CONCEPTS AND TOOLS FOR STRATEGIC REGIONAL–COMPANY POLICY:

METHODOLOGICAL FRAMEWORK

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ABSTRACT

This paper presents the first methodological results obtained during research on "concepts and tools for strategic regional policy". The basic ideas developed include an integrated regional–company economy approach, modeling of long-range competitiveness and technological impacts, strategic focusing on a sustainable economic–social-ecological balance, and a broader application of computerized analytical tools for strategic policy goals. The Strategic Regional–Company Policy is analyzed using four basic levels of methodological knowledge: philosophical, conceptual framework, tool models, and case study examples.

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INTRODUCTION

There are two urgent, universal socioeconomic problems that are very directly-connected with regional analysis. The first is the problem of economic growth irregularity, which manifests itself in the uneveness of regional development rates. Fundamental strategic changes are clearly occuring in the world economy and therefore in national, regional, and company economies too. Moreover, these changes often have different dynamics, which make it difficult to perceive their interrelationships.

Although in the 1950s to 1970s technological progress, the development of labor division and cooperation, and the use of rational policies contributed to a more even distribution of resources, industries, infrastructure, and population among regional systems, some essential disproportions still exist and have been simply enforced. As a result the actual regional picture is a very contradictory one. The regional differences in per capita income and output per worker (that is, level indicators) have diminished. But at the same time, the differences in pace of technological innovations and average annual rates of economic growth (that is, the dynamic indicators) have become more evident and important. The dynamic aspect of regional uneveness can be considered as of major importance in the long-term perspective.

An example is the problem of decreasing economic growth rates in the older industrial regions of northern USA, connected with the relocation of capital and industries to southern regions of the country (Harrison, 1982). The USSR faces the complicated problem of how to increase the rate of development of new territories in Siberia and at the same time accelerate the reorganization of economies in regions with an obsolete economic structure, such as the Urals and the Donbas.

The second acute universal problem comprises the conflict between economic and social–ecological aspects of national and, to a larger extent, regional development. This problem is manifest more in social regional uneveness than in

the economic. In many developed countries the maximum regional per capita income exceeds the minimum by 1.5 to 3 and more. There are great regional differences with many negative aspects: unemployment, migration of labor, low level of social infrastructure development, natural environment degradation. Attempts to solve this problem on the basis of increasing rates of economic growth lead, in many cases, to increasing unemployment and pollution. The reorganization of a regional economy usually proceeds very painfully and oversensitively. It requires a skillful adaptation of national and regional policy to new technological and economic trends.

As a result of the common impact of these universal problems, numerous "problem areas" have arisen and enforced socioeconomic tensions at national, regional, and local levels. The necessary development of such problem areas increases the essential demands on the national economy, because regional policy is now recognized as an organic part of regulated state activity. There are numerous state–region problems and organizations that are assigned the task of solving the problems of regional development. But these problems are reproduced again and again, with the scale and complexity often increasing. The nature of regional disproportion problems is also changing, mainly because of new technological development.

The interdependence of regional disproportions of national and (in some cases) international policies is becoming more clear. For example, the close connection between economic stagnation of northern USA with increased business activity in southern regions is well known. We can see also the interdependence of development of old and new regions in the USSR. In practice we deal here with the special kind of regional competition for the resources of national funds. Such competition manifests itself in the requirements of resource redistribution among regions with different growth rates.

The other special features of regional problems are their long-range nature and the impossibility of solving such problems within the framework of routine planning procedures and market economy conjunctures. The strategic horizon of policy directed to solving these problems is clear. Some global and national socioeconomic tendencies have negative impacts on regional systems, which are reinforced by inadequate policies, thus making great demands on management methodology: how to we cope with the increasing dynamics and instability of economic growth, and how do we overcome the negative impacts of unstable economics on social and ecological systems?

To answer these questions it is very important to acknowledge that the decline of regional economy appears as a decline in companies' economies and leads to the growth of the average age of production funds, deceleration of technological innovation, and, finally, to decreasing efficiency, diminishing competitiveness, and a reduction of the market share and employment. And, on the other hand, companies' prosperity always supports the regional economy and leads to successful solution of its socioeconomical problems. What do we know about the basic patterns of regional–company interactions?

Traditionally, company strategic policy in regional terms is very contradictory. It is known that corporate cost control has led in many countries, primarily to the relocation of companies to areas of low-wage labor. The corporate quality-control in its turn allows plants with considerable R & D capacity to locate in areas that are preferred by qualified workers. At the same time, in many cases, large urban regions in western countries have no prospects with respect to job growth (Harrison, 1982). There is a real tendency for high technology industrial companies to locate in areas with highly intensive R & D activities (Kochetkov, 1977). There are also many spatial strategies for intermediate companies

(Hekman, 1980; Malecki, 1980).

As a first general conclusion, we could define the following regional– company parameters:

- Regional labor markets affect all of companies' basic strategies: technological, growth, diversification, and others.
- The regional infrastructure capacity influences rates of capital investment, plant modernization, production relocation, and consolidation of the company's economy.
- The regional spatial–functional cooperation of companies supports intensification of R & D, increasing corporate technological capability and agglomeration.
- The regional ecological system determines the permissible pollution level and adequate criteria and standards for functioning plants and factories.

It is characteristic that structural adaptation of regional and company economies in the 1980–1990s will undergo spatial regularities which are unlike many features of the traditional mechanisms. New aspects of adaptation consist of increasing difficulties in balancing economic growth, resulting for many countries in a period of instability and rehabilitation, often appearing as the phenomena of also stabilization. In this state economic stabilization exists, but if competitiveness increases, it inevitably disturbs the functioning of regional and company economies. It forces us to pay special attention to the regional differences in the levels of technological reserves. The main problem here is the dynamics of a spatial division of labor (Storper and Walker, 1984). This means that regions inevitably acquire distinctive specialization, regularity that becomes apparent through corporate functional activity, and hence we can talk of regional–company specialization (Malecki, 1984).

At the same time these regularities cannot often reliably orient the strategic policy of particular companies, because such policy depends on many changeable factors and situations. It often occurs that companies located in regions with growth potential cannot be sure of reliable prospects because of the possible technological impacts and structural changes in the world economy. Traditional spatial regularities are also changed under the influence of new interregional networks of telecommunications and computers – new ways of spatial–sectoral and company integration based on information technology. Taking all this together shows the urgent need to build advanced, applied analytical methodologies that will account for the key factors and serve different users when determining policy for their special situations and dynamics.

To reach these objectives it is necessary to achieve the methodological novelty of a policy approach that integrates approaches from regional sciences and policy experience on the one hand and strategic management science and experience on the other. This kind of integration draws together a number of systems analytical procedures:

- Theories of regional development, especially devoted to the problems of structural change and the analysis of regional and company resource capabilities (Hoover, 1975; Andersson, 1981; Bandman, 1981).
- The theory of strategic management, especially that concerned with problems of organizational (company) response to environmental change (Ansoff, 1982; Porter, 1980; Albert, 1980; Rhenman, 1973; King and Cleland, 19178)).

- The ideas of B.H. Liddell Hart, which show the critical role of indirect strategies (Hart, 1984).
- Methods of long-term forecasting as an integral part of the strategic policy approach (Godet, 1982; Naylor, 1983).
- Comprehensive approaches that require the close interlinking of development and management strategies (Peters and Waterman, 1982).
- Policy experience, accumulated at the regional and company level in Europe, Japan, the USA, and the USSR (Aganbegjan, 1979; Kelly, 1979; Clark, 1983; Printice, 1984; Porter, 1983).
- IIASA regional and company case studies, carried out in the 1970s and the 1980s (Knop, 1974, 1976, 1977; Straszak, 1981).
- Decision-support systems, with particular application to regional–company problems (King, 1983).

Using these procedures together with systems analysis methodology, it could be possible to define the general features of a new problem-solving approach that will allow the design, evaluation, and practice of sound, long-term strategies for both a stable and a flexible development of regions and companies and of their interrelations.

This applied methodology aims to improve the ability of policymakers to manage long-term socioeconomic development reliably and efficiently in a competitive environment. To support the implementation of advanced methodology it would be worthwhile to prepare a special ***Manual*** for policy-makers. Such a ***Manual*** should be practical in approach; it should aim to incorporate the various advanced concepts and analytical tools in the actual procedures of strategic policy-making for regional and corporate business centers, as well as for consulting firms and individual experts.

The component parts of the ***Manual*** should be:

- Short descriptions of different types of problems and strategic policy studies, with the necessary information for application to making strategic choices at both regional and company levels. It would be necessary to give here some conceptual recommendation about the identification of strategic problems and policy guidelines in special situations that may be faced by different regions and companies.
- Characteristics of the analytical tools of advanced strategic policy methodology: computerized calculation programs, assessment procedures (market, technology, investment, infrastructure, employment, pollution), data base direction accompanied by more or less detailed explanatory notes, schedules, figures, and so on.
- A possible component of the ***Manual*** may also be short descriptions of actual case studies, which could illustrate actual strategic choices and implementations.

The potential users of an advanced, strategic policy methodology, both at the regional and company levels, could be:

- More than 2000 large-scale regional authorities, including 330–350 policy-making centers in the developed countries.

