Determining the Economic Effectiveness of Capital Investments", in The ASTE Bulletin(Trans.), Vol.13,no.3, (Fall 1971), PP 25-36.

economy. However, the existence of a rate for the economy as a whole is recognised, it is referred to as general rate, and, at least by implication, it could be used in inter-branch and inter-sectoral calculations, where substitutable goods are involved. This is not clearly spelled out, which may be a sign of compromise, since this, as we shall see, is a controversial question.

The existing rate of return in the given sector is to be used as a yardstick for the choice of projects. The new project should not be less efficient, should not have a longer recoupment period, unless no possible alternative can be found. The use of sector "norm of effectiveness" is implied by the use of different profitability norms as success indicators under the reform in different branches of industry. But in addition to these value indicators various other calculations[8] are recommended, of a more general character; physical output per man, required inputs of materials and fuel, technical progress, and so on. While bearing in mind the vagaries of Soviet costs and prices, resort to these non-monetary criteria is understandable, the effect may be to point to conflicting choices. The emphasis on criteria other than the return on capital is greatest when new techniques are under discussion.

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8. For a discussion on Non-monetary indicators, see: Gregory and Staurt, n.4, P.223 and also "Recommendations of the All-Union Scientific-Technical Conference on Problems of Determining the Economic Effectiveness of Capital Investment and New Techniques in the USSR National Economy", n.7, PP.88-89.

Evaluation of Differentiated Recoupment Period Criteria[9]:

Although the CRE was just one of the many rules suggested between 1960-69, but it became the most important and most widely used. Khachaturov who was the chief spokesman of the "differentiated norm of effectiveness" opposes a "single norm" because "there is no free movement of resources between sectors, conditions for investment vary in different sectors, there are differences in the tempos of technical ~~projects~~ projects, there exist non-economic factors.....and there is the nature of the present price system".[10] Others have argued the contrary. They do not dispute the legitimacy of priorities, but the deliberate introduction of priorities into the process of calculation could lead to waste. The debate continues.

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9. Bergson, n.4, PP.262-63; Also see, Judith Thornton, "Differential Capital Charges and Resource Allocation in Soviet Industry", Journal of Political Economy, Vol.79, no.3(May-June,1971) PP.545-61; P. Gregory, B. Fielitz, and T. Curtis, "The New Soviet Investment Rules: A Guide to Rational Investment Planning?" Southern Economic Journal, Vol.41, no.3, Jan.1974, PP.500-04; Phillip J.Bryson, Scarcity and Control in Socialism, Essays On East European Planning, D.C. Health and Company, London, 1976, Chap.7, PP.99-105.

10. Alec Nove, The Soviet Economic System, George Allen & Unwin, London, 1977, P.153. Also see T. Khachaturov, "Economics of Capital Investment" in Murray Yanowitch, (ed), Contemporary Soviet Economics, Vol.1, New York, 1969, P.153-58; See also: T. Khachaturov, "Methodological Questions of Determining the Economic Effectiveness of Capital Investments", in Problems of Economics(Trans.), Vol.2, (1959-60), Jan. 1960, PP.17-22.

Thus an important question raised by CRE criterion was whether a single uniform 'standard coefficient' should be established for the entire economy promoting eventual equalisation of marginal rates of returns on investment projects in all branches. The "Standard Methodology (1960-69)"[11] was clearly in favour of differentiated standard branch norms. For the state to surrender its control over investment allocation and to replace it by a uniform mechanical rule was judged as contrary to the consideration of long-run economic development. The 1958 all-Union Conference on capital effectiveness leading upto the publication of Standard Methodology was quite clear on this point: "..... some projects with smaller effectiveness may be approved..... because they accelerate the solution of the basic economic problems, and are necessary for defence, political and other reasons; ....." and further: ".....capital investments are made on the basis of the economic laws of socialism which require the preferential development of the means of production....."[12] An important point often overlooked in these discussions of the CRE is that the suggested rules generally pertain to the internal allocation of fixed sums of investment within a branch, and that only those alternatives would be evaluated that yield the planned increases in capacity. Also, the norms were generally not set to equate supply and demand, thus requiring a continuation of administrative rationing independently of the suggested rules. This the acceptance of the interest-like calculations in 1960 really represented no significant deviation from the centrally

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11. Standard Methodology, n.7, PP.25-36.
12. Ibid. PP.89-89.

planned nature of the Soviet economy. Instead, the objective was to make the allotted investment more effective and efficient within the context of planned choice.

The CRE measure also failed to come to grips with varying patterns of capital effectiveness, different service lives of the projects, risk differences, the different time spacing of operating cost economies, and by treating the productive outputs as given results in neglecting possible returns to scale and their obvious important efficiency calculations and a host of other problems.[13] (These problems would be discussed in more details in the subsequent chapter).

It was increasingly realized that the search for criteria could not in practice confine itself to any one branch, or closely inter-related branches of the economy; it is just not a question of hydro versus thermal electricity or two different projects for a steel works. There are many permutations and combinations of energy, metals, chemicals, and so on, all interdependent. It is not enought, wrote Effimov and Krasovski[14] to compare variants of the same project. What is needed is a more effective structure of capital investments which would correspond to the basic conception of the plan.

However, the second difficulty associated with this is that the actual "periods of recoupments"[15] in different sectors

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13. Bryson, n.9, PP.102.
14. Nove, n.4, P.235.
15. For figures of actual periods of recoupment, Ibid, P.235.

of the economy differ extremely widely; this was and is the consequence of basing investment decisions on plans for future production devised separately for separate products the result has been that the recoupment period is in general much longer in heavy than in light industry; it is, according to Khachaturov four or five years in light industry, 10 years in transport, 16-17 years in electric power. Is this a sign of misdirection of resources or an inevitable consequence Soviet style priority planning? There is a sharp clash of views on this. Vaag[16] argued that the normative recoupment period must be same throughout the economy; the deliberate introduction of the priority of heavy industry into the process of calculations must lead in this view, to wasteful resource allocation. Khachaturov disagreed. Strumlin also argued that the priority of heavy industry must be firmly maintained. Yet how can one make the inter-sector comparisons envisaged by Effimov and others of the more intelligent planners without a valid inter-sector criterion? [The revisions of wholesale prices in 1967 only partially corrects these disparities, part of which arise because, at any given level of prices, projects in the priority group of industries are preferred regardless of profitability.] Vaag, of course, did not deny that some decisions must be made (and not only in Russia) for reasons other than the estimated return on capital,

16. The discussions on this problem among various economists like Vaag, Strumlin, Khachaturov, Petrakov, Effimov, Krasovsky etc. can be found in more details in "All Union Conference on the Problems of Determining Economic Effectiveness of Capital", n.7, PP.68-90.

but urged that planners must consider real costs, 'not those which we create in our imagination' - the same thought was expressed by Zasyadko; 'of course the criterion or return on capital must not be obeyed blindly, it must be modified by political and strategic considerations, but always in the knowledge of the cost, the loss, arising from the decision. As the debate developed, virtually all the more serious economists increasingly came to agree that a single rate of return criterion, a statement of capital charge, a single effectiveness norm was desirable. This was vividly expressed by mathematical economist, N. Petrakov. "The capital charge norm is of its nature a means of comparing the economic significance of different outputs when compared with the actual effectiveness of capital, it will characterize the degree of relative advantage of the various sphere of application of means of production and labour resources..... It is, therefore, proper to compare the effectiveness of alternative investments in apparently quite different branches, such as electricity generation and food industry."[17] But Nove sees that the validity of his argument depends on prices which reflect supply and demand. In the absence of such prices, planners inevitably continue to derive investment decisions from material balance considerations and confine their attention to alternative means to a given end using different rates of return criteria in different sectors,

17. Nove, n.4, P.236.

and modifying even those in practice in the light of shortages of materials which find no reflection in their prices.

A part of both theoretical and practical significance is what precisely is the nature of the criterion we are discussing? In the discussion Malyshev[18] advanced the view that the economic content of the return on capital is profit, and consequently that profit means should be the same throughout the economy. He too pointed out the necessity of a rational price system if any calculations are to be soundly based. But any criteria based on a price system which fails to reflect use-values are liable to lead to confusing results. The problem of prices[19] can be explained more precisely as follows. The prices of materials or of the end-products, often bear no rational relationship to one another, to their relative scarcity, or to their utility from the standpoint of the user. Consequently the relative profitability of this or that project could be quite misleading a guide to action, and some projects may be simple, excluded by an absolute shortage of one or more products which are required to carry them out, consider for instance, if more than one project yields the planned capacity increase, the project making organisations must generally evaluate the costs and benefits of alternative projects in value terms. If, of two equally expensive investment projects, one project economises on coal inputs while the other project saves natural gas, the final choice will

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18. Nove, n.4, P.237.

19. The problem of prices has been discussed by many economists. See Gregory and Staurt, n.4, PP.214-27; Bryson, n.9, PP.99-105; Nove, n.10, PP.149-72 and also Nove, n.4, P.237. Also see "All Union Conference" n.7, PP.69-90 as the arguments on prices are spread over the whole article.

depend to a great extent on the relative prices of coal and gas. If these prices fail to reflect scarcities, then the wrong choice can be made. These inadequacies of the price system also explains the reluctance of planning authorities to rely too heavily upon a single criterion. For example, the 1958 conference[20] report made it quite clear that, while the conference favoured the CRE measure, but it was to be used in combination with a number of other indicators, where the situation required. If industrial prices failed to reflect relative scarcities, physical indicators were to be used along with the CRE criterion. The possibilities of substantial delays on project completion were also to be considered, as well as the interrelations of the project with other branches, social factors e.g., workers' safety were to enter into the calculations as well.

A capital charge (whether applied to basic capital only or to basic and working capital) has both a micro and macroeconomic effect, and reminds one that the distinction between these categories is often blurred in practice - thus central investment decisions are influenced in various ways by projects put forward from below, and these, as well as the utilisation of capital assets on the spot, must inevitably be influenced by macroeconomic stimuli; a capital charge would effect enterprise behaviour by affecting their accounts. However, the inclusion of capital charges in costs which is a interest rate is also relevant to investment criteria calculations at the centre. The entire

20. It refers to the "All-Union Conference on Economic Effectiveness of Capital", n.7, P.68-90.

debate[21] has been taken on a higher level by becoming linked with a discussion of optimum planning and the utilisation of mathematical techniques. Novozhilov argued, indeed that the whole question of investment criteria is merely a special case of the general question of the proper valuation and utilisation of scarce resources of all kinds throughout the economy. Kantorovich, too, would treat this as an integral part of attaching values to scarce resources, as part of the application of linear programming methods to the Soviet economy. Indeed Kantorovich favoured a capital charge (efficiency norm for the investment) higher than Western interest rates because of the enormous capital requirements of the Soviet expansion programme. Kolmogorov also argued in favour of seeing the norma effectivnosti as species of charge for time, basing it on the idea that since in a progressive economy 'labour value will decline with time, the shifting of expenditure of labour to an easier period will permit ..... an increase in total production. Having found a theoretically respectable foundation for Kantorovich's ideas, he continued as follows: 'We must not be upset by the formal analogy of the norm of effectiveness with the capitalist 'interest on capital' the reforms in some respects represents a clear advance in this field. Thus the capital charge is 'an important gain of principal' as is also the switch to computing profits as

21. The debate has been discussed in Nove, n.4, P.238. But this originally appeared in Primenenie matematiki vekonomicheskikh issledovaniyakh, Moscow, 1959, P.129. This contains the arguments of Novozhilov, Kantorovich and Kolmogorov. See also Nove, n.10, PP.152-53 as well as George R. Feiwel, The Soviet Quest For Economic Efficiency, Praeger Publishers, New York, 1967. PP.171-72.

a percentage of capital. All this should lead to greater concern for the effectiveness of investments, greater care on the use of scarce capital assets, less overapplication of capital grants. But the price system remains a very serious obstacle to rational calculation of alternatives, the actual capital charge varies in different branches. There are still large number of loss making enterprises whose output is judged to be 'necessary' for the economy (no doubt it is, but this fact finds no reflection in prices). Profitability norms vary widely. The average capital charge (6%) is nowhere near the rate which has been recommended by those who advocated its introduction.

A uniform standard index of efficiency has not found official blessing till 1969, although the possibility of such a rate is alluded to. Both T or E($E = \frac{1}{T}$) are to be fixed centrally and differentiated by branches. No clear-cut rules are provided for establishing the norms, nor is their nature elucidated. For each industrial branch the standard must be less than .15 or .30 or, alternatively, the recoupment period must be no longer than 3 to 7 years. In cases of transport and electric power E may be no lower than .1 or T should not exceed 10 years.[22] The rates are apparently to be differentiated according to the priority of ~~the~~ branch, 'various tempos of technical progress' desired, and turnover and composition of fixed capital, with existing rate on the branch as a basis. The divergence of branch rates defies the very logic of assessing the productivity of investment in alternative uses and the priority arguments seems to be tenuous in

22. Ibid, pp. 163-73.

this context particularly since the investment funds and its allocation to branches is predetermined by the planner on priority basis.

Thus, as seen above, the criterion of differentiated recoupment period has been criticised on many grounds. This makes a case for 'Uniform Recoupment Period Criterion' for the whole economy. This leads us to discuss the 'New Investment Rules' which were contained in the 'New Standard Methodology' of 1969.

New Investment Rules[23] The New Standard Methodology(NSM): 1969:

In 1969 the Soviet Union's Standard Methodology was modified by the adoption of a new standard methodology for determining the economic effectiveness of capital investments. Although it did not dramatically alter the basic, traditional approach to investment decisions, it did address itself directly to the problem of variable industry normative coefficients of effectiveness. These new rules were embodied in the "New Standard Methodology" - Known as Comparative Economic Efficiency (or CEE) of capital investment, which differed from CRE or "T" only in so far as it accepted the "Uniform Standard Norm" to apply to all branches of the economy. The CEE requires that investment projects be selected so that:

$$C_i + E_n K_i = \text{minimum} \quad \ldots \quad \ldots \quad (3)$$

23. "The Standard Methodology For Determining The Economic Effectiveness of Capital Investment", n.7, PP.25-36; V. Cherniavski, "The Measure of Effectiveness", Problems of Economics: A Journal of Translations, Vol.15, no.8, Dec. 1972, PP. ; Aboucher, n.4, PP.402-10 Gregory and Stuart, n.4, PP.223-29; Bryson, n.9, PP.105-11.

where $C_i$ = current expenditure of i-th investment variant.

$K_i$ = cost of investment project.

$E_n$ = is the "Uniform Normative Coefficient" of effectiveness of capital investment, which is the same for all branches. The value of this uniform norm ($E_n$) was taken to be 12%. This figure of 12% is close to the average of the previous branch coefficients.

In addition to establishing the CEE concept, the NSM also provides detailed discounting procedures for evaluating in present value terms projects whose operating expenditures and capital outlays change over time. The NSM suggests using a discount rate of 8% (four points below 12%) which it claims is in line with current depreciation procedures (i.e., this 4% reduction coincides with the annual straight line depreciation charge for industrial equipment). But this discount rate of 8% is taken to be uniform throughout the economy and independent of the coefficient of relative effectiveness.

Thus the NSM calls for evaluating investment projects on the basis of their full costs, operating costs plus imputed costs, with imputed costs calculating using a uniform coefficient of 12% for all branches.[24] It should be noted that this 12% uniform norm is close to the average of previous branch coefficients. The calculations of CEE can be illustrated as follows.

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24. For this example, see Gregory and Stuart, n.4, P.224.

Illustration: Computation of CEE of 3 Investment Projects.

| Projects | (1) Operating costs (C) | (2) Investment outlays (K) | (3) Uniform Normative Coefficient | (4) Full costs 1 + (3x2) |
|---|---|---|---|---|
| 1 | 300 | 510 | 12% | 361.2 |
| 2 | 290 | 525 | 12% | 353.0 |
| 3 | 285 | 590 | 12% | 355.8 |

In this illustration, assume that there are three alternative investment projects with different operating and investment costs. As one might expect, outlays in this example (the higher the K, the lower the C). there is a trade-off between operating costs and investment

The problem of how to choose the projects arises not only in case of differentiated recoupment period criteria but also in case of uniform recoupment period, in fact, in the latter case, the problem would become more fundamental as the allocation of investment within branches would also be determined to a large extent e.g., invest in branch A (where E = 10%) rather than in branch Y (where E = 8%). The Soviet Planning practice appears to contain the elements of both and hence the complexity of the problem. E = 12% has been taken to match supply and demand of investment resources, however, the allocation of investment is also determined by long-term policy considerations. So in our example above the projects could refer to investment projects within a branch or in different branches. Because the normative coefficient is uniform for the entire economy, this should make no difference in the evaluation process. The CEE investment

criterion calls for the selection of the project having the lowest costs or the lowest full costs (operating costs plus capital charge). In conformity with the above criterion, project 2 should be selected in this example, as project 2 is not only least costly but it also yields the optimum trade-off between greater investment outlays and lower operating costs.

The NSM suggests that the CEE index be supplemented by further indices[25] e.g., productivity of labour, capital output ratios, capital investment per unit of output and selected physical indices - to take account of the major influences on the calculation of effectiveness.

Critical Evaluation of New Standard Methodology(NSM)[26] 1969:

The NSM of 1969 does seem to represent on improvement over prior rules by establishing a uniform rate of return for all branches and by specifically considering the problem of varying costs and time and time horizon. Though the NSM is a further movement in the direction of investment allocation according to rates of return, it is definitely not a clear break with traditional Soviet Planning. Numerous exceptions[27] to the use of a single normative coefficient are provided for, and it should not prematurely be concluded that the Soviets have turned the critical capital allocation decisions over to an impersonal market type mechanism.

25. For non-monetary indices, see "The Standard Methodology For Determining the Economic Effectiveness of Capital Investment", n.7, P.31.

26. Gregory, Curtis, Fielitz, n.9, PP.502-04.

27. Ibid, P.503.

In the first place, the NSM may have eliminated the double counting[28] of capital costs problem by defining operating expenses to exclude depreciation. Thus one obvious source of inefficiency may have been eliminated, although there is no official confirmation of this point.

Secondly, the NSM appears to opt for an equalization of rates of return throughout the economy by establishing a uniform normative coefficient.[29] However, it should be stressed that NSM, like its predecessor the Standard Methodology (1960) clearly states that the normative coefficients will not be allowed to stand in the way of priority interests of the economy. The NSM reiterates that investment decisions are the final responsibility of Gosplan which must determine whether the proposed investment will accelerate the solution of basic economic problems and states that the proposed efficiency rules may be ignored or modified for a variety of reasons. Thus in cases of conflict between economic rationality and state priorities, economic rationality may have to be modified. Therefore, the uniform coefficient does not necessarily imply an equalization of rates of return, although there should be more movement in this direction. For example, a lower (8%) norm has already been

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28. For double counting of capital assets problem, see: Borgson, n.4, P.260 and also Gregory, Curtis, Fielitz, n.26, P.503. For contrary views on this problem see S. Vainshtein, "On Methods of Determining the Economic Effectiveness of Capital Investments" Problems of Economics, A Journal of Translation, Vol.15, No.3, July 1972, P.12.

29. Gregory and Stuart, n.4, P.225: Gregory, Curtis, Fielitz, n.9, P.503.

established for 'the Far North' and there is a talk of establishing an 8% norm for electric generation. The generally liberal allowance for exceptions to the uniform coefficient rule has become a matter of concern for Soviet economists as it introduces the degree of arbitrariness in investment decisions. While this is true, but the problem with the normative coefficient is how to determine its exact value e.g., 8% or 10% or 12% and so on.

Another factor operating against the equalization of rates of return is the persistence of capital rationing. The 12% normative coefficient (being close to the average of the previous branch coefficients) is most likely not enough to equilibrate the supply and demand for investment goods. At both the new rate and and old branch rate, one can find considerable evidence of an excess demand for capital the inefficiency implications of which have already been noted. With capital rationing, not all projects yielding qualifiable returns can be undertaken or, if they are, long construction delays arise. Planners must therefore, arbitrarily ration scarce capital to limit the demand to the supply. Such procedure, in all likelihood, result in a sub-optimal allocation of investment resources such that the increase in capacity will be less than a maximum. Though according to Soviet mathematical economists this sub-optimality problem can be solved by letting this normative coefficient be computed as a programming shadow price, but there are problems in this approach as well.

Besides, the problem of prices[30], as we shall see in chapter 2, remain an important problem even for the uniform criteria. The Soviet prices remain non-efficiency parameters largely unaffected by the introduction of a uniform coefficient and as such, remain an important source of inefficiency in the investment sphere. The price reform of 1966-67 which preceded the NSM has not transformed the Soviet industrial prices into efficiency parameters but rather adhered to the traditional average branch cost concept while making allowance for newly imposed capital charges.

So far the NSM has been evaluated in terms of efficiency criteria - a procedure which may not be entirely justified. One may note that firstly, there is some uncertainty as to whether static and dynamic efficiency[31] are compatible and secondly, there is a considerable literature which suggests that when externalities are present, equalization of rates of return may be dynamically inefficient. In this manner, unbalanced growth in favour of low yield sectors such as was pursued by the Soviets in favour of heavy industry - may be justified on the grounds of economic priorities or long-term policy considerations.

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30. For the problem of prices in the new investment rules, see: Gregory and Stuart, n.4, PP.224-27; Gregory, Curtis, Fielitz, n.9,P.503, Nove, n.10,PP.149-61. For suggestions made by mathematical economists in this regard, see the following important works: L.V.Kantorovich, The Best Use of Resources Mass.: Harvard University Press, Cambridge, 1965 and also V.V. Novozhilov, "Cost Benefit Comparisons in a Socialist Economy" in V.S. Nemchinov, The Use of Mathematic in Economics, Mass: MIT Press, 1964.

31. For the concept of static and dynamic efficiency see, R. Dorfman, P. Samuelson and R. Solow, Linear Programming and Economic Analysis, McGraw-Hill, New York, 1958.

The NSM seeks to come to grips with the externality problem[32] along much the same lines as originally suggested by Novozhilov and Kantorovich, namely, to take a broader view of what constitutes true investment costs by including both external as well as direct costs. The NSM suggests that not only direct costs of plant and equipment be considered but also the indirect external costs of supportive transportation facilities, raw material development, labour supplies and so on. In this manner, it is hoped that external costs will be internalized and the divergence from efficient resource allocation reduced. Just how well this internalization of external costs will proceed remains to be seen, but the explicit recognition of the externality problem seems to be a positive step which may cancel some of the negative features noted above.

There are certain other practical difficulties[33] in the application of uniform coefficient. First is the indivisibility or the existence of sub-systems within which many marginal decisions are in fact taken. For example, the Western Siberian oilfields: it is essential to invest in pipelines because failure to do so would imperil the entire West Siberian Operation.

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32. For a theoretical discussion on the concept of externality, see: Tibor, Scitovsky, "Two Concepts of External Economies", Journal of Political Economy, April, 1954, pp.143-54; Kantorovich, n.30, and also Novozhilov, n.30, and for the reference of this problem to Soviet Union see; Gregory, Curtis, Fielitz, n.9, P.504.

33. For certain practical difficulties in the application of uniform coefficient, see Nove, n.10, PP.150-52 and also Robert Campbell, The Soviet Type Economies, Macmillan, London, 1974, pp 173-86

The separate consideration of the marginal investment in pipelines becomes irrational and meaningless, say in the context of possible alternative ways of moving oil i.e., the question becomes not "whether but how". If, however, one discovers that the cost of any variant proves prohibitively high, then one might have to re-examine "whether".

Secondly, some investment decisions are not incremental - a variant of the first point. A decision to quintuple of the mineral fertilizers or to develop Alaskan oil is different from the decision of arriving at expanding the output of one firm in footwear industry. The later decision is authentically incremental, rightly taken by reference to the financial results flowing from the decision itself; of course any decision should be such that a better opportunity is not foregone. Nonetheless different considerations in fact apply and should apply, to these different types of decisions.