- More than 20 000 major business companies, including 10 000–12 000 in developed countries, which determine the basic economic activity on national and regional scales.
- National government agencies engaged in territorial distribution of industries, capital, and infrastructure, as well as in solving social and environmental protection problems.
- International, national, and regional research and business centers aimed at solving regional and company problems.
- Industrial development and investment promotion centers in developing countries.

Some case studies have shown that the potential efficiency of a rational organization of structural change in regional–company economies (RCEs) could increase economic growth rates by 2–4%, increase employment by 1.5–3.5%, and reduce regional disparities in income level by 12–15% and more. Apart from the integrated approach to RCE development, use of computerized calculations could additionally reduce the required investment by a volume of 10–15% (Francis and Pillai, 1973; Knop, 1974, 1976, 1977; Semushkin, 1977; Aganbegjan, 1979).

GENERAL METHODOLOGICAL OUTLINE

It is possible to define the following general outlines for an advanced methodology to solve strategic regional–company problems:

(1) A widespread, comprehensive approach to developing local strategies at the regional and company level should be expressed in terms of the regional–company economy as an integrated system. *The RCE approach* is able to put into operation more balanced strategic choices – to find ways of increasing competitiveness while observing social and environmental protection equilibria. It is possible, of course, that due regard for mutual regional-company interlinking criteria could limit the projected economic growth rate.

(2) The acknowledgment that sound RCE strategic development can be achieved only on the basis of a *rational spatial–sectoral division of labor*, which in turn can be well-grounded by a *study of RCE competitiveness*. Such a division is formed as a generalization of specific product-line competitiveness of actual companies located in a given region.

(3) Modeling interdependent processes between the RCE and the competitive environment as a basis for *structural changes policy* of a strategic nature. Structural change strategies (including technological aspects) could be considered as long-term revitalization programs intended to restore national and international competitiveness of RCEs.

(4) *Interregional analysis of RCE* competitiveness in the national and international framework will increase strategic policy validity and create possibilities for more successful spatial public policy.

(5) Calculation of *strategic action implementation sequences*, on the basis of establishing problem priorities, resources, and time characteristics.

(6) Building the *strategic policy aids system*, based on advanced methods of computerized forecasting of RCE long-term development to give a new early warning system of competitiveness prospects and of the necessity for structural changes.

(7) Special attention to consider and search for reliable, sound strategies of RCE development under possible conditions of economic stagnation or other *unpredictable circumstances*.

The methodological principles given above form the analytical framework of a Strategic Regional–Company Policy (SRCP). The show that it is necessary to adopt existing regional and strategic management methodologies to ensure a comprehensive view of the impacts of competition conditions on strategic behavior, taking into account the probable product capabilities and the future behavior of other competing systems.

It is very important here to stress the positive role of the competitive mechanism, although many studies show the connection between competitiveness and conflict. But if we look deeper we can see that in these cases the real reasons for increasing conflict lies in political factors or in the impact of an incorrect policy. Thus, we can aim to develop a positive role for the competitive mechanism in RCE development. Moreover, it is necessary to give competitiveness a new nature based on the planned, spatial division of labor organization, and on the development of interregional and intercompany relationships. Only with this approach is it possible to answer the most difficult question: how to find reliable, sound strategies for each RCE under intercompany, interregional, and international competitive pressures. The main tool that can help to answer this question is modeling of the competitive situation.

In accordance with advanced methodology requirements, a region should not be considered in the routine sense, but as a multiproduct line company and/or a set of companies whose strategic behavior depends on the interactions of internal (economic structure, social–ecological balance) and external (competition environment) factors. Such an approach results because changes in the economy occur, to a large extent, at the regional level, not only because of centralized, top-level policy directions, but also because of the business initiative as well-managed companies.

These patterns, until recently, only occurred in the market economy countries, but during the 1970s and 1980s it became apparent that the East state-owned companies increased their economic independence and considerably broadened their sphere of strategic policy (Aganbegjan, 1979, Kochetkov, 1982). Such modern tendencies confirm the possibility, and necessity, of considering RCE as a new objective, in total or in multicomponents, of strategic policy related to both private and state-owned companies in the West and state-owned companies in the East. To make this task more practical and to use the methodology for comparative analysis, it is necessary to study how to define and calculate competitiveness for West and East companies.

Apart from that, there is a strong constraint on modeling conditions of competitiveness at a regional level. The strategic long-range nature of policies directed to solving universal problems of economic instability and economic-social–ecological conflicts at the regional–company level determines that only a limited number of companies can be considered as strategic units. It is not possible and it is not worthwhile to account for the complete spectrum of regional problems and regional organizations. Strategically focused policy mainly aims to find basic alternatives of sound and sustainable development of regional–company economies, balanced by a limited range of key social and environmental protection parameters.

SRCP is designed to provide policymakers with tools and data for addressing a variety of general issues:

- What are the structural, long-term environmental changes (constraints) and competitive requirements that essentially influence the strategic behavior of regional–company systems?
- What are the key characteristics of regional–company systems that are closely connected with environmental changes?
- What models are available of relationships (interaction processes) between environment and regional–company systems? How can such systems increase their strategic capability for flexible and well-timed responses to a shifting competitive environment?
- What determines the success and failure of SRCP? What does this say about international managerial expertise?

These general issues, in turn, need to be considered in more detail in the light of practical questions:

- What long-term product line specialization is most effective for a given RCE, taking into account its natural, production, human, and other resources (which determine its strategic advantages and competitive positions)?*
- Which markets (market segments), and where, are suitable for a given RCE under certain structural conditions and competitive environments?
- What time trend of structural changes is acceptable, taking into account the balance between short-, medium-, and long-term objectives?
- What performance of RCE could characterize it as the most sound and well-balanced (among the RCEs)?
- What specific social and environmental characteristics and consequences associated with given strategic, structural, and market changes are normal?
- What is needed (for example in relation to state support of new high-technology ventures) to maintain and develop production in the declining regional–company segments?

The research needed to answer these questions should originate from a deeper understanding of the patterns in regional–company system behavior and should aim at resolving the difficult problem of how to connect explanatory theory with organizational design and computerized analytical techniques. There are two key components of investigation of regional–company systems' strategic behavior:

(1) Exploration of the existing and potential capability, and of the competitive situation.

(2) An evaluation of strategic choice.

This means that the advanced methodology for SRCP should be directed at analyzing and designing the competitive capabilities of the regional–company system. Competitive capability as a key notion of SRCP could be described by the following features:

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* It is important to develop the concept of wide product strategies, embracing the notion "product" in different kinds of business. This means that special product lines that are inherent in regions, R & D, manpower investment, and infrastructure activities, as well as in pollution, are considered.

(1) Strategic behavior, objectives, and constraints.

(2) Characteristics of regional economic structure.

(3) Reliability, adaptability, and productivity characteristics.

(4) Characteristics of the market competition.

In order to capture the impact of the competitive environment on the regional–company system is is necessary to build a methodology that closely links the regional–company internal structure with the interregional trade-flow structure. The actual purpose of strategic analysis here is not only to account for the competition conditions, but also to use given knowledge to develop the capacity of the companies to restore (independently or in cooperation with state agencies/other regions/other companies) their competitive efficiency through product, technology, market, and organization strategies during all stages of the long-term perspective. One of the key characteristics of the competitive environment that has a decisive impact on strategic choice is the level of competition intensity. There is a sharp distinction between high- and low-intensity competition because these types of competition environment directly determine the necessary scale of structural changes in the regional–company economy. Correspondingly, one of the main thrusts of SRCP research is to create a methodology that will diminish the intensity of interregional conflicts on the basis of the determination of preferable economic structures for each region.

It is rewarding to study SRCP at four basic levels of methodological knowledge: philosophical, conceptual models, tool models, and case studies (see Figure 1). This procedure can contribute to translating a promising methodological system into a practical problem-solving approach.

BASIC PHILOSOPHY

The basic hypothesis of a IIASA approach is that a successful SRCP depends to a significant extent on the key characteristics of the relationships (interaction processes) between the environment and organizations (business and social strategic units) in the regions concerned. The nature of the interaction process requires us to explore and model it, not at the level of a separate region or company, but at a higher level that embraces both the regional–company systems and the external environment in which they function.

To give such a hypothesis a more constructive character, it is worthwhile to support it with some basic philosophical principles, that could be considered as axioms:

- The dual consideration of SRCP:
  (1) As a joint subsystem of strategic national and international management.
  (2) As relatively separate information systems.
- The need for correspondence between the complexity or diversity of the subject of SRCP, in other words between the system itself and models of the system, between the concrete goals of policy and the methods chosen to achieve them, etc.
- The realization that incomplete formal descriptions may be supplemented by using expert examinations and policymaker's decisions.

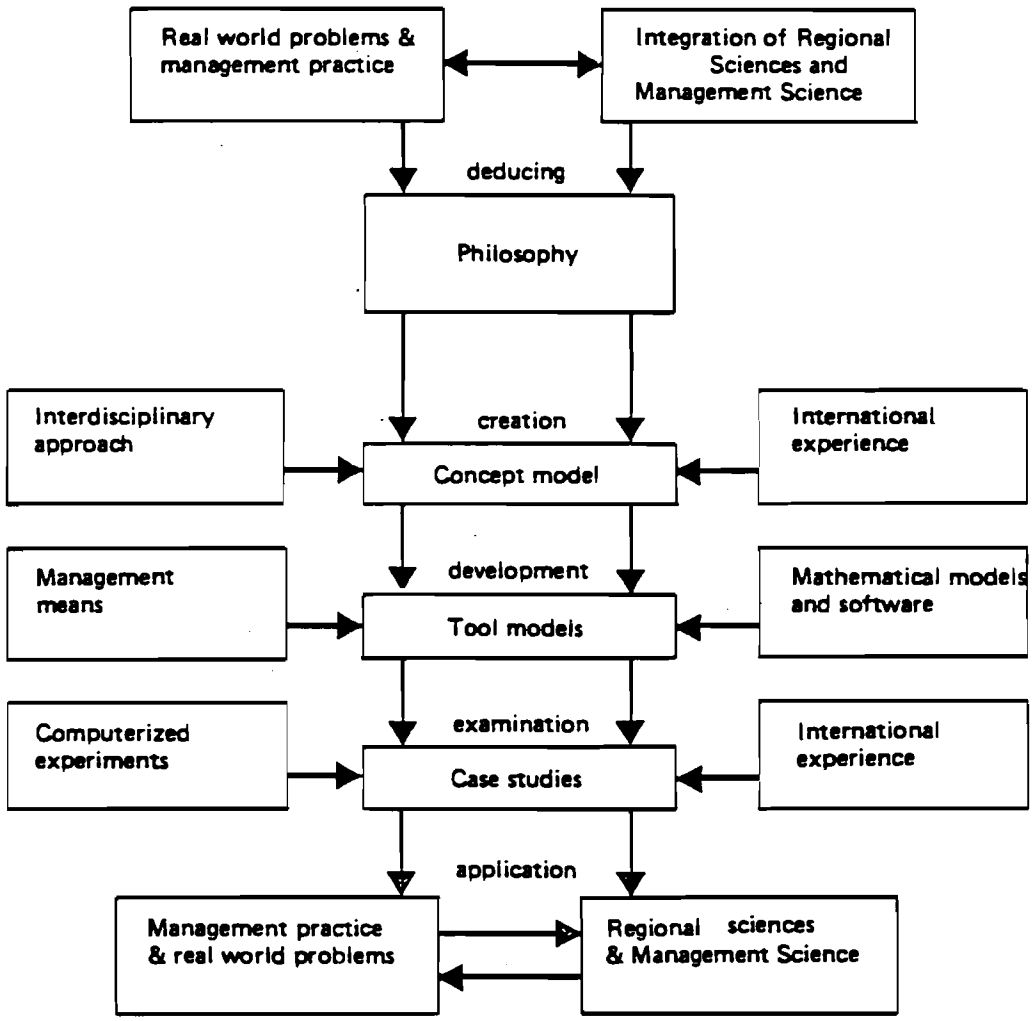


FIGURE 1. Application of systems analysis Methodology to the solution of regional–company problems.

- The consideration of apparent conflicts as the driving forces behind socioeconomic development of regional–company systems.
- The multistructural nature of regional–company systems, and the need to humanize the development of production, organization, social, and ecological structures that they encompass.
- The genetic program approach: building strategies as evolutionary steps for the long-term goals of the company, within the framework of regional, national, and international environmental constraints.
- The learning approach: achievement of strategic flexibility of regional-company system behavior through learning actions directed toward an increasing strategic management capability.

The dual approach to SRCP is largely manifested in efforts to include and rationalize, as far as possible, all of the significant external economic relationships of the systems. Such relationships link each of the companies and their regional sets with external centers of policymaking, and also with other companies and regional systems. Examination of these external relationships is needed to determine the necessary development of conjugated business, social, and ecological sectors; to evaluate external constraints on the dynamics and scale of structural changes; and to calculate the correct efficiency of their realization in the framework of regional systems. It is important, also, to consider the differences between economic, on the one hand, and social–ecological components of regional systems, on the other hand (in other words between business companies and their regional environment). There are no implicit constraints in the development of spatial economic relationships. At the same time, the principle property of social–ecological segments of regional systems, i.e. their natural and functional integrity, is explained by their largely local nature. At the current level of habitat organization this kind of integrity can only be achieved over a relatively limited area. But, though this spatial area keeps expanding as the structure develops, the local features of social–ecological subsystems remain intact for a long time. Their localized (space-limited) nature (as usual in the framework of regional settlement systems) makes it inevitable that social–ecological management be performed mainly locally. This presupposes a leading role for the regional–local level of management in tackling social and natural environmental problems, and that the appropriate functions, powers, and resources be vested with the regional–local authorities.

According to the second and third basic axioms outlined above, the policymaking process will inevitably be complicated, taking into consideration a set of spatial and sectoral (internal and external) feedbacks, as well as the time intervals between strategic actions and their effects. And, of course, some qualitative techniques will be needed to evaluate exogenous parameters in the formal model, to create the right conditions for involving policymakers and experts in the decision-making process, and to interpret the results of the quantitative calculations. At the same time, because of an inevitably incomplete description of the regional–company system it is necessary to combine formal and informal analytical methods.

This means also that the initial basic calculation of strategic choice should be considered only as a path that is close to the ideal; one that approaches reality requires regular revision of objectives and means priorities, and proper correction of strategic, tactical, and operational actions. One could say that the main methodological aim is not to build a system that can find the future structural change parameters, but to build a systemthat is able to conduct regular analysis of changing, competitive environmental impacts.

The nature of regional–company development is also closely connected with other basic tenets of systems analysis methodology, which presuppose that it is always necessary to analyze the various conflicts that arise during the process of policymaking and implementation. This means that it is necessary to consciously build a conflict–behavior basis for the qualitative strategic analysis models, because only this approach can ensure that the models are realistic. As shown in Figure 2 the basic conflict comprises the general inadequacy of management systems in the face of the requirements of dynamically developing production forces. This reflects the well-known idea that socioeconomic conflicts cannot be overcome automatically. At the same time, in practice there are serious difficulties in correctly explaining and soundly managing structural changes in regions and companies. Available information on the future directions of RCE development is often inconsistent or inadequate. This frequently results in the underestimation of future problems or critical competitive factors, unreliability of forecasts, and undue concentration on current issues (as a way to reduce the uncertainty). The predominantly narrow, and monodisciplinary, approach frequently encountered cannot account for the real diversity and interdependence of strategic objectives and tools.

The inability of decision-making centers to cope with information flows results in the development of undesirable and unpredicted latent processes within RCE development. At the regional level, the limitation of available power causes a considerable wastage of time in making and implementing strategic decisions. An approximate set of requirements derived from analysis of management insufficiencies is shown in Figure 3. In addition, there is frequently organizational resistance (and low flexibility) when it comes to redirecting strategies in response to environmental change. Improvements in SRCP should be directed toward the identification and analysis of different contradictions, which would allow:

(1) A deeper understanding of the external and internal relationships of RCE.

(2) The possibility of accounting for the more fundamental conflicts (for instance, between economic and socioecological subsystems) and to analyze other conflicts to do with incorrect policy (for example, between the diversity of RCE problems and the relatively formal models used).

It is especially important to emphasize the close links between the various axioms of the conflicting and polystructured nature of regional–company systems (Danilov-Danilyan and Zavelsky, 1975). This presupposes strategic policy actions that recognize the need for balance between economic, social, ecological, and organizational structures, taking into account their various features and dynamic aspects. Compatibility between these main aspects of strategic choice may well be only a temporary phenomenon. To achieve such compatibility, as well as a dynamic character, it is necessary to ensure that the SRCP exhibits a high level of reliability and adaptability. Some deviations from ideal behavior are, of course, inevitable in all actual situations, and successful management really involves the ability to keep such deviations within certain bounds, on the basis of delaying techniques or other compensatory mechanisms. In this connection it is quite useful to introduce the notion of a "preferred structure" for RCE. From this point of view, SRCP actions should provide the minimum amount of deviation from the parameters that define such a preferred structure, whilst maintaining the dynamic proportions between production, social, ecological, and organizational requirements. The main difficulty here is to achieve compatibility between the individual interests of the different business units that form the organizational (company) structure of