The third point relates to uncertainty, and to the time factor. If a project takes five years to complete, one ideally requires to know the prices of output and inputs, the level of demand, changes in technique and much else as they will be in five years time. The use of present prices can obviously mislead. The theoretical answer is to use shadow prices which can be obtained from a computerized programme. This unfortunately evades the issue because the computer cannot provide this information unless answers to the unknowns are fed into it. So to diminish the area of uncertainty, planners frequently analyse

future requirements in quantitative terms - correct estimation of rates of return would depend on correct calculations.

Finally, we should note Koctuch's comments[34] in this regard, who feels that if differentiated norms are used for different branches and sectors, it is possible that new technology which promises savings will not be introduced because the indicators have not been set too fine. The requirement that should pay for itself as soon as possible, while being assigned different coefficient values for various industrial branches may act in the end as a brake on its introduction. On the other hand, if a single value is set for the entire economy, there is a risk of rigidity and formalism - the risk of strangling, the economically distinguishable conditions of the various industrial branches through a kind of corset uniformity. He further argues that the differential coefficients lead to overemphasis on the interests of individual branches and sectors and to local patriotism. A single quantity - a yardstick to measure the increase in social labour productivity is required by the limited nature of labour-force and of investment resources.

Thus it is seen above that the differentiated recoupment period criterion has been criticised, for it fails to take into account the varying patterns of capital effectiveness, different service lives of the projects, investment risk differences,

34. H.D. Koctuch, "The Recoupment Period: A Czechoslovak View", Soviet Studies, Vol.XV, No.2, Oct. 1963, P.

different time phasing of operating cost economies, and possible returns to scale etc. It is because of these reasons that strong arguments have been made for uniform recoupment period criterion. To what extent the uniform criterion overcomes these problems will be examined in chapter 2.

## CHAPTER II

## PROBLEMS IN DETERMINING A SYNTHETIC FORMULA FOR THE EFFICIENCY OF INVESTMENT.

The main criticisms levelled against the differentiated recoupment period criterion was that it ignores certain important aspects of investment choice, such as the freezing of resources, the durability of the plant, the effects of technology, the variations in costs and output over time. The objective of determining a synthetic expression for the efficiency of investment is mainly to derive a single formula which takes into account various aspects of investment choice relating to different kinds of costs. However, it may be noted that the precise determination of various kinds of costs and outputs is not an easy task for the national economy. In the present chapter we would examine various approaches dealing with the determination of synthetic expression and also with the kind of problems that arise in the precise determination of various magnitudes which are required for synthetic calculations.

The synthetic calculations in the past in Soviet Union, Poland and other East European countries have been done in conformity with the formula suggested at 1959 symposium. This formula links together three fundamental quantities characterizing an investment viz., investment outlays, operating costs, and output. In the simplest identical schematic case in which it is assumed that both variants give identical, constant output in the same time, that the freezing time is zero and the

operating period is equal to the average for the entire economy, then, these variants differ from each other only in the magnitude of the investment outlays and the operating costs. The rule adopted to make a choice of projects or the choice of technical variants is $\frac{1}{T} I+K$ = minimum (where T refers to the recoupment period, that is, the number of years within which the investment must be recouped) and the version of this rule actually codified in the "official instructions" (Instrukcia) took the following form[35]:

$$E = \frac{\frac{1}{T} I + K}{P} = \text{minimum} \qquad \ldots \qquad (4)$$

where P is a given planned target of output and the coefficient E can be interpreted as the unit cost (actual prime cost plus a shadow charge on investment) per unit of output.

But many difficulties were encountered in determining the efficiency of investment on the basis of this formula. The difficulties encountered stemmed from the simplifying assumptions underlying the formula. This, in consequence, made the synthetic calculation more difficult. It would be of interest to examine the difficulties or problems which crop up in determining a synthetic formula for the efficiency of investment. In this scheme, we shall first give the conceptual difficulties and

35. See for details: M. Rakowski (eds.), Efficiency of Investment In a Socialist Economy (Translated from the Polish), Pergamon Press, Oxford, 1966, PP.115-16; M. Kalecki and M. Rakowski, "Generalised Formula of the Efficiency of Investment", in Alec Nove and D.M. Nuti, Socialist Economics, Pengnin, Harmondsworth, England, 1972, PP.252-54.

then discuss the difficulties arising out of the simplifying assumptions underlying the formula.

Conceptual Difficulties[36]: It may be pointed out that the difficulties which arise in the application of the method of investment efficiency calculations occur mainly in the realm of:

(1) The accurate determination of the size of the investment outlays and operating costs connected with the given investment; this is due to the complex connections of these with the entire economy and the fact that the prices in which the investment outlays and operating costs are expressed cannot be regarded as completely adequate from the point of view of efficiency calculation. For instance, if there are more than one project which yield the planned capacity increase, then, the evaluation of the alternative projects must be done in terms of their benefits and costs in value terms and in the absence of rational prices, the correct values of costs and benefits cannot be found out, which means that no matter how rational the devised investment rule is the inefficiencies will remain because the established criterion will fail to reflect opportunity costs. This problem was noted by the investment rules of 1960 as well as that of 1969 and that is why they suggested the use of non-value indices along with the value indices.

(2) The accurate determination of the investment effect: this is due to the variety of indirect and unmeasurable effects and

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36. For conceptual problems see, Rakowski, n.35, PP.3-13.

varying roles of these effects in a developing economy.

These difficulties stem from the complex nature of extreme variety, and varying and multi-directional nature of economic processes. For that reason it seems purposeless to begin the exposition using a general formula as it suggests that both the elements of the calculations as well as synthetic formula are relatively simple andincontrovertible. It would be better to begin with the concepts involved in the efficiency calculations - e.g., use effect, investment outlay, operating costs, operating period, etc. - as these would indicate the kind of problems which crop up in the determination of a synthetic formula for the efficiency calculations.

Use-effect of an investment[37]: Broadly speaking, the use-effect of an investment means the goal to be obtained by the implementation of the investment i.e., the whole of the economic, social and other effects stemming from the investment. In a capitalist economy, profit is regarded the effect, but in a socialist economy it has two objectives: 1) The general objective - which consists of the largest possible increase in the overall use values needed by Society; and 2) The direct objective of ensuring a certain quantity of specific commodities or other use-effects e.g., a certain foreign exchange gain, a certain saving of living or stored up labour.

The principal difficulty in investment efficiency calculations consists of determining a method to permit the indirect

37. Ibid, PP.14-25.

objectives to be agreed with general objectives.

While considering the direct purposes - the use-effect, foreign exchange and savings effect, it may be noted that a specific investment frequently brings different types of effects at the same time. As a result, it is difficult at times to determine strictly whether (and to what extent) a given plant will serve to increase utility and to advance foreign exchange or savings.

Then there is also a tendency to use an approach which regards that the effects obtained in the different periods have the same weightage - though it has no rational basis because the effects obtained in the later periods are less important. Then the comparison of different investment variants require the "identity" of the effects obtained, which further requires them to be reduced to a common denominator. Not only problems arise in taking physical units, there are problems in taking even a value unit - as it requires "correct" prices. And it should also take into account the volume and types of outputs and the time and place it is obtained. The problem gets further intensified as there are considerable differences in the quantity and quality of products, the range of co-operation, the types and quantities of by-products etc. To take one simple example, very frequently all qualitative differences cannot be reduced to quantitative differences since they lead to

differences in the investment outlays and operating costs.

In analysing investment efficiency it becomes difficult to decide what measure should be regarded as the most appropriate, but it may be emphasized that this should be determined for individual branches, and with due account for the specific conditions.

Investment Outlays[38]: It is very complex problem and it would involve a discussion on the elaboration of the concept of investment outlays, method of dividing outlays in certain complex cases, and the concept of freezing of investment outlays.

The investment outlays mean the expression in monetary terms of outlays of living and stored-up labour directed to create specific elements of fixed assets. This may either create new plant or replaces the old one. The relevant question is: what should constitute investment outlays? Should it be direct outlays envisaged in the cost estimates for the construction of the plant - certainly not.

Just as for a given product we compute the manufacturing costs consisting of a chain of partial costs on the scale of the entire national economy, similarly we should also compute total investment outlays required to obtain the given output, consisting of a chain of partial outlays on an economy-wide scale. However, it is not so easy to take all these outlays into account. Firstly, both the chain of partial costs and chain of partial

38. Rakowski, n.35, PP.25-37.

outlays constitute an infinite series since the costs and outlays of each material component are also of a complex nature. Secondly, there are so-called feed-back couplings in the national economy; e.g., if coal is required for the generation of electricity, electricity is required for extracting coal. Then from the view-point of efficiency calculation there is an essential difference between the chain of partial costs and the chain of partial outlays. The chain of partial costs may further involve the problem of duplication or double counting. Similarly, investment outlays for obtaining materials in the various phases of production do not comprise part of further investment outlays - hence it is difficult to calculate the complete investment outlays to obtain a given effect.

Then there is a problem of complementary investment outlays i.e., the outlays for various service installations which on the same site as the given plant and without which the plant could not function since the mere outlays are not directly borne by the investor and may hence be omitted in the cost estimate for the given plant, and one of the most serious errors in investment practice is the inadequate treatment of really indispensable complementary investments.

Yet another problem is that of indirect investment relating to raw materials. In the determination of outlays for the raw material base there is always a doubt as to where to end the calculations of these outlays - a question to which an unequivocal answer is difficult to give. At the same time, the

simplifications may distort the picture. Then there is also a problem as to whether to include or ignore the indirect outlays associated with the overall programme of housing community and social construction being implemented in the country. Since such outlays do exist, therefore, they should be a part of the investment efficiency calculations.

So far it was assumed that one utility effect corresponds to the given investment while in overwhelming majority of cases investment plants yield joint production - with a wide range of products. The outlays for different types of products vary; therefore, if we take into account the investment outlays for two plants - even such as produce identical wares, but in different proportions - and we divide these outlays by the production effect we obtain a completely distorted picture of the capital outlay ratio of each of these plants. It thus becomes necessary so to divide the total outlays that they relate to the corresponding effects. The methods of isolating the outlays for which different effects must be adopted to the individual specific situation. It may be stressed that such isolation in many cases entails very serious methodological difficulties.

Yet another problem is that of freezing of investment resources. This results in a large number of unfinished projects with extra-ordinarily long gestation lags (or construction periods). This not only delays the attainment of planned output but also results in "locking up" resources as "work in progress" for long periods. The obvious outcome of this is the

inefficiency in the system. If at all synthetic calculations have to be carried out correctly, all these aspects must be taken into account. But the formula suggested at 1959 symposium did not pay adequate attention to this problem.

Operating Costs[39]: This is the most vital element of efficiency calculation and an error committed in determining the operating costs would seriously distort the efficiency index. The degree of accuracy in the determination of this element depends on the phase of design and cost estimate documentation taken into account. The problem in either case is to take into account the phenomena which will accrue in too distant future - which is neither a simple nor an easy task. All the problems relating to the operating costs cannot be solved by way of efficiency calculations. At the same time these problems cannot be neglected also precisely for the following reasons:

1. The operating costs are taken into account not only for the moment when plant is started up but also during future operations. It is known that these costs must change in future, since the relation between the labour productivity in different branches will change and this will have a different effect on prices of individual materials and on the general relation between prices and wages.

2. Whereas the entire economy constitutes a dynamic system in which unit production costs decrease rapidly (owing to successive commissioning of new plants), an individual plant

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39. Ibid, PP.45-56.

once "called to life" as a result of an investment constitutes a much more static system in view of the relatively rigid technical and economic parameters. Therefore, the mean unit cost in the entire branch of production and within entire economy increases gradually with the operation. Strictly speaking, the costs in a given plant must also change. They will be affected by improvements, rationalization of production process, modernization and reconstruction of machines and installations, etc. In fact the technical progress is also assessed on the basis of level of costs.

3. The calculation of operating costs exclude amortization of fixed assets but include the actual outlays for future general overhauls or replacement of machines, installations, etc. The amortization of fixed assets represents that proportion of the value which is successfully transferred from the fixed assets to the products (services) obtained through their exploitation. But in fact it is desirable that amortization should be included in cost estimates and general overhauls or replacement should be taken as a separate category and besides, there are a host of other problems associated with the concept of operating costs which cause problems in synthetic calculations.

Operating Period of An Investment[40]: In determining a synthetic formula for the efficiency of investment, it is extremely important to determine the expected operating period of the investment.

40. Rakowski, n.35, PP.57-59.

The efficiency of a plant operated for 10 years will be completely different from that of a plant to be used for 30 years. In a plant with the longer life investment outlays play a smaller role, since they are distributed over a large number of years, while operating costs are more important since they will increase with the operation (in comparison with the latest technical achievements which lead to a reduction in the unit cost). The operating period is not only nor mainly as is generally assumed - a technical problem, but is above all an economic one. Still more significant is the problem of how to determine the operating period? It is generally argued that in the plants with relatively high costs, the economically justified period of operating is relatively short while in plants where operating costs do not play a high role, the economically justified period of future operation may be relatively long. Attention must also be drawn to circumstances (e.g., exhaustion of deposits of natural resources, a brief demand for the products manufactured in a given plant, etc.) which may compel a plant for shorter period than would follow from the reasoning. If the determination of the operating period is based on the forecasts about the influence of economic progress on operating costs of future plants, the problem still remains as to what extent those forecasts are true. Determination of the operating period becomes further more complicated if we take into account plants with a wide range of fixed assets. The determination of the operating period may also affect the selection of the type of plant, its construction, etc.

These were some of the important conceptual problems faced in determining a synthetic formula for efficiency of investment. Thus these are the problems arising out of the simplifying assumption underlying the traditional method for determining the efficiency of investment.

In the light of the above discussion, let us now consider some of the approaches to determine a synthetic formula for the efficiency of investment. The following approaches would be considered:

1. The Kalecki-Rakowski approach[41],
2. The Fiszel approach[42],
3. The approach based on an optimization model[43] which is associated with the names of the mathematical economists e.g., Kantorovich, Novozhilov, Nemchinov, in the U.S.S.R.

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41. Kalecki and Rakowski, n.35, PP.252-62: Rakowski, n.35, PP.83-170, 212-51.

42. HENRYK FISZEL, Investment Efficiency in a Socialist Economy (Translated from Polish), PERGAMON Press, Oxford, 1966, Chaps., 1, 2, 3 and Appendix 1-4 and Mathematical Supplement.

43. Kantorovich, n.30; Novozhilov, n.30; Nemchinov, n.30; Dorfman, Samuelson and Solow, n.31. For more details one can also see the following articles: V. Nemchinov, "Basic Elements of a Model of Planned Price Formation" originally published in Voprosy Ekonomiki, no.12, 1963, PP.105-21; L.V. Kantorovich, "Mathematical Formulation of the Problem of Optimal Planning", Excerpts from L.V. Kantorovich, The Best Use of Economic Resources, Moscow 1959, Pergamon Press, 1965, PP.262-301 and A.L. Veinshtein, "Notes on Optimal Planning", originally published in Ekonomiko-Matematicheskiye Metody, Moscow, 1966; All three articles have been reproduced in Noveand Nuti, n.35, PP.406-434, 435-468, 469-474 respectively.

Let us distinguish clearly between these approaches.

1. The Kalecki-Rakowski (K-R) Approach: The starting point of K-R approach is:

$$E = \frac{\sum I+K}{P} \longrightarrow \text{minimum}$$

where P is a given planned target. The coefficient E can be interpreted as the unit cost (actual prime cost plus a shadow charge on investment) per unit of investment. This was the version of the rule actually codified in the Instrukcja[44]. If we suppose that material costs M are the same for all processes, which therefore, differ only in respect of investment (I) and labour inputs (L), and that $L = L(I)$, $L' < 0$, $L'' > 0$, the first order condition for the minimization of $\sum I+K \longrightarrow$ minimum, gives

$$\frac{dL}{dI} = \frac{1/T}{W} \quad \ldots \quad \ldots \quad \ldots \quad (5)^{45}$$

which is equivalent to text-book condition for cost minimization of a given output, with the rate of substitution between factors equal, in its absolute value, to the inverse of the relative factor prices.

Now if capital goods had infinite (economic and technical durability, $\sum$ would be equal to a shadow interest rate. In case

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44. D.M. Nuti, "The Evolution of Investment Planning in Poland", Jahrbuch der Wirtschaft Osteuropas, Band 3, 1974, PP.399-401. See also, D.M. Nuti, "Investment, Interest and degree of centralization in Maurice Dobb's Theory of the Socialist Economy", Cambridge Journal of Economics, Vol.2, 1978, PP.195-97.

45. If the yearly operating costs are defined as $K_i = L_i + M_i$ where i indicates the process ($i=1,2,\ldots\ldots,n$), $L_i$ is the yearly labour input (assumed here for simplicity to be homogenous), W is the wage rate and $M_i$ is the total cost of materials associated with the process.

of a finite expected service life of investment, there is a relation between T and the shadow interest-rate, implicit in the way amortization is allowed for. Following the correct amortization procedures in a capitalist firm, the actual or imputed capital charge would be equal to a fraction,

$$\frac{r(1+r)}{(1+r)^n-1} \qquad \text{(where r is the interest rate)}$$

so that the implied relation[46] between T (the recoupment period) and r (the interest rate) is given by

$$T = \frac{(1+r)^n-1}{r(1+r)^n} \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

There are two kinds of relations which can be shown here, first is the relation between r and n for different hypothetical levels of T and the other is a relation between r and T for alternative investment lifetimes. This has been done by Nuti. To quote Nuti, "For T = 6 and an investment lifetime (n) of 20 years (which is equivalent to the average lifetime of investment taken in Polish "Instructions" at the time of the issue the implicit interest rate is about 15.7% which is a relatively "high" interest rate. The interest rate implicit in T = 6 does not increase appreciably for higher investment durability, as it tends to 16.67 as $n \to \infty$; however, it falls rather steeply for lower lifetimes down to r = 0 for n = 6. Thus it follows that for n in the 15-30 years range, the implicit interest rate would be within a rather narrow band of about two percentage points, so that even if the assumption of

46. For details see Nuti, n.44, PP.401-04.

uniform lifetime was relaxed, within that range implicit interest rates would not diverge too widely. With regard to the relation between r and T for alternative investment lifetimes, it can be seen that, in the case of investment in modernization of existing plants, where presumably the duration of the savings in current costs would be lower than in the case of new plants (simply because old plants would have had higher current costs, if not modernized, only until the day their replacement is due), the recoupment period taken as "standard" is 5 years. This implies an interest rate within the same band of variation assumed above, for duration within the 9-12 years (but it falls rapidly for the range 5-9; if course if investment in modernization also prolongs the life of old investment a lower rate could be justified)."[47]

Nuti feels that the procedures adopted (as described above) in Poland compare favourably with the Soviet practice of using a capital charge equal to $(\phi + \frac{1}{n})$ and diversifying the standard recoupment periods by sectors, lower for light industries and higher for heavy industries within a range of 3-10 years. Nuti further argues that in these countries no theoretical justification[48] is offered for the use of multiple recoupment periods and on the contrary if we go by the assumption that a lower durability is associated with industries by lower standard recoupment periods, then, the use of a capital

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47. Ibid, P.404.

48. But there is a practical justification that it promotes the development of certain "Key" or "priority" branches.

charge ( $= \frac{1}{T} + \frac{1}{n}$ ) may in fact be consistent in theory, with fairly uniform rates for special pairs of values of the parameters T and n.

Thus the formulation (1) namely, $E = \frac{I\frac{1}{T} + K}{P}$ which is equivalent to hitherto used $\frac{I + Iq_n + K_n}{P_n}$ where $q = \frac{1}{T} - \frac{1}{n}$ based on certain highly simplifying assumptions.[49] For example it considers a highly simplified model of a national economy in which (1) all the plants are built 'instantaneously' and thus avoiding the problem of the "freeze" of investment resources during the period of construction; (2) let all the plants constructed have the same durability, say of twenty years, thereby eliminating the issue of different life-spans of plant operation; and finally (3) assuming that the distribution of output and costs over time are constant to eliminate from this simplified model, the problem of uneven distribution of output and costs over time.

Kalecki and Rakowski introduced a number of further refinements[50] to include the above aspects of investment choice. These two economists take formula (1) as the starting point and then proceed to drop the above simplifying assumptions one by one, thus introducing a modification in the formula. Let us consider each of these modifications.

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49. Kalecki and Rakowski, n.35, PP.252-53; Nuti, n.44, PP.395-97.

40. Kalecki and Rakowski, n.35, PP.253-62, Nuti, n.44, PP.412-18.

(1) "Freeze" of Investment Resources[51]. The construction of a plant and the installation of machinery takes time and during this time investment resources are considered to be "frozen", which have an influence upon the efficiency of investment. If all investment alternatives had the same constructions and the same yearly pattern of outlays during that period, no further element of choice would be introduced (except that "waiting" might affect the central choice of the output targets). Whenever alternatives with different gestation periods are available for producing the same flow of output, the choice of a project with a gestation period longer than others available involves a loss of potential output in the economy. In Poland such loss is estimated and added directly to the actual investment outlay. However, in the Soviet Union the loss of potential output associated with the "freezing" of one unit of investment is computed as a fraction $\frac{1}{t}$ of actual outlay. In the Soviet Union the inverse of the standard recoupment period in the industry was used and the loss was compounded over the construction period. However, in Poland the loss is measured by a "coefficient of immobilization", $q_z$ calculated in a different way. Investment costs are given, for the purpose of the application of the basic rule, as

$$\sum_{j=1}^{t} I_j \left[1 + (t-j)q_z\right] \quad \ldots \qquad (7)$$

51. For a detailed discussion on the problem of freezing of investment resources as well as the methods of dealing with it, see: Rakowski, n.35, PP.37-42, 122, 344; Kalecki and Rakowski, n.35, PP.254-56; Nuti, n.44, PP.412-14 and also see, David A. Dyker, The Soviet Economy, Crosby Lockwood Staples, London, 1976, Ch.5.

where $j = 1,2,.....t.$

$t$ is the length of the construction period,

and $I_j$ is the investment outlay in year $j$.

In practice, total investment I is multiplied by $(1+q_z.n_z)$ where $n_z$ is the "period of immobilization",

$$n_z = \sum_{j=1}^{t} (t-j)(I_j/I) \quad \ldots \quad \ldots \quad (8)$$

Since they regard the influence of freeze of investment resources to be proportionate to the magnitude of the "freeze" of the funds in the course of construction, therefore, one can write

$$\sum_{0}^{t_b} i_t(t_b-t) \quad \ldots \quad \ldots \quad (9)$$

where $i_t$ = partial outlay made at time t after construction was started;

$t_b$ = total construction;

$i_t(t_b-t)$= freeze of the partial outlay $i_t$.

Now replacing the above expression by $I_{n_z}$, where I is the investment outlay and therefore, is equal to $\sum_{0}^{t_b} i_t$, whereas $n_z$ is the "freezing period" equal to the volume of the "freeze" divided by total investment outlay. If investment outlays are evenly distributed over construction time, $n_z = \frac{t_b}{2}$. If they are concentrated at the beginning of construction, $n_z > \frac{t_b}{2}$ and if they are concentrated at the end of the construction period $n_z < t_b/2$.

Now consider the impact of the freeze of investment resources in the course of construction on the economy. In

this simplified model in which construction of plant is "instantaneous" resources frozen gradually in the course of construction would be at the disposal of the national economy for an immediate generation of output. Let $q_z$ be the net national product generated per unit of investment resources which had earlier been frozen per annum. The yield of the partial outlay till the completion of the plant would be $i_t\, q_z(t_b-t)$. It follows that in this simplified model the total additional yield would be $I_{q_z}\, n_z$. Thus as a result of the 'freeze' the outlay on the plant is $I(1+q_z n_z)$ rather than I. Thus expression (4) assumes the following form:

$$E = \frac{I(\frac{1}{t})(1+q_z n_z) + K}{p} \qquad \ldots \qquad \ldots \qquad (10)$$

Now remains the problem of the determination of $q_z$, that is, the net national product yielded annually by a unit o investment outlay which in fact is "frozen" in the course of construction but in this simplified model with "instantaneous construction" are harnessed to production. Now assume that if one unit of investment were to be "unfrozen", it would yield a amount of national product of an average pattern equal to $\frac{1}{m}$, where m is the gross capital output ratio. Allowing for depreciation of fixed capital at a rate v, the net product would be $(\frac{1}{m}-v)$ per annum. It would seem prima-facie that $q_z$ equals $\frac{1}{m}-v$ but an essential correcting factor must still be introduced in the argument. The point is that an increment of national product requires additional employment as well as investment.