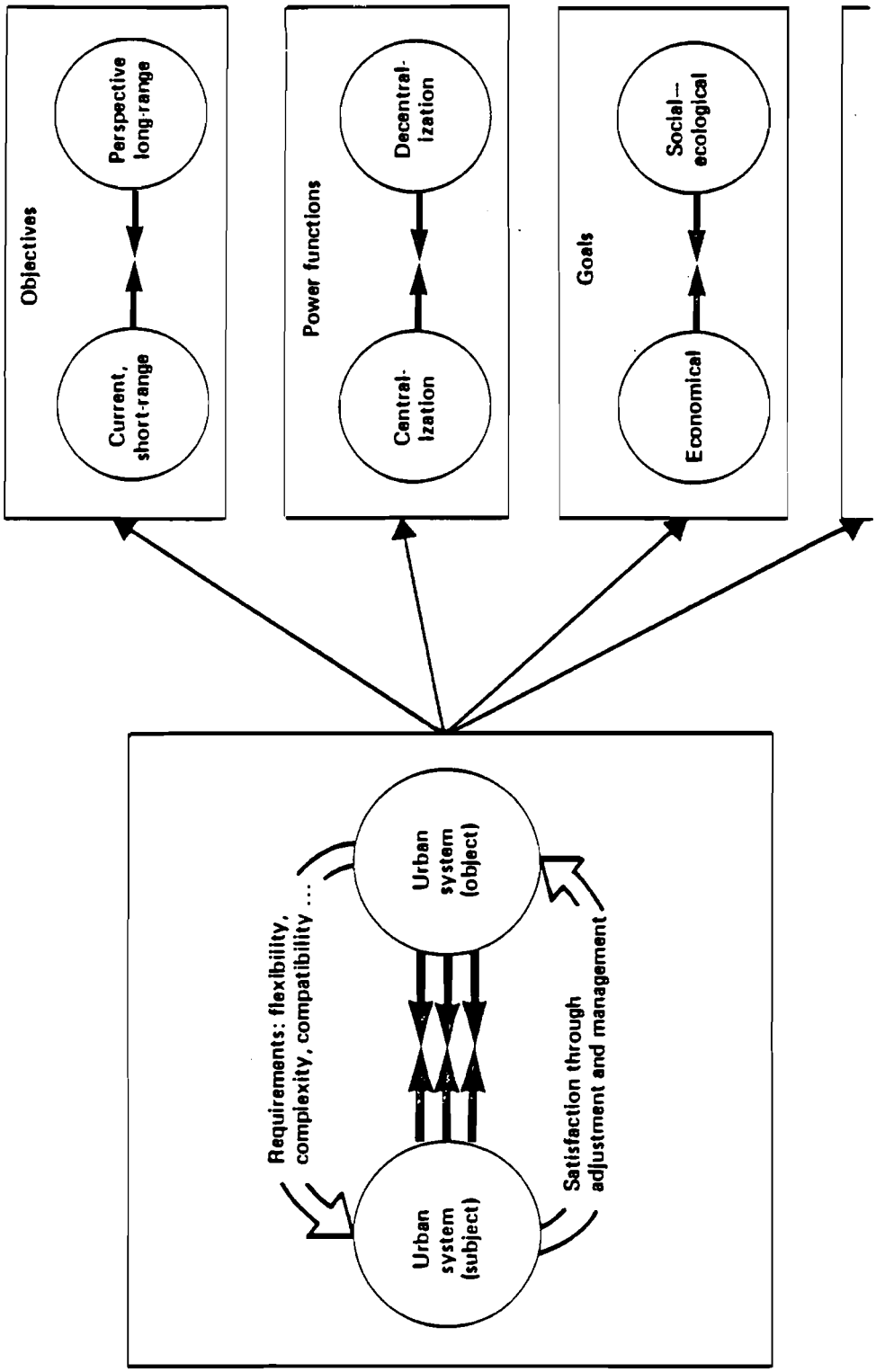


FIGURE 2. Systems analysis of basic and derived conflicts.

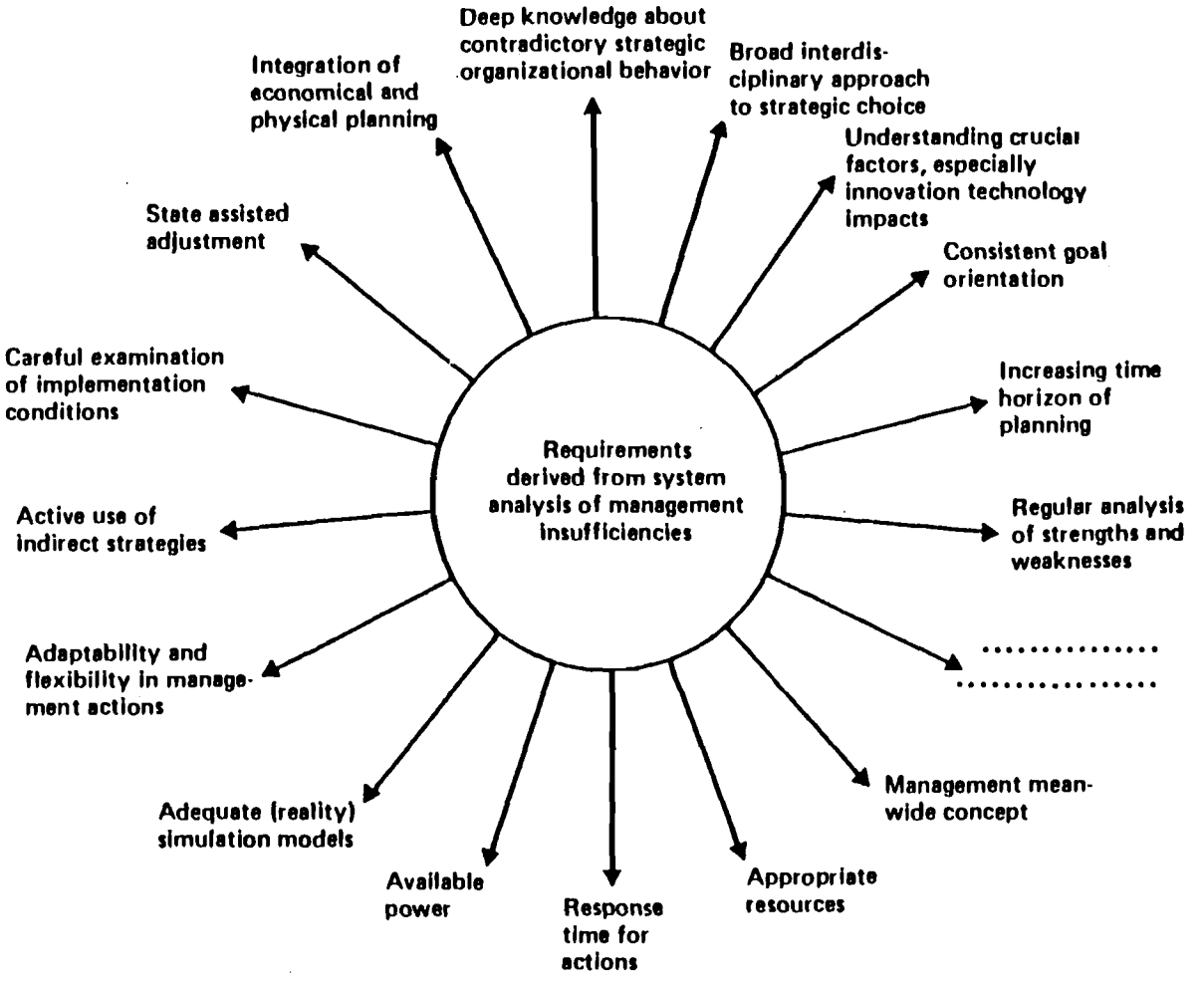


FIGURE 3. Systems analysis of basic management requirements.

Hence, it follows first that regional–company systems could be studied as spatially localized, complex, large-scale organizations that are associated with a certain characteristics strategic behavior, aimed at the achievement of broad economic, social, ecological, and organizational objectives. This explanation determines the wide corresponding concept of the effectivenness of RCE strategic alternatives.

At the same time, the need to achieve long-term stability in the preferred structure for RCE development (to avoid marked deviations and make it possible to return to the preferred position) illustrate the increasingly important role of long-term strategic planning.

The application (as basic axioms) of a genetic program and learning approach should have a significant effect on the successful resolution of any conflicts arising from RCE development.

The basic requirements of the genetic program approach in consideration of SRCP alternatives are:

- Evolutionary gradual changes, implemented in the interaction process between system and environment; this is the impact of intermediate results on the strategic behavior of RCE.
- Possibilities of realization that are, to a certain degree, dependent on plural conditions, both internal and external. Therefore, strategic results are always a modification of plans and wishes related to RCE.
- A system whose parameters become stable as the RCE evolves toward the achievement of its purpose.
- A system whose subsystems have various dynamics of change. Therefore it is necessary to integrate subsystems behavior to achieve RCE stable growth.
- A system to create long-range growth impulses for RCE.

Thus, the genetic program approach explicitly warns against too simplified a design for an RCE. It is especially important to emphasize one of the consequences of the genetic program approach, namely that there is no single, correct basis for the *a priori* formulation of the criteria system for testing the validity of strategic alternatives. Experience of strategic management practice shows the very low probability, *a priori*, of finding a suitable compromise between all the economic, social, and environmental-protection requirements, and the interests of companies. Such a compromise can only emerge in the course of the policymaking process, where it depends heavily on the construction of the complete decision-making algorithm. In its turn, the learning approach, based on fixing monitoring and control subsystems within strategic policy systems, is oriented toward increasing the capability and adaptability of management.

CONCEPT MODEL

The general scheme of the conceptual model for SRCP may be described by the following principles:

- Accounting for the determinant role of technological factors in raising regional–company economic competitiveness.
- Making international, national, regional, and company strategic policies consistent with one another on the basis of the spatial division of labor.

- Achieving long-term economic, social, and ecological balance in the framework of regional–company systems.
- Achieving strategic, tactical, and operational balance.
- Adapting promptly to changing strategic priorities of objectives and means.
- Integrating informative, economic, social organizational, and legal strategic management mechanisms.
- Combining direct and indirect strategies.
- Integrating strategic policymaking and implementation.
- Designing cooperative systems strategically.

These conceptual principles taken together describe the normative behavior of regional–company systems, and should create the conditions for achieving competitive advantages for a given system in accordance with the available resources and policy capability.

According to these principles the key problem for SRCP is to establish the correct interaction between economic investment-production- product-market and technological changes, taking into account as much as possible of the range of social and ecological consequences of this interdependence. The main difficulty here is the conflicting nature of technological innovations, such that no single pattern of structural change exists (Nijkamp, 1983). The routine measures are here directed to alleviating developing threats (unemployment, pollution). But, in practice, this method has more failures than successes.

It is important to note that the role of technological factors in the economic growth mechanism is not understood to the necessary degree. In many cases regional recession is accompanied by technological stagnation and a priority is given to financial strategies. This means that the accelerated role of technological innovation often occurs only in theory. A more comprehensive strategic approach focuses on the problem of raising the effectiveness of technological development as a resource and controlling variable with practically unlimited possibilities. And the sound RCE alternatives include, of course, measures for achieving more balance in the social and ecological aspect of technological and economic changes. This means that the real problem is devolved to the correct application of strategic tools to the technological progress. This is at present, probably, the real mission of SRCP and we intend to develop some advanced methodological instruments for long-range technological impact analysis, with active utilization in decision making and decision implementation.

Taking into account the dominant role of technological factors in increasing RCE competitiveness, the following directions for analyzing and modeling technological choice in the process of SRCP may be formulated:

- Consideration of R & D strategies and technological capability as an endogenous factor and a starting point for accelerating economic growth, and increasing productivity and competitiveness.
- Modeling technological development on the basis of an information set, which characterizes each technology - technical, economic, social, ecological, temporal, and others.
- Modeling technological development by taking into account export orientation of the RCE basic industrial sectors; this examines the aim to produce in these sectors low-price, high-quality products with advanced technology.

- Modeling technological choice as a factor in the stabilization of RCE long-term development by balancing low-risk and high-risk projects. This means an approach to technological development modeling as a multicomponent process.
- Modeling technological choice as an alternative means to balance the social and ecological aspects of RCE development.
- Modeling technological choice both in entering the market with a new product, which insures technological advantages, and in improving the production processes of existing products, resulting in reduced cost and improved quality.
- Taking into account prospective changes in market prices from the consumer's point of view, projected changes in demands, production and organizational structure of companies (especially in relation of diversification), and other anticipated changes in RCE development.
- Modeling technological strategies taking into consideration their life cycles and the possibility of coinciding with economic activity dynamics; this means modeling technological development of RCEs as a dynamic multiphase process with substitution of one technology by another.
- Modeling the appropriate speed of diffusion and adoption of technological innovations among RCEs, taking into account differences in regional conditions (social, economic, and cultural); firm's scale; R & D level; fixed available resource potential; as well as the impact of competition level within RCEs.
- Modeling technological developments in RCEs that are of different scale according to the duration of the strategic horizon (short, middle, or long term).
- Modeling technological impact on employment in RCEs, in the context of economic growth rates and restructuring intersectoral processes.
- Increasing the role of internal and external company cooperation in developing RCE technological capability.

In developing structural change alternatives it is necessary to account for the pulsating nature of technological changes, according to which periods of quantitative changes of evolutionary accumulation transmits into periods of qualitative revolutionary leaps. There are three basic phases of technological progress (Yakovecs, 1984).

First, the more common choice to change the product/process models within the same technology generation. Second, the model choice can be made through replacement of the technological generation, while remaining within the existing technical level of the economy. Third, the choice, of product/process models could be linked to the appearance of fundamental new technologies, which qualitatively determine the transition of runs of other model generations. Each of these technological trends adds its particular contribution to the structural changes of the regional–company economy. Practically, for phases other than fundamental technological revolution, it is more efficient to focus resources in the regional–company level first on the modernization of existing product/process models. On the other hand, during a technological revolution there is the prospect of resolutely refusing routine choices and making structural changes based on transmission to the more promising technological models.

Of course, the real choice depends on many situational factors: RCE scale, internalization level, resources availability, management capability, etc., but it is worthwhile to keep the solution set within the framework of the main choices

described above. Many researchers connect modern technological revolution with such discoveries as computers, microprocessors, genetic engineering, biotechnology, etc. These discoveries essentially influence the structural changes by way of production robotization, flexible and unwasted technologies, the creation of new materials, and new kinds of technical links. The other side of the pulsating nature of technological development is connected with the uneven dynamics of aging processes in the basic industries of RCEs. As a result there are obsolete manufacturing plants and factories eroding the REC competitive edge. Because of this it is worthwhile to include in analytical models of SRCP indicators of the average age of the RCE industrial plants. In the 1980s efficient RCEs have an average age of manufacturing plant of about 7–8 years. At the same time, RCEs with increasingly obsolescent plants of average age more than 10–12 years (in some cases 15–20 years) have lost their competitive positions. There is a correspondence between indicators of RCE competitiveness and the average age of industrial plants. Therefore increasing RCE competitiveness in the framework of long-term structural-change alternatives presupposes that the corresponding dynamics (diminishing) of average age in the basic industries should be reflected in adequate investments in high technology and modernization of manufacturing plants.

It is very important also to note that there exists a great diversity of competing strategies, which could be adopted by different RCEs (Arthur, 1984). In the 1970s and 1980s exploratory scientific analysis greatly exceeds the possibilities of implementation. In fact, in each RCE only a limited number of potentially efficient technologies have been implemented. Many others (among the remaining) could be just as promising, but do not have some of the initial adaptation advantages. Thus, it is not necessary to follow advanced competitors and adopt the same technologies. If an RCE has a sufficiently high technology-adaptation capability, it could adopt a competing technology that is not yet implemented. By technology adaptation capability of an RCE we understand here the combination of a company's R & D capacity, investment potential, management capability, and the region's infrastructure and labor market capacity.

For modeling RCE competitiveness it is important, therefore, that each RCE has the choice to be an imitator or adopter of new technologies. The latter requires developing a technology adaptation capability. And the additional difficulty here is to predict in advance and reliably the potential share of the market taken by each competing technology.

The second conceptual principle deals with how to integrate objectives and resources, taking into account the multilevel nature of the SRCP and regularities of the sectoral–spatial division of labor in the real world. Policy improvements arising from the integration of policy levels are:

- Building a coherent methodology for SRCP as an interaction mechanism between the main levels of policymaking (to counteract the simple reflection of external conditions). This requires a careful analysis of the external relationships of regional–company systems, taking into account the efficiency of division of labor and the changing environment.
- A broad consensus seems to be emerging at all levels of policymaking that there is the need for rigorous measures to restore RCE productivity and competitiveness on the basis bridging the widening technological gap that exists between different RCEs, especially in key high-technology fields.
- Modeling RCEs as a structural, specialized part of national and international economies and, at the same time, as a relatively whole system.

It is important that the sharpness of RCE competitiveness and the intensity of conflicts be diminished on the basis of the rational spatial division of labor at national and international levels. The broad framework of SRCP covers the complete national network of RCEs (and in some cases the network of RCEs of neighboring countries) and allows study of the strategy's efficiency in internalization of the economics.

The third principle, namely that SRCP must not only aim to receive some competitive advantages, but also try to achieve an economic (production) and social–ecological (environmental protection) balance, requires multi-%disciplinary study and design work on the basic structural proportions of regional–company development. This could be achieved in the following way:

- Accounting for the self-organizing nature of social and environmental processes within the framework of regional systems, as well as existing differences between the interests of different social groups, and social–demographic characteristics.
- Preventing, as far as possible, any negative social and ecological consequences of RCE development (whether instantaneous or cumulative), through the use of long-term forecasts.
- Recognizing the significant role of intuitive predictions and informal expert evaluations of social and ecological balances, such as permissible or acceptable characteristics for employment, migration, earned income levels, etc.
- Taking into account environmental protection effects over a projected time horizon.
- Implementing the most effective environmental protection measures - manufacture of pollutant-free products. At the same time, at present the main problem of RCE development is to minimize the costs of meeting environmental quality standards (Orishimo, 1982).

The main difficulty here for many countries is to preserve existing and create new jobs under the broad implementation of new technologies using computers and microelectronics. Now it becomes clear that job losses in RCEs with old, obsolete industries are inevitable. At the same time, the location of new industries is very selective. In some RCEs jobs may be lost because of the unemployment impact when just one company chain in the framework launches a sequence of dangerous socioeconomical processes, which from the synergism principle reinforces the common negative effect of unemployment, in effect a vicious circle. If such a circle exists, the task of SRCP is to initially define those regional system chains which could collapse. To find such weak points using SRCP implies the application of a strategic diagnosis module.

Perhaps the most difficult aspect of SRCP is to decide what determines the strategic–tactical–operational balance in the process of decision-making and decision implementation. Balance of planning horizons could be provided through the introduction of the so-called rolling plan system. Note that, as the time bounds of urban planning increase, the dependence of their framework on existing economic influences diminishes, because more and more constraints are in some way related to the factors concerned. In the long term, there are inevitable structural changes in economies because of the introduction of new technologies, the exhaustion of natural resources, etc. Hence there will be great differences between models developed for the long-term and those for the medium- and short-term. For example, it is difficult to uses the price market mechanism to choose long-term strategies: no less difficult to forecast are product demands, taking into

account the changeable nature of product lines. Another aspect of balancing planning horizons lies in the two-headed policy: increasing competitiveness in the short- and medium-term is placed mainly within the already existing structure of RCE; in the longer perspective new fields of industrial activity become important.