In a situation of full employment, in order to release the manpower necessary to man this unit of investment some additional investment must be undertaken elsewhere in the economy. To obtain an increment of one unit of gross national product, in addition to direct investment in the additional investment required to release the necessary manpower is given by $T_r$ where r is the labour cost of production of one unit of gross output and T is the standard recoupment period. The yearly net product of one unfrozen unit of investment is then reckoned as

$$q_z = \frac{1}{m + T_r} - V \quad [\text{rather than } \frac{1}{m} - V] \quad \ldots \quad (11)$$

In Poland[52] the coefficient $q_z$ were estimated as having the following values: assuming for Poland m = 2.5; T = 6; r = 0.5; V = 0.03 (the rate of depreciation of fixed capital is substantially lower than the rate of wear and tear because of the rapid expansion of the stock of fixed capital). Therefore, $q_z$ = 0.15 or 15%. This value of $q_z$ is pretty close to the inverse of the standard recoupment period, but according to Kalecki this is due to a mere coincidence.

However, in the opinion of Nuti, ".....it is difficult to see why the locking up of investment resources in the form of a longer gestation period should be treated differently from the locking up of investment resources in the form of a higher investment intensity".[53]

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52. Nuti, n.44, P.413.
53. Ibid, P.413.

He further argues that consistency would require $q_z = \frac{1}{T}$ in the practice of many socialist countries, and, in fact, if $q_z < \frac{1}{T}$, the addition to net national product from one unit of unfrozen investment is less than the reduction of current operating costs which could be obtained by investing in more capital intensive projects in new investment projects. Therefore, in such a case it is $\frac{1}{T}$ and not $q_z$ which should be taken as the opportunity cost of freezing one unit of investment. While on the contrary, if $q_z > \frac{1}{T}$, then, according to him, it is $q_z$ and not $\frac{1}{T}$ ought to be taken as opportunity cost of choosing a more investment intensive technique. But he emphasizes that whichever way the problem is considered, the coefficient of immobilization should be equal to the inverse of the standard recoupment period. And he further argues that since the terms r and m are themselves dependent on T, therefore, the efficiency of investment should result in

$$\frac{1}{T} \overset{54}{=} q_z = \frac{1}{m(T) + T.r(T)} - V \quad \ldots \quad \ldots \quad (12)$$

Rakowski[55] has suggested a method to reduce the freezing of investment during the construction period. It would be interesting to examine it in the light of the following example.

Numerical Example: Assume that the construction time or $t_b = 3$ years so $n_{f\,1,2,3}$ are the successive years of construction and

54. This could produce additional complications in the procedure for finding the magnitude of T consistent with the efficient allocation of resources and maintenance of full employment.

55. Rakowski, n.35, PP.38-42.

$n_F$ is the mean weighted time of their freezing, defined algebraically as

$$n_F = \frac{\sum_{t=0}^{t_b} i_t(t_b - t)}{I},$$

to denote the period of partial outlay $i_t = t_b - t + 0.5$. Also assume that the total outlay to be distributed is 60 m.zloty.

To explain this method he visualizes the following three cases:

Case(1): When the investment outlays are distributed evenly over the entire construction period - a case in which $n_F$ would assume the value $\frac{t_b}{2}$. Numerically, it implies that;

$i_1$ = 20 m.zl. ; $i_2$ = 20 m.zl. ; $i_3$ = 20 m.zl.

correspondingly ; $n_{F1} = 3-1+0.5 = 2.5$ years

$n_{F2} = 3-2+0.5 = 1.5$ years

$n_{F3} = 3-3+0.5 = 0.5$ years

The freezing $F = i_1 n_{F1} + i_2 n_{F2} + i_3 n_{F3}$

$= (20 \times 10^6) \times (2.5) + (20 \times 10^6) \times (1.5) + (20 \times 10^6) \times (0.5)$

= 90 m.zl. years.

The mean freezing period of the total outlays will be:

$$n_F = \frac{90 \times 10^6}{(20+20+20) \times 10^6} = 1.5 \text{ years}$$

Hence one can verify that $n_F = \frac{t_b}{2} = 1.5$ years.

Case(2): If the outlays were concentrated at the beginning of the construction period, then, $n_F$ would be greater than $\frac{t_b}{2}$.

Numerically,

$i_1 = 30$ m.zl.; $i_2 = 20$ m.zl.; $i_3 = 10$ m.zl.

$F = (30\times10^6)\times(2.5)+(20\times10^6)\times(1.5)+(10\times10^6)\times(0.5)$

$= 110$ m.zl. years

and $n_F = \frac{(110\times10^6)}{(60\times10^6)} = 1.83$ years

One can again verify that $n_F > \frac{t_b}{2}$ as $\frac{t_b}{2} = 1.5$ while $n_F = 1.83$.

Case(3): If the outlays are concentrated at the end of the construction period, then, $n_F$ would assume a value less than $\frac{t_b}{2}$. Numerically,

$i_1 = 10$ m.zl; $i_2 = 20$ m.zl.; $i_3 = 30$ m.zl.

"F" $= (10\times10^6)\times(2.5)+(20\times10^6)\times(1.5)+(30\times10^6)\times(0.5)$

$= 70$ m.zl.

and $n_F = \frac{(70\times10^6)}{(60\times10^6)} = 1.17$ years $< \frac{t_b}{2}$

and therefore, $n_F < \frac{t_b}{2}$.

Thus, Rakowski shows that the freezing of the outlays incurred during construction can be reduced not only by a shortening of the construction cycle, but also by the concentration of outlays at the end of the construction period, which is crux of the method of investment phasing described above.

But there are some basic problems[56] associated with this method. While in case of the "Method of Investment Phasing",

56. This criticism of the method is mine.

we cannot distinguish between various kinds of concentrations. Rakowski works out a formula only for 3 cases, namely, when outlays are evenly distributed or are concentrated either at the beginning or at the end of the construction period. However, it may be pointed out here that there could still be many other possible concentrations than the ones mentioned above and how to account for those different concentrations of outlays and how to choose the best out of them, the formula is silent about it. Then he also assumes the concentration of outlays in the middle of each year of construction under the first method, thereby taking $(t_b - t + 0.5)$, but how far this assumption is realistic is an open question.

Another method[57] suggested by him is that of partial starting up of the plant before the ultimate conclusion of the investment. This method, he feels, is very effective. In order to use it in given plant the technological process should be divided into relatively independent parts and such a construction schedule should be drawn up so that the individual parts of the plant could start and continue production before the construction of the entire plant is finally completed. Under this method, the outlay "unfrozen" in the year "t" of construction is $i'_t = I \left( \frac{P_t}{P} \right)$, where: $P_t$ = total output in each year 't' of construction and P = output producing capacity. Given $i'_t$'s we can find total unfreezing as $\sum_{t=1}^{t_b} i_t$ and the unfreezing period is $n_{unf} = \frac{\sum_{t=1}^{t_b} i'_t}{I}$ and the freezing period, with

57. Rakowski, n.35, PP.41-42.

due account for the unfreezing, is

$$n_F = \frac{\sum_{t=1}^{t_b} i_t(t_b - t + 0.5) - i'_t}{I} \quad \ldots \quad \ldots \quad (13)$$

But problems are associated with this method as well and Rakowski himself raises these problems. For example, he points out that in practice there is frequently the problem of what moment should be regarded as completion of an investment especially in the construction of complexes comprising of many investment tasks. However, he suggests that in this case in principle, one should take the time of conclusion of investment work and the commissioning of a plant constituting a specific investment goal (hence not of the entire complex). It is also a complicated matter to determine this moment precisely yet for another reason and that as a plant does not reach full production capacity for a long time after commissioning.

Let us now consider the other major modifications introduced in the efficiency formula.

Let us first relax the assumption of standard durability of plant and consider the modification of the formula for non-standard durability of plant and its impact on the choice of production techniques[58]. The issue involved here can be explained in simple terms. For example, if there are two plants with different durabilities then, the plant with the longer life-time has the advantage of producing a given stream of output for a longer period while it has a disadvantage of being

58. Here Polish Procedures are certainly more sophisticated than the practice of adding straight line depreciation $\frac{1}{n}$ to the inverse of the standard recoupment period as has been done in Soviet Union.

tied to a given technical form for a longer period, therefore, the benefits of the technical progress of the embodied kind remain excluded. The balance between the two effects depends on the difference in lifetime, the rate at which operating costs decrease every year in the new plants, and the growth rate of investment in the production of output considered.

Since it was assumed so far that all the plants have the same standard durability $n_s$, therefore, the formulae arrived at cannot be applied when projects of plant of different durabilities are compared. We should determine the correctives for output and costs which enable us to substitute a project of lifetime $n_s$ in place of a project of lifetime n.

In order to make the technical alternatives comparable with that of the plants of durability n, it is necessary to devise a "measure" which will tell us the advantage (or disadvantage) of durability in excess (or lower than) the standard durability $n_s$. This measure, Kalecki & Rakowski, express in the form "$Z_n$" (where $Z_n = \frac{m}{m_s}$) which is a ratio of capital output ratio "m" and the capital output ratio "$m_s$" ($\frac{m}{m_s} = Z_n$). The procedure[59] they have adopted for this purpose is as follows:

Firstly, they estimate the index of output capacity, for which, they suppose:

Let "g" the annual rate at which investment in plants of durability of n years grow;

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59. Kalecki & Rakowski, n.35, PP.256-59; Nuti, n.44, PP.414-16. See also Rakowski, n.35, PP.125-31.

"m" be the capital output ratio, which is assumed to be constant over time;

& I = investment at any time period t and $I(1+g)^{-1}$ = investment in the preceding year while $I(1+g)^{-(i-1)}$ = investment (i-1) years back.

It is further assumed that the stock of fixed capital operating in a given year (expressed at historical cost at constant prices) is measured as a sum of investment carried out in the last n years; if the flow of output is constant over time, this gives an index of output capacity, namely,

$$M_n = \sum_{i=1}^{n} I\left(\frac{1}{1+g}\right)^{i-1}$$

$$= I\,\frac{\left[1-\left(\frac{1}{1+g}\right)^n\right](1+g)}{g} \qquad \ldots \qquad \ldots \quad (14)$$

and since the capital output ratio is "m", therefore, the output from this stock of fixed capital is,

$$F_n = \frac{M_n}{m} = I\,\frac{\left[1-\left(\frac{1}{1+g}\right)^n\right](1+g)}{m-g} \qquad \ldots \qquad \ldots \quad (15)$$

Now in order to compare this technical alternative comparable with that of the durability $n_s$, we should also determine in the same way the capital stock produced by a flow of investment of the same size and growth rate in plants of durability $n_s$. It is argued that if all other things remaining same, then the output flow of an investment process with the parameters (m, n) will be equal to that of an investment process with the parameters $n_s$ and $m_s$ if,

$$\frac{m}{m_s} = \frac{1-\left(\frac{1}{1+g}\right)^n}{1-\left(\frac{1}{1+g}\right)^{n_s}} = Z_n \qquad \ldots \qquad \ldots \quad (16)$$

The following things may be noted in connection with this formula:

(1) So long as $\frac{n}{n_s} < Z_n$, the longer-lived and more investment intensive process will yield a higher flow of output at any given time.

(2) This formula indicates to what extent it is convenient to trade off durability with investment intensity[60].

(3) The value of $Z_n$ depends on the value of "g" and the value of n ($n_s$ is constant). The slower the "g" - the growth rate of investment the greater the advantage of durability and therefore, more attractive the choice of longer lived, investment intensive projects.

(4)(a) If g=0; $Z_n = \frac{n}{n_s}$ and the advantage of higher durability is maximum;

(b) With a greater durability of the plant and a given flow of investment the output grows in proportion to the durability n;

(c) If investment grows at a constant positive rate g, the advantage of durability appears to decrease rapidly. Following Kalecki & Rakowski, if we take for example, $n_s$ = 20 years and g = 0.07(=7%), then, $Z_n$ expressed as a function of "n" takes the following values:

| n years | 5 | 10 | 15 | 20 | 25 | 30 | 40 | $\infty$ |
|---|---|---|---|---|---|---|---|---|
| $Z_n$(%) | 36.6 | 66.1 | 86.0 | 100.0 | 110.0 | 117.1 | 126.0 | 131 |

60. Polish Planners have argued that investment intensity as a rule increased more slowly than the durability of the project.

These values simply explain that if the planners wished to increase the durability of projects from 20 to 40 years, they should do so as long as investment output ratio is no more than 26% higher for 40 than it is for 20 years. Similarly, the projects with infinite durability should not be chosen unless their investment output ratio was less than 31% higher than that of plants of standard durability.

Therefore, it follows from above that an investment project of durability n and investment output ratio $m_i$ is considered equivalent to an investment of durability $n_s$ and investment output ratio $m_s = m_i/Z_n$ on the ground that production capacity at any time is $Z_n$ times what it would have been if the investment project had standard durability. Thus, the expression to be minimized becomes now:

$$\frac{\frac{1}{T} I(1+q_z n_z)+K}{P.Z_n} \quad \ldots \quad \ldots \quad (17)$$

Though this approach is certainly ingenious but the above expression over-states the advantage of durability because the durability will not affect production capacity alone but it will also affect the volume of current costs at the same time, therefore, it is necessary that "K" should be multiplied by $Z_n$ and thus the expression to be minimized becomes:

$$\frac{\frac{1}{T} I(1+q_z n_z)+K.Z_n}{P.Z_n} \quad \ldots \quad \ldots \quad (18)$$

$$\text{or} = \frac{\frac{\frac{1}{T}(1+q_z n_z)+K}{Z_n} + K}{P} \quad \ldots \quad \ldots \quad (19)$$

(2) Effect of Technical Progress: Obviously to a higher lifetime of plant there corresponds a larger flow of costs as well as a larger flow of output and to account for this, an essential modification must be introduced. This amounts to accounting for the effect of durability over the introduction of technical progress and this is done in a similar manner as in the case of output. Assume that:

> investment is growing at a rate g per year;
> total operating costs of production in the new investment increase at a rate $c < g$, because of technical progress advancing at a rate approximately equal to g-c.

Now just as in case of output we calculated $\frac{m}{m_s} = Z_n$, following the same method here, we shall take the relation between the total costs $G_n$ and $G_{ns}$ corresponding to a stock of plants of durability n and $n_s$ and this is given by

$$Y_n = \frac{G_n}{G_{ns}} = \frac{1 - (\frac{1}{1+c})^n}{1 - (\frac{1}{1+c})^{n_s}}$$

Now if "K" be the production costs in a stock of plants of durability n, the production costs in an identical stock of plants of durability $n_s$ would be $KY_n$. This simply means that a plant with a longer lifetime will involve. Therefore, a flow of costs larger by a factor of $Y_n$. Now if

$g = 0.07$ $c = 0.03$ (with progress advancing at a rate of 0.03)

$n_s = 20$ years & if $Y_n$ is expressed as a function of n, then

$Y_n$ will take the following values corresponding to different values of n:

| n years | 5 | 10 | 15 | 20 | 25 | 30 | 40 | $\infty$ |
|---|---|---|---|---|---|---|---|---|
| $Y_n$(%) | 31 | 57 | 80 | 100 | 117 | 132 | 155 | 227 |

Thus the final form of the formula will take the following form[61]:

$$\frac{I.\frac{1}{t}(1+q_z.n_z)+K.Y_n}{P.Z_n} = \text{minimum}$$

wherein K has been replaced by $KY_n$. This tells, on the whole the impact of durability of investment plants on the flow of output and costs. Two important points may be noted in connection with the above formula:

(1) For each project of a given technical durability $n_i$ the value of $n \leqslant n_i$ is found for which the above expression reaches a minimum, and this is taken as the optimum economic lifetime of the project[62].

(2) The project is chosen which has the lowest value of that expression, taken for its own optimum lifetime.

A final modification is introduced to take into account the possible difference between the rate at which labour costs

61. Nuti, n.44, P.417; Kalecki and Rakowski n.35, PP.257-59 Rakowski, n.35, PP.131-45.

62. The higher efficiency of investment in the case where the durability of the plant exceeds the standard period is expressed in this equation by $I(1+q_z n_z)$ being divided by $Z_n$. On the other hand multiplication of current costs K by $Y_n/Z_n$.

and other costs (raw materials, semi-finished products, fuel, energy and capital maintenance) fall over time. It may be emphasized that the basic approach even here also remains unchanged. In other words, the flowsof output and costs of balanced stocks of investment projects of different durabilities are compared and the actual investment outlays and operating costs are adjusted accordingly.

Despite the improvements of the Kalecki-Rakowski method on the traditional criterion, this approach suffers from the following shortcomings:

(1) While considering the modification relating to different durabilities of plants, P was multiplied by $Z_n$ whereas K was not which amounts to inclusion of a non-existent reduction in operating costs.

(2) Secondly, Nuti[63] argues that the value of the optimum economic lifetime, in the above approach, would vary with $n_s$, and $n_s$ is an entirely arbitrary parameter, because there is no reason, in principle, for choosing the durability of one or the other plant as "standard". Therefore, Nuti suggests that the optimum lifetime of a plant should be assessed without reference to a standard durability. Therefore, if the planning authorities are prepared to trade investment for operating costs at the rate 1/T, the expression to minimize ought to be

$$\frac{1}{T} I(1+q_z n_z)\frac{g}{(1+g)\left[1-\left(\frac{1}{1+g}\right)^n\right]}+K\frac{\left[1-\left(\frac{1}{1+c}\right)^n\right](1+c)}{c} = \text{minimum} \quad \ldots \quad \ldots \quad (20)$$

63. Nuti, n.44, P.417.

In line with this, he further suggests that for each alternative investment project the value of n that minimizes this expression should be determined and the project should be selected that minimizes the expression for its own optimum lifetime.

(3) In the third place, he notes the asymmetry[64] between the treatment of durability and gestation period in the above approach. While the durability is treated considering the growth rate of investment and of productivity and its impact on the flow of output and costs, but the gestation period is treated independently of the growth rate of investment & productivity whereas there are both aspects of the time profile of inputs and output, which should be treated in the same way.

(4) He also points out that the attempt by the Polish planners at doing without actual interest rates has led them to introduce no less than three different shadow rates, implicit in the use of the standard recoupment period, the coefficient of immobilization, and the growth rates discussed above, with all the problems raised by this "embarras de richesse".

(5) He also argues that the use of the growth rate of investment & productivity in the context of investment planning, has anticipated the "Golden rule of Accumulation"[65] though of course if the

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64. Ibid, P.417-18 for this as well as the subsequent criticisms.

65. The Golden rule of accumulation states that under conditions of 'steady growth' the maximum level of consumption per capita is obtained by using the technique eligible at a discount rate equal to the rate of steady growth.

growth rate of investment is slowing down the advantage of a longer lifetime is higher than if the growth rate of investment is constant, and the reverse is true for an accelerating growth rate.

(6) Besides Nuti's criticisms, it may also be pointed out that Kalecki-Rakowski's formula, as they admit themselves is no more than a better approximation to the complex economic reality than those in use, rather than as a final solution of the problem. Then there is also a fundamental problem of the determination of $q_z$[66] for different projects (branches/sectors).

(7) Yet another problem with Kalecki-Rakowski's formula is that it is not possible to distinguish between various kinds of concentrations. For example, if we face a situation when the total funds are 260 million zloty and there are two projects A, B on which this amount is being spent in 4 years in the following manner:

| Years | 1 | 2 | 3 | 4 | Total |
|---|---|---|---|---|---|
| Project A | 100 | 0 | 40 | 120 | 260 |
| Project B | 50 | 50 | 80 | 80 | 260 |

How to distinguish between the kinds of concentrations A and B, the Kalecki-Rakowski formula is silent about it. (This, of course, is just one possible case, there could be, in real practice, various permutation & combinations of this kind). This creates the problem of unfinished construction.

66. $q_z$ is the coefficient of immobilization.

FISZEL'S APPROACH:[67] Fiszel's approach to "synthetic efficiency" index is a straightforward extension of discounting methods to Central Planning. These are the methods devised to handle microeconomic situations i.e. to guide intertemporal choices by firms and individuals confronted with perfectly competitive markets. The crux of the Fiszel's approach can be explained as follows:

"The problem of management is principally a problem of the proper choice between different alternatives. By making a choice concerning production we determine not only the amount of outlays necessary to yield on intended effect in the form of output, but also the amount of materialized labour, the period of time during which the amount of labour must be frozen in machines, installations, stocks etc. Investments are precisely the field of management in which means are frozen over long periods of time. Hence when studying the efficiency of investment we must fully account for the structure of investment in time. The rate of interest seems the best suited indicator for the purpose, for it is only by computing the interest to be paid on invested means that we can make comparisons between the various alternatives and accordingly choose the best from the point of view of economy of social labour. Any attempts to

67. Fiszel, n.42, Chaps 1,2,3. See also H. Fiszel, "Capital Finance and Relevant Economic Calculations in a Planned Economy" in M. Kaser and R. Portes, Planning and Market Relations, Proceedings of a conference held by the International Economic Association at Liblice, Czechoslovakia, Macmillan, London, 1971.

disregard interest as a factor, not applicable in a socialist economy must lead economic accounting astray"[68].

Keeping this in view Fiszel has presented some methods of analysis of the efficiency of investments by means of interest rate. In order to describe his method, he starts out with a practical situation when production programme is given and the problem is only to make a choice between alternative investments or strictly speaking, between different technologies.

Let there be two technological solutions in question (1,2). "J" refers to investment outlay on a particular variant so that $J_1$ & $J_2$ here refer to investment outlays respectively on technological alternatives (1,2) and their respective exploitation costs (without depreciation and interest) are $K_1$ and $K_2$. Clearly $K_1$ must be smaller than $K_2$, otherwise the problem would lose all its meaning. He also assumes that the expected period during which the plant is to be exploited is "n" years in both cases and that the rate of interest is "S". The criteria for the choice of technical variant, according to this method is, "choose an alternative for which total outlays made and discounted at a certain moment are the lowest". Hence

$$D_1 = J_1 + \sum_{i=1}^{n} \frac{K_1}{(1+s)^i} \quad \ldots \quad \ldots \quad (21)$$

$D_1$ and $D_2$ refer to the total outlays.

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68. Fiszel, n.42, P.1.

$$\text{and } D_2 = J_2 + \sum_{i=1}^{n} \frac{K_1}{(1+s)^1} \quad \ldots \qquad \ldots \quad (22)$$

where $\frac{1}{(1+s)}$ is the discounting factor.

If exploitation costs ($K_1$) are constant over time, say, over "n" years, then eq.(21) can be put in the following form:

$$D_1 = J_1 + K_1 \frac{(1+s)^n - 1}{s(1+s)^n} \quad \ldots \qquad \ldots \quad (23)$$

For the sake of simplicity, it was assumed above that all exploitation costs are incurred at once, at the end of each year; in fact, however, they are spread over the entire year. Now if we assume that costs are spread more or less evenly and that the costs are discounted from the middle of the year, therefore, eq.(22) becomes now

$$D_1 = J_1 + \sum_{i=1}^{n} \frac{K_1}{(1+s)^{1-\frac{1}{2}}} \quad \ldots \qquad \ldots \quad (24)$$

and equation (23) will become:

$$D_1 = J_1 + K_1 \frac{(1+s)^n - 1}{s(1+s)^{n-\frac{1}{2}}} \quad \ldots \qquad \ldots \quad (25)$$

In a similar manner he relaxes the other assumptions[69] as well and introduce modifications in the above formulae. For example, while comparing the two alternative investments it is assumed above that the output is constant in both cases so that it remains at the same level each year over the whole period of exploitation of the plant whereas in fact the output often varies from year to year. Therefore, in order to take into account the

69. For this and the other assumptions, see Fiszel, n.42, PP.1-20.

temporal structure of discountable output the formula ( ) must be modified. The modification suggested is the following:

$$d_1 = \frac{J_1 + \sum_{i=1}^{n} \frac{K_1}{(1+s)^1}}{\sum \frac{P_1}{(1+s)^1}} \text{ etc.,} \qquad \ldots \quad (26)$$

where $P_1$ = the size of output in the year 1,2,.....m

$d_1$ = is calculated in Zlotys per ton

$D_1$ = is expressed in Zlotys.