According to the fifth principle it is necessary to reexamine regularly the priorities of the various objectives and means, so as to increase the adaptability of SRCP. Specific economic and political circumstances, as well as the more pressing problems encountered in the functioning and development of RCEs, determine the real changes in priorities, including management mechanisms. Such priority changes closely correlate with the predominance of different economic factors and long-term investment trends, taking into account scientific–technological predictions and other projected supplies and demand. New priorities should reflect the increasing importance of factors such as information and time deficiency, economic growth stability, and its balancing with socioecological aspects. It is important that the corresponding priorities also predominate in management design. From this point of view it is increasingly the role of long-term planning to include structural change adaptation mechanisms. Therefore, SRCP cannot be shaped at once; it is an uninterrupted and continual process.

The important component part of SRCP that accounts for changes in priorities of objectives and means should be, as declared earlier, some compensation mechanisms. Among them should be considered the idea of forming, at the national level, a special investment section to support RCEs with obsolete structures. Such a fund could stimulate economic activity of companies and help reestablish social and ecological balances.

One of the main approaches to validate the change of priorities of RCE development involves the SRCP life-cycle concept, which allows forecasting of the competitiveness of company's product lines.

One of the most striking outcomes of applying the SRCP principles discussed above is the increasing unity between management mechanisms (Kochetkov, 1982). There are a number of basic types of strategic management mechanisms; information, economic, social, administrative, and legal. Each of these has its own specific characteristics and ways of influencing the controlled system. Just as regional–company systems cannot be treated as a simple aggregate of their constituent elements, so strategic management mechanisms, by their very nature, cannot be isolated processes, external to each other, but must form an integral system. The occasional uncoordinated action of any of these mechanisms, or a lag in the development of any one of them, inevitably leads to distortions in the functioning of the regional–company system as a whole. In practice, the traditional approach simplifies the relationships involved in the overall balance of RCE development and attaches only minor significance to the social criteria of decision making. But the focus of SRCP nowadays is shifting toward the whole socioeconomic mechanism. This involves the use of economic policy tools, reinforced by elements of personality development, cultural; orientation, development of value and normative characteristics, and material and moral encouragement.

The seventh principle stipulates the inclusion of a traditional set of resource strategies (these maybe called direct strategies) and some indirect ones (Hart, 1984). There are two spheres of strategic, indirect actions:

(1) The zone of the human factor.

(2) Possibility of maneuvers.

The main idea in using indirect strategies is to overcome or diminish the resistance associated with implementing new regional–company strategies. Such resistance has a number of well-known causes: inertia of thinking; the use of outdated, traditional means; bureaucratism; a narrow disciplinary approach; etc. To overcome these problems, indirect strategies, including cultural education and training, may be used. The functional goals of indirect strategies are intended to reveal and utilize the strength of regional–company systems, to increase the capability of SRCP in relation to resistance, and to focus means and efforts on the key directions of urban strategic policy. Different types of maneuvers are used in indirect strategies, including investment, time, and organization. In this way objectives can be achieved with relatively limited resources through concentrating them in a certain place and at the appropriate time.

The eighth principle stipulates building implementability into SRCP, oriented mainly to improving the decision-making process (Ansoff, 1982). In accordance with this principle it is necessary to provide a careful preparation of the implementation conditions already present in the policymaking process. It is important that the price market mechanism itself is not able to put into practice structural change strategies. Some weaknesses also characterize the existing direct (budget policy) and indirect (taxation policy) mechanisms of public regulation. Therefore, we can make here two main remarks. First, the main role in this implementation process should belong to the planning system, but as the strategic horizon shortens, so the role of the market mechanism will increase. Second, to overcome the dangerous, unbalanced stage of regional–company development it is possible to use a range of strategic compensatory mechanisms (see the fifth principle), that return the regional system to a balanced state. Of course, the predominant role among such mechanisms belongs to economic structural changes, which establish the new proportions in the nature of the regional–company system.

The successful implementation of strategic actions depends on the establishment of regional consensus among decision-making centers as to the correctness of the strategic policy. The consensus factor directly presupposes the involvement of companies in the processes of strategic decision-making and decision implementation in the region, and practically implies the building of strategic actions in the framework of the integrated regional–company policy.

The eighth principle presupposes the use of special means, including mathematical models and computerized techniques. Among the most important features of the concept of strategic implementability is to account for time lags between capital investments and the resultant effects. It is extremely important to synchronize different time lags when constructing the integrated investment lag for the RCE as a whole.

The ninth principle emphasizes the importance of the SRCP cooperation mechanism, so as to promote the efficient use of resources with increasing demand and investment capability. The effective solution to this problem implies the coordination of activities of companies within regions and among RCEs as a whole, since the extent of their cooperation in the R & D, investment, production, and other processes can have a considerable effect on the timing, quality, and efficiency of the entire policy. Accordingly, new strategic policy techniques, including the program-oriented approach, matrix organizational structures, improved coordination and cooperation through negotiations, an the involvement of contracting mechanisms, must be introduced.

The conceptual principles described above essentially deal with questions of how to achieve regional–company competitive advantages on the basis of

integration of objectives and resources, short- and long-term actions territorial and sectoral aspects, economic and socioecological factors, national, regional, and local decisions, policymaking and implementation, stability and dynamics, etc. The decisive role of the integrated approach in SRCP is determined by the common nature of the basic philosophical strategic axioms and by the close relationships between different levels of policymaking, different time-periods, and different areas of economic, social, and ecological systems, as well as by the internal structure and competitive positions of a given regional and company economy. Note that the integrated approach does not mean the building of an indivisible complex strategy for RCEs.

It is rather the choice of a set of strategies whose interdependences are:

(1) Their time synchronization.
(2) The common objective of strategic actions.
(3) The coordination of resources.
(4) The compatibility of the structural characteristics of the strategies.

Thus, strategic regional–company policy is viewed as a complex system consisting of seven main components: marketing, investment, production, technological, social, ecological, and organizational strategies, within its integrated sectoral–spatial dimensions.

The module approach is extremely useful in integrating the methodological system described (Ansoff, 1982). The main ideas here are: it is possible to subdivide the decision-making and decision-implementation processes into modules which *(a)* are closely connected to each other, and *(b)* could be used separately depending upon the specific conditions of regional and urban development encountered. It is possible to identify ten basic strategic management modules:

(1) General organization for decision making.
(2) Comprehensive multidisciplinary strategic analysis.
(3) Establishing of objectives.
(4) Long-term forecasting.
(5) Strategic planning.
(6) General organization for decision implementation.
(7) Implementation tactics and operational planning.
(8) Feasibility study.
(9) Investment organization.
(10) Strategic monitoring and control (see Figure 4).

The most immediate task for improving SRCP is to develop an applied methodology for each module and for the system as a whole.

TOOL MODELS

Since SRCP is necessarily oriented toward problems some way into the future, specific types of analytical techniques and approaches are required.

The key question regarding SRCP tools is how to integrate the necessary strategic variables. In addition to logic and experience, some quantitative set of

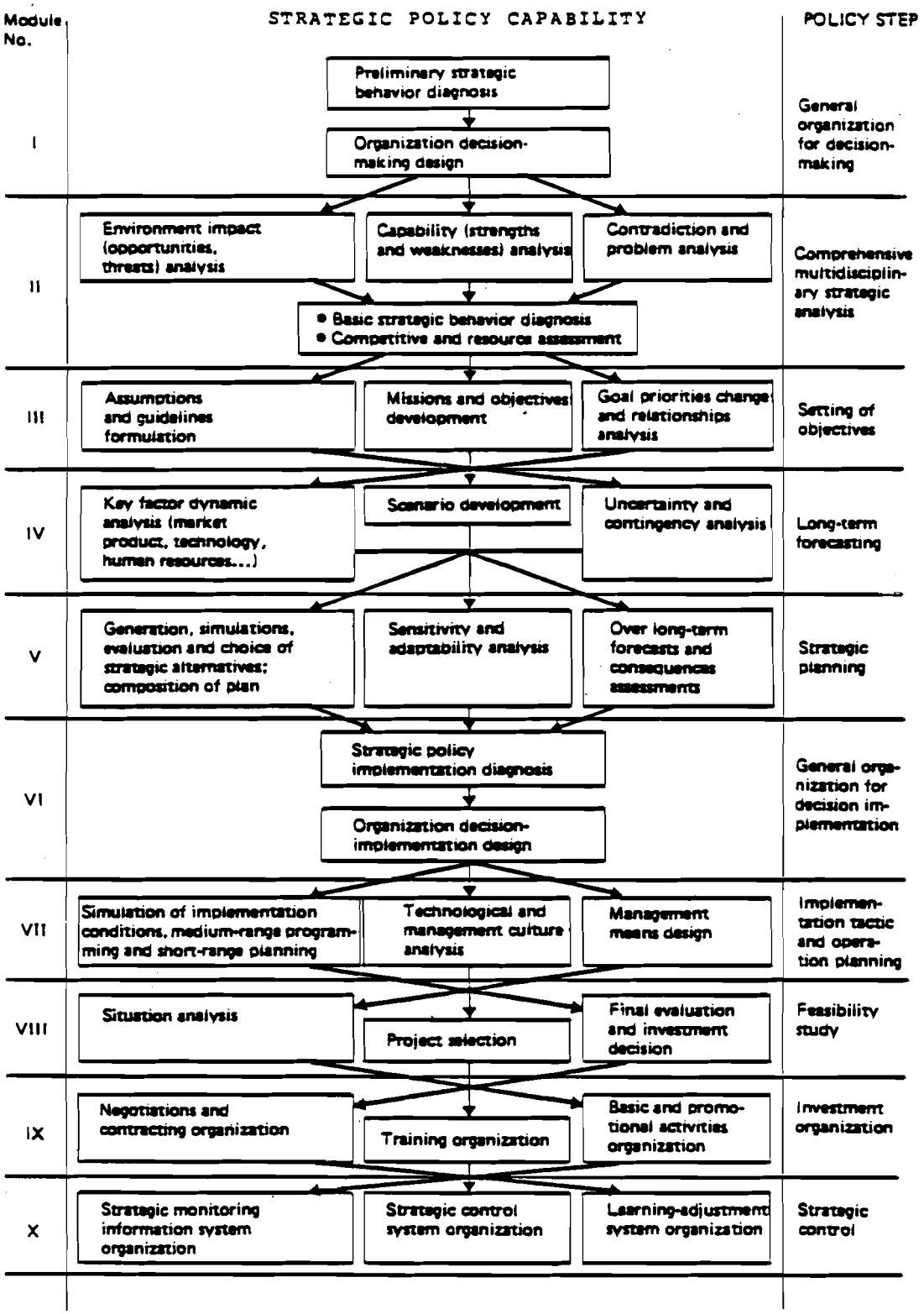


FIGURE 4. The application of systems methodology to strategic basic modules.

trade-offs must be developed, always bearing in mind that quantitative evaluation cannot be precise over the long term and should be used mainly as a guide to the choice of actions. But, of course, only the quantitative modeling approach to integration permits one to identify the appropriate combination of strategic behavioral characteristics for a given system. This underlines the crucial role of computerized tools in analyzing strategic alternatives.

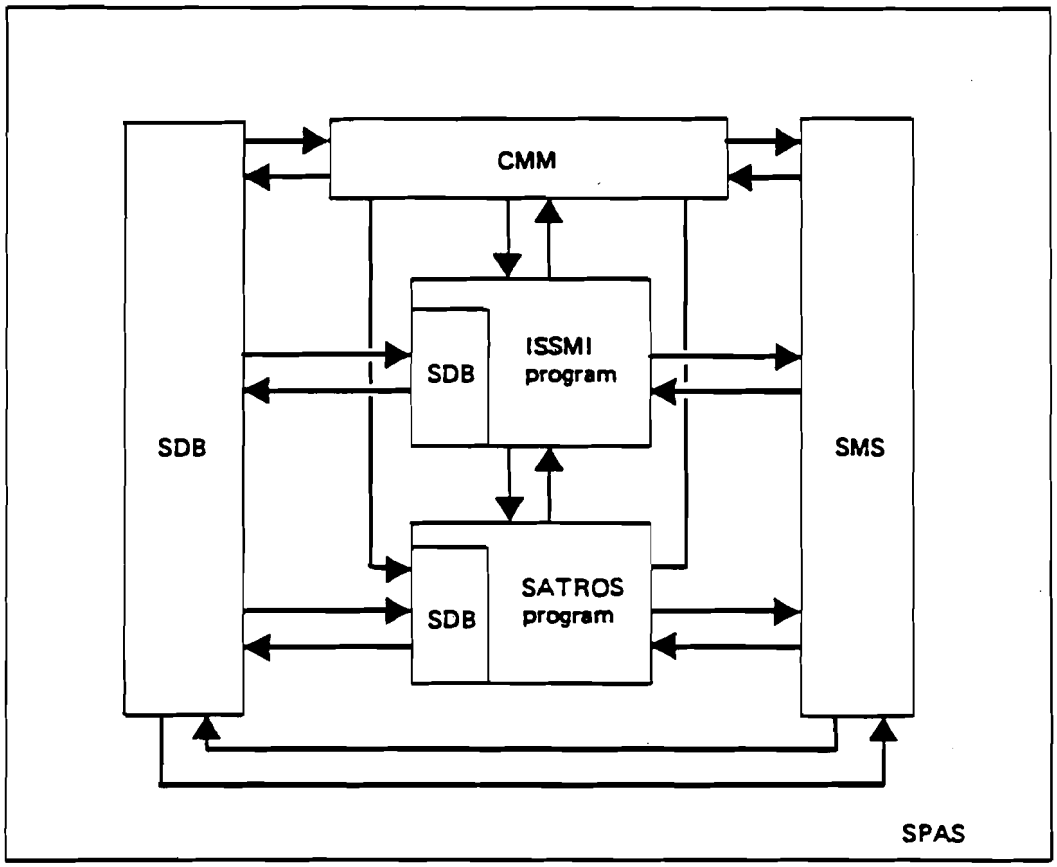
Because of the objective function of SRCP is vectorial in nature, it is necessary to develop to models for the solution of multicriteria problems (Keeney and Raiffa, 1976). These problems often include various informal components that increase the difficulty of designing algorithms for decision making. Systems analysis methodology attempts to overcome these difficulties by developing special methods for nonstandard problem solving, including dialogue systems, descriptive models, stochastic programing methods, etc. By using these tools policymakers can introduce their preferences into the quantitative decision-making process by indicating the desired dimensions of the goal function at every step of the dialogue procedure. Unfortunately, practical results in this area are so far fairly limited. One possible explanation is the difference in working conditions and attitudes between researchers and policymakers. The high level of involvement, as well as the severe time constraints and potential major environmental impacts of policy decisions that characterize the real policymaking process, create significant obstacles to the use of modern, quantitative tools. To overcome these obstacles, systems analysts nowadays strive to improve the operational characteristics of computerized analysis, to ensure close correspondence between theoretical methods and real decision-making technology, and to make the results of the modeling less formal. Considerable attention is paid to improving methods of eliciting and processing informal information, making it easier to correct intermediate results, and proposing possible methods of reaching a compromise between the complexities of the problem and the capabilities of the policymaker. Alternative evaluations based on the same information available to the policy-maker can be a useful check on the reliability of any procedure proposed.

Modern economic science is accumulating experience through the development of many kinds of mathematic models and these models are playing an important role in improving SRCP (Klein, 1969; Crow, 1973; Glickman, 1974; Granberg, 1981; Bandman, 1981). However, many of the computerized models suggested are so complicated as to give only very limited results from the point of view of managers. Most of these models are designed to solve internal problems of RCE development or deal only with interregional problems. The modeling of the interrelationships between RCEs and the environment is in many cases oversimplified, as can be seen from the presence of numerous exogenous and somewhat arbitrary variables. Therefore, it is worth considering the tool models for SRCP as as essential part of the strategic policy aids systems (SPAS), which is being developed by IIASA and can be used for RCE analysis purposes (see Figure 5).

Based on the model approach, SPAS, apart from including a concept model, involves two main programs (covering the decision-making and the implementation stages), a data base, and some subsidiary models. The first program incorporates modules for the decision-making procedures of the ISSMI program.

The other basic program of SPAS is the SATROS, which denotes Strategic Action, Time, Resources, Organization, Succession. This program should involve modules for the policy-implementation process.

The first version of the ISSMI program was developed by IIASA's Regional Issues project in 1984, and has so far given encouraging results. The mechanism of the ISSMI program involves computerized verification of a range of hypotheses about the strategic behavior of a given regional–company system, taking into



SPAS	Strategic Policy Aids system
ISSMI	Integrated Strategies of Structural and Market Improvement program
SATROS	Strategic Actions, Time, Resources, Organizations succession program
CMM	Concept Methodological Model
SMS	Subsidiary Models System
SDB	Strategic Data Base

FIGURE 5. Strategic policy aids systems.

account the corresponding behavior of competitive systems (those producing the same products). The strategic behavior of each regional–company system, in turn, is determined by structural change and has a number of alternative forms.

The ISSMI program operates by using information on the structural–economic strategy alternatives of the regions, which are considered as a single multiproduct company or as a set of companies whose strategic behavior depends on the interrelationships of internal and external factors. This means that the product lines, as a component of the regional–company economic structure, are strategic structural units (SSU).

Similar SSUs are in competition with each other and their strategic parameters are determined by effectiveness characteristics - cost, price, transport charge, profit, investments, stage of life cycle, correspondence with the market sector, and so on. In the ISSMI framework it is possible to determine how the competitive situation changes if one of the RCEs, separately or together with others, could make structural changes and improve its productivity and competitive characteristics on this basis. The ISSMI program also allows one to consider the influence of regional–company protectionist barriers and to define the value of such protectionist policy.

As was expressed earlier, special lines inherent in RCE, R & D, investment, labor force, and nature-protection activities are considered. The inclusion of these activities in strategic choice analysis allows one to extend the possibilities of the ISSMI program and reflects current tendencies in interregional movements of the technology market and the increasing influence of investment flows and infrastructure on economic change. The evaluation of technological, investment, labor force, and ecological capabilities of a region allows policymakers to examine the factors important to a long-run, sustainable economic growth in addition to more immediate values of profitability.