Subsequently he also relaxes the assumption that both plants have the same life-span (n-years) and carries out the adjustments accordingly. However, one of the most important aspects of efficiency of investment is the "freezing of investment resources due to long gestation lags" and Fiszel also agrees that while evaluating the choice of investment variant and determining the "efficiency index" one should take into account not only the expected costs of investment planned but also the period during which the investment means are frozen[70] i.e., the period from the moment construction begins to the moment the plants starts production. And in line with this Fiszel suggests, of course, keeping in view not only the varying rate of growth of investment outlays in various years during construction but also the different construction cycles characteristic of the different

70. For the problem of freezing of resources in Fiszel's approach, see Ibid, PP.3-6.

alternative solutions, that interest on investment means should be calculated as follows:

$$J_1' = \sum_{t=1}^{t_b} i_t (1+s)^{t_b - t} \quad \ldots \quad \ldots \quad (27)$$

where $i_t$ = partial outlays in period t from the moment construction has been started. It is assumed here that outlays are made at the end of each year;

$t_b$ = construction time in years;

$J_1 = \sum_{t=1}^{t_b} i_t$ ;

$J_1'$ = investment outlays including interest on means frozen in the plant under construction.

However, if we assume that instead of partial outlays made at the end of each year, they are made in the middle of each year, which Fiszel feels, is more in line with facts, the formula (27) can be written as follows:

$$J_1' = \sum_{t=1}^{t_b} i_t (1+s)^{(t_b - t + \frac{1}{2})} \quad \ldots \quad \ldots \quad (28)$$

and finally Fiszel considers a case where the outlays increase uniformly here, he suggests the following formula:

$$J_1' = \frac{J}{t_b} \times \frac{(1+s)^{t_b} - 1}{s} \quad \ldots \quad \ldots \quad \ldots \quad (29)$$

Thus the formula (26) suggested above can be written in an expanded formula after allowing for interest on means frozen during the construction period:

$$d_1 = \frac{\sum_{t=1}^{t_b} i_t (1+s)^{t_b - t} + \sum_{i=1}^{n} \frac{K_i}{(1+s)^I}}{\sum_{i=1}^{n} \frac{P_i}{(1+s)^I}} \quad \ldots \quad \ldots \quad (30)$$

The problem remains with this formulation is that the period of construction has been separated from the period of exploitation, basing on the assumption that the plants starts giving the production the moment it is completed. However, in some cases, it so happens that the plant starts production when still under construction, until it gradually reaches its production capacity. Therefore, the treatment of investment outlays and exploitation costs separately is unsatisfactory. In fact the investment outlays are interwined with exploitation costs and therefore, this should also be accounted for in the above formulae. Secondly, when the interest rate was used above as an instrument of economic accounting it was treated as known, though the issue is not so simple. Fiszel stresses that the level of the interest rate determines the choice of the correct investment alternative and in this connection, he suggests that sometimes, it is advisable to make use of the "internal rate of return"[71] to analyse the efficiency of investment where he defines internal rate of interest to mean such a rate of interest for which the value of expenditure and revenue, discounted for a given moment, equals zero, or, which means the same, for which the two series of expenditure and revenue are equivalent while applying this method to the choice of the most advantageous of the many investment alternatives, characterized by different outlays and exploitation costs, we shall take such alternative solutions which yield the same use values.

71. This raises a similar problem i.e. what should be the internal rate of return.

Let us take, for example, two solutions 1 and 2, with $J_1$ and $J_2$ be investment outlays such that $J_1 > J_2$. The annual exploitation costs (constant over the period of n-years) are $K_1$ and $K_2$, respectively such that $K_1 < K_2$. In both the cases the period of exploitation is n years, and the output is constant and for the sake of simplicity the freezing of means during the construction period is not accounted for.

Thus, now the basic problem is to find a rate of interest such that the outlays in both cases, calculated for the moment in which the plant is put into operation, are equal, or:

$$J_1+K_1 \frac{(1+r)^n-1}{r(1+r)^n} = J_2+K_2 \frac{(1+r)^n-1}{r(1+r)^n}$$

$$\Rightarrow \quad J_1-J_2 = (K_2-K_1) \frac{(1+r)^n-1}{r(1+r)^n}$$

$J_1-J_2$ = the additional outlay (expenditure) resulting from the choice of the more capital intensive solution;

$K_2-K_1$ = amount saved on costs, and hence a sui generis revenue.

Given this, the final form[72] of the equation to be examined is:

$$\frac{J_1-J_2}{K_2-K_1} = \frac{(1+r)^n-1}{r(1+r)^n} \quad \ldots \quad \ldots \quad (31)$$

It may be noted that:

(i) From this, Fiszel suggests that 'r' can be found by the trial and error method.

72. Fiszel, n.42, P.8.

(2) The higher the r the more advantageous is the solution-1. For example, if r = 25%, then, solution 1 should be chosen. While when r is small, the choice should be in favour of a capital saving solution. Fiszel feels that only in a few marginal cases, it would be difficult to arrive at a rational decision.

The methods described above were related to alternative investments which aimed at achieving the same or similar use values by different methods and Fiszel emphasizes that this type of research on the efficiency of investment should predominate in a socialist economy because in socialist economies, the allocation of social labour to various branches of production is not made with a view to maximizing profits, but on the other hand, the means invested in various branches of production are determined by social needs as reflected in long-terms economic plans. Therefore, Fiszel feels that the in a socialist economy, the rate of interest may not be the only or the decisive factor in the allocation of means to various fields in which they are to be used, but still it is one of the important criteria. To quote Fiszel "In making decisions on a national scale concerning the advisability of investments in a given field of production, the aim should be to achieve planned targets with a minimum of investment outlays and exploitation costs. This can be attained by comparing the efficiency of the various feasible technological and economic solutions, and here, as has been pointed out above,

the rate of interest should be used as a criterion."[73]

This should certainly not be taken to mean that the rate of interest plays no role in analysing the efficiency of investments in fields of production where use values are not comparable, because Fiszel argues that the centrally made decisions cannot always be univocally determined. For example, he points towards a situation where even a central planning agency may face a dilemma whether to build a plant producing product A or to build a plant producing product B, where both products are assumed to be indispensable to meet definite social needs and the constraints on resources do not permit authorities to build up both the products simultaneously. There creeps in the question of "priority criterion" for determining the choice of the investment. But here too, Fiszel opines that the planning agency might use internal rate of interest as such a criterion and should give priority to the investment which ensures a higher rate of interest that is, which covers expenditure at the highest interest.

Determination of the Rate of Interest[74]:

The Fiszel approach, described above, shows clearly that the choice of investment alternatives largely depends on the rate of interest, when different alternatives yielding the same effect in terms of output and in line with the method described by him

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73. Ibid, PP.10-11.

74. The procedure for the determination of the rate of interest is in conformity with the original workings of Fiszel. See for example, Fiszel, n.42, PP.21-24 and also Fiszel, n.67, PP.187-91.

such a choice can be determined by comparing the capital outlays and costs, discounted for a given moment.

However, if interest rate is known then there is no problem in making this choice, but if the rate of interest is not known, then, the rate of interest itself is to be determined. For determining the rate of interest he suggests the following method.

If in two feasible alternative solutions the total outlays so computed are:

$$D_1 = J_1 K_1 \frac{(1+s)^n - 1}{s(1+s)^n}$$

$$D_2 = J_2 + K_2 \frac{(1+s)^n - 1}{s(1+s)^n}$$

where $D_1$ & $D_2$ = total outlays,

$J_1, J_2$ = corresponding investment outlays,

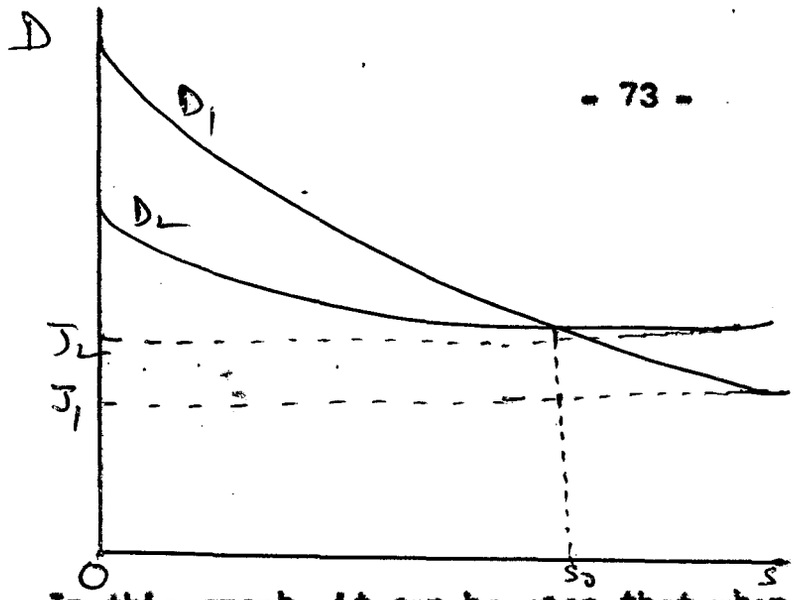
$K_1, K_2$ = annual exploitation costs (without depreciation & interest),

$n$ = period of exploitation (in years)

$s$ = rate of interest.

Then he argues that according to the level of the rate of interest in some cases $D_1 > D_2$, while in other cases $D_1 < D_2$ and yet in some special cases $D_1 = D_2$.

Graphically also it can be shown while measuring rate of interest (s) on x-axis and total outlays (D) on the Y-axis, these three possibilities are depicted as follows.




In this graph, it can be seen that when $0 < S < S_0$, then solution 2 is more advantageous; if $S > S_0$, then solution 1 becomes more advantageous and at the critical point $S_0$, where the two curves intersect, the choice between solution 1 and solution 2 does not make any difference.

Thus, he proves that "the determination of the rate of interest is a condition of correct economic accounting, more so in a socialist economy which has no capital market, the rate of interest cannot develop spontaneously as it does in a capitalist economy. The rate of interest must therefore, be determined. If it is higher than $S_0$ then $D_1 < D_2$ and if it is lower than $D_1 > D_2$.

He goes still further & assumes that let the choice to be made is out of two alternative solutions wherein solution 1 is more capital intensive while solution 2 entails higher exploitation costs over n-years of exploitations of the plant, that is, $J_1 > J_2$ & $K_1 < K_2$. He also assumes that total outlays (investment outlays & exploitation costs) in solution 1 equals the analogous sum in solution 2 so that:

$$J_1 + K_1 = J_2 + K_2$$

$$J_1 - J_2 = K_2 - K_1 \quad \ldots \quad \ldots \quad (32)$$

Now by denoting $J_1 - J_2 = i$

& $K_2 - K_1 = K$

We can write: $i = k$. $\ldots \quad \ldots \quad (33)$

Now if choose solution 2 we gain i on investment outlays but lose k(=i) over n-years of the plant. This released capital i can be used to obtain an increase in the national income in the economy, denoting this increment by "d" which equals iP where "p" is a certain coefficient. It may, however, be noted that released capital i cannot be returned entirely over n years, since each year $K \times \frac{1}{n}$ must also be returned to cover higher exploitation costs. Thus the national economy has at its disposal:

in the Ist year: $i - \frac{K}{n} = i - \frac{i}{n} = i\,\frac{n-1}{n}$ ;

in the 2nd year: $i - \frac{2K}{n} = i - \frac{2i}{n} = i\,\frac{n-2}{n}$ ;

. . . . . ... (34)

in the (n-1)th year: $i - \frac{(n-1)K}{n} = i - \frac{i(n-1)}{n} = i\frac{1}{n}$

and in the $n^{th}$ year: 0

In this manner the sums of capital made available to the national economy over (n-i) years thus amount to:

$$i\,\frac{n-1}{n} + i\,\frac{n-2}{n} + \ldots + i\,\frac{1}{n}$$

$$= i\left(\frac{n-1}{n} + \frac{n-2}{n} + \ldots + \frac{1}{n}\right)$$

$$= i\left(\frac{n-1}{n} + \frac{1}{n}\right)\frac{n-1}{2}$$

$$= i\,\frac{n-1}{2} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (35)$$

$i\,\frac{n-1}{n}$ is the capital that can yield an increment of the national income in one year, while the capital yielding an increment over n-years is $i\,\frac{n-1}{2n}$.

Thus the incremental gain in national income (d) can be represented by

$$d = i\,\frac{n-1}{2n} \times \frac{1}{m} \quad \ldots \quad \ldots \qquad (36)$$

where m = average coefficient of capital intensity expected to mark the economy in the coming period. This indicates the number of capital units needed to bring about one unit of increment of the national income. This yields:

$$iP = i\,\frac{n-1}{2n} \times \frac{1}{m} \quad \ldots \quad \ldots \qquad (37)$$

[ $\therefore$ d equal iP said earlier ]

so that the rate of interest sought is

$$P = \frac{n-1}{2nm} \quad \ldots \quad \ldots \quad \ldots \qquad (38)$$

If "n" (the life span of the plant) is assumed to be comparatively long, say, 20 to 30 years, then, it may be

approximately assumed that

$$p^{75} = \frac{1}{2m} \quad \ldots \quad \ldots \quad \ldots \quad (39)$$

To conclude in the words of Fiszel, "Thus, the rate of interest equals half the efficiency coefficient of investments i.e. half the inverse of coefficient m (that is, the amount of national income yielded by one unit of capital). If it is assumed that m = 3, then $P = \frac{1}{2} \times 3 = \frac{1}{6}$ that is Ca.16 per cent. It follows that the greater the coefficient of capital intensity (i.e. the more capital is needed to obtain one unit of national income) the lower must be the rate of interest, and vice-versa. For instance, if capital intensity increases because reserves of manpower become exhausted, the rate of interest must be reduced conversely, in the absence of full employment, the rate of interest must be suitably raised in order to eliminate capital intensive investments unwarranted by the prevailing labour markets"[76].

Limitations of Fiszel's Approach:

Fiszel's approach though might appear very illuminating and no doubt that some such discounting procedures were adopted by Polish Planning Commission in 1970's, however, the approach is not free from limitations.

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75. This is obvious fact follows from capital theory that higher the capital output ratio, lower will be the rate of interest.
76. Fiszel, n.42, P.24.

In the first place, Fiszel's approach using basically the discounting method, as a rule and that too, using rate of interest (explicitly) for discounting the outputs and costs leads to several questions. And one of the most significant questions relates to the determination of the rate of interest itself and whether such an explicit calculation of interest rate would be recognised by the socialist countries for ideological reasons and would permit it to be used as a sole criterion for ranking or choosing between various investment alternatives. Secondly, though he recommends the use of rate of interest for ranking projects or for discounting investment outlays and other costs etc. however, at the same time he admits that its calculation may not be a simple thing (and more so when it is calculated by trial and error method). Besides, whether such an admixture of western type of rules of making investment choice (e.g., the discounting procedures, internal rate of interest etc.) in a socialist economy would give fruitful results is a questionable proposition.

Then there is another set of criticisms that can be raised against the straightforward extension of discounting methods to Central Planning. In general, these discounting methods are devised to handle microeconomic situations, that is, to guide intertemporal choices by firms and individuals confronted with perfectly competitive markets. When they are applied to the economy as a whole new problems arise, especially in a planned economy where, in principle, equilibrium should be obtained

ex-ante. These problems are very well summarized by Nuti in connection with the Polish experience. To quote Nuti, "..... the simple extension of discounting methods, traditionally developed to handle microeconomic choice, to central planning has a number of drawbacks: what is good for the investor (a high present value) is a signal for the planner that something ought to be changed; discount rates, which are given from the viewpoint of the investors, are to be derived by the planner from his own intertemporal consumption choice: finally, the planner has the additional task of checking the consistency between the forecasts used by investors and the consequences of their choices. Ideally, full-fledged discounting methods should be used in an iteration process leading hopefully to the final choice. As no iteration process is envisaged in this particular field of Polish planning, second-best type of arguments lead to the conclusion that the shortcomings of the actual discounting rules selected will produce a situation not necessarily better or worse than that which would follow the correct formulation of discounting procedures"[77].

3. <u>The Optimization Approach</u>[78]: Finally, we take up the mathematical approach for the purpose of determining the "synthetic

77. D.M. Nuti, "Discounting Methods in Polish Planning", <u>Soviet Studies</u>, Oct. 1971, PP.316-17.

78. The optimization approach has been dealt with at a number of places. See Kantorovich, n.30; Novozhilov, n.30; Nemchinov, n.30; Dorfman Samuelson and Solow, n.31; Veinshtein, n.43, PP.469-74; Nove, n.10, PP.149-67; Gregory and Stuart, n.4, PP.226-27, Bryson, n.9, PP.105-11; Robert W. Campbell, "Mathematics in Soviet Planning, and the Theory of value", in Leeman, n.3, PP.102-18.

index of efficiency of investment". The mathematical approach is based on an optimization model that is, the essential problem for the advocates of this approach appears to be one of constructing an optimal production plan which would ensure the best results by the greatest use of available resources and also the study of the economic indices of such a plan. The basic use of this approach is that on the one hand it helps in analysing and giving optimal solutions of specific economic planning problems such as allocation of production programme, efficiency measures, utilisation of equipment, effectiveness of capital investment within a single factory, a group of factories, an economic region or a sector. On the other hand, some general economic accounting and planning principles in a socialist society are explained on this basis. The results may be applied to economic planning and in choosing economic indices. Therefore, their main conclusion is that a system of production valuations correctly constructed and conforming to real conditions is an effective means of analysing the best use of available resources. Under given conditions in an optimal plan these valuations fully agree with the accounting cost of social labour necessary for the production of a unit of output. Therefore, in order to find such a system of valuation and an optimal plan, an effective approach and special accounting methods are proposed.

With this perspective in view, an influential group of Soviet mathematical economists (e.g., Kantorovich, Novozhilov,

Nemchinov and others)[79] argues that the comparative Economic Efficiency (CEE) criteria can be effectively used only if based upon a rational system of underlying prices and, therefore, the objectively determined prices, they argue, should be generated by using linear programming techniques. Although the methods proposed by various economists of the mathematical school differ among themselves, yet there is a unifying thread. The basic resource allocation problem is seen as choosing among the large number of alternative activities, whose usage levels are limited by resource availabilities in such a manner as to optimize the economy's objective function. For example, the objective function may be the minimization of total cost of producing a planned bill of final output targets. In the course of finding the optimal combination of economic activities, a set of "objectively determined[80] valuations" (shadow prices in Western terminology) would emerge as solution to the dual linear programming problem, which would then be used as rational prices. Importantly, an "objectively determined" price of capital would also be generated which would be rational in the sense that this price would equate the supply and demand for capital, which the Soviet mathematical economists propose to use as the normative coefficient of effectiveness. In the discussion below, Kantorovich's method will be described.

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79. Kantorovich, n.30; Novozhilov, n.30; Nemchinov, n.30.

80. Kantorovich, n.30, PP.5-9.

Kantorovich put forward two fundamental propositions[81]: (a) the calculation of investment efficiency is only one aspect of the general problem of the efficient allocation of resources; (b) costs and benefits at different times should be made comparable by means of a rate of interest.

Let us take investment activities over several time periods, then, each investment activity is defined by a matrix $\|a_{it}\|$ where $a_{ij}$ is an output (if $a_{ij} > 0$) or input (if $a_{ij} < 0$) of the project in the $j^{th}$ year. Therefore, the test of the efficiency of an investment project is the sign of the expression

$$\sum_{i,t} C_{it} * a_{it} \qquad \ldots \qquad \ldots \qquad (40)$$

where again $C_{it}$ is the shadow price of the $i^{th}$ good in the $j^{th}$ year. And this shows that the problem of efficiency of investment is not a separate problem, it forms an integral part of the efficiency of social production.

In order to prove the second proposition[82], the criterion (40) can be written in a slightly different manner, namely, $C_{it} = r_t C'_{it}$, where $r_t$ is chosen so that

$$C'_{1t} + C'_{2t} + \ldots\ldots\ldots + C'_{mt} = 1 \quad \text{where } t=1,\ldots\ldots T.$$

Now defining $\left[\frac{r_t}{r_{t+1}} - 1\right]$ as the 'normal efficiency of investment' - it is a conversion coefficient which relates the price of a set of goods in one period to the price of the same set in the

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81. MELLMAN: Soviet Planning Today, Cambridge, 1971, PP.44-47.
82. For proof see Ibid, PP.45-47.

following period) from period t to period t+1. Criterion(40) now can be written as

$$\sum_t r_t \sum_t c'_{it} a_{it} \quad \ldots \quad \ldots \quad (41)$$

The list of efficiency of investment will be based on the algebraic sign of expression (40) or of (41). If the relative shadow prices are assumed to be constant through time, then (41) is equivalent to

$$\sum_t r_t \sum_i c'_{it} a_{it} \quad \ldots \quad \ldots \quad (42)$$

and the algebraic sign of expression (42) will determine the efficiency of investment $\left[\frac{r_t}{r_{t+1}} - 1\right]$ is a conversion coefficient which relates the price of each good to its price in the following period, and may accordingly be defined as the rate of interest for that period.

Thus Kantorovich regards rate of interest as the basic index to determine the efficiency of investment and while giving examples to show the usefulness of rate of interest for efficiency of investment he assumes a value of 10% for the rate of interest.

Kantorovich's method described above is also subject to criticisms which mainly stem from the highly simplifying assumptions underlying his method; for example, the method assumes activities which are proportional and additive and by not permitting the activities to be non-proportional and non-additive, he rules out two important aspects of investment choice, namely,

technological progress and the presence of externalities. And any criterion ignoring such important aspects of investment choice would not be acceptable.

But in spite of all these criticisms, Kantorovich's work gives a new direction to the determination of the synthetic formula for efficiency of investment and, therefore, occupies an important place in the literature.

It is quite clear from the above discussion, that the determination of a synthetic formula for the efficiency of investment bringing together various aspects of investment choice, is not an easy task. We described above various approaches dealing with the determination of this index, however, none of the methods described above is free from limitations. In the light of what has been said in chapters 1 and 2, it would be interesting to examine what has been the actual planning experience in the USSR and Poland.

# CHAPTER III

## CHOICE OF PROJECTS IN ACTUAL PRACTICE

In chapter I we discussed the choice of investment criteria to decide the choice of technical variants and in this connection we discussed the arguments for and against the differentiated and uniform recoupment period criteria and made a case for uniform recoupment period for all branches of the economy. But making a case for uniform recoupment period criterion amounts to bringing together various aspects of investment choice, which in turn, raise the problem of determining a synthetic formula for efficiency of investment. Various approaches dealing with this problem were discussed in the second chapter, but it was seen that none of the approaches is free from limitations.

In the light of what has been said above we would examine the actual experience of project selection in the socialist countries with special reference to Soviet Union and Poland, however, the emphasis would be on the period after the sixties. The questions which have to be examined in relation to these two countries, are:

(1) Whether in practice the "norms of effectiveness" are uniform or differentiated and whether there is any rationale or basis for adopting a particular "norm(s)" decided by the State Planning Committee;

(2) How have the problems dealt with by Kalecki-Rakowski and others been taken into account in the choice of projects;

(3) The unsolved problems of efficiency of investment in particular, the problem of unfinished construction;

(4) What methods have been proposed to deal with them? Let us examine these questions one by one.

If one goes through the experience of the Soviet economy in so far as the choice of norm of effectiveness is concerned, one finds two basic investment rules: (1) The Standard Methodology[83] (1960-69) suggesting and establishing differential norms of effectiveness for different sectors of the economy; (2) The New Standard Methodology[84] (1969) which recommends a uniform norm of effectiveness for the entire economy. This is why E has been assumed as 12% (which is close to the average of previous branch coefficients) for the choice of projects in the USSR.

As far as the problem of choice of technical variants (or "how to do") is concerned, it arises not only in case of differentiated recoupment period but also in the case of uniform recoupment period. In fact, the problem of "how to do" becomes all the more fundamental in the case of "uniform recoupment period criterion" as the allocation of investment within branches would also be determined to a large extent (e.g., investment in branch X (where E = 10%) rather than in Y (where E = 8%). The Soviet planning practice appears to contain the elements of both and hence the complexity of the problem, for instance, E = 0.12 has

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83. Standard Methodology, n.7, PP.68-90.

84. New Standard Methodology, n.7, PP.25-36.

been taken to match the supply and demand of investment to branches e.g., fuel, energy, electric power, agriculture, chemicals, etc. is also determined by long term policy considerations. It is perhaps for this reason that in spite of the recommendations of a uniform norm throughout the economy, the numerous exceptions are provided and that is why the New Standard Methodology (1969) states that the norms of effectiveness would not be allowed to stand in the way of the priority interests of the economy. For example, a lower (8%) norm has already been established for the Far North, and there is also a proposal to establish 8% norm for electric power generation. This introduces the degree of arbitrariness.

In fact if one goes through the Metodika (1960): one finds the following figures relating to the standard recoupment period in the Soviet Union:

| | | |
|---|---|---|
| 1. | Transportation ... ... ... | 10 years |
| 2. | Power ... ... ... ... | 7-10 years |
| 3. | Construction Building Materials.. ... ... | 7 years |
| 4. | Oil, gas, timber, coal ... ... | 6 years |
| 5. | Machinery, chemicals, light industry ... ... ... | 3-5 years |

Source: Nuti, D.M.: "The Evolution of Investment Planning in Poland", Jahrbuch der Wirtschaft Osteuropas, Band 3, 1972, P.404.

This, one can argue, is in line with the standard methodology (1960-69) which made a case fof differentiated recoupment

period. However, after 1969, there was a modification in the investment rules from differentiated recoupment period criterion to uniform recoupment criterion or the same or uniform norm of effectiveness for the whole economy. But a look at the following information on the norm of effectiveness during 1971-75 Plan in the Soviet Union indicates a picture of differentiated norms for different industries which is contrary to the New Standard Methodology envisaging a "uniform norm" for the whole economy. The figures are given below.

Differentiated Norms of Coefficients of Relative Effectiveness(CRE) in The Industries in the Soviet Union During 1971-75:

| | Industry Group | CRE Norm |
|---|---|---|
| 1. | Ferrous Metallurgy ... ... | 0.12 |
| 2. | Heavy industries and machine construction ... ... | 0.13 |
| 3. | Machine tools ... ... | 0.14 |
| 4. | Construction ... ... | 0.2 |
| 5. | Machine Building for light and food industry.. ... | 0.15 |

Source: Otraslevoi plan Kapitalnykh vlozhenii, Progress Publishers, Moscow, 1972, P. 201.

The only explanation for this violation of the basic rules of uniform criterion seems to be the long term policy consideration which imply that CRE norms would not stand in the way of priority interests of the economy.

However, this should not lead us to conclude that the efficiency of investment has not been based on any criterion. In

fact, if one goes through the actual investment planning in the USSR which is reflected in the Five Year Plan drawn up and approved, with an annual breakdown, for each USSR Ministry and Department and Union Republic, one finds that the efficiency of investment is regarded as one of the important tasks of the socialist construction. That is why Soviet economists [illegible] contend that efficiency of investment is estimated at all levels of planning right from enterprise and collective farm, building trust, and transport organisation to amalgamation, ministry, and department up to USSR Gosplan and at all stages of the drafting of a perspective plan. The procedure followed is that "in the early stages, when the main directions of the microeconomic plan are being established, investment efficiency is estimated only for major sectors and economic areas and for the economy as a whole. At later stages all the basic and supplementary indices are determined at all levels of planning".[85]

While calculating the overall economic efficiency of investment ($E_y$), the following indicators[86] are used:

(1) For the economy as a whole, the economies of Union Republics and economic sectors (industry, agriculture, transport, construction), the ratio of the annual increment to the national income

85. L.Ya. Berri(ed.), Planning a Socialist Economy, Progress Publishers, Moscow, P.247.

86. For various indicators adopted in the actual planning in the USSR see: Ibid, PP.247-52 and also: N. Fedoryenko, T. Khachaturov, A. Rumyantsev and A. Yefimov (ed.), Soviet Economic Reforms, Progress and Problems, Progress Publishers, Moscow, 1972, PP.152-169.

(net output) in its given objects structure in comparable prices ($\Delta Y$) to the investment in the sphere of material production (J) giving rise to this increment i.e., $E_y = \frac{\Delta Y}{J}$ ;

(2) While for individual branches and sub-branches of industry, transport, construction and for ministries, departments, and amalgamations (provided net output is not calculated for them), the ratio of the increase in profits to the investment giving rise to this increase

$$E_R = \frac{\Delta R}{J}$$

where R = annual increase in profits over the planned period;

J = investment in building production facilities.

(3) For individual enterprises, construction jobs, and projects, individual measures, and technical and economic problems, the ratio of profit to investment is calculated as:

$$E_R = \frac{X-M}{J}$$

where X = value of annual output (for the project) in works wholesale prices (without turnover tax);

M = prime cost of the annual output;

J = estimated cost of building the project (or capital outlay on measures and technical and economic problems).

(4) For industries and enterprises where transfer prices are used and for enterprises making planned losses, the ratio of the saving from reducing the prime cost of output to the investment giving rise to these savings.

Therefore, when the overall economic efficiency is determined in accordance with (1) - (4), due analysis should be made of the factors which are responsible for either increasing or lowering the efficiency and these factors are:

(1) Changes in the labour intensity of output and the possibility of releasing manpower or the necessity of attracting it in the wake of investment;

(2) Changes in the material intensity of output releasing additional resources of means of production in the economy or increasing their expenditure;

(3) Changes in the assets (capital) intensity of output securing savings in investment or giving rise to additional expenditure;

(4) A reduction of construction times and a lowering of estimated building costs.

Besides, the estimates of the comparative economic efficiency of investment are used in compiling variants of economic or technical decisions, choosing alternative locations of enterprises and complexes, deciding problems of the choice of interchangeable products, the introduction of new types of equipment, the building of new enterprises or reconstruction of existing ones and so on. This indicator of comparative efficiency[87] is the minimum reduced or normalised outlay i.e. $M_i + E_n J_i$=minimum.

87. Berri, n.86, PP.249-50.

The standard coefficient of efficiency for the economy as a whole is taken at not less than 0.12 (i.e. not less than 12 Kopecks per rouble of investment corresponding to a recoupment period not greater than 8 years. However, this is accompanied by a condition that "where necessary, for consideration of accounting, for dissimilar wage levels (zonal and sectoral), different price levels varying lengths of building programmes, and regional differences, sectoral instructions permit deviations from the established standard coefficient in agreement with USSR Gosplan"[88]. However, this standard coefficient is subject to revision when the Five Year Plans are being compiled. But the indicators of the investment variants under consideration are compared with standard coefficients and the indices of economic efficiency achieved in the previous period. While indicators of the best applied (or projected) national and foreign plants are taken when introducing new equipment.

Thus, while in the Soviet Union one finds minor modifications as far as the basic investment rules are concerned i.e., shift from a differentiated recoupment period criterion to a uniform recoupment period criterion as one of the basic rule for project selection in actual practice. However, in Poland in the last 15 years there have been profound changes in official criteria for project selection on investment planning. The actual official

88. Ibid, P.250.

instructions issued at different times indicate the belated but progressive application of the principles of economic reforms to the investment planning.

The rules adopted on Poland[89] for project selection in investment planning amount to using a uniform shadow interest rate. However, this was replaced first by straightforward application of shadow capital charge (=0.12) and then applying straightaway what is known as "a home-made version of discounted cash-flow method at 10% rate of interest" in Poland.

Thus one can view the changes in investment planning in Poland as a three-stage sequence. These changes are:
(1) The application of Soviet-type criteria of "Recoupment Period", that is, "the period over which the additional expenditure required by the selected project with respect to the immediately less investment intensive alternative, must be recouped by savings in current operating costs obtained by means of the additional investment expenditure". These rules were used for a period ranging from mid-fifties to late-sixties, initially started using in mid-fifties while these were actually codified in the Instrukcja Ogólna[90] in 1962. Another important aspect of Polish investment planning which was different from that of Soviet Union was the introduction of some important correctives in the investment rules relating to some important aspects of

89. These different rules have been given in detail by Nuti, n.44, PP.395-438.

90. Ibid., p. 396

investment projects (such as gestation period, durability, time profile of inputs and outputs). The official instructions embodied, almost verbatim of Kalecki and Rakowski approach[91]. It may be noted that the basic use of these rules was only in the choice of the production method as the overall physical targets were fixed by the centre. But these investments came into conflict with the principles of economic reforms which put more emphasis on profits and profitability and thereby on planning in monetary terms. This problem was not confined to Poland alond but the wave of economic reforms was taking place in the entire Eastern Europe. But this had an important effect of creating an increasing gap between the set of official criteria and the system of research.

What was needed at this stage was change in the investment rules to bring them in conformity with the principles of economic reforms and the initiative was first taken by Czechoslovakia in 1967, while in Poland it was actually codified on official instructions Uchwala[92]. The basic features of these new rules were:

(a) The notion of "recoupment period" was abandoned and was replaced by a perfectly equivalent shadow capital charge. The figure set for this shadow capital charge was 0.12 which, according to a recoupment period of 8 years, compared to the 6 years fixed in 1962 Instructions.

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91. See for example, Rakowski, n.35, PP.83-170; and Kalecki & Rakowski; n.35, PP.252-62.

92. Nuti, n.44, PP.397-98, 419-29.

(b) Uchwala establishes a number of supplementary criteria which are different from the "synthetic index" defined in the "Instructions" (1962). Under the present rules which were quite complicated, the projects were classified into five different classes in order of durability.

(c) One can also notice a much greater concern was also expressed for the repercussions of investment choice on import requirements and export earnings.

(d) With the new investment rules in force, it was clear that the decisional autonomy at the enterprise level was not confined to the choice of production method, but to a wider choice now that of the type and level of output.

(e) Whatever might have been the speed at which economic reforms have been implemented, this change in investment rules was regarded as revolutionary structural change of far-reaching development as this led to the change in relative prices in 1970(December).

However, the rules codified in the Uchwala were also short-lived as these rules were further replaced in 1971 by another set of investment rules consequent upon the government decisions in 1970. The important features of the new rules (1971)[93] were:

1. The new rules of 1971 were the replacement of a shadow capital charge by straightforward application of discounted

93. Ibid, PP.429-36. These new rules were contained in the new official instructions known as Wytyczne(1971).

cash-flow methods, with a discount rate being fixed at 10% (of course no rationale has been given for this value). This analogy was borrowed from the Czechoslovakian investment rules of 1967.

2. Once aagain a more synthetic expression replaces the bureaucratic classification of projects.

3. While other features of 1969 Uchwala have been retained such as the decisional automomy at the enterprise level is still not confined to the choice of production methods alone but to a wider choice of type and level of product. Besides, the role of international repercussions of investment choice has also been retained.

Now we would examine the three-stage changes in details:

First Stage: The first stage procedure of project selection centred around the notion of recoupment period. This rule was followed in the early sixties. The rule simply amounts to choosing a technique minimizing the total costs. This method has already been discussed and evaluated critically in chapter 1, 2. Therefore, we shall pass on to the second stage investment planning in Poland.

Second Stage(1969): The approach described above was in force only till 1969, when it was replaced by another approach embodied in the form of "criteria for classification and choice of projects"[94] established by the Uchwala in 1969. It has been

94. The criteria for classification and choice has been very well dealt with by Nuti, n.44, PP.419-26.

argued that the new approach to project selection does not replace the general principles of project selection of 1962 approach, instead the new approach has been regarded as a complement and enlargement of the earlier approach as the Instrukcja[95] deals with the relative effectiveness, while the purpose of the new regulations is to assess the absolute level of investment effectiveness i.e. the viability of the production task. What is more significant is the shift from planning in physical term to planning in monetary terms, which means that new the effectiveness could be expressed in value terms and this change was regarded by Polish economists as one of revolutionary change both in terms of theory as well as in practice.

The approach adopted can be described as follows:

"Each investment following within the scope of the regulation is to be attributed to one of the five classes. The first class includes the projects by the highest "effectiveness", the next classes include investment by gradually decreasing "effectiveness", up to class IV which includes investments that are recognised as economically effective to sufficient extent. Investment belonging to these classes are to be included in the national plan in order of priority. The inclusion of investment attributed to class V requires separate justification. The classification of investment projects is done on the basis of

95. Whenever in the subsequent analysis, a reference is made to 'official instructions in Poland, we shall be using Instrukcja for 1962 rules and Uchwala for 1969 investment rules.

the magnitude of indices characterising the main aspects of the projects and expressing the criteria adopted as the basis of the assessment"[96].

The criteria laid down by the Udwala are the following:

(1) The effectiveness of production (Ed)[97], expressed the ratio of total expenditures (current costs and investment charge) to the value of production expressed in currency prices or in selling prices taken from actual retail prices.

Now in this index, a distinction was made between the investments which could be expressed in currency prices and the investments (the production of which would be devoted for consumption of population which could not be expressed in currency prices. Now for the former, the following index of currency effectiveness of production was given:

$$E_d = \frac{K^{60} + 0.12J}{DG}$$

→ To be minimized.

where $K^{60}$ = yearly prime costs with sectoral regulations on input norms for material & currency.

0.12 = "the normative coefficient of effectiveness of investment" - a shadow charge that would have been obtained, under the former regulations, by a "Standard Recoupment Period' of 8.67 years.

J = Investment Expenditure, directly or indirectly connected with the projects.

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96. Nuti, n.44, P.419.

97. For this criterion as well as for other criteria subsequently in this method, see Ibid, PP.419-23.

$G^{98}$ = the rate of exchange used to convert currency Zlotys into current Zlotys - this was fixed at 17.5 Zlotys for capitalist countries and 13.5 Zlotys for socialist countries.

D = yearly value of production at international prices in currency Zlotys, where the international prices are adjusted to take account of expected changes.

Now for the latter, the index was given as follows:

Index of Market Effectiveness of Production = $E_r = \frac{K+0.12J}{R}$

where K = current operating costs without correction for the value of currency inputs.

R = value of production at international prices.

(2) The second criterion was the "Pay-off Period of investment outlays on foreign currency" and this was defined as

$$T_{zk} = \frac{J_d G}{DG-K^{\textcircled{a}}} \longrightarrow \text{to be minimized.}$$

where $DG-K^{\textcircled{a}}$ = the surplus of currency value of experts over operating costs appropriately computed i.e. the value of yearly "accounting profits".

$J_d$ = value imported machine and equipment (including fixed licence fees, while royalties are added to prime costs).

$J_d xG$ = expenditure at home prices where G is the rate of exchange.

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98. The balance of payments are done separately for capitalist and socialist countries owing to the problem of non-convertible currency.

And for these investments which could not be expressed in currency prices, the index is:

Pay-off Period of investment expenditure = $T_r = \frac{I}{F}$

where I = value of investment expenditure, which is different from J.

F = increase in the cash flow obtained as a result of the investments.

(3) The third criterion was the length of the cycle of realization of investment which relates to the gestation period.

(4) The index of technical economic progress. This index is defined as a weighted average of productivity changes in the new investment in comparison with the basic level. This basic level is determined by the similar product mix reached in productive plants and in the new investment with relation to the experience of other countries.

The indicators used for calculating this index are (1) the labour intensity of production; (2) the import intensity of production; and (3) capital intensity. These indicators are expressed in terms of percentages over the base level and the weights used are given by the structure of costs in the base year.

It may be noted that the official Regulations determine the maximum level of the indices required for the classification

of projects in any class. The table[99] below summarizes all the requirements and minimum or maximum value of indices corresponding to each class of investment. After a careful study of the table, one can infer that all the indices must satisfy the conditions set for an investment belonging to a given so that the class of an investment project is ultimately chosen by the lowest of the indices taken into consideration. For example, on the basis of index ($E_d$), project of type I will be chosen, similarly on the basis of 5th criterion again project of type I will be chosen and so on.

99. How different indicators mentioned above should be arranged in order to make a choice of projects on this basis, Nuti takes a hypothetical case wherein he tabulates all the criteria for different types of projects. This simplification is very helpful for an understanding of the choice of projects to be made on the basis of various criteria. For this see: Nuti, n.44, PP.422-24.

| Investment having more important national economic significance | | | | | |
|---|---|---|---|---|---|
| Criterion | Class(Type of project in discending order of effectiveness. | | | | |
| | I | II | III | IV | V |
| A Investments, the production of which can be expressed in currency prices. | | | | | |
| 1. $E_d$ ... ... | 0.7 | 0.75 | 0.8 | 0.85 | 1.0 |
| i.e. zl. per US $ | 49.0 | 52.5 | 56.0 | 56.0 | 70.0 |
| zl. per currency zl. (comecon) | 9.5 | 10.1 | 10.8 | 11.5 | 13.5 |
| 2. Tzk(in years) | 1.5 | 2 | 2.5 | 3.5 | 4.5 |
| 3. Cycle of realization of investment(in years) fixed by Ministries within limits. | 2-3 | 2-3.5 | 3-4 | 3-4 | 4-5 |
| 4. Technical-economic progress - no less than | +10% | +7% | +4% | 0 | 0 |
| In addition, for investments in modernization: | | | | | |
| 5. Pay-off Period of investment expenditure($T_r$) in years | 3 | 4 | 5 | 6 | 7 |
| B Investment for supply to the population z-i.e., non expressable in currency prices. | | | | | |
| 6. $E_r$ ... ... | - | 0.7 | 0.85 | 1.0 | 1.1 |
| criteria 2-5 are also applied to group B - investments, except that these investments are not classifiable under I. | | | | | |
| For both Groups A&B: | | | | | |
| 7. The outlet of the products of investment is guaranteed at least for the period over which expenditures are paid back. | | | | | |
| 8. The labour requirements of the projects are guaranteed, especially in the field of higher qualifications. | | | | | |
| * Classification under class I requires in addition: | | | | | |
| 9. At least 30% of production could be exported. | | | | | |
| 10. The raw materials employed are either nationally produced or imported from socialist countries. | | | | | |

N.B.: In the case of minor investments only criteria 4-10 are applied.

Source: Nuti, n.44, P.423.

Criticisms:[100] The Ucbwala approach has been criticised on many counts:-

(1) This new approach replaces a single synthetic index (summarizing various aspects of investment projects) by 6 criteria. And these 6 criteria are neither additive nor directly comparable. But these criteria may come inconflict in certain cases.

(2) The 1962 Instrukcja was based on the work of eminent economist, M. Kalecki, while the Ucbwala is the work of the bureaucrats, and the kind of project classification has been used handles the trade-off of some aspects of project choice for others in the crudest way i.e. by labelling them according to their worst features.

(3) Then there are also criticisms against the indices themselves. For example, the time factor, in the indices of new approach, appears only in the form of a time horizon within which certain things must happen and not as a dimension of the process of production and investment. The Instrukcja on the other hand took into account at least in some way, the time profile of inputs & outputs.

(4) The percentage charge on investment has been lowered from 16.7% to 12%, which is surprising. A uniform percentage charge (shadow rental rate) implies different interest rates for

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100. The Ucbwala approach has been critically examined by Nuti. See for example Ibid, PP.424-26.

different durabilities of projects and these differences become important here as the percentage charge is now lower and no additional allowance is made for durability as compared to Instrukcja. Therefore, the implicit value of r will be more sensitive to the differences in durability.

(5) Then the new regulation also use implicit recoupment period (=8.67 years) as in the Instrukcja and a pay-off period, where the pay-off period is defined as the period of repayment of total investment expenditure by means of undiscounted profits, and not as that of additional investment by lowering costs.

(6) Another drawback of the new regulations is that it does not have any provision for assessing the optimum service life of investment projects, while it altogether neglects a relevant aspect of investment choice, namely, the durability.

(7) Then with the new approach in operation, there is a shift from planning in physical terms to planning in monetary terms, which also implies a wider decisional autonomy from "How"[101] to what & "how". However, with the planning in monetary terms, the index of effectiveness E instead of indicating unit cost of planned output expansion of a given scale and physical composition, indicates "unit cost per unit of revenue". And the latter has been criticised in the first place, for not indicating the scale at which the investment should be operated and secondly,

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101. "How" refers to the problem of how to choose the technical variant.

no particular significance has been attached to the ranking of projects according to the value of E. The rule is that $E \leqslant 1$, which is the minimum requirement i.e. (average) revenue should be at least equal to (average) cost. The first question which remains unanswered is should investment be undertaken short of the point where E = 1, secondly, if priority for includion in the national plan is ordered by increasing E, then, it is quite likely that many projects may be left out, which perform better on the basis of rate of return on investment or present value, as compared to the ones actually selected.

Besides, the new regulations adopt international prices for exportables, imported inputs and import substitutes. However, this is based on an extreme assumption that there are unlimited trade opportunities at unchanged terms of trade and there would be no problem of balancing with particular areas or countries. And if this assumption goes wrong, then, the prices would not represent correct real opportunity cost of commodities. This criticism has special significance for Poland as she has been under pressure of trade balance difficulties in the past few years.

Third Stage of Polish Investment Planning: (The Wytyczne[102] 1971)

The New Discounting Procedures: As seen above, the 1969 approach was criticized severely and the disadvantage of complex system of

102. There are mainly three sources on this: Nuti, n.44, PP.429-36; Nuti, n.77, PP.309-17; D.M. Nuti, "Large Corporations And The Reform of Polish Industry", Jahrbuch der Wirtschaft Osteuropas, Band 7, Munich, 1977, PP.379-83.

classification and the multiplicity of indices was noted. And it is for these reasons that the rules proposed by 1969-regulations were abandoned and a new set of rules were devised by Polish Planning Commission in 1971. But even these new rules of 1971 retain the basic principle of 1969-Regulations in so far as the application of the analysis of investment effectiveness is concerned, however, instead of a uniform capital charge, it introduces a specific element of discounting and combines different criteria into a single "efficiency index", satisfying fewer conditions. It may be noted that:

(1) These new regulations of 1971 are to be applied to groups of linked investment projects rather than to individual plants.

(2) All magnitudes are expressed in monetary terms, using actual international prices for exportables & import-substitutes; and internal prices in all other cases, and "forecasts" of future price trends.

(3) The "efficiency index" as established by Wytyczne(1971) assumes a constant discount rate of 10%.

Given this, E, the efficiency index is defined as follows[103]:

$$E = \frac{\sum_{t=1}^{n} (i'_t + k'_t) + \sum_{i=t}^{m} r'_t - A}{\sum_{t=1}^{m} P'_t} \quad \ldots \quad \ldots \quad (43)$$

103. Nuti, n.44, P.429 and Nuti, n.77, P.309.

The explanation for different symbols used in this efficiency index runs as follows:

$i'_t = i_t \frac{1}{(1+s)^{t-1}}$ ; $i_t$ is the investment outlay at time t; s = 0.10;

$K'_t = K_t \frac{1}{(1+s)^{t-1}}$ ; $K_t$ is the operating cost at time t, it includes an amortisation allowance of the order of 4-5% of initial investment cost.

$r'_t = r_t \frac{1}{(1+s)^{t-1}}$ $r_t$ is the investment outlay on the repairs & modernization at time t;

$A' = \sum_{h=1}^{z} \frac{a_h}{(1+s)^{m-1}}$ $a_h$ is the scraper second hand value of equipment of type "h" in use at time "m", h = 1, .....z; z being the number of different types of equipment in use;

and $P'_T + P_t \frac{1}{(1+s)^{t-1}}$ ; $P_t$ is the value of output sold at time t.

Besides, t = 1,2.....m, where m is fixed in the official regulations. The period m varies from 8-16 years in four classes of productive sectors in the following order:

(1) Manufacturing Industry of a highly specialized kind, producing final products and subject to "particularly fast technical progress". - 8 years;

(2) Manufacturing industry of a less specialized kind, having a greater possibility of transforming final or semi-finished products, subject to "fast technical progress" - 10 years;

(3) Manufacturing industries producing semi-finished products or goods subject to non-fast technical and quality change - 13 years;

(4) Mining, hydraulic projects - 16 years.