Another piece of required information deals with the present and forecast internal and external market situations and competition. The RCEs capabilities are evaluated through its forecast potential for production and export products, technologies, and investments to other competing regions.

Moreover, the ISSMI staff take into consideration the characteristics of the rest of the world, which is included in the program as an additional region with adequate lines and world product prices.

The ISSMI program is used also to account for the requirements imposed on economic structural changes by social (e.g. employment) and environmental (e.g. pollution) balances. Thus the data base of the ISSMI program is oriented toward the differential approach, which allows one to consider specific features of the actual RCE.

As stressed above, knowledge of supply and demand is not usually sufficient for predicting in advance the share of the market for different products for an RCE. We cannot with accuracy predict competitive advantages of special technologies. Hence, the ISSMI program is intended for regular analysis and reevaluation of strategic objectives and means.

The data base of the ISSMI program (first version) consists of about 60 items, descriptive of the characteristics of production (product) lines, social and environmental constraints, market conditions, strategic policy actions, and strategic results obtained. In future it is planned to introduce a set of standardized forms, to be completed by the participant RCEs; the ISSMI staff will record the information in the computer data bank.

As stated above, to find an instrumental solution to this complicated problem at the present time is only possible through the interaction of the quantitative

(strategic) decision-making process with the qualitative analysis made by policymakers and experts. The ISSMI program is oriented to this by the use of a set of comparatively simple mathematical models which are available to practitioners.

The basic tool of the ISSMI program is a software system which is applied to the analysis of mathematical flow models (FMAs)*. The approach used for the elaboration of the FMA system allows the user to account for both parametric and structural changes, and the dynamic and multicriteria aspects of modeling (Umnov, 1984). The FMA system also includes highly effective input–output data generators, which facilitate its use by new users after relatively minimal instruction.

Another feature of the FMA system, which is very important in practice, is the possibility of using the system for "incomplete" models, i.e. those that do not include all links and constraints which define the behavior of the modeled object. The basic algorithm used in the FMA system is equivalent to the multistep solving of a special case of the Chebyshev approximation problem. In its turn, the latter is reduced to interactive solving of a linear programing problem, subject to changing its statement during the process of solution.

The purpose of the SATROS program is to establish priorities and account for the regular resource–time succession of strategic action-implementation within the framework of existing and future constraints and opportunities. SATROS is intended to implement concord between objectives and investment conditions during the implementation of long-term structural changes. Besides, as a rule, it is necessary to correct project cost characteristics and not infrequently to change some technological, economic, and other parameters of the basic strategic solutions. These tasks are proposed to greatly aid the development of a new strategical and/or tactical operation implementation plan. As a very suitable means of solving this problem we cite the network model for the structural change program. Such a model has three main characteristics: time, resources, and mutual relationships between consistent implementation actions. It is necessary to determine the consistency and time period of implementation that will ensure the observance of major resource and technological constraints, as well as economic, social, and ecological balances.

The use of the network model for strategical and/or tactical choice in the phase of implementation is based on time, cost, volume, and economic characteristics, which should have been determined in the previous phase of SRCP (policymaking). For some major structural changes, additional components are needed to establish objective functions and resource efficiency requirements.

Based on the multiproduct regional–company character of strategic policy the objective function should be determined as integral profitability. There is today no calculated method for solving strategic network tasks with a simultaneous accounting of objectives, resources, and technological and environmental factors. Therefore, it is necessary to utilize the model system, in which each model reflects one suitable aspect only and an integral solution is sought on the basis of agreement procedures.

We already have some experience of computerized calculation with an optimized network model with one resource (Kiselnikov, 1984). But the real utility of such a model is inevitably limited. Hence, it is necessary for SRCP to develop a multiresource optimized network model, which should be incorporated into the man–machine interactions process.

In addition to the basic mathematical models, the advanced versions of the ISSMI and SATROS programs assume the development of a number of subsidiary

* The second version of ISSMI program will be based on the optimization mechanism.

models, which will calculate the necessary information for forecasting market demands and production growth rates, and for determining the effects of investment, technology, etc. One specific structural modeling technique is also being developed for the treatment of expert information. This technique, based on interactive computer usage, is called STRUM (structural modeling system) and allows the analysis of interconnections between objectives, problems, conflicts, functions, and actions.

There are many evaluations to be made in the process of making and implementing strategies. It is rewarding to study interdisciplinary evaluation technology as a very promising validation instrument for adapting changing objectives and means. The evaluation process should also identify prospective synergetic effects from any proposed significant restructuring of regional organization systems. An advanced evaluation technology could also be considered as an effective early warning system which would allow a better understanding of and a more constructive response to environmental changes. Strong emphasis should also be placed on the development of a situational (differential) approach methodology - in other words, taking into account specific regional organizational conditions when making strategic policy.

CASE STUDIES

In accordance with the basic logical scheme of systems analysis methodology, case studies are necessary to test hypothetical models, as well as the experimental results generated from computer calculations. Many RCEs now face the problem of urgent structural change. Some meet this challenge successfully while others fail. Analyzing the probable causes of such different outcomes therefore contributes significantly to our understanding of the nature of a sound SRCP. But, of course, the most substantial contribution may be made by comparative studies of strategic policies in the most profitable and well-managed companies, functioning in the framework of some forward-looking industries and certain RCEs. There are interesting experiences as to reasons for the diminishing of some firms' and RCEs' competitiveness in comparison with their rivals in the 1970s and 1980s (Porter, 1983; Stoneman, 1983; Vernon, 1982), such as:

- Slowness of reaction to the reduction of product and technology competitiveness because no early warning systems had been developed.
- Inflexible policy of resources redistribution.
- Incorrect use of marketing agreement mechanisms, that were often reproduced later and not changed, despite requirements for increasing competitiveness.
- Predominance of routine mechanisms for the implementation of technological innovation and the dissemination of management techniques. Many advanced technologies originally developed by RCE research centers have been widely implemented in others.
- Low rate of manufacturing plant renovation and increasing average age of key industries.
- Comparatively small size of firms and relatively insufficient scale of intra-RCE cooperation.
- Disequilibrium between economic and social development, with difficult labor problems.

Of great interest at present is the Japanese experience, which includes RCE development under the influence of technological, long-term programs, including the first results of "Technopolic" large-scale regional (urban) projects. The lessons that could be extracted for SRCP from the Japanese experience (see Printice, 1984; Lynn, 1982) include:

- Long-term strategic orientation and planning of Japanese RCEs and the activity of large companies.
- High level of competitiveness in Japan between RCEs, which leads to competitive advantages in the world arena.
- The key role of R & D strategies in RCE development, which creates the basis for uninterrupted technological substitution.
- Focusing of the economic activity at national, regional, and company levels account for opportunities of gaining competitive advantages, in particular in technologies and products (the development of automatic inspection systems, robots, computerized programming, etc.).
- Organization of essential public support for RCE activities, such as improving products at low cost and improving quality as a basis for increasing intercompany, interregional, and international competitiveness.
- Multiobjective orientation of RCE development, including interdependent finance, growth, employment (social), and other aspects.

The American strategic Policy experience also demonstrates the key role of technological innovation in RCE activity (Knop, 1974; Friedlander, 1976; Thwaites, 1978; Kelly, 1979; Evers and Wettman, 19180; Peters and Waterman, 1982; Clark, 1983). American experiences show the different roles of various regional factors in the location of plants that have different technological levels of production. For high-technology plants the main priority is labor skill, quality of life, R & D activity,. transportation availability, etc. Therefore, it is important to evaluate the regional integrated potential and compare the pros and cons for high-technology plant location. Effective experience of this is accumulated in areas where the technological driving force of regional and corporate economies has required a broad set of tools for strategic planning.

The USA experience shows the importance of strategic management, taking into account technological intensity, which characterizes different firms in the RCEs, because behavior of high-technology companies is very different that of medium- and, especially, low-technology ones. The other side of the American experience comprises evidence of different potentials of large and small companies. The presence of both requires a sectoral division of labor and contract system and these effectively, compliment each other in the framework of the RCE. The USA case studies show also the strong impact of technological developments on the moving of companies from one region to another (in the USA from north to south regions). As well as the Japanese experience, American case studies confirm the necessity to connect regional–company strategic policy analysis with international competitiveness.

An extensive experience of regional–company strategic management under a centralized planning system is accumulated in the USSR and other Eastern countries (Kochetkov, 1977, 1982; Aganbegjan, 1979; Granberg, 1981; Bandman, 1981; Kiselnikov, 1984). The Soviet experience shows that high efficiency is required to carry out regional structural changes on the basis of complex objective programs, developed by special teams. In the Soviet Union is accumulated a rich experience in the field of regional programming using special mathematical models and

software. There are two sets of models used in the preparation of regional programs. First, multilevel models allow us to determine the industrial structure of each region through a national economic approach (top-down). The other set of models was developed for territorial–production complexes with more distinctive spatial aspects. Also, a very promising set of models has been developed for the implementation phase of regional programming. This approach is described above as part of the SATROS program.

The main task of IIASA research is to generalize all these experiences so as to produce methodological approaches of widespread application and value.

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