These different values of "m" indicate that the value of "m" is fixed as low for those industries which are subject to "particularly fast" or "fast" technical progress, however, the value "m" is fixed as high for industries which are subject to not so-fast technical progress or come under the mining industries.

The above "efficiency index" does not tell anything about the balance of payments and, therefore, two more coefficients have been used in the regulations(1971), which do take into account the balance of payments problem. However, it may be noted that the discount rate, even in these coefficients, continues to remain at a constant level of 10%. These two coefficients[104] are:

$$(1) \sum_{t=1}^{n} D'_{ent} = \sum_{t=1}^{k} (R'_t + O'_t) \quad \ldots \quad \ldots \quad (44)$$

This coefficient is called Tze, which is defined as the number of years over which currency expenditures associated with the projects, discounted to take into account the time at which they occur, are recouped by discounted net exports i.e., it is the number of years after which the above equation will hold.

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104. Ibid. PP.310-11.

In this coefficient

$D'_{ent}$ = net export effect of the project in year t, discounted back to year 1;

$R'_t$ = yearly repayment of foreign currency borrowed for the project, discounted back to the initial year;

$O'_t$ = interest payment in year t on foreign funds, discounted back to the initial year.

k = number of years over which repayments of foreign credits is spread;

$Y_{ze}$ = time period n for which the above equation holds.

The other coefficient is expressed as

$$(2) \quad \sum_{t=1}^{n} D'_{knt} = \sum_{t=1}^{k} (R'_t - O'_t) \qquad \ldots \qquad \ldots \qquad (45)$$

This is called $T_k$, and is defined as the number of years over which the sum of discounted currency expenditures equals the sum of discounted currency effects reckoned in a different way. In the above coefficient;

$D'_{knt}$ = currency effect at time period t, which is equal to difference between the value of production and the value of materials (exportables, importables & import substitutes) while both the values (that of production and materials) are expressed in currency zlotys.

Keeping the above criteria in view, it is stated that projects are assessed and ranked on the basis of the "index" and the auxiliary criteria. Thus the minimum requirements laid

down by the new regulations for project selection were:

$E \leqslant 0.95$ (from "Efficiency Index")

$n \leqslant 8$ (from the other two coefficients)

Any project failing to meet these minimum criteria could be undertaken only with the permission of the President, Planning Commission.

Critical Evaluation of 1971 Approach[105]:

In the above approach "efficiency index" has been suggested in order to compute "synthetic index" comprising of different aspects of investment projects. The "efficiency index" reflects the continuous preoccupation of East European Planners with reliance on "objective" and "synthetic" indexators against "voluntarism" in economic decisions; as argued by Nuti[106]. This 'efficiency index' not only avoids the problems arising out of the coexistence of different criteria but also perfects the trend already present in 1969 regulations. Besides, the new "index" also has the virtue of taking account of time aspects of the choice, which were disregarded by 1969 regulations and, in this respect the new approach is an improvement over the 1969 approach. But it should lead to one to conclude that the view "index" is free from shortcomings. In fact, there are two sets of criticisms:

(1) Arising out of the particular discounting procedures adopted.

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105. For criticisms on this approach, please refer to the foot-note 102.

106. Nuti, n.44, P.431.

(2) Arising from the general limitations of the discounting approach when applied to central planning.

Let us first take the problems in discounting procedures adopted.

(1) In the first place, starting from the basic efficiency index E, defined as ratio of discounted gross revenue & cost and no particular significance can be attached to this index apart from a very obvious condition that E 1 in ranking the projects.

(2) Secondly, it has been argued that the ranking of investment schemes on the basis of E is bound to mislead the planners.[107] The point can be explained in a better way if we let V = net present value of the investment scheme & let R = present value of gross revenue, both discounted to the initial period, then the efficiency index E as described above can be rewritten as

$$E = \frac{R-V}{R} = 1 - \frac{V}{R}$$

If the discounting methods are used correctly then, planners will have to consider the absolute level of V and there is also no reason to presume that $\frac{V}{R}$ is an increasing function of V. In fact, it is this wrong presumption which misleads the planners in project ranking on the basis of E. No doubt that a particular investment scheme passing the test of $E \leqslant 1$ will also pass the test $V \geqslant 0$, therefore, even if push the overall invest-

107. For the explanation of this point see, Nuti, n.44, P.432 and Nuti, n.77, PP.312-13.

ment to an extreme situation where either E = 1 or V = 0, exactly the same projects would be selected. But imagine if the overall investment funds run short of this point and the priority be based on the "efficiency index", then, it will result in sub-optimal allocation, as the actual present value of the scheme is likely to be smaller than the potential present value.

(3) The efficiency index takes yearly operating costs inclusive of amortization allowance, while discounting methods have the advantage to allow the direct comparison of cost flows without any accounting allowance. Thus the inclusion of investment costs & a depreciation allowance results in double counting of investment costs.

(4) Furthermore, with the application of discounting methods, one has to take into account the whole of the economic life of the investment and this economic life should not be a rigidly fixed time horizon but something whose magnitude itself should be subject to optimization. If there is uncertainty about the data, something beyond the control of planners, then, a comparison of different alternatives on the basis of their relative merits in first m-years, is justified, as it is done by industrial firms under capitalism. However, if the data are subject to some such kind of uncertainty which can be dispelled by the Central Planner, then, the present value should be computed for alternative lengths of operation and select the one which gives the highest present value. It may also be noted

that a cautious investor would like the investment scheme subject to both the schemes - pay-off criterion under certainty, net present value under certainty. The rules adopted by Polish Planning Commission can be regarded as extremely safe, as it not only combines in a single test the requirement of criteria corresponding to two prospective situations which are mutually exclusive, but also provides a built-in-safety margin of 5% of R implicit in the condition $E \leqslant 0.95$.[108]

Thus Nuti is of the opinion that the new Polish discounting methods in investment planning represent a very cautious, half-hearted step in the direction of discounted cash flow methods.[109] He suggests that within that framework, there are many ways in which Polish methods can be improved e.g. by using net present value rather than a cruder "cost/gross benefit" ratio, by optimizing the length of the operation of projects, by avoiding the double-counting (as a result of the inclusion of amortization allowance) and finally by not relying on international prices as a measure of opportunity cost, as these prices are based on drastic assumption of absence of balance of payments problems.

Though, as seen above, the investment rules for project selection have changed from time to time and, as a result, we find quite a few changes, which could be regarded minor changes

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108. Ibid, PP.313-14.
109. Nuti, n.77, PP.316-17.

in the Soviet Union as far as basic investment rules are concerned, but major changes of both theoretical & practical significance in the investment planning in Poland, especially in the late sixties. However, in spite of that, the socialist economies began to face in the past decade the problem of declining efficiency: the output capital ratio was falling, the ratio of national income to productive funds diminished, new capital construction was less effective than anticipated, long gestation periods were experienced, a large volume of poor quality or incompleted construction accumulated estimated construction costs were often exceeded, projects were developed without any necessity, selected projects were outmoded before they were even completed and had unacceptably high costs and long recoupment periods, bad information, poor documentation for project proposals, and planning errors and misspecifications came ubiquitons in Central Planning.[110]

Keeping in view these problems, the economic reforms were introduced, through the 60's, in the hope that many of these difficulties could be overcome or at least their intensity could be drastically reduced. The adoption of "economic levers" was certainly not inappropriate and therefore, the reforms were expected to correct more than just institutional shortcomings. It appeared, at that time, that possibilities were open for the extension of decentralization in some moderate degree to the

110. See Kurt W. Rothschild, Socialism Planning Economic Growth; Some Untidy remarks on the untidy subject" in Feinstein (ed.), Socialism Capitalism and Economic Growth, CUP, Cambridge, 1972.

sphere of investment planning, though the typical assessment was that planning will continue to play an important part, especially in the field of investment planning.[111]

The evaluation of the economic reforms made above, turned out to be an understatement, at least for those who hoped that economic reforms would bring decentralization and efficiency as the reform measures were carried through half-heartedly. The result was that many of difficulties (described above) remain unsolved even after the economic reforms came in force. It is in this perspective that we would examine the nature, extent and causes of some of the problems which remained unsolved in these socialist economies and also discuss the proposed methods for dealing with these problems. The problem we are confining to is the problem of unfinished construction.

As pointed out above, an important element of economic reforms in the East European Countries was the desire for more efficient investment and a more intensive utilization of capital assets and the great important that was attributed to these aims in these countries could be explained in terms of the economic developments that took place in the years before the reforms. It should be noted that in none of the countries of Eastern Europe did economic growth keep pace with the increase in capital assets and therefore, the capital productivity showed a

111. See for example: Gertraud Seidenstecher, "Capital Finance" in H.H. Hohmann, M.C. Kaser and K.C. Thalheim(ed.), The New Economic System of Eastern Europe, C. Hurst & Co., London, 1975, PP.321-63.

downward trend what is significant is that the reasons in each case were the following[112]:

(1) Investment Policy on the Soviet model i.e. forced development of highly capital intensive branches of industry (such as mining, power generation and metallurgy) with low capital productivity and relatively low investment in branches of industry with relatively high productivity;

(2) Insufficient renewal of machinery and plant on existing enterprises and therefore, unfavourable development of the age structure of the stock of machinery;

(3) Inadequate use of technical advances in production and frequently inadequate employment of existing investments; and

(4) Too much capital tied up in uncompleted projects because of excessively protracted building times and therefore, excessively long initial periods for new capacities.

These basic deficiencies are compounded in their impact by chronic delays in meeting construction completion and equipment installation schedules. The Soviet Union's term for this phenomenon is "unfinished construction", referring to the construction and installation work beyond the initial stages, but not finished to the permit the use of assets. Included within the concept is equipment in the process of being installed or actually on place in uncompleted structures.

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112. Ibid, P.321.

It was generally recognised that the investment plan adopted for 1966-70 (in USSR) overtaxed the economy, with the following effects; the country is investing enormous resources but the returns are intolerably low; the number of projects approved exceeded the potentials of construction, building materials and machinery industries; investment resources are dissipated on too many projects; resources are squandered on ineffective ventures; construction costs considerably exceed estimates; a large amount of resources is frozen in unfinished projects and the plants are obsolete at the time they are commissioned. In fact during 1966-69 incompleted investments increased more than twice as fast (44%) as the volume of centralized investments(21%).[114]

Even after the stringent measures taken in 1969 to curtail the investment fund, the lists of construction projects for 1970 included 3,184 large projects in the process of construction. The total estimates cost of the projects was 188.2 billion rubles and the estimated cost of completion was 87.9 billion rubles as of Jan.1, 1970. About 14.1 billion rubles (8.4%) of total estimated cost or 16% of the costs of completion was allocated for these projects in 1970. At this rate another 12 years would be required to complete the projects. It was estimated that the actual number of projects under way at the same time is 2½ to 3 times in excess of that which could be

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114. Feiwel, n.21, P.488.

executed in accordance with the branch average construction norms. In 1967-68, 500-600 large new projects were begun each year. By 1970, the ministries proposed to start 1000 new projects during the last year of a Five Year Plan as possible to ensure their continuation in the subsequent Five Year Plan. Gosplan cut this figure down to 300.[115]

It was suggested that prima-facie evidence of the plan's lack of realism is presented by the fact that the plan for commissioning new capacities was alarmingly unfulfilled and in some cases it reaches 50-60%. Another indication of plan's lack of realism is the striking upsurge of total unfinished construction (from 29.6 billion rubles in 1965 to 48.6 billion rubles in 1969). The rise in unfinished construction was particularly high in the greatly troubled chemical industry from 2.3 billion rubles to 3.1 billion rubles during 1965-69) and in machine building industry (from 2.5 billion rubles to 4.3 billion rubles). Frequently, projects whose construction period estimated at 2 or 3 years remain under construction for 10 years or more. The average construction period of the large projects is about 12 years. The dragging out of construction periods is particularly pronounced in the consumer goods industries(light, & food industries).[116]

The familiar phenomenon in the West of overshooting estimated costs of construction has become a matter of concern

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115. Ibid, PP.488-89.
116. Feiwel, n.21, PP.489-90.

in the U.S.S.R. as well, especially since the additional costs often reach 50-100% of the original appropriation. Although the system encourages the underestimation of construction costs at the planning stage, small fairness of the size of the variance between estimated and reported costs is not by itself a measure of inefficiency. In a dynamic economy, requirements shift and new improvement are introduced. However, with a taut investment plan the cost increases are bound to contribute to further squattering of resources and prolongation of gestation lags.

The protracted commissioning of capacities is followed by an extended period of "mastering capacities". In this area as well the plan targets are notoriously unfulfilled. Once again the chemical industry was singled out as a particular trouble spot. The national economy is continuously deprived of a quantity of planned output as a result of failures to assimilate new capacities in time. For example, 1968 and first 9 months of 1969 alone, the allocated materials that failed to materialize included the following; over 5 million tons of rolled ferrous metals, 11 million tons of coal, 2.5 million tons of mineral fertilizers, and substantial amount of cement paper, card board and other products.

Besides the reasons given above, one can furthermore elaborate on the causes for large amount of unfinished construction and hence long gestation lags thereby resulting in freezing of investment resources in the Soviet Union.

In the first place there is a violation of the proportions between the planned volume of capital investment and the available resources, making for prompt fulfilment of government orders with regard to launching the operation of new structures. Violation of these proportions has caused unstability in construction plans and frequent changes in the plans both centrally and locally, so the stability of the plans, continuity and sequence in planning and financing are the first conditions for normalizing the dynamics of incomplete constructions. Increase in incomplete construction is also partly explained by inadequate attention to the planning of the indices covering the launching of new enterprises. There are wide gaps between the plans of new enterprises adopted initially and finally worked out. This significantly affects the indices for fulfilmenting capital construction plans in the course of the year. Then there is also a tendency towards the maximum "utilisation" of government funds allocated to capital investment without consideration of government orders for starting the operation of new major undertakings.

The system of financing by outright grants has also led to an increase in incomplete construction work but in terms of volume of work done. In addition to the shortage of basic building materials and certain types of equipment, shortcomings in the system of supply itself make themselves felt. On some projects, large dumps of materials and equipment pile up, which

are badly needed elsewhere. Interruptions in the supply of raw materials, delayed and incomplete deliveries of materials lead to stoppages of construction projects. On the other hand, expenditures for equipment that has not been installed in place "equipment in storage" represent a significant share of incomplete construction. Furthermore, the deliveries of materials and payments for equipment ahead of schedule often has the result that construction projects paying for expensive equipment that will be erected only a year or two later are deprived of the funds needed for capital investments during the current year to pay for the work-in-progress and construction. Finally, above all, there is improper time-phasing of investment. It is found that the entire funds allocated to a particular industry are spent in the initial years so that little funds are left for later years and hence long gestation lags. This is done in order to obtain more and more funds from the subsequent annual budgets. If the investment is phased properly in such a manner that either there is an even distribution of funds or more funds are left at the end of the construction period or in some such manner, only then we could hope to reduce the gestation lags.

Thus, Soviet investment planning has been plagued by many shortcomings and the major being the long gestation lags and the resultant freezing of investment resources. The Polish situation is no better. The problem of inordinate extension of the period of construction happens to be the key problem in

Poland too, especially in regard to the industrial complexes. "The causes were attributed:

(1) to the proclivity to undertake too many projects simultaneously (widening the investment front) irrespective of the possibility of their execution in view of the existing capacity of the building trade;

(2) to failures to meet plan targets for delivery of machinery and equipment;

(3) to anticipated construction equipment;

(4) to shortages of machinery & tools;

(5) to a lack of coordination and delays in the supply of building materials and machinery & equipment for assembly;

(6) to the insufficient preparation of investment projects;

(7) to the lack of documentation and delays in its preparation and bureaucratic process of approval; and

(8) to the perennial problem of understating investment costs, especially in the priority industries."[117]

For example, in 1968 costs of investment were exceeded by 9% in the Ministry of Machine Building Industry and by 4.9% in the Ministry of Chemical Industry.[118] It may be further noticed that the sharpest excesses of reported costs over

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117. G.R. Feiwel, Problems in Polish Economic Planning; Continuity, Change and Prospects, Vol.II in Industrialization and Planning under Polish Socialism, Preager Publishers, 1971, PP.92-93.

118. Ibid, P.93.

estimated costs occurred in large investment projects. The usual practice of sharply understating the cost estimate in order to include the project in the plan and later securing means for its implementation gave rise to a proliferation of projects.

The problem of fictitious reserves is also noticeable during 1966-70 Five Year Plan. This Five Year Plan envisaged an investment resource of 24 billion zlotys. However, the planned investment outlays were exceeded by more than 100 billion, thereby, turning these reserves into a fictitious one. These reserves would have been realistic only if it had been substantiated by real stocks of building materials and construction capacities. But the fact was that such reserves did not exist and at the same time there were no reserves in machine building for construction purposes. The other possibility was that of the reserves of convertible currencies, which would have helped the situation by way of imports of materials & technical equipment of a better quality, but these reserves were also lacking. Thus the reserves envisaged by 1966-70 Five Year Plan were criticised as merely paper goals.

According to the available evidence[119], the freezing of outlays reached almost 110 billion zloty in 1967, with the following rate of growth in relation to the previous year; 1965, 7.2%; 1966, 2.3%; 1967, 5.1%, while the freezing of

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119. Feiwel, n.117, PP.93-98.

outlays in relation to expenditures of the given year was 110.9% in 1964, 112.8% in 1965, 109.3% in 1966, & 104% in 1967. Furthermore, in the units under Central Planning, this relationship was even higher, respectively 133.1%(1964), 135.6%(1965), 130.6%(1966), & 123.7%(1967). There was no specific normative of freezing, but the considerable size of the phenomenon could be deduced by the noticeably drawn-out realization of individual investments. Though the figures given above present a somewhat declining trend of freezing of outlays, however, it may be noted that every year its size considerably exceeded annual investment expenditures. For example, an official Decree in 1968 approved a proviso that the frozen outlays should not exceed the annual investment expenditures in the case of the chemical industry. "Since the coefficient of freezing of outlays in this industry is slightly above the average for the economy and the time and capital structure of chemical investments require a higher level of freezing, one can derive an impression of the size of excessive frozen outlays that have been maintained for years in the Polish economy."[120]

Some scholars have attributed the present shortcomings of investment process in Poland to the generally neglected time factor. The explanation for this runs as follows. Those involved in the investment process often assented to the drawing out of the construction cycle, especially that of reaching the planned

120. Ibid, P.94.

production capacity. The official statistics take into account the freezing of outlays on continued investments only but these official statistics do not take into account the freezing of outlays in commissioned factories that cannot reach their planned production capacities for years after a formal start-up period. However, the latter type of freezing which is less palpable, is a phenomenon perhaps as harmful as the drawing out of construction cycles adversely affect the national though in a somewhat undercover manner. The neglect of time could also be seen in the lack of synchronization between various types investment during the preparation of the investment. For example, take the productive basic investments and complementary investments. Delays in complementary investment generally arise from misguided savings and also from the fact that productive investments are programmed and conducted by industry complementary investments by the local Councils and due to a lack of synchronization between the two the full exploitation of productive capacities was delayed.

Then there was also tautness in the machine and equipment balance. This problem could be encountered in simple delays in the delivery of machines and equipment, in the low quality of these deliveries, and sometimes by a partial import (to patch up shortcomings) caused many difficulties of a technological and economic nature.

There was also a problem of high commitment of resources which was the result of absence of any adequate normative but the excessive size of commitment of resources could be gauged, especially in 1968-69, from the annual requirements for continued investments in industry, which as a rule depleted or even exceeded the estimated total limits of investment expenditures allocated to some association. This resulted in limited flexibility in directing the flow of investment expenditures.

Another important factor was that the investment realization cycles were the most noticeable expressions of the decree of concentration of investment expenditures. For example, to quote Feiwel, "Almost every investment in Poland (with rare exceptions) was realized during a longer time span than envisaged in the Directives. The process of drawing out the period of gestation (abstracting from the period of reaching full capacity) resulted in delays in beginning to use the object, with organizational, technical & economic repercussions. Drawing out the period of gestation also, resulted in a decline of the investment effectiveness, caused not only by an increase in the calculated capital output ratio as a result of increased losses from the freezing of outlays during but also by the relative increase of production costs due to the installation of machines and equipment that became obsolete during the interval."[121] According to an estimate[122] the

121. Feiwel, n.117, P.96.
122. Ibid, P.96.

average excess of the directive construction cycle was about 25% in the investments of the Central Plan and about 43% in that of local plans. The excesses took place in more than half of the projects investigated, while in the remainder, the actual cycle corresponded to the planned cycle or was shorter. Thus with these averages, excesses were shown in 44% of centralized and in 23% of association investments. After 1966, the situation deteriorated in centralized investments but improved in association investments. But the greatest excesses were apparent in the large time consuming investments.

Before 1965, the investment in the area of national economy was financed by non-repayable interest free allocations from the national budget.[123] In other words, such finances did not cost anything to the investor and, therefore, as a result, the enterprises and ministries often tried to invest as much as possible, without any consideration of the profitability of the intended measures. This kind of attitude was adopted either to increase the importance of their own departments to extend their own production profile and thus become more independent of the often badly organised sub-contractors, or to create capacity reserves for themselves to facilitate plan fulfilment. The authorities which were entrusted the task of investment did not resist the pressures of enterprises or ministries, so that more new and more numerous projects were adopted in the investment than could be justified in terms of actual financial and

123. Seidenstecher, n.111, P.323.

material resources. This meant in adequate financial and material support to already started projects and thereby, delaying their completion and, thus, making the machines and equipment of new works technically obsolete by the time they were set in operation.

Thus in order to overcome the above shortcomings the preliminary aims of economic reforms were the following:[124]

(1) to decrease the volume of uncompleted investment;
(2) to improve the functional structure of investment;
(3) to decrease the volume of uncompleted investment;
(4) to shorten building times;
(5) to lower building costs;
(6) to convert technical progress into practice more rapidly;
(7) to exploit existing investment more intensively.

Though there was a considerable similarity in the chief aims of the investment, however, these were dissimilarities in the instruments used to combat these problems in the course of economic reforms in these countries. Here we shall focus upon the proposed methods of dealing one of the major problems of investment planning, namely, the large volume of uncompleted construction. It may be pointed out that this study confines to two countries mainly, Soviet Union & Poland. We would proceed firstly by briefly giving the pre-reform financing of investment and then pass on to the new system of charges on productive assets and bank credits.

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124. Ibid, PP.323-24.

Before 1965, in the Soviet Union, the bulk of industrial investment was determined by the national economic plan and the funds assigned from the State budget as non-reimbursable, interest-free State grants.[125] However, a growing share of these investments is financed by the economic Council's redistribution of funds among enterprises, the enterprises' profit, depreciation and disposal of idle equipment. For example, the 1963 (Soviet Union) Plan envisaged the following sources for financing investments: 60% from budget grants, 23% from the depreciation fund, 12% from profit, and residue from other sources. In this case bank credit plays no role. Some minor investments are allowed outside the plan limits, such as modernization of equipment, some mechanization of production improvement of processes, and installation of equipment etc. These investments may be financed from interest bearing credits, limited to 2,0000 rubles each and reimbursable within 2-3 years. Further, the credit in excess of this amount is subject to approval by higher bank authorities. A further restriction is the bank's credit limit for a planned period. A glande on the available evidence suggests that credits for financing new techniques have increased by about 54% since 1959. Whereas about 70% of those credits was granted to light and food industries, by 1965, 50% was granted to heavy industry.

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125. For these details see, Feiwel, 21, P.114.

Besides some investment can also be financed from the enterprise fund, the fund for encouraging production of mass consumption goods, and contributions from above plan profits. The enterprises investment activity is severely constrained not only by regulating the financial resources but also by unavailability of physical resources, because the system required both an approved title for the acquisition of resources as well as financial means to pay for them.

But the pre-reform investment financing system (that of from the State budget) resulted in an attempt on the part of ministries and enterprises to secure largest possible funds and physical allotment, regardless of needs; they inefficiently apply these whenever allocated for specific projects and ignore their use for others. Once a project underway additional resources could be demanded for its completion. Since the Central investment funds are circumscribed, the granting of additional resources is delayed. The construction period is dragged out and commissioning of capacities is postponed.[126]

It was in this perspective that economic reforms had to play an important role in the reorganisation of investment financing. A reduction of budgetary, non-repayable financing, increased use of resources financed by the enterprises themselves and the extension of investment by means of credit were

126. Ibid, PP.114-15. See also Hans-Herman Hohmann and Hans-Bernhard Sand, "The Soviet Union" in H.H. Hohman, M.C. Kaser and K.C. Thalheim (ed.), n.111, PP.12-15; and also Seidenstecher, n.111, PP.321-64.

intended to overcome the "gift ideology"[127] This new system, it was hoped, would permit an exact calculation of both of the necessary investment expenditure and of the realizable benefits and, finally, it will create a better accord between the investment wishes of the economic units, the intention of the central organs and the real investment resources.

According to one estimate[128] the share of the national budget in financing investment of a productive nature in industry, after the conversion of all enterprises to the new system, was to drop to about 20%, and this was perhaps correct. According to Stroibank, in 1969, 23.5% of the centralized investment in the converted enterprises were financed from budget resources, and these funds were used above all for projects of a non-productive nature as well as for measures of expansion and reconstruction in less profitable enterprises and those running at a loss. Taking the average over the entire economy the budget share in financing centralized investment fell from 61.6% in 1964 to about 47% in 1970-71. However, budgetary finance will continue to play an important role either for investment in infrastructure or in the interests of planned development of the national economy.

Another innovation of the "New System" was the introduction of a charge on productive assets,[129] the scale of which

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127. Ibid, n.111, P.340.

128. Seidenstecher, n.111, P.344.

129. For a discussion on "a charge on Productive Assets" and the figures relating to it, see: Hohmann and Sand, n.126, PP.29-31. And also Seidenstecher, n.111, PP.361-62.

will depend on the value of fixed and working assets of an enterprise. The basic objective of this charge was to eliminate the spurious claims for budgetary funds for investment and also to encourage enterprises to use their means effectively. The rate of charge on assets varied from 6%, in general to 3% in less profitable enterprises and to "no charge" for enterprises running planned losses. This charge on productive assets is simply intended to redirect a great part of the enterprise's payments to the budget into a new channel for the purpose of raising enterprise performance.

A further innovation in investment financing was the introduction of the production development fund[130] in the converted enterprises. This fund is created to enable the enterprises to carry out investment and by themselves. This fund is fed from profit shares, from a part of recovered depreciations and from the proceeds of the sale of surplus capital assets. The profit mark-up normatives were fixed according to the planned employment of the profit of the entire industrial branch, in the same year in which enterprises were converted to new system. However, these normatives are changed by the ministries which resulted in a tendency on the park of enterprises to expend more energy on having their normatives raised, rather than raising these mark-ups by increasing their profits. The sources of this fund in 1968 looked as follows: 36% (profit), 55% (depreciation) and 94% (proceeds of disposals).

130. Ibid, PP.340-51, and also Hohman and Sand, n.126, PP.5-13.

This was the average of the converted enterprises. While on heavy industry this fund constituted of 1/3rd from profit quotas & 2/3rd from depreciation.

It has been argued the production development fund failed to meet its intended functions. In the first place, it happened because the fund remained low for many enterprises. In 1960, it only made up 1.9% of the value of productive assets and it was thought that after the conversion of all enterprises under the new system, this was to be 1/5th of the volume of centralised investments in industry. In 1971 a total of about 4 billion rubles was given to industry by the fund, corresponding to about 13% of the annual volume of centralised investment. It may be noted that this fund is one of chief sources of financing decentralised investment and that is why its volume corresponded to 80% in 1973. In order to attach more significance to this fund, it has been proposed to raise the mark-ups and/or this fund should be concentrated among the production association which to some extent, has already been done.

Another reason responsible for its relatively smaller place was that when the enterprises spent these funds, they encountered considerable problems, for example they could find enough designing and building organisations or suppliers of machines who were in a position to undertake this kind of supra-plan commission. According to an estimate,[131] in 1968

131. Seidenstecher, n.111, PP.346-47.

only 60% of this fund was economic interest, but not in the direct interests of the economic units nor in excess of latter's financial resources. Although in the last years, the extent to which this fund is used has improved, however, the unused funds by early 1972 were over one billion rubles, which was equal to 26% of the funds supply in 1971, so which including projected non-centralised investment in the investment plan, the material covering of these resources is also to be ensured.

And finally, we come to the use of investment credit[132] as a means of financing the investments in the USSR. Investment credit was assigned very different roles in the reform programmes of the Eastern European countries. However, in the USSR, it was primarily seen as an instrument of control over the fulfilment of the State Plan targets. It only acquired the function of an economic lever to the extent that it was to stimulate the most effective possible way of realizing these targets. It would be interesting to examine, how for these measures were put into practice.

The use of investment credits was considered to be useful especially in the centralized investment for the following reasons:[133]

(1) the enterprises which are being obliged to repay the capital within a definite term and to pay interest in this

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132. Ibid, PP.351-63; Also Hohman and Sand, n.10, PP.13-15.
133. Seidenstecher, n.111, P.353.

sum would now be forced to choose their projects economically;

(2) to calculate costs precisely;

(3) to use the available funds carefully;

(4) to curtail building times;

(5) to see to it that finished projects were rapidly put into operation; and

(6) above all to intensify the bank control of investment.

The investment credits could be given only to those projects which were listed in the investment plan. Credit is granted if the enterprises's own funds are not sufficient to meet the plan targets, that is, it has no real investment control function. That means the size of the credit will be determined by the difference between the finance provided for in the plan and the funds the enterprise has to raise itself according to plan. The basis of financing is the endorsed investment plans, estimate costs and the lists of headings. As budget funds were used only to finance centralized investment therefore, the quota of credit in financing investment is quite low. According to an early estimate[134] the quota of credit on financing centralised investment was 50%, but according to Stroibank calculations (after conversion of all enterprises) was 35-40. However, both figures proved far too high because in 1969 only 3% of the centralized investment by converted

134. For the figures given below on credits, Ibid, PP.354-56.

enterprises was from credits, 23.5% from the State budget and 73.5 from their own resources. Even in 1972 the quota of long term credits in investment finance was over 3% and was to rise to about 4% in January, 1973.

The following reasons have been offered for the unexpectedly low quantitative level of credit:

(1) The less profitable enterprises or those which are running at a loss cannot obtain these credits.

(2) There is also a noticeable tendency on the part of enterprises to avoid borrowing credit and instead they try to obtain budget resources. According to one analysis conducted by Stroibank, it turned out that in 6 industrial ministries in 1970, 1404 enterprises who had undertaken centralised investments, only 38 enterprises had provided for the utilisation of long-term credits, while in 1971 this figure was only 33 out of 1256 enterprises.

There is a low demand for credit by enterprises because they are more capable of self-financing than was assumed as the average level of profitability after the revision of whole prices in industry 20% or 22% (in converted enterprises) rather than 15% as planned. According to the reports[135] of the surveys conducted in this regard, it was seen that there are whole branches of industry and republics who hardly make use of any long-term credits, and some of them do not at all. This

135. For the figures given by the reports see Seidenstecher, n.111, P.354.

tendency is noticeable in ferrous metallurgy, the oil & coal industries, engineering, and the republics of Kazakhstan, Tadzhikstan & Georgia. For example, in 1969 the Ministry for Ferrous Metallurgy only recalled 7.5% and the Ministry for the Petroleum Processing Industry recalled only 11% of the credits made available in the endorsed Plan. We can give the following reasons[136] for this low demand:

(a) Since the use of the profit is strictly regulated, therefore, the profit left after division between various purposes, has to be paid to the State budget as 'free remaining profit'[137], the enterprises have little interest in the economic use of their own resources.

(b) There is a provision by which top administrations and ministries often provide enterprises with investment capital by redistributing the profit and recovered depreciation charges within their sphere, if these enterprises do not have sufficient funds otherwise.

(c) Then, there is also a desire to avoid bank control over them, which undermines the reform aim of intensifying the control function of credit.

(d) No doubt the bank is obliged to control the concentration, however, it has been suggested that bank employs much

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136. Ibid, P.354.

137. Free remaining profits are that part of the net profits of the enterprise, which are left after excluding the Production Development Fund, Social Housing and Cultural Fund and Material Incentive Fund. The remaining is then paid into the State budgets.

stricter criteria when it grants credits and winds up credits than when it administers the enterprises' own resources. There is a suggestion to extend the long-term credits for building new enterprises and have a repayment term up to 8 years; should also be extended for financing of reconstruction plans in low-profit or loss-running enterprises. If as a result of these investments, the planned profitability is raised to at least the average level and extensive calculations in some ministries have shown that it can be raised to an average of 16% by these means.

Besides, credit has played a much smaller role (than expected) even in the financing of non-centralized investments of a productive nature (introduction of a new technology, etc.) for which resources from the production development fund of credits could be used together.

Yet there is another side of the picture. It has been argued that credit not only has a low quantitative value but the interest rate charged are also very low and this has also prevented the investment credit from performing a stimulating function. For example, to quote Gertrand Seidenstecher, "Little progress has been made in giving investment credit a stimulating function (in terms of a rational choice of investment project, the minimization of capital expenditure, curtailment of building time, etc.), and this is not only because credit has a low quantitative value but also because of the low interest rates. For credits for centralized investment the interest rate is 0.5

per cent, for credits for non-centralized investment 1.5 - 2 per cent, for overdue credits it is also 1.5 per cent, or 2-4 per cent. If the planned date of operation exceeded the interest rate rises to 1.5 per cent, while investment projects put into operation before their term are given preferential treatment in the form of a reduction to 0.375 or 0.25 per cent. Recently, credit has been granted in specific cases for the provision of equipment with interest rates of 2 per cent (overdue ones of 5 per cent to 7.5 per cent). The numerous proposals to raise the basic interest rate and introduce more differentiated rates have not met with any success yet."[138]

In Poland, there have been four major sources[139] of financing investments (1) self-financing, or resources generated by the enterprises; (2) funds earmarked for specific purposes; (3) budget grants; and (4) bank credits. One notices the changing pattern of financing investment in Polish economy, starting from non-reimbursable budget subsidies, self-financing to bank credits.

Apart from depreciation, the main source for financing the investment is the financial accumulation of enterprises out of profits.[140] The bulk of this accumulation is subject to redistribution by the State budget. A part of the financing

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138. Seidenstecher, n.111, P.355.
139. Feiwel, n.117, P.75.
140. Ibid, PP.79-84, 85-92.

accumulation (profit) is retained by the enterprise because profit serves as a source of financing both enterprise and association investments. For enterprises investments, profit is used through the intermediary of the development fund. Clearly, only the part of the financial accumulation that is left at the enterprises disposal can influence its economic activity. However, there are many negative aspects of using profit as source of finance. For example, profit is something which reflects past performance and profit varies and fluctuates due to factors independent of the enterprise's activity e.g., changes in plan assignments and product mix, the quantity and quality of capital used, changes in prices of inputs and outputs etc. It is also not possible to determine the profit accrued as a result of a particular investment project, especially in existing enterprises that are being expanded. The reliance on profit as an exclusive source for financing enterprise or association investments either would result in impairing planned investments due to a deficiency of funds or would be conducive to a dispersal of investment funds as a result of excess liquidity. The Polish experience of 1959 suggests that when investments are financed from above plan profits, the excess liquidity undermines the investment plan, the enterprise investments complete with centralized investments for real resources and central planners revert to restrictions on acquisition of real assets. For all these reasons, in practice

profit only partly finances the enterprise's investment activity. In fact, profit is used because it is synthetic indicator (though it is also not adequate). While although depreciation has a rather low price and at the same time limited possibilities of exerting economic pressure, but it also has the merit of being relatively stable and thus relatively easy to plan realistically even for longer periods of time. The stability of depreciation makes it possible to synchronize financial & physical planning, which is quite important in a socialist economy.

On the other hand, the method of non-reimbursable budget subsidies and redistribution of means of investment finance between State enterprises is considered to be a simple and inexpensive method, however, it has been criticized[141] for being schematic, formalistic, and rigid and for lacking a system for influencing and rewarding good performance. With the growing deplorable situation on the investment front, arguments are advanced for a widespread application of the more costly method of financing investments by means of bank credit. It is in this perspective that the changing system of financing investment in Poland has to be examined.

Right after Second World War uptil late fifties, the system prevailed in Poland was that of self-financing by the enterprises and this system had two specific features in the

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141. Feiwel, 117, P.82.

beginning (say, around late forties) that no limitations were imposed on the use of financial resources by the enterprises. They could use these funds at their own discretion either for investment or current activity, though some restrictions were imposed later on in the "Three Year Plan" but the real centralization took place only in the "Seven Year Plan". With these changes, the enterprises were directly tied into the budget, the bank accounts in which the enterprises were obliged to transfer excess funds to the budget and the budget, in its turn, financed development requirements. In theory, this change amounts to separation of investment and current activity, however, a lot of difficulties were encountered in carrying out this concept in practice. Now the funds generated from the enterprise's current activity were directed mainly to finance current activity and the State was to take care of financing of development through redistribution. The objective of this change was the desire to concentrate the activity of the enterprise on the maximum fulfilment of production targets. The point was to assure growth of priority branches at almost any price, irrespective of costs, financial results or other qualitative aspects of performance.

The changes introduced in late 1950s resulted in an increased share of profit, retained by enterprises and directed for the enterprises development needs, together with an enlarged scope of decision-making at the enterprise level.[142] The change

142. For this as well as for other subsequent changes, Ibid, P.85, PP.84-92.

was not very significant, however, it aimed at better use of the funds. In 1958, almost at the time of second investment wave, a revised method of financing development was introduced. This new system put more emphasis on the share of profit left at the disposal of the enterprise. It was to be accumulated on a development fund earmarked for both investment and increases of working capital, which means that the size of funds earmarked for enterprises was made dependent on its performance in carrying out its current activity, which also meant the reduction on the intent of the budget and thereby a greater scope of decision-making at the enterprise level.

Thus the 1958 reforms were followed by reforms in 1960, which circumscribed the enterprise with restrictions again. Now the banks were obliged to perform control over investments proposed by specific enterprises, and within the centrally established limits the banks were to finance exclusively those investments that were included in the enterprise's plan. If the enterprise failed to notify the bank within the planned period, the investment could be financed only from working capital. These restrictions remained in force till 1965. This shows inconsistency in the financial system.

However, with such history, again in the Five Year Plan of(1966-70), the Central Planners reverted to the development fund as the scene of the investment inventories interplay and as a source of financing enterprise investments.[143] The new

143. Feiwel, n.117, P.87.

system was considered to be more efficacious on two grounds: (1) the scope of decentralized investment was enlarged, but only at the level of the association, whereas the enterprise investments were limited strictly to replacements; (2) it was hoped that investment inventories interplay would be of greater incentive effect since the restricting normative of working capital was abolished. Thus the new system distinguished between three categories of investments: enterprise investments, association investments, and centralized investments and this system envisaged a growing scope for association investments financed from the association's funds and bank credits bearing a 3% interest charge, where the association investments were to embrace projects that pertained to reconstruction or modernization. Therefore, the new system of 1966 resulted in increased decentralization of financing, by the curtailment of non-reimbursable financing from the budget, and by the extension of self-financing of association's and enterprise's investments from their own funds and from bank credits. In addition, the Ministry of Finance could allow the association a subsidy from the budget when it was considered that depreciation and profit of the association were insufficient to cover the investment needs of the plan.

One of the most striking break from old system was the introduction of bank credits.[144] The bank was to grant credits

144. Ibid, PP.90-93, 107-21.

for association investments on the basis of the annual and long term plans, the planned increment of productive capacity in the given branch and the efficiency of planned investments. Bank credit was to supplement the association funds. The share of association's investment fund could not be lower than 30% of the planned cost of investment for which the bank granted a credit. The bank could apply an increased interest rate after the deadline for commissioning the investment if the investment had not been finished before then. The repayment period of credit depended on the share of the bank credit in financing investment, the ability to repay the credit, and the planned accumulation on the investment fund of the association. The repayment period could not exceed ten years. Credit and interest charges were repaid from the association's investment fund. In case of shortages of this fund, the bank charged additional interest for delays made up from future revenue into the investment fund. For example, no interest was charged on credit for central investment, but bank could levy 3-8 per cent interest on additional credit granted to cover above plan expenditures or post-due credits. But additional credit was not subject to interest if the planned cost was increased from the cost reserve of the investment undertaking. The interest charged by the bank was recorded as an investment loss for the enterprise and was covered from revenue and the investor could demand reimbursement of losses if the contractors violate the conditions of the contract.

The system was plagued with various limitations and shortcomings:

(1) The Central Planners were again facing a situation where centralized investments would compete with enterprise investments for real resources. But this time the situation was more acute as a result of more intense investment drive in 1966-70 and more pronounced disequilibria that ensued between requirements and availability of building materials and construction potentials.

(2) Then the new rule was also regarded as a hesitant measure as it could not solve the problem. It excluded the priority investments (centralized), which continued to be financed from budget subsidies. The credits did not bear interest charges and were repayable from budget subsidies granted after the investment was commissioned.

The methods of financing investment did not alleviate any of the shortcomings generated by the investment push of the 1966-70 Plan.[145] The deplorable situation on the investment front was officially acknowledged by mid-1969. The key problem was the inordinate extension of the period of construction especially in regard to industrial complexes and factors responsible for this have already been discussed above in detail. Thus this system was revamped in 1970 and this was to coincide with the 1971-75 Five Year Plan. The experience had shown many

145. Feiwel, n.117, PP.92-96.

negative aspects of the system financing investments through subsidy, which was the basic form of financing investment in Poland. The credit type of financing which was used for centralized investment had only the form of credit-type of financing, but essentially a subsidy-type financing because the credit was from the State subsidies, which in turn, led to pressures to invest and the calculation of investment efficiency was plagued with inadequacies. This subsidy system was not replaced by self-financing by the system of investment credit, which incorporated reimbursable interest-bearing credit. This credit system was different from both the subsidy-system as well as self-financing in as much as the expenditures would have to be reimbursed and interest charge would have to be paid and at the same a unit does not need to have its own profit in order to invest.

Under the new financing system introduced during (1971-75) Plan, the Central Planners were to retain the influence over the general size of investment expenditures, the general direction of expenditures and the choice of large investment projects of significance. The new system was to create conditions for appropriate redistribution of means and the principle of redistribution is opposed to investment financed exclusively from the unit's own profit i.e. self-financing.[146] The redesigned system of investment financing was intended to provide a more

146. Ibid, PP.108-09.

effective method of influencing investment activity by financial tools and incentives. It is noticeable that the new system purports to rest on the separation of bank credit from self-financing of investment. It states that the productive investment should be financed exclusively by interest-bearing bank credit and the self-generated funds would be used exclusively for total or partial repayment of credit. This would result in the separation of investment decision from that of ability to pay for the undertaking.

As under the new system, there would be a positive relation between the period of construction and interest charges on investment e.g., the longer the period of construction, the higher would be interest charged on investment fund and in addition, the interest charges would start from the State credit was granted and perhaps because of this, it was hoped that the new financial system would induce the investors to choose investment projects with shorter gestation lags and would also exert pressures for its cheaper execution.

The new system envisaged certain checks on the wasteful use of resources by introducing capital charge in the following manner:[147]

(a) if the investor delayed the commissioning of the investment, he would have to pay the capital charge from the planned deadline;

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147. Feiwel, n.117, PP.109-10.

(b) if the project is completed earlier than the planned date, then, he would not pay capital charge for a period between actual completion & planned deadline;

(c) a fifty per cent reimbursement of capital charge to the investor if he achieved the planned capacity on time or ahead; and

(d) a seventyfive per cent reimbursement of capital charge if he achieves other technical economic indexes on or before time.

The new system also introduced the four-fold classification[148] of investments e.g., replacement of machines and equipment, modernization of existing plants and construction of new plants or branches. On the one hand there was a need to standardize and simplify this classification and on the other hand, to bring all the resources earmarked for financing investments of the individual branches into one main reservoir. In this connection, the financing of investment has been looked upon in three ways: (1) financing of Branch Investments; (2) financing of Enterprise Investments; (3) the financing of investments of budgetary units.

The main group of investments embracing the existing centralized investments, the corresponding investments in the local plans, investments decided by the People's Councils,

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148. Ibid. P.110.

investments of association, and a part of enterprise investments were to become branch investments, with the corresponding financial source[149] the investment fund of the branch. While enterprise investments needed for upkeep and modernization of the existing stock of assets would be financed partly from investment repair fund of the enterprise and partly from bank credits. The investment repair fund constitutes of depreciation and contribution from profits. While the investments of the budgetary units will be entirely financed from bank credits, especially, the construction jobs. As far as the repayment of bank credits is concerned, the bank credits for branch investment have to be repaid mainly from the association fund consisting of depreciation and profit and, in addition, could also be financed from future profits derived from the completed project or with profits together with depreciation on the commissioned project, but the repayment of finance for the budgetary unit will be made from the budget. However, it should be noted that these credits would be subject to interest, which has been done to reduce gestation lags of the projects. The interest rate on bank credits[150] was to be 3% but could be reduced for investments meant for reconstruction and modernization. The new rules provided some most

149. How various types of investment would be financed under the system have been illustrated with three charts pertaining to financing of 'Branch Investment', 'Enterprise Investment' and 'Budgetary Units Investment' see Feiwel, n.117, PP.110-14.

150. Ibid, P.114.

potent incentives[151] for completion earlier than the planned and at a lesser investment cost than the planned estimate for a project and penalties for delay in completion and at a higher cost than the planned estimate. For example, the bank would be free to increase the rate of interest on credits upto 9% for exceeding the planned construction cycle and upto 12% for exceeding the planned costs. In particular, nine possibilities were foreseen of compensating the investor for a part of the interest charge, to take one example, the compensation of 0.3% of the basic interest charge, if construction cycle is exceeded but the cost estimate does not. Similarly, other such combinations of the two were also provided for. Though in principle, it is good, but in practice it has a danger of creating pressures to complete investments on time even at increased cost.

151. For details of incentives given by Polish Planners, see Feiwel, n.117, PP.114-21.

## CONCLUSION

The project selection criterion in the USSR and Poland has been sought in terms of recoupment period. The investment rules which operated during 1960-69 in the USSR were in the form of differentiated recoupment period according to which the recoupment periods of the projects to be selected were not to exceed the norm established by the planners (i.e. $T_s$), where to recapitulate T and $T_s$ stand for recoupment period of a project and standard recoupment period. The differentiated recoupment period criterion though having the merit of promoting priority sectors but was critised because it failed to take into account the varying patterns of capital effectiveness, different durabilities of the projects, investment risk differences, different time phasing of operating cost economics and possible returns to scale. Besides, it also fails to take into grip the problem of externalities, uncertainty and technical progress. This criterion because of its inadequacies resulted in large amount of freezing of resources. It was because of these limitations of the differentiated recoupment period criterion, a strong case was made in Chapter I for a uniform recoupment period criterion wherein a norm of effectiveness would be set for the whole economy. This criterion was said to have the merits of overcoming the shortcomings of differentiated recoupment period. At the same time it also comes to grip to the problems of uncertanity and externalities. But it raised an important problem, namely, the problem of determination of a synthetic expression which will take into account various aspects of

investment choice relating to different kinds of costs. We saw in Chapter 2 that the derivations of such an expression, however, is not an easy task. All three approaches, namely the Kalecki-Rakowski approach, the Fiszel approach and the Mathematical approach, which attempt to derive this synthetic expression, are not free from limitations. Kalecki and Rakowski who incorporated various modifications in the traditional formula is no more than a mere approximation to reality. On the other hand, Fiszels' approach of applying discounting procedures using a particular rate of interest to socialist economics raises a problem of determination of rate of interest in the absence of capital market on one side and that of acceptability of the concept of a rate of interest in centrally planned economies on the other. At the same time the Kantorovich's approach is less efficacious as it ignores the problems of externalities and technical progress. Besides, the problems also arose out of the simplifying assumptions for example, the accurate determinations of the size of the investment outlays and operating costs and the accurate determination of investment effect due to a variety of indirect and unmeasurable effects which have varying rates in a developing economy. Thus, we saw in Chapter 2 that though there are strong reasons for a uniform norm, however, the determination of such a norm of cost minimization remains a complex problem.

The practical experience of the USSR and Poland in this regard was examined in Chapter 3, which suggests that

that at least in practice in the USSR, the differentiated recoupment period criterion could not be done away with keeping in view the long term considerations of economic development. However, in Poland we find profound changes in project selection criterion starting from the uniform recoupment period criterion in the sixties and shifting to shadow capital charge and a number of supplementary criteria different from the synthetic index. But these rules were also short lived and were further replaced by straight forward application of discounted cash-flow methods which again recognises the importance of synthetic criteria. But none of these changes could solve the problem of large amount unfinished constructions which was linked with the development of investment criteria. On the one hand and the investment financing on the other hand. The investment financing in the pre-reform period in these economies was done in terms of interest free grants, but realizing its weaknesses this has been replaced in the recent past by the schemes of self-financing, bank credits (with interest charged on them). But the problem of unfinished construction still remains to be solved.

From what has been said above, one can draw the following tentative conclusion:

(1) The development of "key" and "priority" sectors occupies a significant role in the development of centrally planned economies, for example, the development of Siberia

in the USSR is concerned, the use of investment criterion could not be of much use in such cases. Here, the long term economic development considerations should be the sole criterion.

(2) But it should not lead us to conclude that the project selection criterion has no role to play in the centrally planned economies. In fact there are large sectors where a criterion for the efficiency of investment would be useful.

(3) Though there are strong arguments for a synthetic expression, but it is difficult to understand how can we determine the total costs when the determination of total costs which are to be minimised is a very complex problem because of the several institutional and organisational factors involved in it.

# BIBLIOGRAPHY

Books


1. Bergson, A: The Economics of Soviet Planning New Haven, Conn: Yale University Press, 1964.
2. BORNSTEIN and FUSFLED(ed): The Soviet Economy - A Book of Readings, Richard D. Irwin, INC, Homeowd, Illinois, 1970.
3. Bryson, P.J.: Scarcity and Control in Socialism, Essays on East European Planning, D.C. Health & Co., London, 1976.
4. CAMPBELL, R.W.: The Soviet Type Economics, Performance and Evaluation, Macmillan, London, 1974.
5. Dobb, Maurice: Capitalist Enterprise and Social Progress Routledge and Kegan Paul, London, 1925.
6. Dobb Maurice: Political Economy and Capitalism, Some Essays in Economic Tradition, Routledge & Kegan Paul, London, 1937.
7. Dobb, Maurice: Soviet Economic Development Since 1917, Routledge & Kegan Paul, London, 1948.
8. Dobb Maurice: On Economic Theory and Socialism, Collected Papers, Routledge & Kegan Paul, London, 1955.
9. Dobb Maurice: An Essay on Growth and Planning, Routledge & Kegan Paul, London, 1960, Chapter 2.
10. Dobb Maurice: Welfare Economics and the Economics of Socialism, Towards a Commonsense Critigue, Routledge & Kegan Paul, London, 1969.

11. Dyker, D: The Soviet Economy, London, 1976, Ch.5.

12. Ellman, M: Soviet Planning Today, Cambridge University Press, Cambridge, 1971.

13. Ellman, M : Planning Problems in the USSR: the Contribution of Mathematical Economics to their solution, 1960-71, CUP, London, 1973.

14. Feinstein, C.H.(ed.): Socialism, Capitalism and Economic Growth: Essays Presented to Maurice Dobb, CUP, London, 1967.

15. Feiwel, G.R.: The Soviet Quest For Economic Efficiency Issues, Controversies and Reforms, Preager Publishers, New York, 1967, reprinted in 1972.

16. Feiwel, G.R.: Problems in Polish Economic Planning: Continuity, Change and Prospects, Vol.II, Preager Publishers, New York, 1971.

17. Fiszel, H.: Investment Efficiency In a Socialist Economy, Translated from Polish, Pergamon Press, Oxford, 1966.

18. Granick, D.: Enterprise Guidance In Eastern Europe, Princeton UP, 1976.

19. Gregory, P.R. and Stuart, R.C.: Soviet Economic Structure and Performance, Harper & Row, New York, 1974.

20. Hutchings, Raymond: Soviet Economic Development, Basil Blackwell, Oxford, 1971.

21. Kantorovich, L.V.: The Best Use of Economic Resources, Translated from Russian, Mass; Harward University Press, Cambridge, 1965.

22. Leeman, W.A.: Capitalism, Market Socialism and Central Planning, Readings in Comparative Economic Systems, Khosla & Co., Delhi-7, INDIA, 1976.

23. Nove, Alec: The Soviet Economy, George Allen & Unwin Ltd., London, 1968.

24. Nove, Alec & Nuti, D.M.(ed.): Socialist Economics, Penguin, Harmondsworth, England, 1972.

25. Nove Alec: The Soviet Economic System, George Allen and Unwin Ltd., London, 1976.

26. Novozhilov, V.V.: Problems of Cost-Benefit Analysis In Optimal Planning, New York, 1970.

27. Berri, L.Ya: Planning a Socialist Economy, Vol.II, Progress Publishers, Moscow, 1977.

28. Porwit, K: Central Planning: Evaluation of Variants, (Translated fromPolish), Pergamon Press, Oxford, 1967.

29. Rakowski, M.(ed.): Efficiency Of Investment In a Socialist Economy, (Translated from Polish), Pergamon Press, Oxford, 1966.

30. Fedoryenko, N., Khachturov, T., Yefimov, A.: Soviet Economic Reforms: Progress & Problems, Progress Publishers, Moscow, 1972.

Articles

31. Abouchar, A.: "The New Standard Methodology for Investment Allocation", Soviet Studies, Vol.XXIV (3), 1972-73, Pages 402-411.

32. Atlas, Z.: "Production Effectiveness: A Category of Political Economy and a Requirement of Economic Policy", Feb 1975/Vol.XVII No.10, pages 3-23.

33. Audiants, Iu,: "Credit and the Economic Substantiations for interest on Credit" in Problems of Economics (Iasp), Dec., 1970/Vol.XIII, No.8, Pages 22-43.

34. Belousov, R.: "The Chief thing is Economic Effectiveness" in Problems of Economics (Translated Journal), July, 1965, Pages 33-37.

35. Bogachev, V.N.: "Problems of Development of the Construction Industry in Siberia" in Problems of Economic Iasp, August 1974, Vol.XVII, No.4, Pages 77-102.

36. Bor, M. & Ocskordov, V: "Methods of Calculating the Economic Effectiveness of New Technology" in Problems of Economics, (Translated Journal), August, 1963, Pages 16-23.

37. Brenner, M.: "Problems of Petroleum in the Perspective of development of the USSR Economy" in Problems of Economics (Translated), August, 1958, Vol.I (1958-59), No.14, pages 10-18.

38. Brenner, M.: "Some Economic Problems in the Development of the USSR Petroleum Industry" in Problems of Economics (Translated Journal), Vol.2, (1959-60), May, 1959, Pages 38-41.

39. Bugaev, G.: "The Standard Index Method of Determining Effectiveness", Problems of Economics (Translated Journal), June, 1963, Pages 27-32.

40. Bukta, Laszlo (Hungary): "Investment-Decision in the Decentralized Sphere" in Eastern European Economics Fall, Vol.XIII, No.1, pages 3-25.

41. Bunich, P.: "Economic stimub to increase the effectiveness of Capital investments and output to capital ratio" in Problems of Economics (Translated Journal), Sept., 1966, pages 37-50.

42. Bunich, P.: "Planning Indices and Economic Incentives for Effectiveness utilisation of Fixed Assets" in Problems of Economics (Translated Journal), 1964.

43. Bunich, Pavel: "Proportion Between Fixed Assets and Gross Industrial Output" in Problems of Economics (Translated Journal), July, 1962, pages 46-54.

44. Bush, Keith: Soviet Capital Investment since Khrushchev - A Note. Soviet Studies, 1972-73, Vol.XXIV (1) Pages 91-97.

45. Cherniavskii, V.: "Choice of the Project Variant" in Problems of Economics (Translated Journal), July, 1963, Pages 3-9.

46. Cherniavskii, V.: "An Attempt to define the Efficiency of Capital Investment in the Iron & Steel Industry" in Problems of Economics, Vol.2 (1959-60), Nov., 1959, Pages 18-23, Chap. 2, 3.

47. Chernomordik, D.: "Effectiveness of Capital Investment and the Time Factor" in Problems of Economics (Translated Journal), Sept., 1962, Pages 28-36.

48. Dzhelomanova, E.V.: "Some Question of Raising Efficiency in the use of Fixed Production Assets" in Problems of Economics (Translated Journal), Oct., 1965, pages 29-37.

49. Efimova, E.G.: "On the Economic Content of Capital Charges" in Problems of Economics, Iasp, March, 1972, Vol.XIV, No.11, Pages 49-66.

50. Emelianov, A. & Tolkachov, A.: Methodological Problems in Determining theEconomic Effectiveness of Production Mechanization and Automation" in Problems of Economics (Translated Journal), Vol.2 (1959-60), April, 1960, pages 3-8, Chs. 2, 3.

51. Eremeev, K. & Khalturin, V.: "Methodology for Determining the Economic Effectiveness of Capital Investment in Agriculture" in Problems of Economics (Translated Journal), Vol.2 (1959-60), May, 1961, pages 39-45.

52. Eremin, A.: "On Effectiveness Criteria" in Problems of Economics Iasp, March, 1972, Vol.XIV, No.11, pages 31-49.

53. Fedorenko, N.: "Some Problems of the Accelerated Development of the Chemical Industry" (July) in Problems of Economics, Dec., 1958, Vol.I, No.8, Pages 18-24(1958-59).

54. Ginzburg, S.: "New Developments in Construction Financing" in Problems of Economics (Translated Journal), Feb., 1966, Pages 11-24.

55. Gorupic, Drago: "The Investment Decision in our System of Capital Formation" in Eastern European Economics, Spring 1964, Vol.II, No.3, pages 30-44.

56. Gregory, P.: Feiltz, B. and Curtis, T.: "The New Soviet Investment Rules: A Guide to National Economic Planning" Southern Economic Journal, Vol.41, No.3 (Jan. 1974).

57. Gregory, P.R.: "Some Indirect Estimates of Eastern European Capital Stocks and Factors Productivity" pages 71-86, Soviet Studies, Vol.XXVII, 1975.

58. Grossman, G.: "Scarce Capital and Soviet Doctrine", Quarterly Journal of Economics, Vol.67, No.3, (Aug., 1953).

59. Harcourt, G.V.(1967): "Investment decision criteria, Capital Intensity and the choice of technique" Czechoslovak Economic Papers, No.9.

60. Huszar, J. & Mandel, M. (Hungary): "The Investment Decision Making System in Hungary" in Eastern European Economics, Spring, 1973, Vol.XI, No.3, pages 27-50.

61. Jasny, N.: "A Note of Rationality & Efficiency in the Soviet Economy", Soviet Studies (1) XIII 1961-62, pages 35-69.

62. Jasny, N.: "A Note of Rationality & Efficiency in the Soviet Economy", Soviet Studies (4), 1960-61, Vol.XII, Pages 342-53.

63. Jasny, N.: "Rationality and Efficiency: A Further Note", Soviet Studies (3), 1961-62, Vol.XIII, pages 321-41.

64. Jarkovsky, Vladimir (Czechoslovakia) "The Dynamic Determination of Economically Efficient Capital Investment and New Technology" in Eastern European Economics, Summer 1973/Vol.XI, No.4, pages 86-113.

65. Kalecki, M. & Rakowski, M.: "Generalization of the Pattern for Effectiveness of Capital Investment" in Eastern European Economics, Fall 1962/Vol.1, No.1,pages 20-26.

66. Kandyba, M. & Panasenkov, V.: "Ways of Increasing the Economic Effectiveness of Capital Investment" in Problems of Economics (Translated Journal) Sept., 1964, pages 40-47.

67. Kantor, L.: "Relationship between Rates of Growth of Output and Fixed Assets in Industry" in Problems of Economics (Translated Journal), Jan., 1963, pages 52-59.

68. Karotamm, N.: "The Economic Effectiveness of Capital Investment in Socialist Agriculture", Problems of Economics (Translated Journal): Nov., 1958, Vol.1, No.7, Pages 60-65 (1958-59).

69. Katzenelepbogen: "Problems of the Methodology of Determining the Economic Effectiveness of New Techniques" in Problems of Economics (Translated Journal), Vol.2 (1959-60), Sept., 1959, pages 68-72, Ch.2.

70. Karagedov, R.G.: "The Question of the Relationship between the categories of Economic Effectiveness and Profitability" in Problems of Economics (Iasp), Nov., 1970, Vol.XIII, No.7, pages 24-25.

71. Khachaturov, T.: "The Economic Reforms and Problems of Effectiveness of Capital Investment" in Problems of Economics (Translated Journal), March, 1968, pages 12-24.

72. Khachaturov, T.: "Methodological Questions of Determining the Economic Effectiveness of Capital Investment" in Problems of Economics, Vol.2 (1959-60), Jan., 1960, pages 17-22.

73. Khachaturov, T.: "Ways of Increasing the Economic Effectiveness of Capital Investments" in Problems of Economics (Translated Journal), Sept., 1964, pages 29-40.

74. Khachaturov, T.: "Raising Investment Efficiency and Scientific Grounds for its determination" in Problems of Economics (Translated Journal), Nov., 1966, pages 3-16.

75. Khachaturov, T.: "Creating the Technical and Material Base of Communism and Methods of Raising the Effectiveness of Capital Investments" in Problems of Economics (Translated Journal) Oct., 1961, pages 39-49.

76. Khachaturov, T.: "Price Formation, Investment Effectiveness and Profitability" in Problems of Economics (Translated Journal) Vol.2 (1959-60), July, 1961, pages 18-26.

77. Khachaturov, T.: "Economic Effectiveness of Integrated Mechanisation and Automation" in Problems of Economics (Translated Journal) Vol.2 (1959-60), April 1960, pages 8-15.

78. Khachaturov, T.: "The Economic Effectiveness of Capital Investments" in Problems of Economics (Translated Journal) Sept., 1967, pages 3-13.

79. Khachaturov, T.: "Ways of Improving Capital Construction and Increasing its effectiveness" in Problems of Economics (Translated Journal), July, 1962, pages 23-31.

80. Krasovskii, V.: "Ways of Improving the Structure of Capital Investments" in Problems of Economics (Translated Journal), Jan. 1964, pages 25-35.

81. Koctuch, H.D.: "The Recoupment Period: A Czechoslovak View", Soviet Studies (No.2), October, 1963, Vol.XV, pages 167-182.

82. Koctuch, H.: The Recoupment Period: "A Czechoslovak View, Soviet Studies, Vol.15, No.2, Oct., 1963, pages 167-81.

83. Komarek, L. & Riha, L.: "Problems in Measuring the Effectiveness of Investment under socialism", Czechoslovak Economic Papers, No.3, 1964, ~~Prague~~, pp.33-67

84. Kornai, J.: "The Determination of the optimum Investment Plan for an Industrial Sector by the use of Linear Programming" in Eastern European Economics, Summer 1963, Vol.1, No.4, pages 44-57.

85. Krasovskii, V.: "The Integral Effect and the Time Factor" in Problems of Economics (Iasp), Sept., 1975/Vol.XVIII, No.5, pages 71-91.

86. Kudrov, V.: Comparison of Fixed Productive Capital and its "Return" in Problems of Economics (Iasp), Nov., 1970, Vol.XIII, No.7, pages 3-24.

87. Kukikov, V.N.: "Some Problems of Long-term Crediting of Centralised Capital Investments" in Problems of Economics Iasp, Feb., 1975, Vol.XVII, No.10, pages 55-59.

88. Problems of Economics (Translated Journal) Feb-March, 1969, Vol.XI, No.11 Chap.V, pages 74-86.

89. Kvasha Ia. and Krasovskii, V.: "Reproduction of Fixed Assets and Standardization of Capital Outlays" in Problems of Economics (Translated Journal) Jan., 1963, pages 42-52.

90. Kvasha, Ia and Krasovskii, V.: "Capital Construction and Problem of Replacement" in Problems of Economics (Translated Journal), May, 1965, pages 27-35.

91. Kvasha Ia and Krasovskii, V.: "Capital Construction and Accumulation" in Problems of Economics (Translated Journal), Nov., 1965, pages 13-22.

92. Kvasha, Ia. B.: "Capital Intensity" in Problems of Economics (Translated Journal) Annual No.1966 in Jan., 1967, pp. 66-105.

93. Kvasha, Ia and Krasovkii, V.: "New Technology and the Planning of Capital Investments" in Problems of Economics (Translated Journal) Feb., 1962, pages 29-38.

94. Kvasha, Ia and Krasovskii, V.: "Economic Effectiveness of Capital Investments" in Problems of Economics (Translated Journal), Feb., 1962, pages 21-29.

95. Kvasha, Ia.: "Measuring the Effectiveness of Social Production" in Problems of Economics (Translated Journal), March 1975/Vol.XVII, No.11, pages 79-100.

96. Levnin, G.: "Capital Investment in Ferrous Metallurgy and Length of time needed for completing the construction of the New Industrial Enterprises", Aug., 1958, Vol.I, No.4, pages 21-29 (1958-59) in Problems of Economics (Translated Journal).

97. Los, Borism: "Concerning Indices of Effectiveness of Capital Investments" in Problems of Economics (Translated Journal), July, 1962, pages 31-36.

98. Malyshev, P.: "The Proportion Between Productive and Non-Productive Accumulation" in Problems of Economics (Translated Journal), Nov., 1965, pages 3-13.

99. Mezentsev, V.: "The Development of the Chemical Industry - One of the most important task (June) in Problems of Economics, Dec., 1958, Vol.I, No.8, pages 18-24.

100. Michael, J. & Lavella, S.J.: "The Soviet New Method" Pricing Formulae, Soviet Studies Vol.XXVI (1974) pages 81-98.

101. Montias, J.M.: "Some recent Development in Soviet Economic Thought", Soviet Studies (2) 1948-49, Vol.I, pages 119-27.

102. Montias, J.M.; "Rational Prices and Marginal Costs in Soviet-type Economics", Soviet Studies (4) 1956-57, Vol.8, pages 369-80.

103. Notkin, A.: "Criterion of the Economic Effectiveness of Socialist Production" in Problems of Economics (Iasp), March, 1975, Vol.XVII, No.11, pages 56-79.

104. Nove, Alec: "Aspects of Planometrics of Zuuberman, Soviet Studies (3), 1968-69, Vol.XX, page 380.

105. Nuti, D.M.: "Material Incentive Schemes and the Choice of Techniques in Soviet Industry", Australian Economic Papers, December, 1966.

106. Nuti, D.M.: "Investment Reforms In Czechoslovakia", Soviet Studies, 1969-70, No.3, Vol.XXI, pages 350-60.

107. Nuti, D.M.: "Discounting Methods In Polish Planning", Soviet Studies, October, 1971.

108. Nuti, D.M.: "The Evolution of Polish Investment Planning", Jahrbuch der Wirtschaft Osteuropas, MUNICH Band 3, 1972, Vol.7, pp. 398-431

109. Nuti, D.M.: On The Rates Of Return On Investment", KYKLOS, 1974, No.2, pp. 345-69

110. Nuti, D.M.: "Large Corporations and the Reform of Polish Industry", MUNICH, Band , 1977, Vol.7, pp 379-83.

111. Nuti, D.M.: "Investment, Interest and Degree of Centralization in Dobb's Theory Of The Socialist Economy", Cambridge Journal of Economics, 1978, pp. 191-99.

112. Pashkovskii, V. & Koriagin, B.: "Problems in the Economic Substantiation of interest rates" in Problems of Economics (Iasp), Feb., 1972, Vol.XIV, No.10, pages 51-67.

113. Petrov, V.: "Effectiveness of Capital Investment in the Transport Industry of the USSR" in Problems of Economics (Translated Journal), 1958-59, Vol.1, No.3, July, 1958, pages 51-55.

114. Popovil, Strasimir: "Investment Problems in the Yugoslav Economy" in Eastern European Economics, 1963-64 No.1-2, Vol.2, pages 78-90.

115. Raskin, G.: "Capital Investments in Agriculture and the Calculation of their effectiveness" in Problems of Economics (Translated Journal), Feb., 1962, pages 38-45.

116. Recommendations of the All Union Scientific-Technical Conference on Problems of Determining the Economic Effectiveness of Capital Investment and New Techniques in the USSR National Economy", Problems of Economics, A Journal of Translation, Vol.1, No.9, Jan.1959, pages 86-90.

117. Rychlewski, Eugeniusz (Poland): "The Investment System of a Socialist Economy" in Eastern European Economics, Fall 1973, Vol.XII, No.1, pages 3-45.

118. Smekhov, B.: "Measuring the Effectiveness of Capital Investments" in Problems of Economics (Translated Journal) Vol.2, 1961(Oct), pages 32-39.

119. Smertin, Arkadia: "Calculation of the Effectiveness of Capital Investment in the Manufacture of Interchangeable Products" in Problems of Economics (Translated Journal), July, 1962, pages 36-48.

120. Sokolov, B.: "Reducing the volume of Incompleted Construction" - An Essential Economic Task, Problems of Economics (Translated Journal), March, 1959, Vol.I, No.11, pages 19-26 (1958-59).

121. Srein, Z.: "Investment decision Criteria and the Recoupment Period", Czechoslovak Economic Papers-9, 1967.

122. "Standard Methodology for Determining the Economic Effectiveness of Capital Investments" translated in the ASTE Bulletin, Vol.B, No.3 (Fall 1971), pages 25-36, - Originally appeared in Ekonomicheskaia gazeta (The Economic Gazette No.39 (1969), pages 11-12.

123. Dr. Stojanovic Radmila: "Time As a Factor in Capital Investment" in Eastern European Economics, 1963-64, No. 1-2, Vol.2, pages 90-100.

124. Sukhotin, Iu: "Foreign Economists on Soviet Studies of Effectiveness of Capital Investments", in Problems of Economics - A Translated Journal, March, 1962, pages 48-55.

125. Szabo, Jozsfed: "Investment Effectiveness and Balanced Development of the National Economy" in Eastern European Economics, Summer 1963, Vol.1, No.4, pages 36-44.

126. Thornton, Judith: "Differentiated Capital Charges and Resource Allocation in Soviet Industry", JDE Vol.79, No.3 (May/June, 1971), pages 545-61.

127. Tibor Liska: On the Further Development of Efficiency Calculation: Eastern European Economics, Summer 1963, Vol.1, No.4, pages 16-28.

128. Usik, M.: "A System of Basic Indices Showing the effectiveness of Capital Investment" in Problems of Economics (Translated Journal), Oct., 1958, Vol.I, No.8, pages 67-71.

129. Vainshtein, B.: "The Theory of Effectiveness of Social Production" in Problems of Economics (Iasp), March, 1971, Vol.XIII, No.11, pages 3-22.

130. Vainshtein, V.: "On Methods of Determining the Economic Effectiveness of Capital Investment" in Problems of Economics, A Journal of Translation, Vol.15, No.3, (July, 1972), page 12.

131. Vilanskii, M.: "Determining the Efficiency of Territorial Distribution of Production" in Problems of Economics, (Translated Journal), Sept., 1967, pages 13-15.

132. Yefimov, A. and Krasovskii, V.: "On planned Indices of Economic Effectiveness of Capital Investments" in the National Economy of the USSR" in Problems of Economics, Vol.2 (1959-60), Jan., 1960, pages 10-17.

133. Zauberman, A.: "New Soviet Books on Planning", Soviet Studies (2) 1961-62, Vol.XIII, pages 154-60.

134. Zauberman, A.: "Present State of Planometrics", Soviet Studies (1), 1962-63, Vol.XIV, pages 62-75.